



EAFE 2015



Salerno, Italy > April 28 - 30

Table of Contents

Words from the EAFE President	3
Letter from Director-General for Maritime Fisheries and Aquaculture, Ministry of Agriculture, Food and Forestry (Italy)	4
EAFE 25th Anniversary.....	5
General Information	6
Scientific Program	7
Organization	8
Program Overview	9
Pre-Conference EAFE2015 Seminar	10
Plenary Sessions	11
List of Sessions	12
Conference Program.....	13
Abstracts	29
List of Participants.....	85

Words from the EAFE President

Dear EAFE Conference Delegates,

I extend to you a very warm welcome to our 2015 conference, the 22nd EAFE conference, here in lovely, and hopefully sunny, Salerno. We are very grateful to our friends at NISEA and the University of Salerno for organising and hosting us this year. It is good to move our conference around Europe to help bring to mind the substantial differences that exist in the fishing and aquaculture activities of the different regions of Europe.

According to the submission of abstracts and conference registrations, we should now be at one of our most successful EAFE conferences. I am delighted with how healthy and relevant EAFE continues to be, particularly as we take this opportunity to celebrate 25 years of EAFE. Our membership numbers are high and attendance levels at recent conferences and events have indicated that people find the content and the networking opportunities to be informative and useful.

I am especially pleased to welcome and thank our key note speakers, Professor Chris Costello from University of California at Santa Barbara, Dr Audum Lem of the United Nations' FAO and Ernesto Penas of the European Commission's DG Mare. I would also like to thank to Riccardo Rigillo, General Director for Fishery for the Italian Ministry, for the endorsement of the conference.

During the last four years, as well as the conference in Edinburgh in 2013, EAFE has organised a workshop in Bilbao on the blue economy and an event providing expert presentations to members of the Peche Committee at the European Parliament who were considering reform of the EU Common Fisheries Policy and the Common Organisation of the Market.

I hope that EAFE members continue to find the association useful and relevant in keeping them up to date with research, industry issues and policy considerations facing our seafood sector throughout Europe (not only the EU!) and I trust that the sharing of knowledge, ideas and enthusiasm among our members and conference delegates will continue to inspire new and relevant research and discussions among industry groups and policy makers.

I am happy to hand on the Presidency of EAFE this year, after four years in office, in the knowledge that our association is thriving and in the belief that those who steer EAFE over the next years will ensure that the activities of our association continue to take account of the needs and interests of researchers, our industry and our policy makers throughout Europe.

With very best wishes for a successful conference,



Hazel Curtis
President of the European Association of Fisheries Economists (EAFE)

Letter from Mr Riccardo Rigillo, Director-General for Maritime Fisheries and Aquaculture, Ministry of Agriculture, Food and Forestry (Italy)

Dear EAFE Conference Delegates,

It is with great pleasure that I extend to you all a very warm welcome on behalf of the Ministry of Agriculture, Food and Forestry and say how grateful we are to EAFE for convening its XXII Conference here in Salerno.

I also express our thanks and gratitude to the University of Salerno and NISEA for hosting this Conference and for all the facilities that will undoubtedly contribute highly to the success of this Conference.

It is important to note that the agenda of the Conference covers a wide range of very interesting items relating to the management issues within the Common Fishery Policy. In particular, the socio-economic impacts of the CFP, the special session on landing obligation and the sessions on markets and marketing of fish products are topics of high interests.

Through this conference, we would like to engage with all of you in an open and constructive dialogue about the challenges in achieving the goals of the Common Fisheries Policy and the provision of an effective scientific advice that should integrate the economic and biological aspects.

The Conference is an opportunity to renew contacts and discuss problems of mutual interest with delegates from European countries and from other continents. More than 130 delegates will discuss on fisheries and aquaculture and I am sure that this debate will result in well grounded improvements of fisheries and aquaculture management.

I wish you a productive, fruitful and successful Conference and a very pleasant stay in Italy.

Mr Riccardo Rigillo,
Director-General for Maritime Fisheries and Aquaculture
Ministry of Agriculture, Food and Forestry (Italy)

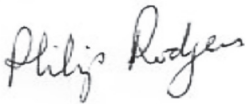
EAFE 25th Anniversary

How wonderful it is that EAFE is celebrating its first twenty-five years of existence.

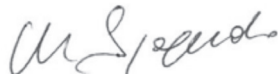
The task of sending congratulations from the original officers has fallen to Philip as the first Vice-President following the passing last year, a month short of the 25th anniversary of the Inaugural Meeting, of Jacques Weber, the founding President, whose legacy to fishery economics in Europe we represent.

When Jacques called together the Economists working in fisheries in the then 12 countries of the European Community he used the six formal institutions as his bedrock. It has struck me as I write that none of those six survives pretty much as they were. Denmark's SJFI (later FOI) and the Netherland's LEI have both been moved out of the government sector into academia. Italy's IREPA has temporarily suspended its activity and evolved into a different organisation. France's IFREMER lived for a long period under uncertainty until it was moved away from Paris and the University of Portsmouth's CEMARE closed last November. The Sea Fish Industry Authority's Fishery Economics Research Unit has been split and ultimately incorporated into the Technical Division.

In the face of this, the wider individual members have shown commendable resilience. The depth of support for EAFE suggests that Jacques' vision of a body of ready advice on fisheries, parallel to ICES and acting as an independent intermediary actively participating in the fisheries management decision making process, has only just begun to appear. We can look forward to many more 25ths.



Philip Rodgers
Past EAFE President



Massimo Spagnolo
Past EAFE President

General Information

Venue

Centro Congressi Salerno
Via Roma, 29 Salerno (Italy)

Internet connection

The internet connection during the conference will be available by connecting to the wifi of the Conference centre "CameconWiFi" by making access with your own account on Facebook, Twitter, LinkedIn, Google+. For people not provided with a social's account, a password will be delivered to participants at the check-in point.

Registration

The registration to the conference will start on Tuesday 28th at 8.15 a.m. We remind that people can finalise or complement their registration at the check-in point and that payments could be done by cash or credit card.

Social dinner

The social dinner will be held on Wednesday 29th, 8 p.m. at the "Lloyd's Baia Hotel", Via Enrico de Marinis, 2 84019 Vietri sul mare. A transfer service from the city centre to the Lloyd's Baia Hotel will be provided to conference's participants with 2 pick-up points, one outside the Grand Hotel main entrance and one at the main entrance of the Villa Comunale (see above details), around 7.30 p.m.

Guided tour

Conference participants will be given the possibility to participate to open air guided tour by walk to the historical city centre that will show the historical and touristic key points of Salerno (no fee to be paid). The tour will be available on 28th and on 30th at 6.30 p.m. (same tour), starting from the Conference venue (more details will be provided during the conference). Participants wishing to participate to the guided tours are kindly asked to think about the preferential date (28th or 30th) and communicate it at the e-mail address eafe2015@nisea.eu or at the registration, in order to allow a better arrangements of the tours.

Taxi service

The cost for a taxi from and to Napoli Capodichino are:

- Napoli Aeroporto - Salerno city centre (hotel to be reached) € 100 (+VAT 10% if invoice is needed)
- Salerno city centre - Napoli Aeroporto € 100 (+VAT 10% if invoice is needed)

For booking please write an email to v.bove@radiotaxisalerno.it or call to +39 338 77 82 352 (also sending an SMS)

During the conference period participants can also use the radiotaxi service by calling to +39 089 75 75 75 (active h24) for intra-city transfers (i.e. to reach the Conference centre or for personal need).

N.B.: in case of flight delays, hosts are kindly requested to communicate, if and as soon as possible, the timetable changes. The above price is guaranteed for a delay maximum of 30 minutes. After that, the cost will be charged of 10 € for each hour more (or fraction).

Scientific Program

Organization

- DISES - Department of Economics and Statistics - University of Salerno



UNIVERSITÀ DEGLI STUDI
DI SALERNO



- NISEA
Fisheries and Aquaculture Economic Research



with the endorsement of Ministry of Agriculture, Food and Forestry, MIPAAF

mipAAF

Ministero delle
politiche agricole
alimentari e forestali

Scientific Committee

- Gianluigi Coppola (Chair -University of Salerno, IT)
- Ikerne Del Valle (University of the Basque Country, ES)
- Bertrand Le Gallic (University of Brest, FR)
- Rasmus Nielsen (University of Copenhagen, DK)

Organizing Committee

- Loretta Malvarosa - NISEA (IT)
- Rosaria Sabatella - NISEA (IT)
- Evelina Sabatella - NISEA (IT)
- Gianluigi Coppola - University of Salerno (IT)
- Monica Gambino - NISEA (IT)
- Maria Cozzolino - NISEA (IT)
- Paolo Accadia - NISEA (IT)
- Dario Pinello - NISEA (IT)

Program Overview

	Monday 27th April	Tuesday 28th April	Wednesday 29th April	Friday 30th April		
08:15		Registration				
08:30						
08:45						
09:00						
09:15						
09:30						
09:45						
10:00						
10:15						
10:30		Pre-Conference Seminar			Plenary Session 1	Parallel Sessions 10 - 11 - 12
10:45						
11:00						
11:15	Coffee Break		Coffee Break	Coffee Break		
11:30						
11:45						
12:00						
12:15						
12:30						
12:45						
13:00						
13:15		Lunch	Lunch	Lunch		
13:30						
13:45						
14:00						
14:15						
14:30		Parallel Sessions 4 - 5 - 6	EAFE General Meeting	Parallel Sessions 18 - 19 - 20		
14:45						
15:00						
15:15						
15:30						
15:45						
16:00	Coffee Break	Special Session and Parallel Session 13	Coffee Break			
16:15						
16:30	Parallel Sessions 7 - 8 - 9	Coffee Break	Parallel Sessions 21 - 22			
16:45						
17:00						
17:15						
17:30						
17:45						
18:00						
...	18:30 Welcome Cocktail		20:00 Social Dinner			

Pre-Conference EAFE2015 Seminar

Monday, 27th April 2015, 10.30 a.m.
DISES Department of Economics and Statistics
University of Salerno

The Costs and Benefits of Property Rights in Fisheries

Christopher Costello

(Bren School, UC Santa Barbara and NBER)

Plenary Sessions

Plenary Session 1

chair **Hazel Curtis**

Incorporating Spatial Consideration in Fisheries Management and Policy

Keynote Speaker: **Christopher Costello** (Bren School, UC Santa Barbara and NBER)

Plenary Session 2

chair: **Jose Fernandez Polanco**

Status and trends of global fish trade

Keynote Speaker: **Audum Lem** (Deputy Director FIP Secretary FAO - COFI FT GLOBEFISH)

The European market observatory (EUMOFA), **Xavier Guillou** (European Commission DGMARE)

Plenary Session 3

chair **Ralf Döring**

Economic advice for the Common Fisheries Policy: catching up with biological advice

Opening Speech: **Riccardo Rigillo** (Director-General for Maritime Fisheries and Aquaculture. Ministry of Agriculture, Food and Forestry, Italy)

Keynote speaker: **Ernesto Peñas Lado** (European Commission DG-MARE Director of the Directorate A, Policy development and co-ordination)

Governance of Marine Fisheries and Biodiversity Conservation: **Serge Michel Garcia** (IUCN. CEM Fisheries Expert Group)

List of Sessions

N°	Title	Chair	Time	Room
1P	Incorporating Spatial Consideration in Fisheries Management and Policy	Hazel Curtis	Tuesday, 28 / 10 - 11 am	Gran Salone Genovesi
1Pa	Fishing Management	Miguel Peña Castellot	Tuesday, 28 / 11.30 am - 1 pm	Gran Salone Genovesi
2Pa	Best practices in aquaculture sector	Rasmus Nielsen	Tuesday, 28 / 11.30 am - 1 pm	Auditorium
3Pa	Markets and marketing of fish products	Bertrand Le Gallic	Tuesday, 28 / 11.30 am - 1 pm	Sala Gatto
4Pa	Fishing effort management	Raul Prellezo	Tuesday, 28 / 2.30 - 3.45 pm	Gran Salone Genovesi
5Pa	Impact assessment of management plans and bio-economic models	Monica Gambino	Tuesday, 28 / 2.30 - 3.45 pm	Auditorium
6Pa	Market benefits from eco-labeling/certification	Ekaterina Tribilustova	Tuesday, 28 / 2.30 - 3.45 pm	Sala Gatto
7Pa	Governance of Marine Fisheries	Hans Van Oostenbrugge	Tuesday, 28 / 4.30 - 6 pm	Gran Salone Genovesi
8Pa	Markets and marketing of fish products	Frank Asche	Tuesday, 28 / 4.30 - 6 pm	Auditorium
9Pa	Marine strategy: Economic Indicators for sustainability monitoring	Fabrizio Natale	Tuesday, 28 / 4.30 - 6 pm	Sala Gatto
10Pa	Fishery management: the bottom-up approach (the role of stakeholders)	John Tisdell	Wednesday, 29 / 9 - 11 am	Gran Salone Genovesi
11Pa	Social dimension of fishery and role of small scale fishery	Ola Flaaten	Wednesday, 29 / 9 - 11 am	Auditorium
12Pa	Economic data collection, new data needs and best practices	Sergio Destefanis	Wednesday, 29 / 9 - 11 am	Sala Gatto
2P	Status and trends of global fish trade	Jose Fernandez Polanco	Wednesday, 29 / 11.30 am - 1 pm	Gran Salone Genovesi
1S	Landing Obligation	Erik Lindebo	Wednesday, 29 / 3 - 6 pm	Gran Salone Genovesi
13Pa	Best practices in aquaculture sector	Michael W. Ebeling	Wednesday, 29 / 3 - 4.45 pm	Auditorium
14Pa	Best practices in aquaculture sector	Maria Cozzolino	Wednesday, 29 / 4.45 - 18 pm	Auditorium
15Pa	Impact assessment of management plans and bio-economic models	Ikerne Del Valle	Thursday, 30 / 9 - 11 am	Gran Salone Genovesi
16Pa	Fishermen's behaviour, economic entrepreneurship in a changing environment	Dario Pinello	Thursday, 30 / 9 - 11 am	Auditorium
17Pa	Rights-based management approaches	Birgir Runolfsson	Thursday, 30 / 9 - 11 am	Sala Gatto
3P	Economic advice for the Common Fisheries Policy: catching up with biological advice	Ralf Döring	Thursday, 30 / 11.30 am - 1.30 pm	Gran Salone Genovesi
18Pa	Impact assessment of management plans and bio-economic models	Ralf Döring	Thursday, 30 / 2.30 - 16 pm	Gran Salone Genovesi
19Pa	Community-led coastal development and the relationships between human activities and ecosystem services	Jarmo Virtanen	Thursday, 30 / 2.30 - 16 pm	Auditorium
20Pa	Markets and marketing of fish products	Jordi Guillen	Thursday, 30 / 2.30 - 16 pm	Sala Gatto
21Pa	Economic data collection, new data needs and best practices	Jörg Berkenhagen	Thursday, 30 / 16.30 - 18 pm	Gran Salone Genovesi
22Pa	Markets and marketing of fish products	Anna Motova	Thursday, 30 / 16.30 - 18 pm	Auditorium

P = Plenary Session

Pa = Parallel Session

S = Special Session

Conference Program

XXII EAFE CONFERENCE

*New management issues within the reformed Common Fishery Policy:
implementation and socio-economic impacts*

Salerno 28-30 April 2015

Monday, 27 April 6.30pm

Welcome cocktail

Tuesday, 28 April 8.15 - 9.15am

Registrations

Tuesday, 28 April 9.15-10.00am

Welcome and introduction to EAFE 2015

Aurelio Tommasetti

Rector - University of Salerno

Adalgiso Amendola

Chair - Faculty of Economics

Hazel Curtis

EAFE President

EAFE's 25th Anniversary Celebration

Philip Rodgers

EAFE Past President

Massimo Spagnolo

EAFE Past President

Tuesday, 28 April 10.00-11.00am

Plenary session 1

chair ***Hazel Curtis***

Incorporating Spatial Consideration in Fisheries Management and Policy

Keynote Speaker **Christopher Costello** (Bren School, UC Santa Barbara and NBER)

discussion

Tuesday, 28 April 11.00 - 11.30am

Coffee break

Tuesday, 28 April 11.30am - 1.00pm

(1) parallel session

Fishing management

chair **Miguel Peña Castellot**

Major reforms of the Common Fisheries Policy 2002 and 2013: impact on the economic performance of the European Union fishing fleet

Angel Calvo Santos (*Structural policy and economic analysis, EU DGMARE*)

Fleet measures in the EMFF Operational Programmes 2014-2020: a preliminary analysis

Miguel Peña Castellot (*Structural policy and economic analysis, EU DGMARE*)

Structural Changes, Policies, and Capacity in the Italian Fishing Fleet: an Analysis over the 1994-2014 Period

Fabio A. Madau (*University of Sassari, Italy*), *Roberto Furesi, Pietro Pulina*

21st-century fisheries management: RTI, a spatiotemporally explicit tariff-based approach combining multiple drivers and incentivising responsible fishing

Sarah B. M. Kraak (*Thünen-Institut für Ostseefischerei, Germany*), *David Reid, Amos Barkai, Edd Codling, Ciaran Kelly, Emer Rogan*

Bidding and performance in multiple unit combinatorial auctions for fisheries quotas: Role of information feedbacks

John Tisdell (*Tasmanian School of Business and Economics, Australia*), *Md Sayed Iftekhar*

discussion

Tuesday, 28 April 11.30am - 1.00pm

(2) parallel session

Best practices in aquaculture sector

chair **Rasmus Nielsen**

The economics of escaped farmed salmon

Frank Asche (*University of Stavanger, Norway*), *Atle Guttormsen, Kristin Roll*

Learning-by-doing or technological LEAPFROGGING: production frontiers and efficiency measurement in Norwegian production of juvenile almonids

Hilde Ness Sandvold (*University of Stavanger, Norway*), *Frank Asche, Ragnar Tveterås*

A method to benchmark farmed sea bream batches technical efficiency

Leonidas Papaharisis (*Nireus Aquaculture SA, Greece*), *Lamprakis Avdelas*

From sector specific nitrogen policies to a common individual transferable quota system - Sector and Macro-economic Implication

Lars-Bo Jacobsen (*University of Copenhagen, Denmark*), *Rasmus Nielsen Max Nielsen*

The importance of live-feed traps - farming marine fish species

Rasmus Nielsen (University of Copenhagen, Denmark), Max Nielsen, Tenaw Gedefaw Abate, Benni Winding Hansen, Per Meyer Jepsen, Josianne Spøttrup and Kurt Buchmann

discussion

Tuesday, 28 April 11.30am - 1.00pm

(3) parallel session

Markets and marketing of fish products

chair **Bertrand Le Gallic**

Product-oriented approach in marketing of fisheries and aquaculture products

Ekaterina Tribilustova (Eurofish International Organisation, Denmark)

Presentation and analysis of the recent developments of trade in tuna products: an EU perspective

Nicolas Dross (DG Trade, European Commission)

The role of fish-markets in the Icelandic value chain of cod

Ogmundur Knutsson (University of Akureyri, Iceland), Ólafur Klemensson

The German whitefish market: an application of the LA/AIDS model using retail-scanner-data

Julia Bronnmann (University of Kiel, Germany)

Can TV programs improve the competitiveness of European Seafood products? Exploratory results from the SUCCESS project

Bertrand Le Gallic (AMURE, University of Brest, France)

discussion

Tuesday, 28 April 1.00-2.30pm

Lunch

Tuesday, 28 April 2.30-3.45pm

(4) parallel session

Fishing effort management

chair **Raúl Pallezo**

Modelling the technology of commercial fishing vessels in Italy: a cost function approach

Alfonso Pellecchia (University of Salerno, Italy), Gianluigi Coppola, Monica Gambino, Evelina Sabatella

Optimizing fishing production based on fisheries instead of fleets: an application of the FISHRENT model to the Irish fishing sector

Richard Curtin (Bord Iascaigh Mhara, Ireland), Michael Keatinge, Emmet Jackson

Efficiency analyses of fisheries when stock estimates are lacking
Ola Flaaten (University of Tromsø, Norway), Nguyen Ngoc Duy

Potential ecosystem effects of the application of management targets derived from single species assessments: insights from a multispecies-multifleet model
Simone Libralato (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Italy), Francesco Colloca Serena Lopez, Cosimo Solidoro, Giandomenico Ardizzone

discussion

Tuesday, 28 April 2.30-3.45pm

(5) parallel session

Impact assessment of management plans and bio-economic models
chair *Monica Gambino*

The Eco² Model - A basic bio-economic module for the description of the dynamics of cohort biomass in response to exploitation
Eckhard Bethke (Thünen Institute of Sea Fisheries, Germany)

Bioeconomic models of grey seal predation impacts on West of Scotland demersal fisheries
Vanessa Trijoulet (University of Strathclyde, United Kingdom), Alex Dickson, Robin Cook

Competitive interactions between pulse and beam trawlers in the Southern part of the North Sea
Sys Klaas (Institute for Agricultural and Fisheries Research, Belgium), Buysse Jeroen, Polet Han, van Meensel Jef

An application of life-cycle theory to the west of Scotland cod fishery
Philip Rodgers (University of Lincoln, United Kingdom)

discussion

Tuesday, 28 April 2.30 - 3.45pm

(6) parallel session

Market benefits from eco-labeling/certification
chair *Ekaterina Tribilustova*

Organic Salmon – Considered a Fisheries or Agricultural Product among Consumers?
Isaac Ankamah Yeboah (University of Copenhagen, Denmark), Max Nielsen and Rasmus Nielsen
Seafood labelling and consumers choices
Lamprakis Avdelas (University of Portsmouth, United Kingdom), Shabbar Jaffry

Consumers' response to sustainability labelling in wildfish

Katrin Zander (Thünen Institute, Germany), Doreen Bürgelt, Inken Christoph-Schulz, Petra Salamon, Daniela Weible

Effect of eco-labeling of fishery products on economic performance of European firms

José Luis Fernández Sánchez (University of Cantabria, Spain), Ladislao Luna Sotorrio, Ignacio Llorente García

discussion

Tuesday, 28 April 3.45 - 4.30pm

Coffee break

Tuesday, 28 April 4.30 - 6.00pm

(7) parallel session

Governance of Marine Fisheries

chair **Hans Van Oostenbrugge**

The European Union's structural policy for fisheries and its evolution 2000-2013

Dominique Leveil (Structural policy and economic analysis, EU DGMARE)

Spatial Impact Analysis of Implementing an ITQ System in the Swedish Pelagic Fisheries

Anton Paulrud (Swedish Agency for Marine and Water Management, Sweden), Natacha Carvalho, Fabrizio Natale

Balanced Harvesting in Fisheries: Economic Insights and Implications

Anthony Charles (Saint Mary's University, Canada), Serge Garcia, Jake Rice

ITQs, Common Fisheries Policy Reform and Stakeholders Perceptions

Manuel Coelho (University of Lisbon, Portugal), Rui Junqueira Lopes, José Bonito, Filipe Manuel Alberto Ferreira

discussion

Tuesday, 28 April 4.30-6.00pm

(8) parallel session

Markets and marketing of fish products

chair **Frank Asche**

Fishmeal and Aquafeed: The Relationship Between Feed Component and Salmon Prices in a Maturing Aquaculture Industry

Atle Oglend (University of Stavanger, Norway), Frank Asche

Integration in Brazilian shrimps market

Ruth B M Pincinato (University of Stavanger, Norway), Frank Asche

Competition across tropical farmed fish in the EU

Jose Fernandez Polanco (*Universidad de Cantabria, Spain*), *Ignacio Llorente, Ladislao Luna*

Duration and temporary trade

Hans-Martin Straume (*Norwegian Business School, Norway*), *Frank Asche*

discussion

Tuesday, 28 April 4.30 - 6.00pm

(9) parallel session

Marine strategy: Economic Indicators for sustainability monitoring
chair **Fabrizio Natale**

Homo Economicus meets Homo Politicus: A comparison between preferences of EPA bureaucrats, recreational anglers, and the public

Håkan Eggert (*University of Gothenburg, Sweden*), *Mitesh Kataria, Elina Lampi*

Cost-effectiveness of monitoring within the MSFD: The Southern Eastern Bay of Biscay case study

Arantza Murillas-Maza (*AZTI, Spain*), *María C. Uyarra*

Testing for persistence & volatility in marine diversity indexes

Ikerne Del Valle (*University of The Basque Country, Spain*), *Kepa Astorkiza*

Measuring the Maritime Economy: Spain in the European Atlantic Arc

Javier Fernandez-Macho

discussion

Tuesday, 28 April 6.00pm

End first day

Tuesday, 28 April 6.30pm

Guided tour

Wednesday, 29 April 9.00 - 11.00am

(10) parallel session

Fishery management: the bottom-up approach (the role of stakeholders)

chair **John Tisdell**

Providing incentives for fishermen through rights-based co-management systems: the Basque case

Arantza Murillas Maza (*AZTI, Spain*), *Martin Aranda, Margarita Andrés*

The EcoFishMan project on the Ecosystem-based Responsive Fisheries Management in Europe

Anna Kristín Danielsdóttir (*Matis Ltd., Iceland*), *Sveinn Margeirsson, Karim Erzini, Fátima Cardador, Petter Olsen, Michaela Aschan, Jónas R. Viðarsson, Paul G. Fernandes, Cristina Silva, Antonello Sala, Ólavur Gregersen, Rosa Chapela Pérez, Marta Ballesteros, Marco Thorup Frederiksen, Oddur Már Gunnarsson*

Responsive fisheries management system in practice: The Icelandic small boat mixed demersal fishery
Olavur Gregersen (*Syntesa Partners & Associates, Faroe islands*), *Svein Agnarsson, Rosa Chapela Pérez, Marta Ballesteros, Jose Luis Santiago-Ria*

An Integrated Methodological Framework for the Definition of Local Development Strategies for Fisheries Local Action Groups: an application to the Stretto Coast FLAG in South Italy
Claudio Marcianò (*University of Reggio Calabria, Italy*), *Romeo Giuseppa, Fortunato Cozzupoli*

Tenure & fishing rights - Meeting the challenges ahead, bottom up
Anika Seggel (*Fisheries and Aquaculture FAO, Italy*) *Rebecca Metzner*

discussion

Wednesday, 29 April 9.00-11.00am

(11) parallel session

Social dimension of fishery and role of small scale fishery

chair **Ola Flaaten**

Is professional fishing an asset for recreational demand on the coastline?
Carole Rogars-Collet (*AGROCAMPUS OUEST, France*), *Mélody Leplat Philippe, Le Goffe Marie Lesueur*

Employment and income in Swedish coastal fisheries
Staffan Waldo (*AgriFood, Swedish University of Agricultural Sciences, Sweden*), *Johan Blomquist*

Are the social characteristics of the skipper affecting the efficiency of the Egyptian fisheries?
Dario Pinello (*NISEA, Nisea Fishery and Aquaculture Research Organisation, Italy*), *Anghelos Liontakis, Alaa El Haweet, Mark Dimech, Atif Salah*

Remuneration systems used in fisheries and their effects on fisheries management and rent distribution
Jordi Guillen Garcia, *Jean Boncoeur, Katia Frangoudes, Olivier Guyader, Claire Macher, Francesc Maynou, and Mathieu Merzéréaud*

The Irish Coastal and Inshore Fleet: A Socio-Economic Appraisal
Richard Curtin (*Bord Iascaigh Mhara, Ireland*), *Brian Burke, Richard Curtin, Emmet Jackson, Michael Keatinge*

discussion

Wednesday, 29 April 9.00-11.00am

(12) parallel session

Economic data collection, new data needs and best practices

chair **Sergio De Stefanis**

EU fishing coastal communities, fishing grounds and markets. Spatial relations and dependencies emerging from the analysis of high resolution fishing activity data from the AIS system
Fabrizio Natale (*European Commission Joint Research Centre*), *Maurizio Gibin, Alfredo Alessandrini, Michele Vespe*

Public aid and the EU fish processing industry: an economic analysis of drivers and trends in performance
Alessandra Borrello (European Commission: DGMARE/JRC), *Simkje Kruidierink*

New data needs and best practices in data collection systems
Ekaterina Tribilustova (Eurofish International Organisation, Denmark)

Application of the PIM method for the valuation of the capital value of the Finnish fllet: economic and policy implications
Heidi Pokki (Natural Resources Institute Finland, Finland), Jarno Virtanen and Simo Karvinen

Application of Perpetual Inventory Method for the valuation of the capital value of the Finnish fleet: Comparison between microeconomic and macroeconomic approaches
Jarno Virtanen (Natural Resources Institute, Finland), *Heidi Pokki and Simo Karvinen*

discussion

Wednesday, 29 April 11.00 - 11.30am
Coffee break

Wednesday, 29 April 11.30am-1.00pm
Plenary session 2
chair: **Jose Fernandez Polanco**

Status and trends of global fish trade
Keynote Speaker: **Audum Lem** (Deputy Director FIP Secretary FAO - COFI FT GLOBEFISH)
The European market observatory (EUMOFA), Xavier Guillou (European Commission DGMARE)

discussion

Wednesday, 29 April 1.00 - 2.00pm
Lunch

Wednesday, 29 April 2.00 - 3.00pm
EAFE General Meeting

Wednesday, 29 April 3.00 - 4.15pm
Special session
Landing Obligation
chair **Erik Lindebo**

Introduction: the CFP and Landing Obligation, **Erik lindebo**
Socio-economic impact of landing obligation for the Dutch demersal fisheries

Mike Turenhout (LEI Wageningen UR, The Netherlands), Batsleer Jurgen
Successful Implementation of the Landing Obligation in Swedish Fisheries
Andrea Giesecke (Environmental Defense Fund, United Kingdom)

MEDAC contribution in the draft of the management plan on landing obligation for small pelagic
Rosa Caggiano (MEDAC- Mediterranean Advisory Council, Italy)

Empowering fishermen towards the landing obligations, with their own technical solutions
Lars O. Mortensen (Technical University of Denmark, Denmark), Hans Jakob Olesen, Josefine Egekvist,
Anna Rindorf, Clara Ulrich

Reducing Discards in EU fisheries: introducing our toolkit
Erik Lindebo (Environmental Defense Fund, Belgium)

discussion

Wednesday, 29 April 3.00 - 4.15pm

(13) parallel session

Best practices in aquaculture sector

chair **Michael Ebelling**

Effects of Economical Production Factors on the Shrimp Culture in Southern Region, Islamic Republic of Iran
Reza Faizbakhsh (Tehran, Iran), Che Roos Saad, Mad Nasir Shamsudin, Saeed Yazdani, Elham Maghsoudloo

Production Risk and Technical Efficiency in Aquaculture: A Study of Tilapia Farming in Bangladesh
Md Akhtarul Alam (Norwegian University of Life Sciences, Norway)

The Impact of Community-Based Aquaculture on Poverty and Inequality: Evidence from Seasonal Floodplain Areas of Bangladesh

Atle Guttormsen (Norwegian University of Life Sciences, Norway), Md. Akhtaruzzaman Khan, A.B.M. Mahfuzul Haque, M.M. Dey

Conversion from Rice to Fish Farm in Bangladesh: Efficiency and Productivity Perspectives

Atle Guttormsen (Norwegian University of Life Sciences, Norway) co-author: Md. Akhtaruzzaman Khan

Economics of Trout Grow-out Systems - A qualitative Benchmarking of Typical Farms in Germany, Denmark and Turkey

Tobias Lasner (Germany co-author: Nielsen Rasmus)

discussion

Wednesday, 29 April 4.15 - 4.45pm

Coffee break

Wednesday, 29 April 4.45 - 6.00pm

Special session (cont.)

Landing Obligation

chair *Erik Lindebo*

Modelling fishers' response to discard prevention strategies: the case of the North Sea saithe fishery

Sarah Simons (Thünen-Institute of Sea Fisheries, Germany), Ralf Döring, Axel Temming

BioEconomic Impact of Landing Obligation Policy in Spanish fleets Operating in Iberian Waters under a MSY long term management framework

Raúl Prellezo (AZTI, Spain), Jose Castro, Santiago Cerviño Jose Maria DaRocha, Dorleta Garcia, Paz Sampietro

Costing the implementation of the Landing Obligation in Irish demersal fisheries: preliminary results from gear trial trip level economic surveys and bioeconomic modelling

Richard Curtin (Bord Iascaigh Mhara, Ireland), Ronan Cosgrove and Emmet Jackson and Michael Keatinge, Norman Graham

Effects of the EU CFP discard landing obligation analyzed with an ecosystem model for the Gulf of Trieste

Igor Celić (Università degli Studi di Trieste, Italy), Simone Libralato, Cosimo Solidoro

Mixed fisheries management: Can a ban on discarding promote more selective and fuel efficient fishing?

Jurgen Batsleer (Wageningen University/VisNed, The Netherlands), Adriaan Rijnsdorp, Katell Hamon, Harriet van Overzee, Jan Jaap Poos

Choked by the implementation

Raúl Prellezo (AZTI, Spain), Jon Ruiz, Luis Arregi, Xabier Aboitiz

discussion

Wednesday, 29 April 4.45 - 6.00pm

(14) parallel session

Best practices in aquaculture sector

chair *Maria Cozzolino*

Impact of a biomitigating aquaculture technology on production and environment: the case of integrated multi-trophic aquaculture (IMTA)

Duncan Knowler (University of the Basque Country, Spain), Gregor Reid, Hossein Ayouqi

Cost structure and profitability of mussel aquaculture in Greece

Lamprakis Avdelas (University of Portsmouth, United Kingdom), Leonidas Papaharisis, Sofia Galinou-Mitsoudi

How to cope with mass mortality of bivalves? A few lessons drawn from several case studies around the world

Sophie Pardo (University of Nantes, France), Guillotreau Patrice, Bundy Alida, Cooley Sarah, Defeo Omar, Le Bihan Véronique

Economic Optimization of Species Composition for Emission Neutral Offshore Aquaculture Production
Michael W. Ebeling (University of Applied Sciences , Germany)

discussion

Wednesday, 29 April 6.00pm
End second day

Wednesday, 29 April 8.00pm
Social Dinner

Thursday , 30 April 9.00 - 11.00am
(15) parallel session
Impact assessment of management plans and bio-economic models
chair **Ikerne Del Valle**

Mixed-fisheries management plans in the frame of the new CFP: challenges in addressing more numerous and less well-defined policy objectives in a regional ecosystem-based approach. Experiences from the North Sea.

Lars Olof Mortensen (Technical University of Denmark), **Ernesto Jardim**, **Clara Ulrich** , **Steven Holmes**, **Alexander Kempf**, **Arina Motova**, **Anna Rindorf**, **Sarah Simons**, **Youen Vermard**

A Bio-Economic Model of European Fisheries (BEMEF)

Griffin Carpenter (New Economics Foundation, United Kingdom), **Aniol Esteban**

Single species vs multispecies management when economic objectives are in place and transitional period considered. Case study of Iberian waters

Raúl Pallezo (AZTI, Spain), **Dorleta Garcia**, **Jose Maria DaRocha**, **María Jose Gutierrez**, **Jose Castro**, **Santiago Cerviño** and **Paz Sampedro**

The role of economics in the EU advisory process

Ralf Döring (Thünen-Institute of Sea Fisheries, Germany)

discussion

Thursday , 30 April 9.00 - 11.00am
(16) parallel session
Fishermen's behaviour, economic entrepreneurship in a changing environment
chair **Dario Pinello**

A Trip to Reach the Target? - The Labor Supply of Swedish Baltic Cod Fishermen

Cecilia Hammarlund (Lund University, Sweden)

Modelling Fisher Choice and Métier Dynamics: A novel application of Markov transitions

Sarah Davie (Marine Institute, Ireland), **Cóilín Minto**, **Rick Officer**, **Colm Lordan**

Estimating to return to farming and fishing using a sibling approach

Johan Blomquist (*Swedish University of Agricultural Sciences, Sweden*), *Martin Nordin and Staffan Waldo*

Does profit maximisation drive the choice of fishing métier in Welsh fisheries?

Giulia Cambiè (*Bangor University, United Kingdom*), *Julia Pantin, Harriet Salomonsen, Michel J. Kaiser*

The Pulse Beam Trawl for brown shrimp fishery in the North Sea

Jörg Berkenhagen (*Thünen-Institut, Germany*), *Daniel Stepputtis, Petr Zajicek*

discussion

Thursday , 30 April 9.00 - 11.00am

(17) parallel session

Rights-based management approaches

chair **Birgir Runolfsson**

Hand in hand: Using discretionary policies to mitigate some of the perceived negative effects of the Icelandic ITQ system

Sveinn Agnarsson (*University of Iceland, Iceland*), *Vifill Karlsson*

Structure and main characteristics of the Icelandic Fishing Industry

Olafur Klemensson (*Central Bank of Iceland, Iceland*), *Ogmundur Knutsson*

The Icelandic lumpsucker fishery as a Responsive Fisheries Management System

Sveinn Agnarsson (*University of Iceland, Iceland*), *Jonas R. Vidarsson and Sigidur Sigurdardottir*

ITQ Ownership in the Netherlands, developments during two decades

Hans van Oostenbrugge (*LEI, The Netherlands*), *Katell Hamon, Mike Turenhout*

The fishery management: bottom-up approach (the role of stakeholders)

Alagie Sillah (*Department of Fisheries, Gambia*)

discussion

Thursday , 30 April 11.00 - 11.30am

Coffee break

Thursday , 30 April 11.30 - 1.30pm

Plenary session 3

chair **Ralf Döring**

Economic advice for the Common Fisheries Policy: catching up with biological advice

Opening Speech: **Riccardo Rigillo** (*Director-General for Maritime Fisheries and Aquaculture. Ministry of Agriculture and Forestry, Italy*)

Keynote speaker: **Ernesto Penas Lado** (*European Commission DG-MARE Director of the Directorate A, Policy development and co-ordination*)

Governance of Marine Fisheries and Biodiversity Conservation: **Serge Michel Garcia** (IUCN. CEM Fisheries Expert Group)

discussion

Thursday , 30 April 1.30 - 2.30pm

Lunch

Thursday , 30 April 2.30-4.00pm

(18) parallel session

Impact assessment of management plans and bio-economic models

chair **Ralf Döring**

Assessing the socio – economic effects of the individual fishing rights managed in a common pool: the case of Bluefin tuna

Margarita Andrés (*AZTI, Spain*), *Arantza Murillas*

Differences between impact assessment methodology for data rich and data poor fisheries. Suggestions for improvement

Leyre Goti (*Thünen-Institute of Sea Fisheries, Germany*)

Improvements in Impact Assessment for fisheries management

Loretta Malvarosa (*Nisea Fishery and Aquaculture Research Organisation, Italy*), *Ralf Döring, Arina Motova*

Panel discussion on Impact Assessment

Thursday , 30 April 2.30 - 4.00pm

(19) parallel session

Community-led coastal development and the relationships between human activities and ecosystem services

chair **Jarno Virtanen**

Community-led coastal development and the relationships between human activities and ecosystem services

Luca Mulazzani (*University of Bologna, Italy*), *Roberta Trevisi, Rosa Manrique and Giulio Malorgio*

Local fishing communities and nature based tourism

Alberto Ansuategi (*UPV/EHU, Spain*), *Duncan Knowler, Tobias Schwoerer, Salvador Garcia-Martinez*

Economics of German Inland Fisheries

Michael W. Ebeling (*University of Applied Sciences , Germany*)

A New Approach in Shark Fisheries Concertation: Experimental Field Study in Colombian Eastern Tropical Pacific Ocean (ETP)

Cecile Brigaudeau (*University des Requins et des Hommes, France*), *Juan Camilo Cardenas, Cesar Mantillo Ribero*

discussion

Thursday, 30 April 2.30 - 4.00pm

(20) parallel session

Markets and marketing of fish products

chair **Jordi Guillen**

Seaweed consumption in France: which market tools for which consumer?

Sterenn Lucas (*Agrocampus-Ouest, France*), *Stéphane Gouin, Marie Lesueur, Quentin Lebras*

How to reconceptualized efficiency the marketing of seafood products?

Stephane Gouin (*AGROCAMPUS OUEST, France*), *Sterenn Lucas, Carole Ropars, Marie Lesueur, Dimitry Fasquel*

The sustainability of the Sicilian seafood chain: Innovation, organizational models and value chain

Giocchino Fazio (*Università degli studi di Palermo, Italy*), *Stefano Fricano*

Demand for Animal Protein in Norway

Pei Chun Liu (*University of Stavanger, Norway*), *Ragnar Tveterås and Kristin Lien*

discussion

Thursday, 30 April 4.00 - 4.30pm

Coffee break

Thursday, 30 April 4.30 - 6.00pm

(21) parallel session

Economic data collection, new data needs and best practices

chair **Jörg Berkenhagen**

Profit and invisible resource rent in fisheries - revisited

Knut Heen (*University of Tromsø, Norway*), *Ola Flaaten, Þórólfur Matthíasson*

Overcoming the challenges of gathering, managing and improving the quality of seafood processing industry data over time

Tsvetina Yordanova (*Seafish, United Kingdom*)

A bio-economic data analysis on the state of resources and the economic performance of Italian fishing fleet

Rosaria F. Sabatella (*Nisea Fishery and Aquaculture Research Organisation, Italy*), *Alessandro Mannini*

Fisheries economic and fisheries effort analyses: the need for a 'one stop shop' for data definitions, coding and regulatory requirements

Jörg Berkenhagen (Thünen-Institut, Germany), S. Holmes, C. Ribeiro, F. Scott, M. Elliott, K. Verlé, I. Vukov, J. Dalskov, J. Egekvist, A. Baikov, A. Ahvonen, P. Korhonen, S. Leonardi, S. Demanèche, I. Tzouramani, A. Papoutsis, L. Labanchi, I. Davidjuka, O. Ozernaja, I. Jakovleva, A. Balnis, M. Aquilina, E. Muscat, K. Hamon, E. Avdić, A. Paulrud, K. Ringdahl, T. Reilly, A. A. Calvo Santos

discussion

Thursday, 30 April 4.30 - 6.00pm
(22) parallel session
Markets and marketing of fish products
chair Arina Motova

An analysis of a mega fish-box scheme in France

Laurent Le Grel (FISH-PASS, France), Ivan Dufeu, Ronan Le Velly, Julien Noël

A brief comparison of the supply chain for chicken and Atlantic salmon

Andreea-Laura Cojocaru (University of Stavanger, Norway)

Testing for market integration between ex-vessel markets for cod in Norway

Ingrid Kristine Pettersen (Capia AS, Norway), Frank Asche

Resilience of the international seafood market to trade restrictions. Evidence from the Russian ban in 2014

Arina Motova (JRC Institute for the Protection and Security of the Citizen, Italy), Fabrizio Natale

discussion

Thursday , 30 April 6.00pm
Closure of the Conference - EAFE

Thursday , 30 April 6.30pm
Guided Tour

Abstracts *

* The first author is the presenter

(1) parallel session - Fishing management

chair **Miguel Peña Castellot**

Major reforms of the Common Fisheries Policy 2002 and 2013: impact on the economic performance of the European Union fishing fleet

Angel Calvo Santos

Abstract: This paper provides an overview of the main economic trends of the European Union fishing fleet in the period between the two major reforms of the Common Fisheries Policy in 2002 and 2013. Analysis of the available time series shows that the general economic performance of many national fleets has improved gradually over this period. The paper also examines the differences between performance across a number of different fleet segments and the extent to which the sector is adapting to global challenges, e.g. rising fuel prices, labour costs, global competition, etc. The paper concludes with an overview of the major challenges ahead in economic terms for the EU fishing fleet, in particular as a result of the 2013 reform.

Keywords: Common Fisheries Policy, Economic Performance, EU Fishing Fleet

Fleet measures in the EMFF Operational Programmes 2014-2020: a preliminary analysis.

Miguel Peña Castellot

Abstract: By Spring 2015, most EMFF Operational Programmes for the 2014-2020 programming period will have been submitted if not adopted. This paper examines the ways MS are intended to implement fleet measures in their programmes with a particular focus on permanent cessation (including an analysis of action plans for unbalanced fleet segments), temporary cessation and engine replacement.

Keywords: EMFF, Fleet Measures, Permanent/Temp Cessation

Structural Changes, Policies, and Capacity in the Italian Fishing Fleet: an Analysis over the 1994-2014 Period

Fabio A. Madau, Roberto Furesi, Pietro Pulina

Abstract: Since the first Common Fisheries Policy (CFP) Reform, management of fishing capacity and fishing effort have become among the European Union (EU) priorities in terms of fisheries. Specifically, CFP serves the aim of a stable and enduring balance between the fishing capacity of the fleets and the fishing opportunities over time. New fishing vessels may enter the fleet only after the same fleet capacity (in kW and gt) is removed from the fleet. However this 'entry-exit' system has strongly affected dimension and structural characteristics of the fishing fleet throughout the EU. Concerning the Italian fleet, in the last decades dimension is dramatically decreased even if not homogeneously in each fleet segment. This study aims to analyze what sort of changes have characterized the Italian fishing fleet in the last twenty years and to estimate productivity (capacity, efficiency) measures of the fleet. Information were collected from the Italian section of the Fleet Register and were related to socio-economic and production data arisen from other statistical database (e.g., ISTAT, IREPA). Specific attention is put on the role of policies - at communitarian, national, and regional levels - in forcing these changes. This study also allows us to estimate changes in potential and real capacity (and efficiency) occurred in the fleet, using the Data Envelopment Analysis (DEA) method on aggregated data on different segments of the fleet over the observed period. Some policies implications derive from this analysis for better understanding possible scenarios in the Italian sector and for better addressing policies in order to combine the finalities of fleet reduction and profitability.

Keywords: Structural Changes, Common Fisheries Policy, Fishing Capacity

21st-century fisheries management: RTI, a spatiotemporally explicit tariff-based approach combining multiple drivers and incentivising responsible fishing

Sarah B. M. Kraak, David Reid, Amos Barkai, Edd Codling, Ciaran Kelly, Emer Rogan

Abstract: We developed a blueprint of RTI (Real-Time Incentives), a simple system for fisheries management. It replaces single-species catch/landings quotas and days-at-sea limitations. Instead, fishing mortality rates of multiple species and impacts on the ecosystem are regulated through a single 'currency'. Under RTI, fishermen would no longer have to comply with a myriad of regulations that prescribe and prohibit. Instead, they have one account of fishing-impact credits of which the spending rate is determined by the time they spend in different "spending-rate areas". In some areas (ecologically or biologically sensitive areas) they may pay 2 to 5 credits (RTI units) a day, and in other, less sensitive, areas they may pay 1, 0.5 or even 0.1 RTI units a day. Managers set the tariffs based on agreed target mortality rates of multiple species, using knowledge of the spatiotemporally varying catchabilities of the species caught/impacted in a mixed fishery. The RTI tariffs, shown on a tariff map, can be updated within-year, at any chosen time scale, e.g. weekly ('real-time') based on data. Users of different fishing gear get allocated different tariff maps, reflecting the differences in impact of the gears on the commercial resources and the ecosystem. Fishermen are relatively free to run their business based on their own preferences and at the same time automatically avoid too high impact on the commercial fish resources or the ecosystem. We present: (i) The development of integrated on-board and on-shore software accommodating the entire system. (ii) The process of establishing the case-specific details of the system in consultation with the fishing industry, maximising their buy-in and willingness to comply. (iii) Simulation results showing that RTI can, to a large extent, overcome the classical mixed-fisheries problem: the fishing mortality of a "choke" species can be controlled while simultaneously allowing fishing opportunity for other species. In this regard RTI may perform better than traditional management systems, such as effort restriction, TAC or TAL. In the light of the Ecosystem Based Approach to Fisheries Management and in particular in the context of the EU landings obligation, this integrated fisheries management approach looks promising to develop further.

Keywords: Real-Time Incentives, Mixed Fisheries, Spatiotemporal Management

Bidding and performance in multiple unit combinatorial auctions for fisheries quotas: Role of information feedbacks

John Tisdell, Md Sayed Iftekhar

Abstract: Combinatorial auctions allow trading of different types of quotas (for example for different regions, industry or species) in the same auction market. Bidders can submit bids on combination of individual quotas which would allow them enjoy synergy benefits. This article investigates the impact of varying levels of information feedback on performance in a multiple unit forward combinatorial auction using laboratory experiments. We questioned whether (a) providing additional information and (b) learning through time helps in more efficient bidding. We designed and tested three information treatments. Under the basic information treatment bidders were provided with market prices and own-bid status information. The second treatment involved providing additional information on winning bids. The final treatment provided information on all bids and their respective status. The results of human bidders were compared with robot bidders with a fixed learning strategy. We observed that much of the benefits of information are derived from structural effects, like repeated rounds and package valuations. Providing additional market information did not improve auction performances. Robots with synergistic valuations earned similar profits as humans. In contrast, allowing traders to revise their offers improved auction performances. These results will be useful in designing fisheries quota markets.

Keywords: Multispecies Quota Market, Combinatorial Markets, Economic Experiments

(2) parallel session - Best practices in aquaculture sector

chair **Rasmus Nielsen**

The economics of escaped farmed salmon

Frank Asche, Atle Guttormsen, Kristin Roll

Abstract: Escaped salmon is a "bad output" which is produced concurrent with the good output, i.e. farmed salmon. The bad output is undesirable, both from the farmers' and the environment's point of view, as there are private and social costs related to it. Private costs stem from loss of production or insurance costs. Social costs are related to the farmers' use of the environment as a free resource. Escapes of farmed salmon, along with high levels of sea lice are considered as the industry's main environmental challenge. This study examines the interaction between the production of farmed salmon and the occurrences of escapes recognizing that the salmon industry is consisting of multioutput firms which are producing both a good and a bad output concurrently. We estimate a translog cost function. The effects of the bad output are investigated using measures of shadow values as well as test of jointness and separability, allowing us to quantify overall costs linked to efforts aimed at reducing the escapes.

Keywords: Salmon, Escapes

Learning-by-doing or technological leapfrogging: production frontiers and efficiency measurement in norwegian production of juvenile salmonids

Hilde Ness Sandvold, Frank Asche, Ragnar Tveterås

Abstract: The Norwegian salmon industry has been a great success in terms of production growth. Production has increased significantly the last decades, and the production costs have been reduced at the same. Earlier research shows that almost two thirds of the reduction in production costs can be attributed to better and cheaper inputs. The input factor that has the greatest cost-related impact on the salmon production after feed is smolt. The supply of fry and smolt is therefore a critical element for further growth in Norwegian salmon farming. Sandvold and Tveterås (2014) show that a substantial technological progress has taken place in juvenile production during the period 1988-2010. This progress has to a large extent followed the development of the costs. However, firms adopt technologies at different times. Two hypothesis that explains productivity growth and technology adoption is technological leapfrogging and learning-by-doing. The first one implies that firms entering innovative industries may be able to leapfrog incumbent firms by bypassing heavy investments in older technologies, and taking advantage of best-practice technology that was previously unavailable. The latter one explains different productivity level by the learning-by-doing theory, where incumbent firms benefit from more experience. In this paper, we investigate the productivity growth in Norwegian hatcheries, with a particular focus of the age of the firm. We analyse the existence of learning-by-doing and technological leapfrogging effects in the production of juvenile salmonids at the firm level using an econometric productivity analysis. We estimate a stochastic cost frontier model on panel data from 1988-2012 collected by the Norwegian Directorate of Fisheries. Preliminary results indicate that that technological leapfrogging is present in the smolt production. This is important as it indicates that new technology is more important than experience and location choice. It also illustrates the importance of new technologies, and particular recirculation systems, which is the most important new technology.

Keywords: Aquaculture, Salmon, Efficiency Measurement

A method to benchmark farmed sea bream batches technical efficiency

Leonidas Papaharisis, Lamprakis Avdelas

Abstract: Sea bream fish farming is a well-established industry in Mediterranean basin with Greece, Turkey and Spain being the main production countries. The competition between producers has increased through the years and the vast majority of production firms compete in the same market with unbranded commodity products. The main competitive advantage of the producers acting in the market remains the price and as such the efficient production seems to be the ultimate goal in order to survive under hard price competition. In order to achieve the highest economic performance, high technical efficiency of batches of fish stocked every single year needs to be achieved. To date, a number of traditional biological indicators such as feed conversion ratio (FCR), specific growth rate (SGR), and survival are used to compare various batches. A method of benchmarking batch efficiency is proposed. Data Envelopment Analysis employed to estimate Technical Efficiency using several batches of Gilthead sea bream (*Sparus auratus*) stocked during 2011 in representative production areas of Greece and in farms operating under the same overall management. DEA efficiency scores and ranking using traditional indicators is presented. The findings provide support to production managers in focusing on improvement of specific factors of interest for batch efficiency and to evaluate their decisions, such as month of stocking, harvesting size and harvesting duration. Furthermore, findings may assist administrators in providing best practice guidelines for Mediterranean fish farming operations.

Keywords: Technical Efficiency, Sea Bream Batches, Benchmarking

From sector specific nitrogen policies to a common individual transferable quota system - Sector and Macroeconomic Implication

Lars-Bo Jacobsen, Rasmus Nielsen, Max Nielsen

Abstract: In 2003, the Water Framework Directive (WFD) was implemented into legislation in all EU countries. The aim of the WFD is to achieve "good ecological status" for all water bodies by 2015 and no later than 2027. Measures differ among Member States (MS), but common to most MS are that individual sectors are governed by individual policies, not taking into accounts that the marginal abatement cost between producers in all sectors governed by these individual policies should in principle be equal to reach an economically optimal regulation practice. In this paper, we will analyze the policy targeting nitrogen leaching from agriculture and aquaculture and the overall as well as sector specific economic consequences of introducing an individual transferable nitrogen leaching quota system (ITQs) covering both sectors. The empirical analysis is carried out with Denmark as a case. In Denmark, the first policy measures targeting leaching of nitrogen was introduced in 1985 subsequently followed by numerous policy initiatives, The main focus has naturally been on agriculture as the sectors contributing the major part of total leaching (currently 70%), point sources contributes 12 percent, among these are aquaculture with a contribution of 1.8 per cent of the total leaching. The remaining 18 percent is contributed from nature (non man-made contribution). In agriculture nitrogen leaching is caused by usage of manure and fertilizer whereas aquaculture contribution origins from the use of feed through discharges directly in water bodies. For agriculture, a broad range of policy measures has been implemented in the period since 1985, some targeting higher utilization of manure and fertilizer, buffer zones along inland water courses etc. A nitrogen-norm system has also been introduced effectively limiting the amount of nitrogen farmers can supply to the field. On average, the farmers are currently using manure and fertilizer at a level 15 per cent below their economic optimum. In the same period policy measures targeting aquaculture was also implemented by introducing individual feed quotas, thus limiting the possible output of excessive nutrients and production. Based on account statistics for agriculture and aquaculture the shadow price are calculated for agriculture and aquaculture of leaching one extra kg. nitrogen actually reaching the waterbodies. The shadow price is calculates as turnover minus marginal costs of polluting one

extra kg. of nitrogen leaching, given the current production capacity and regulation. Operating costs and costs of purchase of extra fertilizer/feed quota is included. The result of this calculation yields €5 and €16.5 per kg. nitrogen leached for agriculture and aquaculture, respectively. This difference suggests that there is room for welfare improvement, implementing a policy that would ensure reallocated nitrogen leaching, equalizing the shadow prices between the two sectors. We use these shadow prices to capture the present policy situation by introducing individual quotas on nitrogen leaching yielding rents equal to the shadow prices. We analyze the impact of a common quota system using a general equilibrium model of the Danish economy developed from the Australian ORANI model. The model is extended with a nitrogen module which ensures that we can incorporate the present analysis. First the model needs to be calibrated to the initial situation of individual quotas in agriculture and aquaculture and secondly we need instruments to remove the initial quotas and implement a common quota. Therefore the model is further developed with leaching functions linking agriculture's input of fertilizer to leaching into waterbodies and for aquaculture we add an equation that links input of feed to the leaching. We use the calculated shadow prices as quota rent per kg. leached allowing us to measure the initial total quota rent based on the quantity leached from each of the sectors, respectively. To allow for the present policy and also a common ITQ system we introduce equations that determine the actual quota rent per kg. leached as the sum of the individual quota rent and a common quota rent. With the present policy the individual quota rents are determined endogenously, while we fix the common rent at zero and fix the leaching from agriculture and aquaculture at present levels. For any shock to the model, the solution will yield different solutions to the quota rent in each sector, and also allows shocks to the individual quotas. To implement a common quota system, we will change the closure such that the individual leaching is free to adjust, and instead we fix the total leaching and at the same time fix the individual quota rents and let the common quota rent adjust. The common ITQ system is then simulated by shocking the individual quota rents to zero and let the model find a solution to the common quota rent for the same aggregate nitrogen leaching. Finally we need to impute the quota rent into the core model meaning that changes in the quota rent should affect the purchaser's prices of the input causing the leaching. We do this by introducing equations that transform the total quota rent in each sector into an ad valorem equivalent tax on input and add this to the existing taxes that might be present. One of the reasons for modelling the policy in this way is that we cannot use the tax instrument and data in the core model since inputs causing the nitrogen leaching are not the same in the two sectors. The inputs do not have a common price and leaching per quantity of input is different, meaning that we cannot use a simple ad valorem tax on input in the core model and forces these to be equal. Simulating a common ITQ system, nitrogen leaching is reallocated from agriculture to aquaculture, which results in an increase in production of 55 percent in the aquaculture sector. The effect on the production in the agricultural sectors varies between -1.8 and -0.2 percent. The common quota price is calculated to €2 very close to the initial calculated shadow price in agriculture, reflecting that agriculture is the predominant polluter of nitrogen. At the macro level there are small positive effects on GDP and gross national expenditures (0.005 and 0.003 percent). Current policy analysis suggests that Denmark still needs to reduce the total nitrogen leaching by 17.6 percent to reach the aim of the WFD. The above results suggest that a common quota system could be used as an instrument for the required future reduction in the Danish nitrogen leaching, since this reduction can be achieved with less welfare losses, due to the dynamic effects of reallocation of nitrogen between sectors.

Keywords: Aquacultures, Nitrogen Leaching, ITQ

The importance of live-feed traps - farming marine fish species

Rasmus Nielsen, Max Nielsen, Tenaw Gedefaw Abate, Benni Winding Hansen, Per Meyer Jepsen, Jossianne Spøttrup, Kurt Buchmann

Abstract: This study investigates the challenges of different live-feed regimes and discusses alternative live

feed items for substitution, which can prevent a future live-feed trap (equivalent to the fishmeal trap) for the benefit of the aquaculture sector in terms of species diversification, reduced risk through lower price volatility, and increased production through increased productivity. For some marine species, such as, turbot, grouper, flounder, halibut and tuna live-feed are vital for their survival in the first stages of their life cycle. At the moment, the most commonly used live-feed items in commercial fish farming are Rotifers and Artemia. However, the harvesting of Artemia cysts is heavily dependent on a single natural source, the Great Salt lakes in the US, where 90% of the Artemia cysts are harvested. The high dependency on one natural source is risky, as the Artemia crises in the mid 1970's showed, where prices were sky-rocketing. Harvesting of unsustainable quantities or environmental changes can affect the production and thus result in high price volatility, which can affect the aquaculture industry negatively. Another problem concerning Rotifers and Artemia are that they do not have the optimal biochemical composition of nutrients that the fish larvae need to survive and develop into a healthy fish fry. To overcome part of the nutrient problem both Rotiferes and Artemia need enrichment with fish oil, and as such, they become more exposed to price volatility being depended on fish oil which is a scarce resource. Copepods are an alternative to the above mentioned live-feed regime. They do not need enrichment before use, and is as such not a part of the fish oil trap, because of their superior biochemical composition of nutrients. Furthermore, studies on the use of Copepods as live-feed have shown a significant increase in survival and growth rates compared to Rotiferes and Artemia. Furthermore, it has been shown that production of Copepods for the aquaculture industry is economically feasible in a semi-intensive production system.

Keywords: Life Feed, Marine Aquaculture

11.30 am - 1.00 pm

Room: Sala Gatto

(3) parallel session - Markets and marketing of fish products

chair **Bertrand Le Gallic**

Product-oriented approach in marketing of fisheries and aquaculture products

Ekaterina Tribilustova

Abstract: At present, European market for fisheries and aquaculture products is significantly impacted by global demand as well as by consumers at the local level. An analysis of current priorities and challenges of the sector, trade, and marketing strategies can provide an insight into trends in the European marketplace for fisheries and aquaculture products. Collaboration among all actors across local, regional, and international levels will encourage the growth of markets in the region, however, more needs to be done to increase fish and fishery products consumption across the region. In this regard among the first steps to be taken is to improve data collection and analysis at each step of the value chain. Producers need to adapt a market- rather than production-oriented approach, using a better understanding of markets and consumer preferences to respond to these quickly. It is important to increase fish consumption in domestic markets, reduce dependence on fish imports, and develop and implement coordinated marketing strategies and promotional activities at various levels. Successful marketing activities will need first to identify the communication channels best suited to the message and the relevant audience. Increasing consumption also depends on the collaboration between the different stakeholders in the fisheries and aquaculture sector at the local, national and international level. Best-case studies are illustrated by good practices of marketing and promotion of fisheries and aquaculture products in Italy, Spain, Turkey and Norway.

Keywords: Marketing, Promotion, Consumption

Presentation and analysis of the recent developments of trade in tuna products: an EU perspective

Nicolas Dross

Abstract: The trade in tuna products with the EU will soon face systemic changes which might profoundly affect the industry, bringing both challenges and opportunities. The last few years have seen the multiplication of free trade agreement negotiations on the global level. In 2013, for example, the EU launched a raft of large-scale negotiations, with countries including the United States and Japan. This comes on top of a number of ongoing negotiations (eg, Mercosur, Thailand, and Vietnam), as well as recently concluded ones (eg, Korea, Canada, Andean Community). Some of these countries are important players in the fisheries industry and the tuna sector in particular, whether because of their role as resource-rich fishing nations or competitive processors. Equally important for the tuna sector is a cluster of EU development-oriented negotiations known as Economic Partnership Agreements with African, Caribbean and Pacific countries. Some of the partner countries involved, for instance in the Pacific region, control rich tuna resources. Other countries, especially in West Africa, are significant players in tuna canning. Finally, of particular importance to the tuna sector is to be aware of the modernisation of the EU's scheme of trade concessions for developing countries, known as the Generalised Scheme of Preferences (GSP). The new rules have now entered into force and will have a noticeable impact on the sector. For example, as of 19 December 2014, the Philippines can export tuna duty free to the EU.

The role of fish-markets in the Icelandic value chain of cod

Ogmundur Knutsson, Ólafur Klemensson

Abstract: The two of the main pillars of the Icelandic fishing industry are the large vertically integrated fishing companies and the SMEs, specialised in fishing, producing or marketing. In order to understand how they are able to function side by side and at the same time secure a relatively high value added for the domestic part of the Icelandic value chain of cod. In the authors' recent studies on structural changes in the fisheries value chain in Iceland from 1990 to 2007, six dissimilar main operational strategies were identified. Common to all of those was the need for an efficient use of the Icelandic fish markets. Three distinctive effects of fish markets were identified: firstly, specialisation, where large and small fisheries companies use the fish markets to swap or sell all other species than needed in their specialised production (usually to SMEs producers specializing in those species); secondly, to gain stability in sourcing, where companies source raw material from the fish markets and top-up when there is lack of certain species (or sizes) from the companies' own boats and; thirdly, the market driven function or effect (market orientated value creation). To study this facilitating and supporting effect of fish markets on the on the progress of the Icelandic fisheries sector further, the focus is now the importance of fish markets from the time of their establishment in Iceland in 1987. The research is based on semi-structured and in-depth interviews with managers of a number of Icelandic fishing and processing companies and is a part of an ongoing research on the value chain structure and on organisational- and productivity changes in the Icelandic fisheries sector.

Keywords: Value Chain, Fish Markets, Structure

The German whitefish market: an application of the la/aids model using retail-scanner-data

Julia Bronnmann

Abstract: Whitefish is one of the largest segments in the global seafood market. The whitefish market includes traditional wild caught species; cod, Pollack and Alaska-Pollack, and the more recent introduction of aquaculture species; pangasius and tilapia. The study describes the price development of pangasius and tilapia over the study period. The contribution of this study is in estimating the demand structure for the five whitefish species in Germany using retail scanner data. The underlying panel is a unique dataset covering whitefish purchases in more than 1.300 German retail stores over a period of five years.

Keywords: Fisheries

Can TV programs improve the competitiveness of European Seafood products? Exploratory results from the SUCCESS project.

Bertrand Le Gallic

Abstract: The H2020 SUCCESS project aims at improving the competitiveness and economic sustainability of the European Seafood sector. A part of the project deals with the understanding of the consumption patterns in different European Countries. TV and other media programs have an undebatable impact on consumption patterns. In this context, it is of central importance of the project to consider the worldwide development of food and cooking TV shows, and their likely effects on diet decisions. This research will analyse the place of seafood products in specialised TV programs, broken down into market segments (whitefish; mussels and crustaceans, etc.). A survey of the potential spectators will help understanding how these programs are actually modifying the buying patterns of seafood products. In addition, broadcast companies will be interviewed to analyse their own understanding of the potential benefits of seafood products. The presentation will present the preliminary outcomes of the research, including the historical development of cooking programs, as well as the place of seafood products within these programs. In addition, preliminary results from the spectators' survey will be presented.

Keywords: Consumption, TV Programs

2.30 - 3.45 pm

Room: Gran Salone del Genovesi

(4) parallel session - Fishing effort management

chair **Raúl Prellezo**

Modelling the technology of commercial fishing vessels in Italy: a cost function approach

Alfonso Pellecchia, Gianluigi Coppola, Monica Gambino, Dario Pinello, Evelina Sabatella

Abstract: The features that distinguish the Italian fleet are the low geographical concentrations and the strong differences in specialization, productivity and profitability between different geographical areas and fleet segments. As a consequence, the Italian fisheries management system has been traditionally based on fishing effort regulation systems. Within the multi-specific fisheries typical of coastal waters, input restrictions are more efficient and easier to apply and monitor. Fishing effort management has been introduced through the implementation of a system based on fishing licenses and control of the fishing capacity. However, the main disadvantage of a regulatory tool based exclusively on fishing capacity reduction is that it only addresses one of the components that determine fishing mortality, i.e. capacity. This means that where only one input factor is controlled, operators will be inclined to replace the regulated factor with those not subject to control. This type of behavior entails overcapitalization (or capital stuffing) of the fishing area and increasing of vessel "catchability". Fishing effort measures may include a set of alternative measures (licenses system, protected areas, restrictions on equipment, size limits, limitations on the number and/or duration of fishing operations for certain types of fish and temporary cessation of fishing activities) that can actually produce different economic effects. In this paper we try to test the differences in technology and in the level of economy of scale existing among the Italian fleet segments and/or fishing Italian areas on the basis of the estimation of a Translog Cost function (among others Pascoe, 2001; Eggert and Tveteras, 2007). It permits to measure the elasticity of substitution among factors, (and if it is constant or not), and also the level of economies of scale. The dataset used include 1096 vessels were selected through a Probability Proportional to Size (PPS) sampling from the Italian administrative regions. The sampling is of a stratified nature in that the fishing vessels of the fleet are divided into homogenous groups (fleet segment and maritime regions) based on two stratification variables (landings and LOA) and independent samples are taken from each of these clusters. In

order to make this we use the data on Capital, estimated on the basis is estimated of the PIM methodology (Perpetual Inventory Method) as requested in the DCF. The results of the study revealed that a large variety in the mean technical efficiency among regions and fleet segments. Administrative regions. The results of the study revealed that a large variety in the mean technical efficiency among regions and fleet segments

Keywords: Capacity, Economic Efficiency, Frontier Production Function

Optimizing fishing production based on fisheries instead of fleets: an application of the FISHRENT model to the Irish fishing sector

Richard Curtin, Michael Keatinge, Emmet Jackson

Abstract: In this paper the FISHRENT model is parameterised in two distinct manners to the Irish whitefish catching sector and optimisation through both is compared. The European Union analyses national fleets through DCF segmentation which is based on the gear that a vessel utilises 50% or more of the time in the previous year along with the length category of the vessel. The combination of gear and length categories results in dozens of possible DCF fleet segments. In Ireland the fisheries authorities utilise a simpler segmentation methodology based on the target species of the vessels. Here, five main segments are used; pelagic, specific (targets bivalves), beam (flatfish) and polyvalent general (various targets) and polyvalent potting (shellfish). The polyvalent general segment is the only one that directly targets whitefish. This segment is the largest in terms of vessel numbers, GTs and kW of the whole fleet. Here the segment is divided into the length categories of <12m, 12-18m and >18m to distinguish between small scale and large scale activity and the FISHRENT model is optimised over 15 years. In parallel the model is parameterised and optimised according to operational units based on fishery activity. Here, landings data has been segmented on a trip basis, categorising each trip to a distinct operational unit which covers the three main demersal fisheries (hake-monkfish-megrim; cod-haddock-whiting; nephrops) and the regional Irish seas where they are located. As vessels switch between fisheries throughout time based on the fishing opportunities which those fisheries provide, which themselves are influenced by large degrees of uncertainty due to environmental variability, the idea of optimising fleet segments may be misconceived. Here we show the differences between both methods through the use of a simple bioeconomic model.

Keywords: Segmentation, Optimisation, Bioeconomic Modelling

Efficiency analyses of fisheries when stock estimates are lacking

Ola Flaaten, Nguyen Ngoc Duy

Abstract: This study proposes three technical efficiency estimation methods with three different fish stock proxy measures when using the stochastic production frontier (SPF) approach. These methods are applied to two Vietnamese offshore fisheries, gillnet and hand-line fisheries, where measures of stock abundance are unavailable. The results show that use of data envelopment analysis (DEA) to derive a composite stock index to account for differences in stock conditions between periods is more robust than the use of catch per unit of effort (CPUE) measures. The DEA approach is also free of distributional and production related assumptions and is not subject to a distortion in the measures of technical efficiency and production elasticities. The empirical results indicate decrease in stock abundances. This reduction is probably due to overexploitation of offshore resources.

Keywords: Technical Efficiency, Stock Index, Offshore Fisheries

Potential ecosystem effects of the application of management targets derived from single species assessments: insights from a multispecies-multifleet model

Simone Libralato, Francesco Colloca, Serena Lopez, Cosimo Solidoro, Giandomenico Ardizzone

Abstract: Ecosystem approach to fishery requires the representation and analysis of effects of fisheries in a

multifactor, multispecies and multifleet context. Nevertheless, fishery management advices are still achieved through the application of single species assessment methods, that might include some external factors but lack of any representation of interaction with other species. Here we used a food web model representing the Tyrrhenian Sea to test the potential ecological and economic effects of single species fisheries assessments. The ecosystem of the central part of the Tyrrhenian Sea is described with a food web model that incorporates a large set of local information by species regarding long term trawl surveys, gut content analyses, stock assessments results and fisheries statistics. The model describes the ecosystem by means of 62 functional groups (from picophytoplankton to marine mammals) and 4 main fishing fleets operating in the area (trawlers, longlines, purse-seiners and passive nets). This model is used to test the effects of single species assessments by performing scenarios in which fishing mortality for overexploited target species (e.g. hake, red mullet, deep-sea pink shrimp, anchovy) is imposed gradually to the Fmsy resulting from assessments. The results in terms of ecosystem (biomasses and indicators) and economic (landing quantities and values) changes are analysed.

Keywords: Ecosystem-Based Management, Ecosystem Model, Tyrrhenian Sea

2.30 - 3.45 pm

Room: Auditorium

(5) parallel session - Impact assessment of management plans and bio-economic models

chair **Monica Gambino**

The Eco² Model – A basic bio-economic module for the description of the dynamics of cohort biomass in response to exploitation.

Eckhard Bethke

Abstract: The presented approach is based on two growth equations which are commonly used to describe individual growth in mass: The von Bertalanffy-growth function for wild fish stocks and a simple exponential growth model primarily used in aquaculture. Here both models are merged into a single model. The resulting equation in conjunction with the traditional abundance equations offers crucial advantages for modeling the changes in biomass of a single cohort of a fish stock as a function of assimilation rate, maintenance rate, natural mortality, fishing mortality and time. This approach provides also the development of a simple link between ecology and economy. The result of the derivations is a set of equations which can be used as a basic bio-economic module for the composition of large ecosystems and the description of the dynamics of dependent species regarding ecology and economy in response to exploitation. The use of the model is explained by a simple example in which the use of an ecosystem is controlled solely by changing the mesh size. Three management strategies are compared on the basis of their present values.

Keywords: Assimilation Rate, Growth Function, Bio-Economic Modeling

Bioeconomic models of grey seal predation impacts on West of Scotland demersal fisheries

Vanessa Trijoulet, Alex Dickson, Robin Cook

Abstract: Nowadays, a controversy exists between fishermen and conservationists about the role grey seals may have played in the decline of the groundfish stocks around UK. Currently, opinions are still divided, and it seems that further studies need to be done to measure the economic impact of seals on fisheries and to propose future seal and fishery management. We developed a bioeconomic model able to quantify the economic impact of grey seal predation on West of Scotland fisheries for cod, haddock and whiting. The biological model accounts for seal predation and fishing catches and is linked to an economic model estimating

fisheries revenues and costs. The model includes a multifleet component which enables us to be as close as possible to the current organization of the West of Scotland fisheries. Three bioeconomic models are tested. The baseline model assesses seal impacts on fisheries revenues in the long term assuming a constant fishing mortality. Two dynamic models are also tested to determine seal impacts when fleet behaviour is considered: the open-access model where the revenues are dissipated at the equilibrium and the closed fishery model where the fleets maximize their net profits (Maximum Economic Yield scenario). Cod is the fish the most impacted by seal predation so its collapse in the long term has to be avoided to observe any possible seal impact. The open-access model predicts cod collapse regardless of the number of seals so no impact is observed in this scenario. The baseline and MEY scenarios show that a small change in seal population can induce a slightly larger change in fleet revenues at the equilibrium. However, the MEY scenario estimates a substantial impact on the total fishery profitability. Consequently fleet revenues and fishery profitability may be increased by grey seal management, but this strategy can only be successful by applying complementary fisheries regulations to avoid cod collapse in the long term.

Keywords: Bioeconomic Models, Fisheries, Seal Predation

Competitive interactions between pulse and beam trawlers in the Southern part of the North Sea

Sys Klaas, pr. dr. ir. Buysse Jeroen dr. ir. Polet Hans dr. ir. van Meensel Jef

Abstract: Since 2009 every European member state is allowed to replace 5% of its beam trawl fleet by pulse trawlers to target demersal fish in the Southern part of the North Sea. Compared to beam trawling, pulse trawling is more efficient in terms of fuel use, reduces by-catches and has less disturbance of the seafloor. The Dutch beam trawl fleet switched gradually to pulse trawling and since 2012, 42 vessels are equipped with pulse fishing gear to target sole (*Solea solea*). Simultaneous changes occurred in the fishing effort distribution of Belgian beam trawlers. Effort is reduced on fishing grounds which they exploit together with pulse trawlers and reallocated to areas where pulse trawlers do not fish. This study investigates the relationship between the introduction of pulse trawlers and the changed effort patterns of Belgian vessels. The focus of this study is on the short term and reversible mechanism of interference between fishing vessels. This mechanism is examined based on the difference in weekly exploitation patterns of Belgian and Dutch fishing vessels. Dutch fishermen typically make fishing trips from Monday until Thursday, while Belgian fishermen continue fishing during weekends. Thus, if interference competition increased, we hypothesize that daily catch rates during weekends should be higher than during weekdays. Logbook data of commercial Belgian beam trawlers were used to fit a regression model with an interaction effect accounting for the weekend effect. Other relevant covariates accounting for skipper effect and spatio-temporal variation are included as well. Results show differences in catch rates for sole between weekdays and weekends. In 2012 and 2013, daily sole catches are higher during weekends than during weekdays. Before 2012, in absence of pulse trawling no difference was measured. For plaice (*Pleuronectes platessa*), there was no weekend effect in 2012, but in 2013 there was a negative effect during weekends. For the values of landings, there was only a negative effect during weekends in 2012. Our results show that interference competition for the target species sole increased. Fishermen reacted in different ways, some fishermen fish less in the Southern part of the North Sea and reallocate effort to other fishing areas while other fishermen changed their strategy by targeting plaice to balance the loss of sole in 2013.

Keywords: Fleet Dynamics, Econometrics, Pulse Fisheries

An application of life-cycle theory to the west of scotland cod fishery

Philip Rodgers

Abstract: This paper applies a life-cycle approach to the West of Scotland fishery for atlantic cod. It approaches the fish stock as a harvestable resource regardless of growth levels and drops the assumption usually

accepted in fishery models that a long-run non-zero bioeconomic equilibrium will develop where the catch and growth will be equal. Instead, successive short-run economic equilibria develop at the cost of long-run equilibrium. The impact of this is to treat the fish stock resource as harvestable regardless of its growth rate and to treat the growth as a correction to the size of the fish stock reserve. A second consequence is that the control variable representing the presence of the fish stock in the production variable can be re-defined to accommodate. The model simulates the rise and fall of the fishery from 1950 to 2011 and calculates the coefficients of a production function.

Keywords: Life-Cycle, Gordon-Schaefer, Production Function

2.30 - 3.45 pm

Room: Sala Gatto

(6) parallel session - Market benefits from eco-labeling/certification

chair **Ekaterina Tribilustova**

Organic Salmon - Considered a Fisheries or Agricultural Product among Consumers?

Isaac Ankamah Yeboah, Max Nielsen, Rasmus Nielsen

Abstract: The year 2016 is groundbreaking for organic aquaculture producers in EU, as it represents the deadline for implementing a full organic life cycle in the aquaculture production. Most often, such a shift implies cost enhancing production measures for the farmers. Hence, for the farmers it is essential to know if their efforts are being rewarded by receiving a higher price for their product from the consumers. This is especially important in countries where organic aquaculture already exists and where plans are made for future expansion of the production, such as Denmark. This study investigates the market for salmon to reveal the existence of an organic price premium and tests whether consumers consider organic salmon as a fisheries or agriculture product, because this has implication for the size of the price premium that exists. Using consumer panel scanner data for Danish households and the use of hedonic price modelling; the paper establishes that there is a price premium of 19.7% for organic salmon on the Danish retail market. Comparison of the premium to the literature of MSC fisheries and organic agriculture price premiums indicates that consumers consider organic salmon as an agriculture product and not fisheries. In other words, this implies that consumers value organic salmon just as high as organic agriculture products; which tends to be higher than the most celebrated MSC fisheries eco-labeled products. For concerned producers, this is a comforting first hand news.

Keywords: Premium, Aquaculture, Ecolabelling

Seafood labelling and consumers choices

Lamprakis Avdelas, Shabbar Jaffry

Abstract: In recent years, there has been a growing interest of promoting and rewarding sustainable management in fisheries and aquaculture using product differentiation through eco-labelling and organic labelling respectively. At the same time food safety concerns arise due to often food crisis experienced worldwide in the past few years. In this paper, we present results of a stated preferences choice experiment addressing consumer choices for seafood products in the pre-crisis Greek market. Four different species (namely anchovy, cod, seabream and mussels) are included and, amongst other attributes, safety certification and two labels i.e. eco-label and organic label are introduced in the experiment. We employ discrete choice models to identify determinants of consumer choice among the attributes introduced in the choice experiment. As expected, a positive impact of labels and certification for fisheries products is anticipated for the Greek market. Consumers are positive towards the prospect of labelling for fisheries products, as compared to un-labelled products.

Keywords: Fisheries, Aquaculture, Label

Consumers' response to sustainability labelling in wildfish

Katrin Zander, Doreen Bürgelt, Inken Christoph-Schulz, Petra Salamon, Daniela Weible

Abstract: Consumers increasingly ask for food produced according to sustainability criteria. The number of MSC certified fisheries is increasing, but what is about consumers' specific knowledge on, interest in and expectations about sustainable fisheries as well as about their knowledge of existing sustainability labelling on fish in Germany? We conducted 12 focus groups with fish consumers in order to elicit consumers' expectations from sustainable fisheries and to analyse their perception and judgement as well as the purchase relevance of several labels which exist for sustainable fisheries. Our results show that consumers expect sustainable fisheries to avoid by-catches or overfishing, and to not use large trawl nets or dynamite. For many of the discussants this topic was new, and knowledge about fisheries was mostly low. When asked in an unprompted manner for their knowledge of labels for sustainable fisheries (MSC, Friend of the Sea, Dolphin Safe, Iceland Responsible Fisheries and Naturland-Wildfisch) the logo of the MSC was the only one known by some of the participants. Knowledge of the underlying standards was even worse. It turned out that many participants were skeptical about food labelling and standard setting in general. They stated to be tired from all the different food labels. This distrust was transferred to some degree also to the labels for sustainable fisheries. Accordingly, many participants stated to not look for sustainability labels when purchasing fish products. The specific challenge for the fisheries sector when thinking about how to communicate with consumers is to have the limited knowledge of many consumers on fish products in mind and to accept their often limited interest in looking for and processing additional information. Sustainability standards which clearly differentiate from 'normal' fisheries are needed. Easily understandable communication in the internet and short and simple messages on packages supported by a catchy label in national language should be provided in order to increase consumers' response to sustainable fisheries.

Keywords: Consumer Behaviour, Consumer Attitudes, Sustainable Fisheries

Effect of eco-labeling of fishery products on economic performance of European firms

José Luis Fernández Sánchez, Ladislao Luna Sotorrio, Ignacio Lorente García

Abstract: The aim of this research is twofold. First, a descriptive analysis is conducted on the implementation of eco-labeling in European companies in the value chain (production, processing and selling) of contrasting fishery and aquaculture products whether the companies that are leading the eco-labeling process are the most established and those with more resources in the sector. And, secondly, a causal analysis, using the method of panel data analysis on a sample of firms in recent years have introduced the MSC label to analyse the effect that eco-labeling can have on firms' economic performance. Regarding the possible effect of eco-labeling on economic performance of firms, it is noted that eco-labels have their main disadvantage of the high costs that may be incurred by certified companies (certification and management costs), whereas they have the following benefits: (i) it allows consumers identify reliable and easily green or sustainable products in the market, reducing information asymmetries between consumers and firms as well as transaction costs; (ii) it is a marketing tool for product differentiation and customer segmentation, encouraging firms to introduce ecological and environmental aspects in product design so that the product will have an attribute or value more to differentiate the company from the rest getting a higher price and a profit margin for their products or services; and, (iii) it also provides a positive signal to firms' external stakeholders what can enhance the image of the company increasing its reputation. Therefore, the implementation of eco-labels in fishery products can improve economic performance of firms, which can be measured through companies' profitability or market share, when the benefits of implementation outweigh disadvantages. The analysis in this paper only takes into account those companies that in January 2012 had implemented the MSC eco-label on their products since the agency that manages this standard is the only one that provides information as to the implementation date of the certificate in the company. Firms belonging to the activities of harvest, processing

and wholesale of the fishery products value chain with the MSC certification were identified on the website of the institutions that administer this label. Then, these companies were selected in the AMADEUS database and yearly economic data of these companies for the period 2003-2011 (the last year with information available in the database) were collected. To perform this research, multivariate analysis using both fixed and random-effects models has been used to contrast the effect of the social label on firms' economic performance. The conclusions obtained show a low eco-label implantation in European firms although this strategy to differentiate the product lets to get a higher return.

Keywords: Eco-Label, Responsible Consumption, Firm Performance

4.30 - 6.00 pm

Room: **Gran Salone del Genovesi**

(7) parallel session - Governance of Marine Fisheries

chair **Hans Van Oostenbrugge**

The European Union's structural policy for fisheries and its evolution 2000-2013

Dominique Levieil

Abstract: Since its inception in the 1970s, the EU structural policy for fisheries has endeavoured to support the implementation of the Common Fisheries Policy (CFP) thus to contribute to the conservation of the fisheries resource and to the protection of marine ecosystem, while improving the productivity of the EU fisheries sector and the standard of living of people dependent on fishing. This paper examines the results and impacts of this policy and its recent evolution in the light of the adoption of the 2013 reform of the CFP. It will show, in particular, how the focus has shifted from direct support to the modernisation and productivity of the fishing fleet sector, to the promotion of sustainable fishing and of additional added value to the fisheries products. It will also consider the evolution from support to the fisheries sector to support to fisheries areas and more general coastal communities across the European Union.

Keywords: Structural Policy, Fisheries

Spatial Impact Analysis of Implementing an ITQ System in the Swedish Pelagic Fisheries

Anton Paulrud, Natacha Carvalho, Fabrizio Natale

Abstract: In October 2005 the Swedish Board of Fisheries proposed in a report to the government to introduce a new management system of the Swedish Pelagic fisheries based on Individual transferable quotas (ITQs). The aims of the reform were to support the structure of the fleet, to preserve the resources and secure an economically, environmentally, and socially sustainable fishing sector. The Operational Plan for the fishing industry in Sweden 2007-2013 stated that the over-capacity in the pelagic fleet was around 30%, while the industry stated that this part of the fleet should be halved to achieve international competitiveness. Individual transferable quotas (ITQs) are a management strategy that has been widely discussed, not least in the reform of the European Common Fisheries Policy but also as a market-based management method in the scientific literature. Introduction of ITQs is in theory expected to reduce overcapacity and improve the economic performance of a fishery. The system was gradually implemented starting with individual vessel quotas (IQ) in 2007 becoming transferable in November 2009 resulting in a fully operational ITQ system. In addition to the shares of the quota distributed on vessel level, there were also certain quantities allocated outside the system to coastal fisheries, primarily to vessels fishing with nets and smaller seiners, for the reason to preserve and strengthen the regional-based fisheries in the Baltic Sea. This part of the quota was and is not subject to tradability. The effects of the ITQ system were immediate and significant: by the end of 2010 the number of pelagic vessels had halved and since then it's more or less stable. In this paper we present the outcome of

introducing an ITQ system in the Swedish pelagic fisheries. A special focus using spatial analysis is on how the coastal communities have been affected since the introduction of the ITQ. We also analysed the outcome of the implementation of the ITQ system in terms of capacity, efficiency, profitability and employment. The results observed in the Swedish pelagic fisheries were substantial although expected according to economic theory and further support earlier research results. The results also show that a well-designed ITQ system doesn't need to be a threat for small-scale communities. These empirical results provide valuable insights on how an ITQ system functions and eventually restructures fisheries and fishing fleets.

Keywords: Rights-Based Management, Small-Scale Communities, Over-Capacity

Balanced Harvesting in Fisheries: Economic Insights and Implications

Serge Garcia, Anthony Charles, Jake Rice

Abstract: It is well established that widespread adoption of an Ecosystem Approach to Fisheries implies a need to broaden from single-species fisheries management objectives to incorporate broader goals relating to the aquatic ecosystem and its wellbeing – notably, according to the Convention on Biological Diversity, “conservation of ecosystem structure and functioning”. This paper explores economic aspects of a recent proposal to meet these goals through a shift to more ‘Balanced Harvesting’ (BH). This involves distributing fishing mortality across a wider range of species, stocks, and sizes in an ecosystem, in proportion to their natural productivity. The major changes suggested for a move to BH are (1) to broaden the range of species and sizes caught in the ecosystem, and (2) to lower the exploitation rates for some conventionally-targeted species. Research to date indicates that a BH strategy outperforms other options in terms of three performance indicators: available biomass, extirpations (species extinction), and total yield from the ecosystem. However, the economic implications of the approach have received much less attention. This paper provides a preliminary assessment of several key economic and livelihood considerations: (1) the extent to which BH implies trade-offs between the CBD goal of “conservation of ecosystem structure and functioning” and other ecological, economic and social principles and objectives, (2) effects of BH on fishing enterprise and household economics, as well as processing and post-harvest aspects, (3) distributional impacts across fleet sectors and fishing gears, between small-scale and large-scale fisheries, and between the present and the future, (4) interactions between BH and other management strategies and tools, and (6) economic analysis of possible transition paths to implementation, including options for partially implementing BH, and their relative costs and benefits. The paper closes with an assessment of additional research and knowledge requirements for further analysing the merits of BH and the implementation options.

Keywords: Ecosystem Approach, Fishing Mortality, Balanced Harvest

ITQs, Common Fisheries Policy Reform and Stakeholders Perceptions

Manuel Coelho, Rui Junqueira Lopes, José Bonito Filipe, Manuel Alberto Ferreira

< In the early 2010s the Pew Environment Group released a study that finds that E. U. fisheries have failed to reduce fleet capacity thus exerting fishing pressure on stocks at around two time sustainable levels. Over-capacity and overcapitalisation was identified as the principal failure of the Common Fisheries Policy (CFP). This conclusion may be important for the discussion about the tools to get sustainable management and for the on-going CFP reform. After two re-evaluations (1992, 2002), a new reform of this common policy was scheduled for 2012/2013. With the publication of the “Green Paper” on the Reform, the European Commission went on launching a wide consultation to the national administrations, stakeholders, researchers and other interested people. The objectives were to discuss the problems of the current situation and to explore the alternatives and the ways forward the new reform of fisheries policy. Rights Based Management schemes have already been experimented in specific fisheries and localizations. The practical indications and lessons given by these experiences are fundamental to explore the feasibility of such tools as instruments of the con-

servation and management policy. The purpose of this paper is to continue the debate. A special attention is given to the possibility of introducing a more focused approach on Rights Based Management, in the form of ITQs (Individual Transferable Quotas) in the CFP management regime. It is made of four points: In the first point, we introduce the basic theoretical framework of Individual Transferable Quotas. In the second point, we develop the analysis of the Reform proposals and, in the third point, a critical review of ITQs introduction in European fisheries is made. Finally, the paper approaches the Portuguese case and reports the different perceptions of the Portuguese stakeholders (including fishermen, vessel owners, administration, consumers and NGOs) about ITQs, in the context of CFP reform.

Keywords: ITQs, Common Fisheries Policy, Stakeholders Perceptions

4.30 - 6.00 pm

Room: **Auditorium**

(8) parallel session - Markets and marketing of fish products

chair **Frank Asche**

Fishmeal and Aquafeed: The Relationship Between Feed Component and Salmon Prices in a Maturing Aquaculture Industry

Atle Oglend, Frank Asche

Abstract: Aquaculture now supplies almost half the marine proteins going to human consumption. Growth of aquaculture production has led to worries about overfishing and reduction in wild-caught food fish. For carnivorous species such as Atlantic salmon, marine proteins from wild-caught fish are necessary feed components that provide vital micronutrients. The need for marine proteins to support growing production could indicate an undesirable pressure on the reduction fisheries supplying the marine proteins. However, for salmon aquaculture, the reliance on fishmeal in the feed has steadily declined. In the early nineties, salmon feed contained as much as 50% fishmeal, while more recent feed can contain as little as 15%. Further reduction of fishmeal in the feed will take time. This is a technological barrier, and high fishmeal prices will incentivize research to reduce the share further. At the current technological barrier, it is certainly feasible that strong demand for farmed fish, such as salmon, can spill over to generate high fishmeal prices. This is especially relevant when demand is strong for farmed fish species that cannot substitute away from marine proteins in the feed. Stronger correlation between feed component and farmed fish prices however does not imply that feed demand from aquaculture drives feed component prices. For salmon aquaculture, non-neutral technical change has made salmon production more feed intensive, and with a cost share approaching 60% for feed, variation in feed prices is becoming increasingly important for the cost development in Salmon aquaculture. For increasingly feed cost driven prices, movements in feed component prices will more strongly dictate the movements in farmed fish prices. This paper investigates the relationship between important feed component prices (fishmeal, soybean and wheat) and salmon prices. Feed raw materials are highly traded commodities, and prices tend to follow a common stochastic trend. We demonstrate empirically that fishmeal prices reflect more strongly in salmon prices now than when the cost share of feed in salmon production was lower. We argue that this stronger relationship between fishmeal and salmon prices is due to salmon prices having moved from being mostly productivity driven to factor price driven in a period of increasing and high feed raw material prices, and lower productivity growth. Even though salmon and fishmeal prices follow a common stochastic trend, we find that fishmeal prices are weakly exogenous in this relationship. The stochastic trend in fishmeal prices spills over to salmon prices, not the other way around. A shock to the fishmeal price is fully absorbed in salmon prices in one year, while changes in salmon prices have no significant effects on fishmeal prices.

Keywords: Reduction Fisheries, Fishmeal, Aquaculture

Integration in Brazilian shrimps market

Ruth B. M. Pincinato, Frank Asche

Abstract: Shrimps (mainly *Litopenaeus vannamei*) comprise a large share of the Brazilian aquaculture production. Although this production nowadays is focused mainly on the domestic market, most of the farmed shrimp used to be exported (mainly to US and Europe) until 2003, when changed gradually towards the domestic market due to the USA anti-dumping process, combined to the strengthening of Brazilian currency, the competitiveness of China's shrimp in other markets, and white spot disease outbreak. The domestic market, in turn, before that, had relied mostly on shrimps from fisheries, mainly seabob (*Xiphopenaeus kroyeri*) and pink shrimp (*Farfantepenaeus brasiliensis* and *F. paulensis*), which are currently considered as overexploited. Considering this scenario, this paper analysis whether (1) the farmed and wild species are in the same market; and (2) the changes in the farmed production towards the domestic market affected the domestic shrimps prices. In order to answer these questions and considering the time series as stationary accordingly to the Augmented Dickey-Fuller test, a dynamic adjustment representation of price dynamics will be applied. The hypothesis to be tested allow us to suggest that if a joint test that all γ_i parameters are zero is rejected, p_1 causes p_2 . If causality is not observed, the markets are independent. If the evidence of causality is just in one direction, this indicates price leadership. Another hypothesis to be tested is that the restriction $\beta_i + \gamma_i = 1$ holds, if there is a long-run relationship. Moreover, we will investigate whether the changes regarding the farmed shrimps market has affected the domestic market. The analysis will be based on monthly prices for the three main shrimps categories (wild pink and seabob shrimp, and farmed whiteleg shrimp) from the wholesale market 1994 to 2012.

Keywords: Market Integration

Competition across tropical farmed fish in the eu

Jose Fernandez Polanco, Ignacio Llorente, Ladislao Luna

Abstract: Tropical freshwater fish has become one of the most important aquaculture commodities in the first decade of the century. Production has significantly grown in developing countries, resulting in a surplus targeting soon the markets in developed countries in the search of higher prices and profits. The real figures of this trade were difficult, if not impossible, to estimate as they were recorded aggregated into more generic commodities. However, since 2010, new items have been introduced in the list of tariff codes and several farmed species, including the most relevant tropical, are now differentiated allowing the study at the species level. It is still soon for a long run analysis, but the evolution in these three years points to an interesting competitive scenario. Three main species of tropical fish are marketed in significant volumes in the EU; being frozen fillets the most common presentation. Competition is tested using price integration. This analysis tests relationships across prices of different commodities. Nile perch producers do not appear to be directly competing, since causality across the prices of imports coming from Uganda, Tanzania and Kenya can be rejected. However, this is not the case for tilapia imports, where prices for the fish from China, Indonesia and Thailand have been found to be correlated. With tilapia, China's prices are not affected by any competitor, and the country exerts the role of price leader. The prices of tilapia imported from Indonesia are caused by the prices for tilapia from Thailand. And Thailand is affected both by China and Indonesia. Considering the case of *Pangasius* competing with tilapia, the best combination is given when China, Thailand and Vietnam are put together in the same model. In this case, Thailand and China are exporting tilapia, while Vietnam exports primarily *Pangasius*. The relations observed for tilapia exporters are confirmed, with the variation of low causality from Thailand on China as a result of the inclusion of the prices of Vietnamese *Pangasius*. The prices of *Pangasius* cause the prices of tilapia exports from China and Thailand, but none of these exerts any influence on the Vietnamese prices.

Keywords: Market Competition, Tilapia, *Pangasius*

Duration and temporary trade

Hans-Martin Straume, Frank Asche

Abstract: While the theory on the dynamics of trade duration is formulated at the firm level, most empirical analysis has been undertaken with data at a country and industry level. In this study we have access to firm export data with some information about the importing firm for one industry - Norwegian salmon farming. This allows us to study trade dynamics in further detail. Trade duration is investigated using two approaches; by estimating hazard rates and using a multinomial logit model. In the latter approach, we define the length of a trade relationship by number of transactions, including one category with relationships containing only one transaction - hit and run strategies. As expected, the results indicate that the degree of dynamics increases as the data becomes more disaggregated. These results highlight the importance of firm level data to understand the full extent of trade duration dynamics. It is of particular interest that trade relationships seem to be shorter in larger markets being served by many companies and where competition accordingly seems keen, a feature that is masked in industry level data.

Keywords: Salmon Aquaculture, Duration Analysis, Transaction Data

4.30 - 6.00 pm

Room: Sala Gatto

(9) parallel session - Marine strategy: Economic Indicators for sustainability monitoring

chair **Fabrizio Natale**

Homo Economicus meets Homo Politicus: A comparison between preferences of EPA bureaucrats, recreational anglers, and the public

Håkan Eggert, Mitesh Kataria, Elina Lampi

Abstract: In this paper we study whether environmental bureaucrats share preferences for environmental policy with the general public. We use the choice experiment method to elicit preferences for improvements in coastal cod abundance along the Swedish West coast. This is done for the general public, Swedish EPA (SEPA) bureaucrats, and for recreational anglers. Half of the respondents in each population were asked to choose the alternatives that best corresponded with their opinion, Homo Economicus, and the other half was asked to make policy recommendations that they should be decisive for Swedish fisheries policy, Homo Politicus. Our approach facilitates a comparison between the preferences of the different groups given the same preference orderings, and an empirical test concerning the Multiple preference hypothesis. Preferences of the general public do differ from preferences of both SEPA bureaucrats and recreational anglers. Moreover, the different roles also matter. For example, the recreational anglers are less self-oriented as Homo Politicus, reducing the difference in MWTP of general public and recreational anglers for the fish stop policy. Moreover, the differences in the average MWTPs are smaller between SEPA bureaucrats and the general public as Homo Economicus compared to when they answer as Homo Politicus.

Keywords: Choice Experiment, Willingness To Pay, Distribution

Cost-effectiveness of monitoring within the MSFD: The Southern Eastern Bay of Biscay case study

Arantza Murillas-Maza, María C. Uyarra

Abstract: The Marine Strategy Framework Directive (MSFD) requires Member States (MSs) to have established and implemented monitoring programmes for the assessment of the environmental status of their marine waters by 2014. The aim of this work is to analyse the cost-effectiveness (CE) of undergoing monitoring activities in the Southern Eastern part of the Bay of Biscay related to the implementation of the MSFD. CE analysis requires analyzing which output (measured through environmental indicators, such as geographical

applicability, relevance to pressures, number of assessed indicators, etc.) is derived after cost incurring (measured through socio-economic indicators, such as personnel costs, ship rental costs, etc.) in the context of the different monitoring activities. To this end, a multicriteria analysis methodology approach, that considers social, environmental and economic dimensions, is adopted. As a result, a CE global index is obtained together with a “critical” and an “ideal” thresholds. The critical threshold represents the minimum limit value attached to the index under which the monitoring activity will not be sustainable whereas the ideal threshold represents the target level over which monitoring activities should be developed. In accordance with the outcomes of this analysis, management recommendations should aim towards improving the sustainability of monitoring programmes. This methodology could be implemented to other regional cases.

Keywords: MSFD, Cost-Effectiveness, Monitoring

Testing for persistence & volatility in marine diversity indexes

Ikerne Del Valle, Kepa Astorkiza

Abstract: This paper focuses on the application of seasonal long memory processes to describing marine diversity concentration indexes (CIs) in an ecosystem (Wt) following a frequency domain approach by means of Whittle’s local method (Robinson, 1995) and the extension of Arteche and Robinson (2000) for seasonal cyclical long memory models in the seasonal frequencies $\{p/6, p/3, p/2, 2p/3, 5p/6, p\}$; combined with conditionally heteroscedastic innovations aiming to capture volatility. We are considering 3 alternative indexes (i.e. Herfindahl-Hirschman Index (HHI), Hall-Tideman Index (HTI) and the entropy measure (EN)) based on individual species specific monthly income shares (pit), where lit and it are respectively the income (in 2012€) related to species si during period t and the overall incomes generated by all the species in Wt. Our data set is made up by a 64×312 matrix, where each of the 64 columns represents the deflated monthly incomes shares (2012€) (lit) related to each si $\{i=1, \dots, 64\}$. Thus, after computation, the resulting output is monthly time series for each CIs. In order to analyse both, the persistence of the monthly series and the potential time-varying volatility, we obtain maximum likelihood estimates of a SEASONAL ARFIMA-GARCH process with a superimposed stationary ARMA component in its conditional mean and a GARCH type heteroscedasticity. Results support that ones clean of persistence, the series may be identified with a ARMA(3,1)-GARCH(1,1) process.

Measuring the Maritime Economy: Spain in the European Atlantic Arc

Javier Fernandez-Macho

Abstract: Despite the importance of the socio-economic dimension of the use of marine waters, there has been little research in the field until recently, when interest has grown in the concept of “blue growth”. This study aims to contribute to filling this gap with a socio-economic assessment of the main maritime sectors, with an emphasis on the Spanish part of the European Atlantic Arc. To this end, we have collected, classified and presented comparable and reliable maritime socio-economic indicators. The data obtained allows us to assess the size of the Spanish maritime sector and the position of the Spanish Maritime Cluster in the wider context of the maritime economy of the European Atlantic, as well as discuss the appropriateness of a strategy of forming clusters at the national level versus a transnational approach. The results indicate differences between regions in the European Atlantic Arc that complicate the development of integrated policies to stimulate blue growth. Extending our knowledge of the maritime economy of the Atlantic Arc will make it possible to design strategies that address the real issues.

Keywords: Blue Growth, European Atlantic Arc, Maritime Economy, Maritime Clusters.

9.00 - 11.00 am

Room: Gran Salone del Genovesi

(10) parallel session - Fishery management: the bottom-up approach (the role of stakeholders)

chair **John Tisdell**

Providing incentives for fishermen through rights-based co-management systems: the Basque case

Arantza Murillas, Martin Aranda, Margarita Andrés

Abstract: The main aim of this research was to examine issues related to fisheries management measures and, more importantly, issues related to the fisher's behavior, in particular, compliance behavior. Interviews and focus groups have been organized to gather knowledge from regional stakeholders in order to provide regional and European authorities with empirical evidence about the perceived legitimacy of current and future management measures under different co-management systems. Qualitative information collected on fishermen incentives together with quantitative simulations on bio-socioeconomic impacts could help regional and European authorities in defining new management measures aimed at providing the right incentives for reaching the expected results in terms of bio-socioeconomic sustainability of the fishing. This research provides a categorization of the TAC allocation systems, considering right-based management issues, in the Basque fisheries in Northern Spain. Special attention is paid to the stakeholders role: institutional set up conformed by the fishing guilds, cofradías, and the Production Organizations, POs. It is worth recalling that in the EU fishermen organizations are playing major roles in management of individual allocations. Besides the qualitative knowledge from regional stakeholders, a quantitative impact-analysis is also covered in this research. In particular, the introduction of a common pool of individual quota self-managed by the fishing sector for the bluefin tuna fishery, the introduction of daily limits for mackerel and anchovy fisheries, within a top-down and a bottom up approach, respectively have been simulated to analyze its impact in ecological, economic and social terms using the fishrent bio-economic model.

Keywords: Management, Incentives, Stakeholders

The EcoFishMan project on the Ecosystem-based Responsive Fisheries Management in Europe

Anna Kristín Danielsdóttir, Sveinn Margeirsson, Karim Erzini, Fátima Cardador, Petter Olsen, Michaela Aschan, Jónas R. Viðarsson, Paul G. Fernandes, Cristina Silva, Antonello Sala, Ólavur Gregersen, Rosa Chapela Pérez, Marta Ballesteros, Marco Thorup Frederiksen, Oddur Már Gunnarsson

Abstract: The EcoFishMan project aim was to develop a responsive fisheries management system (RFMS) based on results-based management (RBM) principles. The intended context of application of the RFMS is complex, mixed-fisheries and multi-stakeholder fishery sectors like those found in the EU/Common Fisheries Policy (CFP) area. Also to be an ecosystem-based management system under a precautionary framework that defines maximum acceptable negative impact, targets elimination of discards and maintains economic and social viability. EcoFishMan is a multidisciplinary project, involving scientists and stakeholders in activities relating to biology, stock assessment, technology, economy, sociology and legal aspects of fisheries management. It started with a review, following identification of outcome targets and identification of relevant indicators, which were then visualised through development of a GIS based decision support tool. The RFMS was designed, developed and evaluated in collaboration of scientists and stakeholders and tested through case studies. It took place in an iterative process (spiral development model) to ensure that the RFMS is adaptive to different types of fisheries and changes in the environment. A roadmap was produced for the

implementation and maintenance of recommendations in the system. In the RFMS, stakeholder involvement was essential and through their active involvement in the development of the system, EcoFishMan aimed at improving cooperation and mutual understanding between scientists, policy makers and other stakeholders. Top-down management strategies was combined with a co-management and bottom-up approach that aimed to shift the burden of proof and to involve and benefit stakeholders, offering a fundamentally new approach to fisheries management.

Keywords: Fisheries Management, Stakeholders Interaction, Multidisciplinary

The Responsive fisheries management system in practice: The Icelandic small boat mixed demersal fishery

Olavur Gregersen, Svein Agnarsson, Rosa Chapela Pérez, Marta Ballesteros, Jose Luis Santiago-Ria.

Abstract: The Responsive Fisheries Management System (RFMS), developed within the EU financed FP7 project EcoFishMan, is based on the idea that the authority in question can set certain outcome targets that the operators seek to achieve through the implementation of a management plan. These targets can both be biological, i.e. a certain stock size or mortality rate, or socio-economic, i.e. a certain level of profitability. It is then left to the assessor to assess whether the plan is acceptable and likely to enable the operators to achieve the outcome targets. In this paper we outline the interaction, between the authority, operator and assessor, using one of the case studies included in EcoFishMan, the Icelandic demersal mixed fishery. The management plan for this fishery was proposed by the Icelandic National Association of Small Boat Owners and included all commercial fishing vessels under 15 meters in length. The target species were cod, haddock and saithe, and the planning period spanned the years 2014-24. This was thus a hypothetical case, where we compared a base line scenario to a scenario where the management plan had been introduced. The management plan included 18 outcome targets, whereof 9 referred to such biological objectives as spawning stock size, fish mortality, bycatches and discards. The other 9 targets referred to various socio-economic aspects of the fishery. The project also developed an assessment framework for the RFMS and the paper details the procedure used for assessing the management plan and outlines the main results from the analysis undertaken.

Keywords: Fisheries Management, Management Plan, Assessment

An Integrated Methodological Framework for the Definition of Local Development Strategies for Fisheries Local Action Groups: an application to the Stretto Coast FLAG in South Italy

Claudio Marcianò, Romeo Giuseppa, Fortunato Cozzupoli

Abstract: The programme 2007-2013 marks an important review process of UE's Common Fisheries Policy (CFP), borrowing from the Leader Approach the typical features of both territorial and local development and bottom-up approaches. In the process of a policy formulation, within the creation of a "Fisheries Local Action Group" (FLAG), it is possible to observe a greater involvement of the local actors coming from public, private and no-profit sphere. In particular, the socio-economic partnership of the FLAG is the governance system responsible for the definition of Local Development Plans (LDP), intended as a collective policy in which fisheries communities play a key role in defining strategies for a sustainable development of coastal areas in economic, environmental and social terms. However, the identification of development strategies shared by different stakeholders can be hindered by possible conflicts among some members or groups of actors because of different interests and visions of development. The goal of this study is to present an integrated methodology that may facilitate the elaboration of a development strategy built on the basis of local knowledge and shared by all partnership members. In particular, the proposed planning process follows three main phases: territorial analysis, animation and concertation. The first activity includes a territorial diagnosis through a knowledge process aimed at pointing out the useful information to define a suitable strategy for the exigencies of fisheries area. The territorial animation phase includes both activities of "listening to"

the territory, in order to detect the requirements and the needs of operators, and of looking for suitable stakeholders to be involved in the partnership. The last stage is represented by concertation assemblies among the partnership's members to define, in a shared and participated way, the development interventions to promote and carry out on the territory. In this stage a multicriteria method (Analytic Hierarchy Process) and a convergence process were used in order to elicit, and successively aggregate, the individual preferences related to priority measures and interventions, to be included in the LDP. The proposed methodology has been applied for the definition of the LDP of the Stretto Coast FLAG in South Italy allowing the definition of a development strategy shared by the partnership as a whole.

Keywords: FLAG, Planning, AHP

Tenure & fishing rights - Meeting the challenges ahead, bottom up

Anika Seggel, Rebecca Metzner

Abstract: In March 2015, the Food and Agriculture Organization of the United Nations (FAO) and the Government of the Kingdom of Cambodia co-organised Fishing & Tenure Rights 2015: A global forum on rights-based approaches for fisheries. Attended by 140 participants from a variety of fisheries-related disciplines and 38 countries, this forum was, in part, inspired by the FishRights 99 and Sharing the Fish '06 conferences - and sought to broaden discussion beyond commercial/industrial fisheries and to include more fisheries stakeholders and types of fisheries. It has been clear for some time that there is no one-size-fits-all solution when designing rights-based management systems for the very diverse fisheries around the world; however, consensus on how to address the many details and issues that come up still needs to be found. UserRights 2015 brought participants together to share success stories and challenges in the process of designing and implementing appropriate rights-based systems for fisheries. Working group discussions focussed on social, economic, environmental, governance and legal aspects of rights-based approaches as well as on (re)distributional and gender impacts on all stakeholders directly and indirectly dependent on fisheries resources. In response to the ideas expressed during the forum, FAO will be looking to fill the knowledge gaps about tenure and rights-based approaches and to foster harmony amongst the various perspectives of rights-based approaches. This presentation will provide some of the emerging success stories of rights-based systems that have been built bottom-up that were presented at UserRights 2015, lay out some of the knowledge gaps identified during the forum, identify present and future challenges for marine and inland fisheries, and seek the advice of session participants.

Keywords: Tenure, Access Rights,, Challenges, Rights-Based Approaches

9.00 - 11.00 am

Room: **Auditorium**

(11) parallel session - Social dimension of fishery and role of small scale fishery

chair **Ola Flaaten**

Is professional fishing an asset for recreational demand on the coastline?

Carole Ropars-Collet, Mélody Leplat, Philippe Le Goffe, Marie Lesueur

Abstract: The concept of multifunctionality of fisheries is emerging, as fishery activities do not only provide commodity goods but have others functions (territorial and social). The capacity of fishing activities to attract visitors in tourist areas is one of the most believable functions with respect to the multifunctionality of fisheries: Visitors like to see boats in the ports and fishes in the markets. People are sensitive to aesthetic, social, cultural and heritage amenities related to fishing activities (presence of boats and fishermen, fish landings

and selling). Here, we have to deal with an almost pure public good, for which the degree of jointness in the production of marketed goods and services depends on the type of the activity (probably stronger for small-scale fisheries and direct sales than for deep-sea fishing and sales auction). We tried to see if the amenities produced by commercial fisheries are valued by visitors. Do fishing activities contribute to the attractiveness of the coast? We assume that the individual choices to go on a site on the coast are a function of attributes describing this site. Attributes selected include recreational activities, amenities of the seaside and amenities produced by fishing activities: coastal trails, marina, beach, architectural heritage, fishing boats and direct sales of seafood caught by local fishermen. Furthermore, we used a distance attribute as a proxy of cost. We used choice experiments to study individuals stated preferences for these various attributes. From the individual choices of virtual sites (built by mixing the different attributes and their levels), we analyzed the individual trade-off between attributes. During the summer 2013, a large survey was conducted in the neighboring departments of the Channel and the North sea coasts in France, in United-Kingdom and in Belgium, on a sample of 2 000 people. A random parameter logit model (mixed logit) was used to analyze individual choices, enabling to avoid limitations of a standard logit model and allowing for random taste variation. We supposed heterogeneous preferences between individuals for all attributes of sites (including the cost attribute). As each surveyed people perform several choices, our data set is a panel. The analysis of the distribution for the estimated parameters shows that for all the investigated population, every attribute contributes positively to the utility. All the selected attributes are relevant to explain the choice of sites on seaside. Estimations show the preferences for the attributes of interest ("fishing boat" and "direct sale") are especially heterogeneous between the individuals. We used a lognormal distribution for the random parameters that enables us to calculate the moments for the distribution of willingness to pay (WTP). The estimated means of willingness to pay for the characteristics of sites are all positive. Even if respondents prefer much better the "beach" and "coastal paths" attributes, the "fishing boats" attribute is the fourth higher mean of WTP, very close behind the "architectural heritage" one. Besides, the analysis of the distribution for the WTP for the presence of fishing boats shows that for a part of the sample, the mean of the "fishing boats" WTP is really high. Surveyed people having a link with fishing (professional, recreational, family, etc.) in France, or being native of the seaside in United Kingdom, have also stronger WTP for the "fishing boats" and "direct sales" attributes than other people. Then, according to our econometric results, we can conclude that individuals like to see fishing boats on the coastline and that fresh fish caught by local fishermen landed and directly sold on the ports or in local open markets is also an attraction for visitors. These attributes are positive externalities produced by inshore fisheries.

Keywords: Multifunctionality, Non-Market Value, Choice Experiments

Employment and income in Swedish coastal fisheries

Staffan Waldo, Johan Blomquist

Abstract: An important aspect of fisheries management is the socio-economic development of the sector. New policy measures will have different impacts among regions, fisheries, etc. However, the fishing sector is only one sector in the economy and fishermen might have other sources of income as well. These might be important determinants of the social and economic status of fishermen. In the project "Employment and salary in Nordic coastal fisheries" a broader picture of fishermen's employment and wages is analyzed for Denmark, Norway, Iceland and Sweden. In the Swedish case study, fisheries statistics such as catches and fishing areas are combined with employment statistics from other sectors of the economy in a unique dataset for 2000-2012. Focus is on the individual fisherman and his family. This enables an analysis of how the development of the fishing sector affects the socioeconomic status of fishermen taking into account income from other sources, including that of other family members. Further, we are able to analyze fishermen exiting the profession in order to determine their new socio-economic status after leaving the sector. This is important

for the analysis of policy reforms where employment in fisheries is expected to decrease. Preliminary results show that many fishermen have an alternative income but total income is still low compared to other sectors in the economy. However, total income differs among different fishing segments and fisheries management might significantly increase income.

Keywords: Socio-Economic, Income, Fisheries Management

Are the social characteristics of the skipper affecting the efficiency of the Egyptian fisheries?

Dario Pinello, Anghelos Lontakis, Alaa El Haweet, Mark Dimech, Atif Salah

Abstract: One of the main problems faced by the Egyptian fisheries seems to be the overcapacity of the trawl fleet. One consequence of this overcapacity seems to be an overexploitation of the fisheries resources in coastal waters. This could have led to competition and conflicts with the small-scale vessels since both fleets exploit the same fishing grounds. The dominance of the larger trawl vessels by time could have led to an increase in the number of trawlers, and a reduction in the small-scale fishery. This study explores the technical and scale efficiency of the small-scale coastal fisheries as well as bottom trawlers in Egypt. Efficiency is explored using an input-oriented Data Envelopment Analysis (DEA) model. Moreover, the association of efficiency scores with vessel's and skipper's characteristics are also explored. Results indicate that small-scale vessels achieve, on average, a very high average technical efficiency score (0.92) and a higher scale efficiency score (0.96). Moreover, the results reveal that in coastal fisheries, smaller vessels can better manage their resources. On the other hand, bottom trawlers achieve reasonably high technical efficiency (0.86) and a halfway scale efficiency score (0.58). One important finding of the analysis is that in coastal small-scale fisheries, unlike trawlers, technical efficiency is positively correlated with the experience of the skipper. In a looser context, it can be said that small-scale coastal fisheries mainly rely on skill, while bottom trawlers fisheries rely more on technical equipment. The study concludes that there is room for improvement in the efficiency of the trawler vessels, which will allow for the achievement of the same level of output, using reduced inputs. On the other hand the small-scale fleet demonstrates high efficiency scores which means that the fleet could be further utilized for the exploitation of the coastal resources.

Keywords: Efficiency, Social, DEA

Remuneration systems used in fisheries and their effects on fisheries management and rent distribution
Jordi Guillen, Jean Boncoeur, Katia Frangoudes, Olivier Guyader, Claire Macher, Francesc Maynou, and Mathieu Merzéréaud

Abstract: In most fisheries worldwide, crew are remunerated through different shared remuneration systems rather than a fixed wage. In shared remuneration systems, wages are somehow related to revenues, and so landings. Thus, crew wages increase when the economic performance of the vessel improves. This implies that remuneration systems can affect the fishing effort level required to achieve some management targets (e.g., maximum profits and open access), as well as the rent distribution. These effects are explored analysing different remuneration systems based on real remuneration systems applied in diverse world-wide fisheries. Results confirm that optimal fishing effort level, crew wages and rent distribution often depend on the remuneration system, and consequently remuneration systems can have an important and often neglected impact on management decisions.

The Irish Coastal and Inshore Fleet: A Socio-Economic Appraisal

Richard Curtin, Brian Burke, Richard Curtin, Emmet Jackson, Michael Keatinge

Abstract: The Irish inshore fleet is the subject of very little academic research and the source of low quantities of data. Qualitative studies have been carried out on this fleet over time describing its activity and fishing grounds however at a quantitative level knowledge of this fleet is sparse. The reasons for this are numerous

and varied. From a regulatory point of view the inshore fleet is not legally obliged to declare landings if these landings are less than 50kg in weight. Therefore the exact quantities landed by the fleet (and estimates of their catches) are not available unlike other segments of the Irish fleet. As the inshore fleet is mainly composed of small vessels, less than 10m in length, and many of the operators are part-time fishers, it is safe to assume that the economic activity of the fleet, on an average vessel basis, is not as substantial as other fleet segments. The target species exploited by this fleet are generally not controlled by output regulations such as total allowable catches (TACs) or quotas and so there is little regulation of the effort applied by this fleet. In this paper the evolution of the inshore and coastal fleets will be detailed over the period 2004-2013 covering the social, biological, technical and regulatory aspects. The main objective of this paper is to estimate the economic activity attributable to these fleets. This will be carried out through analysis of multiple datasets such as logbooks, sales notes and the GTIS global trade database to estimate landings and value generated along with the Sentinel Survey Program economic cost database to evaluate the short term and long term profitability of these widely distributed fleets.

Keywords: Inshore Fleet, Data-Poor Fisheries, Economic Viability

9.00 - 11.00 am

Room: **Sala Gatto**

(12) parallel session - Economic data collection, new data needs and best practices

chair **Sergio De Stefanis**

EU fishing coastal communities, fishing grounds and markets. Spatial relations and dependencies emerging from the analysis of high resolution fishing activity data from the AIS system

Fabrizio Natale, Maurizio Gibin, Alfredo Alessandrini, Michele Vespe

Abstract: Fisheries economic data from the Data Collection Framework are assembled at EU level by fleet segment, country and main fishing areas levels. Such aggregations are too coarse for an in-depth analysis at the level of single coastal community. Socioeconomic studies at coastal community level are conducted on an ad hoc basis and limited to specific case studies in few countries. A published paper on fishing dependent coastal communities (Natale et al., 2013), disaggregated economic data from the Annual Report of the EU Fishing Fleet (STECF, 2013) and measured the relevance of fisheries employment and GVA as a ratio of general statistics for the areas surrounding all EU fishing ports. By lacking detailed fishing activity data for the entire EU, the study relied on the assumption that the home port of the fishing vessel could be considered as the main place of gravitation for the allocation of socio-economic indicators associated to the fishing activity. For the very same lack of data, the study could not examine the geographical dependencies of coastal communities "on the sea side" considering their typical fishing grounds. These dependencies between the human component on land and natural resources at sea, can be seen as one of the main concern of fisheries economic analysis and bio-economic modelling. In this paper we address the challenge of understanding this relation using detailed vessel positioning data from the vessel Automatic Identification System (AIS). With the entry in force of the obligation of Directive 2011/15/EU to use AIS on-board of vessels above 15 meters of length from May 2014 this data is increasingly becoming available in the EU and may be more accessible than VMS and logbook data for scientific studies at supra-national level. After evaluating the level of uptake of the AIS for the EU fishing fleet in 2014, we examine the areas of gravitation of the EU fleets on the basis of a world-wide AIS data set maintained at the Joint Research Centre. Starting from almost 2.5 billion of raw vessel positioning messages covering more than 160.000 vessels we analyse the movements of the vessels at great level of detail. In our model each vessel is represented as an agent whose behaviour defines the

relation between the coastal community of origin, the fishing grounds and the other ports visited. The study entails both computational issues linked to the processing of large volumes of AIS messages and advanced GIS, data mining and network analysis methods. The main result of the current paper is a map and a network representation of the relationships between EU fishing coastal communities, their fishing grounds and the other ports where the fishing vessel operates. Such representation allows assessing which coastal community might be affected by fisheries management or environmental protection measures. It is also possible to cluster fishing coastal communities considering their polarization effect on the fish markets. Further research on the classification of fishing versus non-fishing behaviour and the lack of AIS messages coverage will be addressed in a larger EU project aimed at producing a high resolution European fishing effort map.

Keywords: Coastal Communities, Fishing Behavior, AIS

Public aid and the EU fish processing industry: an economic analysis of drivers and trends in performance

Alessandra Borrello, Simkje Kruiderink

Abstract: This paper outlines the main trends in the structure and economic performance of the fish processing industry in recent years and examines the various drivers for these trends. It also analyses the public support from the European Fisheries Fund (EFF) received by the fish processing industries of the EU Member States (MS) over the period 2007-2013 and comments on the use of financial assistance by MS relative to the economic, environmental and social objectives of the EFF. The paper concludes with an assessment of the challenges ahead for the EU fish processing industry.

Keywords: Fish Processing, Public Aid, Economic Analysis

New data needs and best practices in data collection systems

Ekaterina Tribilustova, Aina Afanasjeva

Abstract: Availability of data on production and information about development of trade, markets and consumer trends are essential issues in the sustainable long-term development of fisheries and aquaculture sectors. There are currently a number of regional and global aquaculture datasets, which serve different purposes; however, available data allows to assess the past trends and does not allow to predict the future which is the need of both the industry and governments. Several distinct challenges for the sustainable development of the aquaculture sector in terms of markets and marketing include production-focused, rather than trade and market oriented data collection systems. Timely data and market analysis is essential to better understand developments in markets and value chains; however reliability and transparency of data are essential in this regard. New data needs also include a necessity to be less aggregated, however it could raise confidentiality issues, since economic data cannot be made public for segments for which there is an insufficient number of companies. Both industry and national authorities' role in data transmission and data collection needs to be further supported since both organizational and adaptive responses are needed to respond to market changes and increase negotiation power with different distribution channels. EUMOFA database and other data collection systems are provided as an illustration of best practices covering different needs for the sector.

Keywords: Data Collection, New Needs, Best Practices

Application of PIM method for the valuation of the capital value of the finnish fleet: economic and policy implications

Heidi Pokki, Jarno Virtanen, Simo Karvinen

Abstract: EU Member States are obliged to collect the data on economic performance of the national fishing fleet under the Data Collection Framework (DCF), which is based on the EU legislation (Commission Decision (2010/93/EU)). The legislation obligates Member States to collect fleet data among other things on capi-

tal values, investments and capital costs (interest cost and depreciation). The economic data from the EU data collection framework (DCF) are used for economic analysis and to support the political decision making in the EU. According to the European Commission decision 2010/93/EU the capital value of the fleet should be measured using the Perpetual Inventory Method developed by the OECD. However, the PIM method requires that many assumptions are made concerning among other things the service lives, depreciation schemes, the value of different components of the fleet and while these assumptions are crucial for the analysis, but not easily determined, they need to be adjusted to fit the national laws and practices. The paper focuses on the application of the PIM method to the Finnish fleet data. First we introduce the Perpetual Inventory Method and its concepts. Thereafter we discuss the practical aspects of applying the method for Finnish fishery context and outline the uncertainties remaining in the application of PIM for the Finnish data. Then we compare these results from the macroeconomic approach using PIM with the micro economic approach from financial statements. We show that the different approaches have a significant impact on fleet profitability. This in turn has further implications on evaluation of sustainability of fisheries.

Keywords: Fisheries, Capital, Fishing

Application of Perpetual Inventory Method for the valuation of the capital value of the Finnish fleet: Comparison between microeconomic and macroeconomic approaches

Jarno Virtanen, Heidi Pokki, Simo Karvinen

Abstract: The economic data in Data Collection Framework (DCF) is designed for long term macroeconomic analysis where appropriate costs including opportunity costs of all production factors are considered and measured in a standard manner. Therefore this data differ from the financial statements that are used for fiscal purposes and financial analysis of business i.e. microeconomic analysis. Specifically these two approaches differ in valuation of capital. The financial statements present capital value and related costs according to the country-specific accounting principles. In a long term economic analysis however we need to consider all tangible assets invested in the sector. Therefore in the DCF the capital valuation and costs should be measured using the Perpetual Inventory Method (PIM) developed by the OECD that has become the most commonly used international standard for valuation of tangible capital goods. In this paper we compared the results from macro and microeconomic approaches. The Finnish fishing fleet is old thus the fleet has been mostly depreciated and the book values in the balance sheets are low compared to that with PIM which reflects the long term capital invested in the sector. Therefore the capital costs in the financial statements are significantly lower than those derived by PIM method. As a result the short term net profitability from financial statements is significantly higher than the long term profitability derived using PIM method. Actually financial analysis shows that the Finnish fishing fleet is making profits while the macroeconomic approach turns the fleet unprofitable. In the end this result just underlines the difference of these two approaches: a fleet may be profitable in the short term even it is not economically sustainable in the long term.

Keywords: Q220 Fishery, Q01 Sustainable Development, E22 Capital

11.30 am - 1.00 pm

Room: Gran Salone del Genovesi

Plenary session 2 - Status and trends of global fish trade

chair: **Jose Fernandez Polanco**

The European market Observatory for fisheries and aquaculture products (EUMOFA): data and services for fisheries economists and market analysts

Xavier Guillou

Abstract: Delivering on market and economic intelligence is a new mandate for the European Commission in the Common Market Organisation. EUMOFA is developed to bring economic analysis and updated consoli-

dated data to economic operators, public authorities and researchers. This presentation will show what can be extracted from this large and detailed database for fisheries economists to analyse impacts and trends. It will also present ongoing developments in terms of data and methodology on the supply chain and prospective tools.

3.00 - 4.15 pm

Room: **Gran Salone del Genovesi**

Special session - Landing Obligation

chair **Erik Lindebo**

Socio-economic impact of landing obligation for the Dutch demersal fisheries

Mike Turenhout, Batsleer Jurgen

Abstract: The European Commission has agreed to reduce unwanted catches and prevent discarding by means of progressively introducing a landing obligation. This agreement is met with some criticism, questioning the ecological implications as well as the social and economic consequences for the fishing industry. Introduction of the EU landing obligation is expected to have an enormous social and economic impact on the Dutch fishing fleet. It is very likely that costs will increase and that fishermen need to anticipate on the consequences of this new legislation by changing their fishing behaviour and move to the use of more selective fishing techniques. Recently, several Dutch research projects (Fisheries Innovation Platform (FIP)) have been started to explore possibilities to decrease discards and to identify the ecological and socio-economic impact of the discard ban to be introduced. Here, we would like to highlight the socio-economic impact study for the Dutch demersal fisheries. In pilot projects extra costs for investments and extra labour (on board and on land) are investigated and results will be compared to data from regular fishing trips where just marketable species are processed on board and landed. Outcomes are important to generate support from the fishing industry and ensure feasibility of the landing obligation. Hence, the projects requires an intensive collaboration between science, industry and government. In this paper and presentation the first results of the projects and an estimation of the impact for the whole demersal fishing sector will be elaborated. Mike Turenhout (LEI Wageningen UR) and Jurgen Batsleer (IMARES and CVO)

Keywords: Landing Obligation, Demersal Fisheries

Successful Implementation of the Landing Obligation in Swedish Fisheries

Andrea Giesecke

Abstract: The Environmental Defense Fund's (EDF) EU Ocean's programme facilitated a series of meetings in Sweden through 2014, bringing together key industry leaders as well as representatives from the Swedish government's Marine and Water agency (SWaM). This work is part of EDF's goal to leverage successful experiences in other fisheries, to assist Swedish authorities and fishermen in designing and implementing an inclusive co-management process to address all relevant requirements of a new quota management system. This work is now moving into the next phase of four working groups; northern prawn, Nephrops, white fish, and one for demersal fisheries in the Baltic Sea. The aim is to facilitate a process where these groups work together to develop viable management recommendations for their respective fisheries in line with defined guidelines and timetables provided by the agency. Similar to many other Member States, Sweden is facing huge challenges as they are about to implement the Landing Obligation (LO) in their demersal fisheries as of January 2016. SWaM is responsible for the implementation and has identified that some form of transferable quota system is one tool necessary for successful implementation, given that some quota species may con-

strain the fishermen putting to sea, because they are not sure they have sufficient quota for any bycatch which must be landed under these new obligations. Other tools that could be tried in the Swedish fleet include risk pools and buffer quotas, especially for those species where Sweden does not have a big part of the overall EU quota. The LO is a huge challenge for managers and industry, and will alter current fishing practices and regulations. Sweden, however, is in a good position because of world leading selectivity measures already in place and further improvement is already being developed and tested. There is also a political willingness to make changes to the current quota management system. This makes Sweden an excellent flagship country for showcasing smart solutions to the LO (as outlined in EDF's discard reduction manual). Having these solutions developed by fishermen together with the government and other stakeholders is key to success.

Keywords: Quota Management, Landing Obligation, Co-Management

MEDAC contribution in the draft of the management plan on landing obligation for small pelagic

Rosa Caggiano

Abstract: The recently reformed CFP set new goals and redesigned some of the roles between the actors of European fisheries, in particular by strengthening the participation of stakeholders in the decision making process. Implementation of these new goals, such as the landing obligation, the achievement of the MSY for all stocks, regionalization, the formulation and implementation of multiannual management plans represent an ambitious challenge. In this framework, stakeholders - organized into 11 Advisory Councils, including MEDAC, composed by professional and recreational fishing organizations, NGOs, consumers, labor unions and others - are no longer called, as before, to express simple opinions and positions, but have to provide the EC and Member States with proposals and technical solutions, possibly, in the form of joint recommendations among multiple MS. This is what happened in the case of the first management plans on landing obligation for the Mediterranean and it will likely happen in the future with the development of the first two LTMPs on small pelagic species for GSA17 and 7. The presentation will focus on the MEDAC advice on a joint recommendation on discards management plan adopted on June 2014.

Keywords: Landing Obligation, Management Plan

Empowering fishermen towards the landing obligations, with their own technical solutions

Lars O. Mortensen, Hans Jakob Olesen, Josefine Egekvist, Anna Rindorf, Clara Ulrich

Abstract: The initial steps of EU's CFP landing obligation have been implemented since January 1st 2015 and the policy will be gradually implemented for all fisheries and regulated species over the next four years. A number of studies have already addressed the potential consequences of the landing obligations on the fisheries; although they usually rely on the assumption of unchanged fishing patterns. However, the true consequences are largely unknown, as the processes by which the fishermen will adapt and change their patterns are difficult to predict. The current study describes the outcome of a Danish landing obligation trial, where some fishermen have been challenged to develop their own solutions to optimize their catch value while reducing discards. The current study includes 14 demersal fishing vessels, operating in the North Sea, Skagerrak and the Baltic Sea. Fishermen were given the freedom to design any modification to their fishing gears and technical rules were relaxed during the trial. The fishermen were subsequently asked to fish alternatively with both normal and new gear over the study period (4 to 6 months). Fishermen were required to sort and weight all discard of six common target species on a haul by haul basis. Additionally, all vessels were equipped with electronic monitoring including CCTV to allow for full documentation of fishery. Collected data, along with bilateral information from questionnaires and interviews, are analyzed to investigate differences in discards and size composition in the target species, between conventional and new gears. The results of the study will evaluate whether fishermen were able to maintain high revenues while decreasing discards and which selectivity changes were incentivized by the landing obligations. This will provide new insights on

the feasibility to manage fisheries via results-based approaches rather than via prescriptive technical rules.

Keywords: Free Gear Modification, Results-Based Management, Discard Reduction

Reducing Discards in EU fisheries: introducing our toolkit

Erik Lindebo

Abstract: The new Landing Obligation (LO) is probably the biggest 'game changer' in fisheries management in Europe since the inception of the Common Fisheries Policy (CFP) in 1983. It challenges the way that both fishermen and management authorities have historically gone about their business by requiring that all catch is landed and prohibiting the discarding of fish at sea (starting in 2015). Most actors agree that the prescriptive nature of the new legal requirements are daunting in terms of implementation, but support the noble nature of what the LO aims to achieve. In this context, the Environmental Defense Fund (EDF) has produced a practical discard reduction toolkit that sheds light on possible approaches to implementation of the LO. The toolkit includes the use of smart quota tools as well as selectivity and avoidance solutions. Although most of the approaches are in practice in other fisheries, the toolkit helps to specify their possible applications under the LO and CFP. The toolkit acts as a living reference document that can evolve as both technical and political conditions change during the implementation of the LO. It is important that the fishing industry is an integral partner throughout the implementation process, together with management authorities, to seek tailored and effective solutions with maximum possible consensus.

Keywords: Landing Obligation, Smart Quota Tools, Selectivity And Avoidance

3.00 - 4.15 pm

Room: **Auditorium**

(13) parallel session - Best practices in aquaculture sector

chair **Michael Ebelling**

Production Risk and Technical Efficiency in Aquaculture: A Study of Tilapia Farming in Bangladesh

Md Akhtarul Alam

Abstract: Aquaculture is a fast growing sector which has great potential for expansion due to favorable resources and agro-climatic conditions in Bangladesh. But it consist a large number of risks compared to other biological farming. This study investigates production risk and technical inefficiency as two possible sources of the production variability that observed from one farm to another and location to location. Data from a total of 350 tilapia aquaculture farms for the production period 2012-2013 were collected from north-central and south east region of Bangladesh. The average production is 10.6 tons per hectare. The study employed the stochastic frontier production function with flexible risk specifications. The empirical results show that the mean output is significantly influenced by feed, fertilizer and fingerlings. Fingerlings is found to be risk increasing input which revealed that increased usage of fingerlings increased the production risk in the study area. Feed, labour and fertilizer are found to be risk reducing inputs. This implies that an average risk-averse farmer is expected to use less of fingerlings and more feed, labour and fertilizer compared to a risk neutral farmer. Furthermore, the study shows that farmers age, education level, extension service, farming experience, training on technology practices, availability of credit from financial institutions are the determinants of technical inefficiency. The mean technical efficiency level of the farmers is 84%, which indicates, the farms operate 16% below the frontier production level. Fisheries extension service and easy access to credit are required for increase production. Ensuring quality feed and fingerlings at affordable price are very essential for increase production from current level. Key words: Aquaculture, Production risk, Technical efficiency

Keywords: Aquaculture, Production Risk, Technical Efficiency

The Impact of Community-Based Aquaculture on Poverty and Inequality: Evidence from Seasonal Floodplain Areas of Bangladesh

Atle Guttormsen, Md. Akhtaruzzaman Khan, A.B.M. Mahfuzul Haque, M.M. Dey

Abstract: Community-based natural resource management (CBNRM), used as a policy tool for reducing poverty and improving the livelihoods of poor communities, has become popular throughout the world, especially in developing countries. This paper explores the impact of a community-based aquaculture (CBA) system on household income, poverty, and inequality using a three-year panel of household-level data from Bangladesh. The results of our analysis suggest that the CBA management system significantly increases income from fish without any corresponding negative impact on income from other sources. The CBA system has a positive and significant impact on employment generation, but it also has an equalization effect on fish income and total household income inequality, i.e., CBA significantly reduces income inequality. Moreover, poverty analysis indicates that a CBA management system can reduce the incidence and depth of poverty in a common resource area.

Keywords: Community Based Management

Conversion from Rice to Fish Farm in Bangladesh: Efficiency and Productivity Perspectives

Atle Guttormsen, Md. Akhtaruzzaman Khan

Abstract: Bangladesh is a land scarce country with one of the highest population densities in the world. Agriculture occupies the largest share of the total land resources of the country. Rice is the main agricultural product and also most important staple food. Over the past two decades, however, many rice farmers have been converting land from rice to fish production. These trends raise a number of questions. Although the price of rice has increased in recent years, why are the farmers converting their land from rice to fish? And more importantly, are fish farmers operating efficiently after converting their land from rice to fish? We evaluate the causes of land conversion from rice to fish and the profit efficiency status of fish farmers after conversion of land and the causes of profit loss using cross sectional primary data collected from Mymensingh district in Bangladesh. Translog form of stochastic profit function is more dependable than that of Cobb-Douglas form under the farming condition in the study area. Profit efficiency scores suggest that most of the rice farmers are operating near frontier level and are operating in a range of decreasing returns to scale. Even higher input intensity is having a negative impact on their profitability, and farm size and profit efficiency are positively related. These may be the main causes of land conversion from rice to fish. On contrast, farmers who have converted land from rice to fish farming shows substantially higher variation in performance. But even with low levels of efficiency they are able to earn around four times profit of rice farmers. The regression results suggest that one percent increase in efficiency levels can contribute to overall profitability by two percent and profit inefficiency is decreasing in the coming years. Results also reveals that farmer's age, education, credit, extension service, training, years of land conversion, depth of water and water color can significantly reduce profit loss of fish farms. In the wake of these findings, greater role by the government in the form of technical training & advice and provision of credit is highly recommended for the farmers to adapt to the best practices being followed in the sector.

Keywords: Aquaculture

Economics of Trout Grow-out Systems - A qualitative Benchmarking of Typical Farms in Germany, Denmark and Turkey

Tobias Lasner, Rasmus Nielsen

Abstract: A precondition for thorough economic analyses of the competitiveness of the European aquaculture sector is the availability of reliable and comparable data, at best, economic performance data at farm level. However, data of aquaculture farms are most often not at hand. Moreover, Europe seems to have a lag of

knowledge concerning farm level economics in the freshwater aquaculture sector. One reason for the lack of good data might be that collecting surveys about economic performances of the aquaculture sector seems to be extremely burdensome, time-consuming and expensive compared to the economic importance of the sector. Thus, we promote a more qualitative and commensurate approach to the task of collecting economic data on aquaculture farms, which supplements current production data. In particular, where proper statistics and data are not available, a qualitative approach provides a good alternative. Based on focus groups with local trout farmers, consultants and researchers we define 'typical' trout farms in Germany, Denmark and Turkey as a pilot study. We used expert interviews as well as field observation to ground our farm datasets empirically. Following this procedure datasets about in- and outputs of typical farms are provided. One of the advantages of this approach is the reduction of costs for the collecting data, while the deep data analyses simultaneously lead to an enhanced understanding of farm economics. Our farm level benchmark focuses on cost-efficiency at the grow-out stage to make the production systems analyses international comparable. With one exception, our results show that all the investigated grow-out systems were profitable. The Turkish farms have the advantage of low wages, high withdrawal rates and exchange rate effects. The Danish farms are highly productive and German farms are able to take advantage of high prices at local niche markets. Our paper will further explain and discuss the potentials and limitation of using a data collection system based on "the typical production systems approach" in Europa.

Keywords: Aquaculture, Farm Economics, Benchmarking

4.45 - 6.00 pm

Room: **Gran Salone del Genovesi**

Special session (cont.) - Landing Obligation

chair **Erik Lindebo**

Modelling fishers' response to discard prevention strategies: the case of the North Sea saithe fishery

Sarah Simons, Ralf Döring, Axel Temming

Abstract: Designing effective management plans requires understanding fishers' behaviour under that plan, because fishers change their behaviour in response to economic and management incentives, which in turn will lead to different fishery outcomes. This study presents a modelling framework for management strategy evaluations which takes into account the response of fishers to management schemes. Based on the upcoming discard ban as part of the reformed Common Fisheries Policy, two discard prevention strategies were tested for the North Sea saithe fishery, where fleet segments have either no or a generally low quota for cod. Costs and benefits were assessed under the current management, a non-flexible system, where fleet segments had to stop fishing once the cod quota was reached and a flexible system where quota of saithe could be used to cover over-quota catch of cod at a ratio 1:5. The flexible scenario was beneficial both in protecting the North Sea saithe and cod stock and in increasing net profits of fleet segments in the long term. The avoidance behaviour of fleet segments to over-quota catch led to a high SSB level of saithe and cod in the long term, ensuring high long-term catches and profits. Although the non-flexible scenario seemed to be beneficial for the cod stock, it had a negative impact on the saithe stock, because mainly juvenile saithe before spawning were caught reducing the spawning-stock biomass in the longer term. A non-flexible scenario was costly in terms of up to 29% lower net profits for individual fleet segments generating little economic incentive to be compliant.

Keywords: Landing Obligation, Bioeconomics, Fleet Dynamics

BioEconomic Impact of Landing Obligation Policy in Spanish fleets Operating in Iberian Waters under a MSY long term management framework

Raúl Prelezo, Jose Castro, Santiago Cerviño Jose Maria DaRocha, Dorleta García, Paz Sampedro

Abstract: The landing obligation (LO) policy introduced in the last Common Fisheries policy Reform (CFP) is expected to have a major impact in the economic performance of the fishing fleets. The negative effects of the LO policy would be mitigated by changes in the selectivity of the fleets that would be achieved for example by technical changes in the gears or by the spatio-temporal redistribution of effort. In this study we have evaluated the economic impact of LO policy in the Spanish demersal fleet operating in the Iberian Sea region. We used a multistock and multifleet simulation model to combine the LO policy with a long term management plan based on the ICES MSY framework. We investigated the impact under two different fleet dynamics. In the simplest case the effort distribution among metiers was maintained constant along the simulation. In the second one we studied the adaptability through the redistribution of total effort along metiers according to a profit maximization strategy. In both approaches selection patterns, at metier level, were maintained constant. However in the second approach since the effort distribution along metiers varied, the overall selection pattern also changes. We found that the impact of LO is fleet dependent. Profits of trawlers and of vessels using hooks are always lower under LO policy. Profits of longliners are higher with LO in most of the years. The losses are higher in the short term but they do not disappear in the long run. On the other hand, the redistribution of effort according to a profit maximization strategy mitigates somewhat the economic loss in the LO policy scenarios. Finally we found that the quotas of pelagic stocks caught by the fleets (blue whiting, horse mackerel and mackerel) are greatly limiting the effort of the fleets and hence their fishing opportunities.

Keywords: Landing Obligation, Fleet Dynamics, Long Term Management

At Sea Simulation of the Operational and Economic Impacts of the Landing Obligation on Irish Demersal Fisheries

Richard Curtin, Ronan Cosgrove, Norman Graham, Sara-Jane Moore, Eoghan Kelly, and Michael Keatinge

Abstract: The Landing Obligation for demersal species will commence in 2016 in EU waters. The implementation of this regulation may impact fleet profitability by both increasing costs and reducing revenues. This study field tested operational and economic impacts of the LO in two demersal trawl fisheries in the Celtic Sea. Tactical alterations such as changes in fishing grounds assisted in reducing catches of undersize fish in a mixed demersal fishery but may also have led to reductions in catches of marketable fish and profitability. Utilisation of more selective gear greatly reduced catches of juvenile fish and prolonged fishing effort before choking occurred in a Nephrops fishery. Choke species are likely, however, to remain problematic in this fishery in other areas, and when catches of below minimum conservation reference size Nephrops are relatively high. Demonstration of major increases in economic returns under a likely quota uplift scenario in the Nephrops fishery highlights the importance of such measures in maintaining ongoing fleet economic viability in the face of major challenges posed by the LO.

Keywords: Selective Gear, Quota Uplift, Economic Viability

Effects of the EU CFP discard landing obligation analyzed with an ecosystem model for the Gulf of Trieste

Celić Igor, Simone Libralato, Cosimo Solidoro

Abstract: The introduction of the discard landing obligation (EU 1380/2013 and 1392/2014) in the reformed Common Fishery Policy has been heavily criticized for its possible overall negative impact on the ecosystem.

We utilized the Northern Adriatic Sea, characterized by multi-gear/multi-target fisheries typical of the Mediterranean Sea, as a case study to simulate the bio-economic effects of the discard landing obligation. The study area is the Gulf of Trieste, where approximately half of the landings is caught by high discard rate fisheries (more than 40% of the total catch is discarded) such as the rapido trawl, otter trawl, hydraulic dredge and to a less degree the mid-water pelagic trawl. An ecosystem model, representing dynamics from phytoplankton to top predators and fisheries, was used to evaluate the implications of the regulation by comparing scenarios with and without landing the discard. The bio-economic evaluation was done by estimating both the introduction of the added value of the marketed discard species and a long term variations of the biomasses of the target species and its effects on the revenues. The model can simulate the variation of the species' biomasses, and it allows to assess economic and ecologic indirect effects and trade-offs due to the application of the new regulation. Possible future integrations should evaluate further reduction of the fishing effort or/and an adoption of more selective fishing gears.

Keywords: Ecosystem Model, Fisheries Discard, Adriatic Sea

Mixed fisheries management: Can a ban on discarding promote more selective and fuel efficient fishing?

Jurgen Batsleer, Adriaan Rijnsdorp, Katell Hamon, Harriet van Overzee, Jan Jaap Poos

Abstract: We model the potential effects of a discard ban on the annual fishing strategy of individual fishers in a mixed fishery under quota management. The North Sea beam trawl fishery, which catches large amounts of undersized plaice, is used as a model system. Under a discard ban, fishing is restricted to the fishing grounds and weeks where a maximum revenue can be realised with other species while catching the quota of the restricted species with a reduced bycatch of undersized fish. If properly enforced, a discard ban provides an economic incentive towards the implementation of more selective fishing gears that catch fewer discards and are more fuel efficient (pulse trawl). If a discard ban is not properly enforced, restrictive quota do not necessarily result in the intended decrease in discarding as the fishery continues to fish while discarding the over-quota catch and least valuable size classes caught. A discard ban may even result in an increase in discarding.

Keywords: Landing Obligation, Beam Trawl, Pulse Trawl

Choked by the implementation

Raúl Prellezo, Jon Ruiz, Luis Arregi, Xabier Aboitiz

Abstract: Although the ecological and biological aim of the landing obligation is well appointed in the new Common Fisheries Policy (CFP), it can bump against practical implementation. We study the case of the Bay of Biscay, a highly productive system with fleets targeting multiple species (>25) with relatively high levels of discards (due to regulatory and economic reasons). The landing obligation implemented in the new CFP adds a new category, the so-called choke species, to the three types of catches clearly distinguished by these fleets: the target, the "by-catch" and the non-desired catches. We study the economic consequences of the implementation of the new landing obligation focusing on its practical implementation rather on attaining the objectives of it. For doing so the activity is analysed under a trip resolution, finding that the LO create-changes in the total income but also in the total costs by trip derived from landing costs, hold capacity and extra crew costs.

Keywords: Landing Obligation, Trip Resolution, Trawl Fishery

(14) parallel session - Best practices in aquaculture sector

chair **Maria Cozzolino**

Impact of a biomitigating aquaculture technology on production and environment: the case of integrated multi-trophic aquaculture (IMTA)

Duncan Knowler, Gregor Reid, Hossein Ayouqi

Abstract: Commercial aquaculture has experienced impressive growth over the past few decades. However, a number of social and environmental concerns have arisen, such as the release of excess nutrients in locations where these may lead to undesirable nutrient enrichment. Several production technologies have been devised to address this problem in particular. One such innovative solution is integrated multi-trophic aquaculture (IMTA), currently under investigation in Canada and elsewhere. IMTA is the placement of monocultures in close proximity so that they are connected by nutrient transfer through water. IMTA culture is intensive (as opposed to extensive), including species from different trophic levels as a means to target various waste streams. Clearly, economic analysis is critical to understanding IMTA's potential usefulness in the real world, yet virtually no studies to date have examined the economics of IMTA as opposed to its financial attractiveness (which ignores positive biomitigation externalities). A key question to be addressed by economic analysis is whether IMTA can reduce the nutrient contribution from finfish operations, and whether this results in part from reducing the volume of finfish production in the IMTA operation. To address these questions, we develop a bioeconomic model of a conventional finfish operation, using salmon farming in Canada to motivate the analysis. Subsequently, we extend the model to constitute an IMTA operation by adding extra terms associated with a second "extractive" species, including terms for the added revenues and costs, as well as an extra biomitigation term. We then assess the comparative production and environmental performance of IMTA versus a monoculture operation under an assumption of optimal management. Next, we consider a regulating authority that could impose a nutrient effluent tax on aquaculture operations to induce an optimal level of IMTA adoption and demonstrate what such a tax would look like. Finally, we extend this analysis to consider the often discussed notion of a "nutrient credit", a form of subsidy that parallels the concept of a carbon credit in the climate change literature.

Keywords: Sustainable Aquaculture, Eutrophication, Biomitigation

Cost structure and profitability of mussel aquaculture in Greece

Lamprakis Avdelas, Leonidas Papaharisis, Sofia Galinou-Mitsoudi

Abstract: Mussel aquaculture is being conducted for more than 50 years in Greece. Lately, production seems to deteriorate both in terms of quality and quantity, thus negatively affecting economic output. On top, there also exist some evidence of environmental degradation at least at the wider production area at northern Greece. Nevertheless there is only few research available on the costs and the profitability of the sector. The structure of the sector, which consists mainly of micro and small enterprises does not allow for data collection based on published annual balance sheets. To date, the basic variables available under the EU Data Collection Framework, namely annual production and number of production sites, does not allow for any economic analysis of the sector. In this paper, we briefly present the evolution of mussel aquaculture production in Greece mainly based on existing literature, we discuss the challenges presently faced by the sector and we present preliminary results on the cost structure and the profitability of Greek mussel aquaculture companies based in data from an ongoing survey in northern Greece.

Keywords: Mussel Aquaculture, Cost - Profitability, Greece

How to cope with mass mortality of bivalves? A few lessons drawn from several case studies around the world.

Sophie Pardo, Patrice Guillotreau, Alida Bundy, Sarah Cooley, Orfeo Defeo, Véronique Le Bihan

Abstract: In many parts of the world and particularly during the last decades, commercial (harvested or cultured) bivalves have been hit by mass mortality episodes due to climatic and/or anthropogenic stressors which are not always clearly understood in their causes and consequences. Such phenomena resulted in various responses from fishers or farmers. In the present study, several commercial shellfish from different parts of the world affected by mass mortalities were analyzed by the ADaPT (Assessment-Diagnosis-Appraisal & Typology) approach in order to assess collective and individual responses of the stakeholders (users, managers, states) to these events. We also assessed the impacts or consequences of these perturbations on the natural, social and governing systems. The comparative analysis provided a basis for the appraisal of adaptive responses and their likelihood of success by combining the characteristics of their natural, social and governance settings. Common stressors increasing the vulnerability of shellfish ecosystems to mass mortalities were identified (e.g., increasing sea surface temperature and salinity, nutrient-enriched waters, acidification), but cannot explain by themselves why social responses may succeed or fail to sustain the local farming or fishing industries. Social capital of the local communities and governability were key factors of resilience and adaptation to environmental changes affecting social-ecological marine systems.

Keywords: Mass Mortality, Bivalve, Adaptative Responses

Economic Optimization of Species Composition for Emission Neutral Offshore Aquaculture Production

Michael W. Ebeling

Abstract: This contribution aims to outline a model to determine economic optimal species composition of offshore aquaculture farms if the target is set to be emission neutral. Current research mainly focuses on local respective regional neutrality of emissions, in particular by creating IMTA concepts. Given this target the model is set up to find optimal solution in the trade off between economic yield and emission avoiding. Finfish aquaculture will be neutralized by mussel- or macro algae farming. Finfish are different concerning growth rates and feed conversion, so emissions from finfish facilities will vary by species. Extractive species like mussels and macro algae will be farmed in order to neutralize emissions of nitrogen and phosphor. Both also differ in terms of nutrition extraction from the water column. All, finfish, macro algae and mussels have different production costs and deliver different profits, maybe losses. This trade off between profits from finfish production compared to profits/losses of running mussel and macro algae facilities and the comparison between nutrition emission of the finfish facility with different efficiency in terms of nutrition extraction of mussels and algae is the central problem. By using biological and economic information, based on own research on economic feasibility of offshore aquaculture for costs and revenues, a first attempt to set up such a model will be presented. The results of such a model with concrete parameter values from the specific area will allow spatial planners and administrative bodies to identify economic efficient aquaculture species combination if the target is emission neutrality. This means e.g., that the use of potential space in exclusive economic zones for offshore mariculture, as recently calculated by FAO scholars, could be optimized. Of course, such a general model could finally run with all given emission targets.

Keywords: Aquaculture

9.00 - 11.00 am

Room: Gran Salone del Genovesi

(15) parallel session - Impact assessment of management plans and bio-economic models

chair **Ikerne Del Valle**

Mixed-fisheries management plans in the frame of the new CFP: challenges in addressing more numerous and less well-defined policy objectives in a regional ecosystem-based approach. Experiences from the North Sea.

Lars Olof Mortensen, Clara Ulrich, Ernesto Jardim, Steven Holmes, Alexander Kempf, Arina Motova, Anna Rindorf, Sarah Simons, Youen Vermard

Abstract: The 2013 CFP requires that multi-annual management plans are gradually implemented for all regulated fisheries resources in European waters, taking into account the various objectives of the CFP, including the MSY target, the ecosystem-approach and the landing obligation. At the same time, trilogue agreements between the Council of Ministers, the European Parliament and the European Commission have implied that point estimate-based harvest control rules as known from existing single-species management plans shall no more be used, and that management decisions shall only be based on a range of acceptable targets (Fmsy ranges). These new frames render the design and the evaluation of future management plans much more complex. Such a Multi-Annual Management Plan is to be established for the North Sea demersal fisheries in 2015 (NS-MAP). In this region, multiple species and fleets are interlinked through complex multi-species and mixed-fisheries interactions, and multiple management objectives are formulated. This paper presents the processes, challenges, trade-offs and evaluation outcomes linked to this plan, and discusses its added value compared to the present situation.

Keywords: Management Plan, Mixed-Fisheries, North Sea

A Bio-Economic Model of European Fisheries (BEMEF)

Griffin Carpenter, Aniol Esteban

Abstract: The Bio-Economic Model of European Fleets (BEMEF) analyses the socio-economic impacts of reaching maximum sustainable yield (MSY) in European fisheries. It is a multi-period static equilibrium model, using fish stock assessments and yields as exogenous variables to estimate the socio-economic impacts for fleets in future time periods. Using the most recent three years of fleet data (2010-2012), forecasts are made for 2013, 2014, 2015 and a long-term state of MSY. In total, BEMEF covers 263 fleets from 15 EU countries. Changes to model parameters are analysed over 150 total allowable catches from 25 main commercial species. As BEMEF is excel-based, much of model is adjustable, with explicit parameters for quota advice, fish price flexibility, fuel price forecasts, technological change, quota uptake and quota allocation. The four quota allocation scenarios distribute quota within a Member State based on historic share, fuel minimisation, effort minimisation or job maximisation. The results from these scenarios have been analysed and published in a report on the potential impacts on quota reallocation (forthcoming: February, 2015). A simplified web-based interface is available at www.fisheriesmodel.org and is designed to reach a diverse user base interested in fisheries management.

Keywords: Bio-Economic Model, Quota Allocation, MSY

Single species vs multispecies management when economic objectives are in place and transitional period considered. Case study of Iberian waters

Raúl Prellezo, Dorleta García, Jose Maria DaRocha, Maria Jose Gutierrez, Jose Castro, Santiago Cerviño, Paz Sampedro

Abstract: Management of fish stocks is biologically driven in the sense that MSYs have been set as targets for stocks. The current CFP has change the way in which management of European fish stocks has to be made. In principle the main change has to be done by a multiannual plan where single or multispecies characteristics have to be taken into account in a regional basis. The main setting of this management plans coming from the regulation and in fact from the regulators are the MSY level (or a range of them) and a deadline but not a path (that is a HCR) to reach the defined targets. The transition period is important given that the targets are defined by conventions. MSY has been set as a target or even as limit for stocks. Paths are extremely important, since what they do is to define the present sacrifice to obtain future potential benefits. When paths are considered three issues arise: Firstly given that the target is defined legally and without any economic considerations the economic logic could be included in the management procedure by using the Net present value as the main indicator of the performance of the path. The sum of the value of the landings can be considered from the current perspective, that is discounting the future values by a fixed discount rate. Secondly fleets as economic units have to be considered in an economic inclusive way. They have financial objectives, as well as economic incentives to react to the economic incentives in places set up by the managers. Finally management of stocks on multispecies fisheries does not affect fleets in the same manner. Fleets who share the exploitation of the same stock, have different technical characteristics, costs and landing profiles. It implies that any optimality (according to the NPV) of a path can be positive or not when a fleet by fleet analysis is performed. The objective is to compare how to manage a fishery from an economic perspective, when it is fleet based under two main approaches. Single species management and multispecies fisheries. In fact the main idea is to focus on the transitional period, that is, the objective of reaching MSY is still there, but we analyse how to reach to this MSY objective from a fleet by fleet perspective.

Keywords: Management Objectives, Transitional Period, MSY

The role of economics in the EU advisory process

Ralf Döring

Abstract: The Common Fisheries Policy (CFP) includes general environmental, social and economic objectives for fisheries management. The European Commission (EC) administers the CFP and develops proposals for regulations, including the yearly regulation on fishing opportunities (TAC and quotas). These regulations follow now the overall objective to reach the Maximum Sustainable Yield (MSY) at the latest in 2020. Although there is some room for interpretation what MSY really means, the economic objective 'viable fishing sector' is even more vague. Before preparing proposals for regulations the EC consults its advisory body the Scientific, Technical and Economic Committee for Fisheries (STECF). Within the STECF there are several economic expert working groups (on the economic data of the fishing fleets, fish processing industry and aquaculture) but economists are also taking part in multi-disciplinary groups on e.g. the implementation of the new landing obligations. The question, however, remains which influence the economic advise has. The data collection improved a lot following the STECF advise, it is hard to judge if advise on management strategies was taken up in the past (as member states and the parliament are taking decisions) and the impact assessments for long term management plans and other regulations are required but so far relatively little effect is visible that decisions were based on the outcome of impact assessments. In the paper I will explore the role of the economic advise by categorizing the work in data related reports, advise on management

strategies or impact assessments of long term management plans. Additionally I will raise some thoughts on and questions about the possible future role of economic advise.

Keywords: STECF, Economic Advise, Fisheries Management

9.00 -1 1.00 am

Room: Auditorium

(16) parallel session - Fishermen's behaviour, economic entrepreneurship in a changing environment

chair **Dario Pinello**

A Trip to Reach the Target? - The Labor Supply of Swedish Baltic Cod Fishermen

Cecilia Hammarlund

Abstract: Fishing offers a unique opportunity to investigate the relationship between incomes and labor supply, enabling the contradicting hypothesis of inter-temporal substitution and reference-dependence to be tested. The variation of working hours, depending on the length of a fishing trip, and variation in incomes, depending on the catch, is high as compared to other occupations. One way to handle the situation of highly variable incomes might be to set trip-specific revenue targets, i.e. to stop fishing when a certain revenue level has been reached. To investigate the revenue target hypothesis, the case of Swedish Baltic cod trawlers is used. The probability of returning to port after each haul is estimated and related to total revenue earned so far on the trip. The results indicate that fishermen on most vessels in the sample choose to continue a fishing trip if revenues are higher than expected. However, fishermen on smaller vessels act more in line with the revenue target hypothesis, i.e. higher revenues increase the probability to return to port.

Keywords: Labor Supply, Revenue Targeting, Stopping Model

Modelling Fisher Choice and Métier Dynamics: A novel application of Markov transitions

Sarah Davie, C oil n Minto, Rick Officer, Colm Lordan

Abstract: Detecting changes in fishing behaviour in response to external drivers and pressures is an important and expanding research area. Greater understanding of fisher behaviour can be used to improve the design and implementation of management initiatives. Improved understanding of fisher- and aggregated fleet behaviour can help to harmonise incentives with management objectives, and thus reduce errors in implementation and unintended outcomes (Fulton et al., 2011). A novel m tier-based bio-economic model of the Irish fleet is presented. Our approach integrates a m tier strategy through modelling transition probabilities between m tiers. These transitions are conditioned by detailed explanatory variables (including fuel costs, value, and quota drivers) and estimated within the lesser-utilised framework of Markov transition probabilities. To deal with the large number of transitions (big data), the model can be cast as a competing risks model, which applies a series of individual survival analyses models to represent the movement of vessels on a trip by trip basis from one state to another. These may then be combined to formulate the full Markov transition model. The predicted transition probability matrices can then be used to predict fisher m tier choice, based on a series of explanatory variables aimed at mimicking fishing decisions and drivers. High levels of fidelity observed within m tiers indicate that vessels have a preference to maintain the status quo. When m tier transitions do occur, the variables retained within the state to state transition survival models identify the important drivers behind the change. Diversity of retained variables implies m tier groups are affected by, and respond differently, to drivers and external pressures. The model enables prediction of spatial and temporal fishing effort distributions, in response to simulated effort re-distribution scenarios (e.g.: spatial and temporal closures; changes in fishing costs or revenues). Incorporation of this bio-economic fleet dynamics

model within management strategy evaluation frameworks will enable more accurate representation of the true fleet dynamics, and hence improve capacity to advise on the efficacy of prospective management actions that directly consider the economic influences on fisher behaviour.

Keywords: Bio-Economic Modelling, Markov Processes, Fisher Behaviour

Estimating to return to farming and fishing using a sibling approach

Johan Blomquist, Martin Nordin, Staffan Waldo

Abstract: In many professions children tend to choose the same occupation as their fathers, e.g. doctors, lawyers and self-employed. This is also the case in agriculture and fishing, where the decision of becoming a farmer or a fisher is closely tied to farm and vessel succession. However, in Sweden, as in many other countries, low inflow of young workers is causing an increasingly adverse age structure. This is particularly evident in fishing where the average age is well above fifty years, and the low inflow of young workers is seen as a major challenge to the industry. Low returns to farming and fishing is plausibly the most important factor causing the low inflow. Traditional wage regressions reveal that incomes are significantly lower in these occupations. However, standard wage regressions face the difficulty of controlling for self-selection problems. That is, the probability becoming a farmer/fisher is closely tied to perceived future income possibilities. We may therefore expect that only youths who anticipate high income of farming/fishing will choose to follow their parents' footsteps. This in turn implies that the income difference between farmers (fishers) and others are not representative of the true income potentials facing children of farmers/fishers. With this background in mind, the current paper has a twofold aim: i) explore the intergenerational transmission of farming and fishing, and ii) estimate the returns to farming and fishing in a sibling comparison framework. That is, by comparing the labour market returns of siblings raised in farmer/fisher families, we are able to account for farming/fishing characteristics that are specific for each farming/fishing family and that influence future income possibilities. To accomplish this, we use a rich dataset containing information on the entire farmer and fisher population in Sweden, their family ties (parent-child, siblings and spouses) and register labour market data we contribute with central findings on two important topics where the knowledge is still scarce.

Keywords: Intergenerational Mobility

Does profit maximisation drive the choice of fishing métier in Welsh fisheries?

Giulia Cambiè, Julia Pantin, Harriet Salomonsen, Michel J. Kaiser

Abstract: Prediction of the response of fishers to regulations requires an understanding of the behavioural drivers associated with different fishing métiers. Here we study the effect of the seasonality of target species, fishing location and daily costs on métier use for multi-species multi-gear fisheries in Welsh waters (UK). Technical characteristics, cost structure and landings of target species of 56 fishing vessels were obtained from interviews with vessel owners during 2013. Interviews were focused on the most representative small scale (vessel length < 10 m) and medium scale (vessel length \geq 10 m) segments of the Welsh fleet from a socio-economic perspective. To identify the fishing métiers used by the fleet we carried out a hierarchical cluster analysis based on the catch profile per boat. A multiple correspondence analysis (MCA) was then applied to explore how métiers use varied between months and fishing area (North, Mid and South Wales). Finally, we assessed how the increase in diversity of fishing tactics can affect the economic performance within a fleet segment. A total of 18 métiers were identified for the studied fleet. The MCA showed that 51% of the annual variation in the use of the métiers was explained by the seasonality of the target species and the fishing area. A quantile regression analysis showed that the daily costs decreased with the number of métiers used. This result can explain the upward trend in the number of métiers used by vessels characterised by a marginal economic position. However, this also implies that using multiple métiers decreases the maximum daily incomes and thus the increasing diversity of the fishing tactics can lead to a decrease in the maximum

expected profit. Our results suggest that profit maximization is not always the main driver in defining fishing métier use. Maximization of catch weight by targeting different species when they are more abundant and the reduction of daily costs are often the main objectives when increasing diversity of the fishing tactics.

Keywords: Métier, Fishing Tactics, Wales

The Pulse Beam Trawl in the North Sea Brown Shrimp Fishery - does it pay off?

Jörg Berkenhagen, Daniel Stepputtis, Petr Zajicek

Abstract: The Pulse beam trawl used in brown shrimp fisheries is a fishing device which uses electric pulses (instead of a ground rope with bobbins used with traditional devices) to startle shrimp. In response, they jump off ground and can be caught by the net. The pulse beam trawl aims at reducing unwanted bycatch and towing resistance. Consequently, it aims at reducing fuel consumption and the impact on fauna and seabed. We performed a catch comparison for a consecutive period of 13 months onboard a shrimp beam trawler (more than 900 hauls) which was equipped with both a traditional and a pulse beam trawl. The influence of the alternative fishing technique on the total value of the catches and on fuel consumption was determined and compared with estimated additional costs for investment and maintenance. Landings weight was 7% higher and value was 8% higher for the pulse technique. Estimates for additional annual costs for the pulse technology summed to about 15.000 €. Fuel savings were estimated at 10%. Whether the investment pays off or not is largely dependent on the prices for fuel and for brown shrimp. Some scenarios using a range of typical catch quantities and fuel costs indicate that break-even is likely to be achieved. An additional effect reflecting a reduction of bycatch and seabed impact cannot be directly expressed in monetary terms. However, in the context of the ongoing discussion about negative impacts of beam trawling on the environment any reduction can be regarded as a major asset.

Keywords: Pulse Beam Trawl, Investment, Selectivity, Brown Shrimp Fishery

9.00 - 11.00 am

Room: Sala Gatto

(17) parallel session - Rights-based management approaches

chair **Birgir Runolfsson**

Hand in hand: Using discretionary policies to mitigate some of the perceived negative effects of the Icelandic ITQ system

Sveinn Agnarsson, Vifill Karlsson

Abstract: The Icelandic fisheries have since 1990 almost exclusively been managed by a system of individually transferable quotas (ITQ). Although the system has, as expected, had many positive effects on economic performance and fleet size, the almost complete transferability of quotas has been criticised for the perceived effect the transfers and associated quota concentration have had on economic activity in individual communities. In addition, natural variations in stock size and catches of certain species, mainly crustaceans, have weakened regions which cannot compete in the quota market for other species. In order to mitigate these perceived effects, Icelandic authorities have since 1995 allocated a certain small amount of quotas to disadvantaged communities. Using panel data on 82 different localities over the period 2005-14, we analyse the local impact these discretionary allocations have had on harvesting and processing, in particular the relationship between quota allocations on the one hand and landings, catches of vessels registered in the relevant communities and processed catches on the other. In all three cases we find a negative relationship, implying that the allocation on quota has had negligible effect on the local fisheries sectors. These preliminary results for the most disadvantaged communities are confirmed using regression analysis, where we analyse the

effects the quota allocations and other discretionary options have had on processing, landings and catches. We conclude that great care should be taken in designing and implementing policies aimed at addressing local situations as they may not always have the expected impact.

Keywords: Fisheries Management, Discretionary Allocation, Disadvantaged Communities

Structure and main characteristics of the Icelandic Fishing Industry

Olafur Klemensson, Ogmundur Knutsson

Abstract: This study maps the structural and organisational changes in the Icelandic fishing industry in the last two decades. The background is the radical changes in the structure of fishing activities, production/processing and in the export and marketing activities in Icelandic fishing industry. The main characteristics of the fisheries sector have changed from being a centralised/ regulated and alliance-based structure to a deregulated, diversified and a vertical integrated structure. The study will address the changes in the structure/organisation in the fishing sector and in the companies and the development of the value chain in the Icelandic fishing industry. The main forces of these changes have been identified as the four main pillars of competitive advantages of the Icelandic fishing industry. These are 1) The fishing management system in Iceland, 2) Fish auction markets, 3) Structure/organisation and governance of the value chain, 4) Entrepreneurial and innovative culture. The methodology is built on the analysis of organisational theory and on statistical analysis and micro-economic assessment. The value chain is described and analysed for selected major types of products according to the relative share of each of these products in the total production of seafood. And lastly, the economic performance of the Icelandic fishing industry (fishing and processing) will be addressed vis-à-vis the Norwegian fishing industry and the EU fleet performance. **Keywords:** Icelandic fish industry, fishery management, fish auctions, structural/organisational changes, value-chain analysis, strategic group mapping, innovations. **Keywords:** Icelandic fish industry, fishery management, fish auctions, structural/organisational changes, value-chain analysis, strategic group mapping, innovations.

Keywords: Structural/Organisational, Fishery Management, Strategic Group Mapping

The Icelandic lump sucker fishery as a Responsive Fisheries Management System

Sveinn Agnarsson, Jonas R. Vidarsson, Sigridur Sigurdardottir

Abstract: The term Responsive Fisheries Management System (RFMS) was developed within the EU financed FP7 project EcoFishMan that came to an end in 2014. RFMS is founded on results-based management (RBM) principles, and is defined as an ecosystem-based sustainable management system under a precautionary framework that eliminates discards and maintain economic and social viability. The RFMS comprises three defining features: authorities define measurable objectives for the utilization of fisheries resources; resource users are made responsible for achieving these objectives; users provide documentation that allows for an audit of the extent to which the objectives are met. The Icelandic lump sucker fishery is a small-scale, seasonal fishery which is managed in close cooperation with fisherman by a combination of licensure, effort and gear restrictions. Because of its simplicity, the lump sucker fishery was used as one of the case studies within the EcoFishMan project, where the authorities, operators and assessors took part in implementing the RFMS under a hypothetical scenario. The key management objectives were set as sustainable and profitable utilisation of the lump fish stock which would strengthen employment and settlement in the country. Accordingly, two outcome targets were set; relative fishing mortality should not exceed 0.75 and fishing pressure, as measured by the relative number of fishing licenses in each fishing area, should fluctuate no more than it has done in recent years. In this paper we discuss the management regime used in the lump sucker fishery in the past, analyse the RFMS developed for that fishery in close consultation with the fishermen involved and set out the

main difficulties encountered in implementing the new system.

Keywords: Responsive Fisheries Management, Stakeholder Consultation, Sustainability

ITQ Ownership in the Netherlands, developments during two decades

Hans van Oostenbrugge, Katell Hamon, Mike Turenhout

Abstract: The Netherlands has the eldest ITQ system in the EU, originating in the early 1990's. For all main species, fishing rights can be traded and leased. In theory the introduction of tradable fishing rights could lead to an increasingly efficient and prosperous fishery as the more economically efficient fishers can lease in most fishing rights. Examples of such development after the introduction of ITQs can be found all around the world. In the Netherlands, however, the number of fishing companies has shown a limited decrease and net profits have remained low for the last decades. This empirical study investigates the developments in ownership and use of ITQs of plaice and sole in the Netherlands in the period from 2001 onwards based on detailed information on ITQs. It shows that ITQs have been concentrated and over the last few years this concentration is increasing. Moreover, comparison with catch data show that over the last few years there is an increasing imbalance between ITQ ownership and use and a growing part of the total ITQs are used for leasing and not for own use. Together with information on the lease prices it links the developments in quota ownership to the economic performance of the sector and raises the discussion about effectiveness of the system and the effects of the legislative, management and cultural context on the developments in quota ownership in the fishery.

Keywords: Itqs, Management, Business Economics

The fishery management: bottom-up approach (the role of stakeholders)

Alagie Sillah

Abstract: State control over the use of natural resources has never been a thing of the past until recently when it was realized that communities have more say over what type of projects suits them, unlike the the past, when projects were imposed on them. Overtime, those kind of projects brought them tremendous losses and by extension, to the entire country, for the simple reason of taking the up-bottom approach. Despite bringing development efforts to their doorsteps, on the contrary, were not relevant to their development aspirations and as a result, most of those efforts ended up being white elephants. It was at this point in time when dialogue between communities and decision makers became a necessity as it became clearer that a particular kind of project suitable for one community may not necessarily be suitable for another community, hence the difference in nature e.g. social, cultural, ecological etc. Regulations came into being that before projects are implemented for communities they are meant for, they must first be consulted through dialogue and they must further be involved at management level which was later referred to as co-management. As bottom-up approach is one that works from the grass-roots, which is from a larger number of people working together causing a decision to arise from their popular majority. Therefore, communities would now have to incept projects that suit their development aspirations. ROLE OF STAKEHOLDERS In the fisheries sector, local ecological knowledge contributed immensely in the areas of policy change affecting programs and project regulationS. This effectively assisted in both horizontal and vertical communications referring to fisheries policies in management measures as conservation. In no small measure, addressed the issue of catch shares in any identified fishery. Advocacy for policy reforms is a tool that they should be used as it belongs to them. Monitoring, control and surveillance through auto-regulation will help in the enforcement of the regulations.

Keywords: Approach, Community, Project

11.30 am - 1.30 pm

Room: Gran Salone del Genovesi

Plenary session 3 - Economic advice for the Common Fisheries Policy: catching up with biological advice

chair **Ralf Döring**

Governance of Marine Fisheries and Biodiversity Conservation

Anthony Charles, Jake Rice

Abstract: The classic interaction between the use of Nature and the protection of Nature has a very long history. This paper explores such an interaction, specifically in regard to fisheries and marine biodiversity conservation. Decision-making over fisheries and over biodiversity may be seen as constituting two potential 'streams' of governance, flowing through global governance, including United Nations fora, through nations of the world (e.g. interactions of environmental and fisheries agencies), and in thousands of coastal communities. Coming from common roots, the governance 'streams' have evolved over the years, producing legislation, policy and management plans, affecting economies, ecosystems and societies, and generating passions and conflicts. There has been an increasing intensity of interactions, and similarities that have grown through externally driven convergence and interactive coevolution. This paper examines the dynamics of these changes, and possible limits to integration related to risk tolerances and core beliefs, by exploring impacts of the governance streams on the commons, at multiple scales from local to global. Case studies are drawn from a new book on the governance of marine fisheries and biodiversity conservation, which examines the interaction of the governance streams across multiple fishery types, geographical regions, governmental levels and disciplinary perspectives. The cases include small-scale fisheries, small island developing states, regional management bodies, and global institutions. From these cases, it is clear that the more differentiated the processes of decision-making about fisheries and about biodiversity, the freer the streams are to follow different pathways to different places, but the more interrelated the problems those streams try to address, the more opportunities for conflict arise if the streams are following different pathways to different places. Ultimately, it is concluded that while total overlap of the two governance streams may be unlikely, and even undesirable, avenues to productive integration in the future may be of benefit to many commons globally.

Keywords: Fisheries Governance, Biodiversity Governance, Decision-Making

2.30 - 4.00 pm

Room: Gran Salone del Genovesi

(18) parallel session - Impact assessment of management plans and bio-economic models -

chair **Ralf Döring**

Assessing the socio - economic effects of the individual fishing rights managed in a common pool: the case of Bluefin tuna.

Margarita Andrés, Arantza Murillas

Abstract: The eastern Atlantic and Mediterranean bluefin tuna (BFT) stock has been overfishing in the last decades. At the 2006 annual meeting of the International Commission for the Conservation of Atlantic Tunas, a 15-year recovery plan was agreed. This plan consists in a set of effective control measures to ensure the respect of the management measures such as TAC and quotas. In Spain, the individual quota of BFT was implemented in 2008. Spanish Government allocates its shares of the TACs to the fishing fleets concerned; allocation is done on an individual vessel basis. In the case of the Basque purse seiner fleet, the BFT indivi-

dual rights (managed by the cofradia under the producer organization umbrella) are pooled and then the fishing rights are distributed homogeneously among all vessels. The introduction of a common pool of the fishing rights system has been simulated to analyse its impact in ecological, economic and social terms in the Basque Purse seine fleet. Within the simulation, three scenarios have been considered: (i) fish their own quota, (ii) temporal transferability of the fishing rights and (iii) definitive transfer of the fishing rights. In the simulation phase the Fishrent bio-economic model has been applied to produce a quantitative assessment. Using simulation results, different indicators covering a variety of criteria have been evaluated following the EU guidelines on impact assessment. In particular, effectiveness and efficiency of the individual right system in relation to the objectives of the management measure; coherence of the fishing rights with overarching objectives, compliance of the fishermen with the fishing rights regulation and, finally, the acceptability of this management measure. The main effect of the implementation of individual rights managed in a common pool leads to a rent homogeneously allocated. Obviously, there are boat owners who lose while others win. One advantage of the common pooling is the greater bargaining power when selling fishing rights. So much so that selling the individual rights is the most profitable option, fulfils with the most of fixed objectives, it is accepted by stakeholders and it is the most efficient option; but the reduction of overcapacity might not occur.

Keywords: Impact Assessment, Individual Rights, Common Pool

Differences between impact assessment methodology for data rich and data poor fisheries. Suggestions for improvement.

Leyre Goñi

Abstract: Under the FP7 SOCIOEC research project we analysed the impact of different management measures of the new Common Fisheries Policy across several EU and non EU case studies. One of the case studies involved evaluating the social and economic impact of a marine protected area on a small scale fishery segment in the Baltic coast of Germany. This case presented several challenges due to the lack of data typical of this type of segment. In addition to the lack of data, the small size of the segment and the characteristics of the marine protected area management measures (including closed areas and effort restrictions) made it predictable that any impact on the fishery would be particularly important in social and economic terms for the community affected given its vulnerability, which made the analysis even more relevant. Even though first best solutions (as bio-economic modelling) were not accessible due to lack of data (no VMS and logbook data lacking enough spatial definition, limited effort data) this case shows that ancillary sources of data (data from a reduced panel, funding schemes data) can still be used and complemented with qualitative information from the fishermen and fishermen representatives. This information can then be elaborated and analysed using simple methods, as calculating lower and upper bounds for economic or social sustainability and drafting simple system dynamics diagrams. Qualitative data from interviews and focus groups can serve not only to sharpen the lower definition quantitative data, but also to provide insights on further aspects influencing the impact of the management measure, as the compatibility of objectives and incentives of different groups of stakeholders. This type of methodology contrasts with others more based on economic and social indicators (as those based on data from the DCF) but are nevertheless adapted to obtaining useful results for smaller scale problems. We believe they could be further implemented in other similar contexts of data poor areas e.g. in the Mediterranean.

Keywords: Data Poor, Small Scale Fisheries, MPA

Impact assessment methodology as a part of fisheries management

Loretta Malvarosa, Arina Motova, Ralf Döring, Arantza Murillas, Leyre Goñi, Claire Macher, Sigríd Leutha, Rasmus Nielsen, Gunnar Araldson, Paolo Accadia

Abstract: Socio economic effects of management measures of the future CFP (SOCIOEC) project started

in 2012 and included 25 partners from 12 countries. The main aim of the project was to assess new management options of the CFP and improve methodology of the Impact Assessment (IA). The project covered several major research areas, affecting decision making process in fisheries: definition of fisheries management objectives, possible incentives and behavior of the sector under different management options, government structure and stakeholder's involvement, IA of different management options. Most of the work is done on the case studies level, covering almost all major EU fishing regions and fisheries, what allowed taking into account particularities of different management options implemented in the EU. The aim of this presentation is to provide synthesized overview of the major results of the project, showing the importance of each SOCIOEC research area and its contribution to the decision making process. Special attention will be given to the improvement of the IA methodology, which following sustainability impact assessment concept in fishery includes not only integrated analysis of three sustainability dimensions, but also considering the "soft" form of analysis and stakeholders involvement as part of the impact assessment process in fisheries. The rating methodology developed under the SOCIOEC provides possibility to assess the results of different policy options in terms of acceptability, effectiveness, coherence and efficiency.

Keywords: Impact assessment, Fishery Management, Qualitative Analysis

2.30 - 4.00 pm

Room: **Auditorium**

(19) parallel session - Community-led coastal development and the relationships between human activities and ecosystem services

chair **Jarno Virtaneen**

Community-led coastal development and the relationships between human activities and ecosystem services

Luca Mulazzani, Roberta Trevisi, Rosa Manrique, Giulio Malorgio

Abstract: Social and ecological dimensions of fisheries are strictly related with the sustainable development of coastal communities, and this connection is increasingly accepted by the Common Fishery Policy. According to the objectives of new Regulation No 1380/2013, the Common Fishery Policy should contribute to a fair standard of living for small-scale fisheries. Furthermore, it is recognised that an ecosystem-based approach to fisheries management needs to be implemented, taking into account of fishing and other human activities, while preserving the biological processes necessary to safeguard the habitats of the ecosystem affected. On the other hand, the European Maritime and Fisheries Fund, with Regulation No 508/2014, supports the sustainable development of fisheries areas following a community-led local development approach, in order to maximise the participation of fishery sectors, and to ensure that local communities fully exploit and benefit from the opportunities offered by maritime and coastal development. This includes the possibility of diversification of the income of fishers through the development of complementary activities. Under this context, it looks important to analyse the relationships existing between coastal and maritime human activities, including fisheries, and ecosystem services. Most of coastal and maritime activities are in fact supported by a flow of ecosystem services. On the other hand, climate change, feedbacks from coastal and maritime activities, and exogenous outputs from other human activities can affect the stock of natural capital and the flow of ecosystem services (including their value), with consequences on related economic activities. This, in the long-run, can lead to different behaviours of stakeholders (e.g. fishers), including the diversification of activities. This study presents a theoretical framework for the analysis of the relationships between human activities and ecosystem services in coastal and marine environments. Furthermore, a case study is developed in three small-scale fishery communities of Apulia region (South of Italy). The opinion of a sample of local

stakeholder about the state of the environment, the causes of its changes and the consequences on human activities and fishers' behaviour is collected through a survey including participative meetings and personal questionnaires, and then analysed through a Bayesian network approach. In addition to their importance for the collection of data, the participation of stakeholders in similar studies is essential to increase the collaboration with scientists and for empowering small-scale fishing communities about their role and opportunities in the coastal and marine environment.

Keywords: Ecosystem Services, Local Development, Small-Scale Fisheries

Local fishing communities and nature based tourism

Alberto Ansuategi, Duncan Knowler Tobias Schwoerer Salvador Garcia-Martinez

Abstract: Nature-based tourism is often advocated as a desirable conservation strategy for small-scale fishing communities as it gives local people motivation to protect the wildlife and ecosystems that attract visitors, while benefiting the community. However, valuation of environmental inputs in nature-based tourism (e.g. charismatic species, scenic amenities, etc.) needs to be done correctly. Often, there are opportunity costs involved that are not counted, so that determining the value of the environmental inputs to local communities may be more complex than simpler calculations might indicate. For example, in communities where participants in a local seasonal whale watching industry also fish, they must decide if and when to switch from fishing to whale watching and in doing so must accept implicit tradeoffs. We model whales as an input to the production of wildlife viewing trips, but recognize that this occurs within a community dependent on a year round fishery. Standard theory suggests that THE industry will switch from fishing to whale watching each year when whale watching becomes marginally more profitable than fishing, including switching costs. We assume that both whale watching and fishing are managed by a social planner who is concerned with total community welfare, comprising income from both activities. We formulate a model for shrimp fishing and whale watching within a dynamic optimization framework that maximizes community income. However, the two activities occur in sequence and the switching point is determined endogenously. In addition, both activities involve inputs that are subject to control. As a result, we employ a two phase switching optimization procedure. After presenting the optimization problem, we demonstrate the necessary conditions to solve it and derive the value of a marginal whale to the local communities as well as other management options. As a case study, we use gray whale watching in the small coastal communities of the Bahia Magdalena lagoon complex in Baja, Mexico.

Keywords: Fishing Communities, Whale Watching, Management

Economics of German Inland Fisheries

Michael W. Ebeling

Abstract: Inland fisheries is currently not part of the Data Collection Framework of the EU, but it is receiving subsidies from the European Union. Marine aquaculture has become part of the DCF during the last revision and it is discussed to integrate freshwater aquaculture into the new Data Collection System (DC-MAP). Concerning the inland fisheries no deep analysis about the economics has been undertaken so far, at least in Germany. The author has investigated the economics of the inland fisheries in the German state Brandenburg during the last 2 years, which is one of the main players in this field, together with a biologist from the institute of inland fisheries in Brandenburg. Data about the economic performance were collected together with data on the catch composition and the main processing and marketing activities of the companies. Results show the problems of the sector and the importance of subsidies under the EMFF and from other sources. Eel is identified as the most important species and the in-depth analysis also shows the relevance of income from other sources than fisheries, like gastronomy and fees from recreational fishermen. This contribution aims to present the detailed analysed data from the inland fisheries in Brandenburg and will discuss policy implica-

tion, like the impact of eel management measures on this segment. Additionally possibilities and constraints of future data collection in this sector will be discussed as well.

A New Approach in Shark Fisheries Concertation: Experimental Field Study in Colombian EasternTropical Pacific Ocean (ETP)

Cecile Brigaudeau, Juan Camilo Cardenas, Cesar Mantillo Ribero

Abstract: The pelagic thresher shark (*Alopias pelagicus*) is one of the largest and most abundant open ocean predators in the Eastern Tropical Pacific (ETP), and one of the most exploited sharks in the sub-region. *A. pelagicus* has been classified as Vulnerable on the IUCN Red List since 2004. Since 1994, there have been a progressive reduction of the landed volumes and the average size of captures. This information is a serious concern; given the number of people who depends on fishing in this area and the ecological repercussions linked to top elasmobranchs decrease. Officially, *Alopias pelagicus* is only a by-catch, but some surveys have shown that vessels target this specie during a period. Des Requins et des Hommes, with the Malpelo's Foundation and the Ministry of Fisheries of Colombia (AUNAP), had created in 2012 the COLSHARK program to study this specie. Four axes of research have been developed: tagging sessions to understand movement patterns, genetic analysis to know the population, an observers network to have more information and fishermen concertation to elaborate collaborative conservation plan. This presentation will report the results from a pilot experiment in Buenaventura and Tumaco, Colombia, using an economic experiment adapted from Cardenas et.al. 2012. The sessions were conducted with two groups of forty fishermen each in the Pacific coast of Colombia. This game was designed to emulate the incentives and context of the tragedy of the commons and why the individual and group incentives diverge. We have choosed an economic experiment that involves a dynamic stock of a renewable resource, and use real monetary incentives to test the behavioural response by the participants to the availability or absence of information about the state of the resource stock. The results suggest that not providing information about the stock of the common-pool resource, in the absence of self-governed institutional arrangements may accelerate the tragedy of the commons. However, the possibility of self-governed solutions through a group face-to-face conversation is capable of slowing down the exploitation of the resource, particularly when the information about the resource stock is not available to the players. These results reiterate the well-known finding that self-governance can be effective in managing common-pool resources.

Keywords: Economical Games, Fishery, Self-Governance

2.30 - 4.00 pm

Room: Sala Gatto

(20) parallel session - Markets and marketing of fish products

chair **Jordi Guillen**

Seaweed consumption in France: which market tools for which consumer?

Sterenn Lucas, Stéphane Guoin, Marie Lesueur, Quentin Lebras

Abstract: The seaweed industry is a sector in expansion and production outlet is an important fact to look at. One of the possible outlets is the edible seaweed market for French consumers. If this is still a niche market, the increasing popularity of Japanese food in France, brings consumers to discover new product containing seaweed, and thus highlighting this product. But where are we up to seaweed consumption in France? What market tools can bring consumer to new and more sustainable products as seaweed? The data used to highlight seaweed consumption patterns come from a survey we carried out between June and July 2013 in France

in the framework of IDEALG project (ANR-10-BTBR-04). The purpose of this survey was to investigate French consumer perception of, and purchase intentions for, edible seaweed products. The database includes 825 questionnaires completed in face-to-face interviews. Thus, if 57,82% of French are seaweed consumers, 42,56% among them consume seaweed only through Japanese products as sushi-maki, and the consumption frequency still remains weak. We can then distinguish two types of consumers: the "All products" consumers (consumers A) and the "Japanese products" ones (consumers J). Using multinomial probit model, we highlight some distinguish characteristics between non consumers and the two type of consumers. We find that if there is some similarity between the two types of consumers, some distinction can be useful in order to favour this consumption. Indeed, if consumers J and A are younger than non-consumers and more curious towards food in general, food choice criteria differ. Furthermore, the connection with seafood is stronger for consumers A. Concerning the market tools, it seems that consumers J and A don't have the same expectation. Using a multinomial probit model with random intercept, we analyse the demand for four types of labels for seaweed products: an environmental label, guaranteeing sustainable seaweed products, a quality label, guaranteeing constant quality seaweed products, a health label, guaranteeing no toxic substances in seaweed products, and a fair trade label, guaranteeing decent working conditions. We also proposed the possibility to choose no label. The mains results show that the probability to choose environmental and fair trade label is higher for the consumers A, while consumers J don't distinguish themselves from non-consumers in terms of labels preferences. The perceived images of label as expensive products lead people who pay strong attention to the price to remain sceptics in regard of any label. High income favours the choice of health label. Another interesting result is that individual preferring seaweed-growing, instead of wild seaweed, have a higher probability to choose any label. We can supposed that consumer in favour of cultivated seaweed can see through label a way to reinforced confidence in seaweed, despite a process view as less natural that for wild seaweed. Nonetheless, this result needs further analyses. As the term seaweed is not always well perceived for food, others names for commercial use (e.g sea vegetable) have been proposed to consumers and non-consumers. Overall, this paper allows us to profile seaweed consumers, and to have a better knowledge on the market possibility for this seafood product. Furthermore, we underline that efficient politics of labelization needs to be conducted depending on the type of consumers.

Keywords: Seaweed, Consumer Behavior, Label

How to reconceptualized efficiency the marketing of seafood products?

Stephane Guin, Sterenn Lucas, Carole Ropars, Marie Lesueur, Dimitry Fasquel

Abstract: Address new developments in consumer behavior, the seafood marketing must adapt by bringing more products to services, better dramatization, recourse to new advertising and promotional tools ... The offer must not just adapt to situational constraints shoppers (buyers), but rethink its consumer units. The idea is to reconceptualize the seafood by matching an offer themed. Currently, seafood products are divided into four universes in outlets, retailers or artisanal fishmongers: fresh deli, frozen, canned. These four universes are competitors when they should be complementary. It is the manufacturing technology and packaging that determine the supply of these universes. By answering the moments of consumption, considered situational, it is possible to break out the categories and, therefore, to build a universe categorical dynamic, more consistent for consumers. Indeed, the fresh seafoods universe focus its marketing on the species, the shape and type of cut (fillet, steak ...). Enhancement and product development are forward mainly by the promotion. The deli defines its offer on two product categories: surimi and salmon. The canned universe segments its offer around tuna, sardines and mackerel. Finally, frozen universe highlights shrimp and scallops Jacques. The objective of the program COGEPECHE is to conceptualize the world of seafood to better promote this sector in meeting consumer expectations moment of consumption. A new division of the offer, based on "the need for units" allows us to offer commercial solutions for every consumer need. Creating consumer world is

reflected in the reunification of all segments of the seafood (fresh, catering, canned, frozen) around the same dedicated space. This organization allows consumers to have a structured, clear and consistent supply in the same catchment area. The purpose of this re-conceptualization of the universe of seafood is to change how to market them. This offer is based on the principle of the "situation-function" more effectively respond to reasoned purchases (more respectful of the seasons ...), structured and thoughtful, rather than opportunistic purchases based on promotion. This article presents the results of the program COGEPECHE from qualitative studies with expert: fishmongers, professional organization, fishmongers, manufacturers, department managers (Delphi method). Three expert workshops conducted in three French cities have raised their opinions and recommendations, and to propose new universe of consumption patterns, more realistic, responding better to the French way of life. Three patterns of new concepts are presented in this article, which emphasize the role of buying motives based on the affective behaviors, the dramatization, the role of loyalty and consistency of supply. The first part of this article presents the business strategies of different French retailers. The second part proposes new reconceptualization concept of seafood products and the third part gives the main recommendation to sell most efficiency seafood products in retails and fishmongers

Keywords: Marketing Seafood Product, Universe Of Consumption, Reconceptualization

Demand for Animal Protein in Norway

Pei Liu, Ragnar Tveterås, Kristin Lien

Abstract: In this paper we study the relationships between animal protein (fish, poultry, red meat) consumptions of households in Norway for the years 2000-2011, a period with substantial changes in meat consumption patterns. We proceed from traditional analysis by adding additional demographic factors that may play a role consumer consumption. The most interesting results turns out to be cat ownership and primary grocery chain option variables. Food consumption in households are often determined by the key household factors such as household size, number of children gross income, education, age, and etc., product innovations in recent years adjusted consumer preferences where convenience and availability become definite roles in food selection. Food consumption choices in households are often determined by the preferences of all the members in a family, and as the bond between the owners and their pets grow stronger, the animals' diet is closely linked to the owners'. Having the convenience of purchasing seafood that can be consumed by both parties, households may opt for this healthier animal protein rather than the traditional red meat. Hence, we look into cat ownership for a relationship with healthier food choices. Furthermore, consumers may differ in their preferences if the availability of their primary meat choice is present at the grocery of their convenience. We estimate AIDS models using the Laspeyres price index with separate equations for 3 animal protein sources; fish, poultry and red meat. Using a decade long Norwegian data set, we study the effects of different combination of household factors – households with and without cats, households with different primary grocery chains - on different animal protein choices. We also control for demographic and socioeconomic factors of the grocery manager and household. Seafood is beneficial for human health, hence it is useful for the seafood industry look for any new or overlooked determinants of fish product consumption in addition to the dominate factors and obvious price and expenditure elasticities.

Keywords: Seafood Demand, Aids Model

The sustainability of the Sicilian seafood chain: Innovation, organizational models and value chain

Gioacchino Fazio, Stefano Fricano

Abstract: To what extent and how the acquisition of new innovative processes can affect the structure and roles of the actors within the seafood sector chain? What are the possible effects along the entire value chain and on the distribution of this value to those who have contributed to generate it? The proposed analysis aims to clarify some aspects of these complex issues whose implications may affect the future and the

economic sustainability of the fisheries sector in Sicily. The related economic literature investigates the role of organizational change management on improving the performance of companies engaged in the launch of innovative processes. In particular, the analysis focuses on those integrated strategies that combine the adoption of innovation with a changes in the organizational models, a new management approaches and the availability of adequate human capital. From the methodological standpoint, these issues are addressed through the analysis of two case studies: that of the "OP della Pesca di Trapani" that includes a significant number of firms of the capture sector (about 120) and that of the productive fishery district of Mazara del Vallo, one of the few productive districts in the sector active in Italy.

Keywords: Seafood Chain, Organizational Models, Value Chain

4.30 - 6.00 pm

Room: **Gran Salone del Genovesi**

(21) parallel session - Economic data collection, new data needs and best practices

chair **Jörg Berkenhagen**

Profit and invisible resource rent in fisheries - revisited

Knut Heen, Ola Flaaten, Þórólfur Matthíasson

Abstract: In fisheries, as well as in other natural resource based industries, there is difference between the concepts of profit and rent, the former a basic indicator for gauging business performance of firms and the latter for evaluation of the economic welfare contribution of resource and industry. Economists are mainly concerned about resource rent and the managers of the industry with the objective of maximizing rent – often conditional on ecological and social issues - whereas business economists are concerned about the profitability of the firms. In the academic literature and in costs and earnings studies there are not always clear definitions of the profit and rent concepts and the use of them in actual analyses. This paper will discuss and clarify differences and similarities of profit and rent concepts, theoretically and based on data from the Norwegian and Icelandic fish harvesting industries. The empirical study will be conducted for the overall industries as well as for specific fisheries under different management and property rights regimes. It is expected that for policy purposes the importance of distinguishing between profit and rent is greater for fisheries under strict management control, like ITQs, than those closer to open-access.

Keywords: Invisible Resource Rent, Capitalized Rent, Limited Entry

Overcoming the challenges of gathering, managing and improving the quality of seafood processing industry data over time

Tsvetina Yordanova

Abstract: It is well-known that the fish processing industry in the UK is of long-standing tradition; however, providing specific up-to-date information about the industry has continuously proven to be challenging. The Economics team at Seafish collects data on behalf of the Marine Management Organisation and UK Government for submission under the European Data Collection Framework (DCF). Seafish Economics also use the gathered data and collect additional data to provide economic evidence base for business decisions and policy discussions, in addition to a detailed Seafish report. The large size and complex structure of the industry, and the sheer number of possible business set-ups in terms of activities undertaken and species handled, pose a number of challenges to the collection, management and correct interpretation of industry data. Moreover, DCF requirements and industry information needs evolve over time, and thus, so do research questionnaires and methods; this creates problems in terms of tracking data consistently over time. In

addition, the familiar trade-offs between quality, time and cost of the research projects play a large part in determining research outcomes in practice. This presentation explores some of these challenges and how we have tackled them. Some key points for discussion will be challenges around: i) Building and maintaining a comprehensive database; ii) Understanding and interpreting older data within a new framework; iii) Applying changes in variable definitions going back in time; iv) Defining qualitative variables in an exhaustive way; v) Deriving categorical variables unambiguously; and vi) Managing conflicting priorities in data collection; vii) Presenting analysis while adhering to confidentiality rules, among others.

A bio-economic data analysis on the state of resources and the economic performance of Italian fishing fleet

Rosaria Felicita Sabatella, Alessandro Mannini

Abstract: The Common Fisheries Policy (CFP) requires the implementation of an ecosystem-based approach to fisheries management. This means an integrated approach to managing fisheries within ecologically meaningful boundaries which takes account of fishing and other human activities. The components of an ecosystem management approach to fisheries include the establishment of an appropriate balance between conservation and responsible use and the principle that conservation and management decisions for fisheries should be based on the best scientific information available. In the Italian context, this integrated approach to fisheries management is well known and it is reflected on the fisheries data-collection programme and data dissemination. In the paper the principal outcomes of the "Yearbook on the state of resources and economic performance of Italian fishing fleet" will be presented. The report analyzes the fishery sector on the basis of an integrated analysis of biological data, fishing effort data, landings by species and socio-economic data. Innovative tools for dissemination of information through web applications is also presented.

Keywords: Ecosystem-Based Approach

Fisheries economic and fisheries effort analyses: the need for a 'one stop shop' for data definitions, coding and regulatory requirements

J. Berkenhagen, S. Holmes, C. Ribeiro, F. Scott, M. Elliott, K. Verlé, I. Vukov, J. Dalskov, J. Egekvist, A. Baikov, A. Ahvonen, P. Korhonen, S. Leonardi, S. Demanéche, I. Tzouramani, A. Papoutsis, L. Labanchi, I. Davidjuka, O. Ozernaja, I. Jakovleva, A. Balnis, M. Aquilina, E. Muscat, K. Hamon, E. Avdic, A. Paulrud, K. Ringdahl, T. Reilly, A. A. Calvo Santos

Abstract: In recent years considerable progress has been made in performing management strategy evaluations taking into account the biology of a stock to assess its response to different management measures. Such work is now being extended to multiple stocks exploited by mixed fisheries. Similar progress has been made in considering the economic effects of management strategies. In addition the 2013 CFP requires that multi-annual management plans are implemented for all regulated fisheries resources in European waters, and the expectation is that each will first be assessed for its suitability in terms of both ecological and economic sustainability. To this end the EU Joint Research Centre (JRC) hosts and maintains probably the most comprehensive fleet disaggregated effort, catch and economic fisheries data in Europe. But a stumbling block in advancing bio-economic modelling is that the data has been collected under data calls designed without consideration of producing merged data. This paper outlines the work taking place to bring about the harmonization of data calls. It highlights the need for common codes and specific definitions to avoid conflicting interpretations of what is required and also the need for the requirements for data collection under EU legislation to be transparent and easily found.

Keywords: Bioeconomic Modelling, Data Harmonization, Transversal Variables

(22) parallel session - Markets and marketing of fish products

chair **Arina Motova**

An analysis of a mega fish-box scheme in France

Laurent Le Grel, Ivan Dufeu, Ronan Le Velly, Julien Noël

Abstract: The presentation analyses a case involving a change of scale in local food systems, namely, a “mega fish-box scheme” set up among five fishing vessels and about 1500 households in the area of Nantes, in France. Fishermen are located in an island (Yeu, in Vendée) and are involved in sustainable fishing methods. They are small size businesses with boats ranging from 12 to 20 m and crews not exceeding 5 persons including the skipper. The authors describe the people and devices that made possible and shaped this mega scheme. They specify the points on which the market mediations that were established generated alternativeness and the points on which they are sources of more conventional ways of operating. They have collected data which allow them to compute the value added and the way it is shared along the value chain. It is shown that the scheme is based on the coexistence of three rationales. Price formation at the upstream stage of the value chain results from supply and demand confrontation at the auction market. At the retail level, price is based on fair trade principles which imply that it is agreed in advance and enables fair payments to producers. Finally, the way margin is shared among the members of the crew is not driven by a capitalistic exploitation idea but by social considerations which lead to an egalitarian distribution. The analysis sheds in light that, far from generating conflicts of interest, the interaction between these three seemingly contradictory rationales, illustrates the willingness of the stakeholders to reach a compromise that is acceptable to all.

Keywords: Alternative Food Networks, Market Mediations, Local Food Systems

A brief comparison of the supply chain for chicken and atlantic salmon

Andreea-Laura Cojocaru

Abstract: The supply chain for salmon is, in many respects, the world’s most efficient seafood supply chain. Adopting new technologies and expanding the scale of production are aspects that have contributed to the competitiveness of the industry. In order to remain competitive, the industry must continue to reduce production costs, and must strive to improve product quality and shelf-life, reduce waste from raw-material, and reduce its environmental impact. To this end, the salmon industry still has much to learn from similar processes in other food-growing industries. In particular, the production and processing of poultry meat has experienced significant increase over the decades. It has become the fastest growing and most rapidly changing highly-intensive livestock farming segment, where approximately 70% of poultry are raised in intensive systems, and are processed in often fully-automated environments. On the aquaculture side, salmon is one of the leading industrialized species in terms of harvesting and logistics, with a production history closely following that of poultry. Despite the fact that a number of technological innovations have become available with regards to fish-processing (sorting, gutting, filleting, skinning, bone removal), the slaughtering and processing methods for Atlantic salmon (*Salmo salar*) remain semi-automated and traditional. In this study, we examine the reasons behind the success of broilers, and we compare today’s state-of-the-art in the chicken industry against the processing standards undertaken for Atlantic salmon. In addition to the market advantages and opportunities, the chicken industry has also attracted numerous criticisms. We look at how these aspects of production may become relevant for salmon and how they may impact the economic, environmental and political sustainability of this industry. The study is funded by the Norwegian Research Council project no. 233689 (Fillet-O) and the industry (AGA, Cermaq, Grieg Seafood, Jackson, Marel and Seaside).

Keywords: Salmon, Poultry, Supply-Chain

Testing for market integration between ex-vessel markets for cod in Norway

Ingrid Kristine Pettersen, Frank Asche

Abstract: This paper investigates whether there exists one or several ex-vessel markets for cod in Norway. There are several landing regions for delivering wild caught cod along the Norwegian coast, and the distances are large. Historically the Norwegian fishing fleet consisted of smaller vessels, which were dependent on fishing close to home, possibly preventing arbitrage. This has changed, and the fleet consists of a higher number of larger and more mobile vessels. This means that vessel owners to a larger extent can choose where to fish and where to land the fish in order to achieve higher prices. The estimation results suggesting that the market for ex-vessel cod in Norway is well-integrated with a common price determination process is therefore not unexpected. The test for weak exogeneity is rejected for all regions, indicating that there is no central market. Quality or attributes affecting quality still give rise to price premiums. This study evaluates premiums associated with different attributes of the ex-vessel cod in Norway, such as where the fish have been caught, gear type, size, quality and storage.

Keywords: Cointegration, Hedonic Price, Cod

Resilience of the international seafood market to trade restrictions. Evidence from the Russian ban in 2014

Arina Motova, Fabrizio Natale

Abstract: In August 2014 Russia introduced a trade ban on imports of main food commodities from the EU, USA, Canada, Australia and Norway. Russia is a main destination for exports of seafood from Norway and 7th in the list of major export partners of seafood for EU. This work provides analysis of impacts of trade ban on international seafood trade. A special focus of the analysis is on the consequences for the fisheries, aquaculture and seafood processing sectors in the EU. The work is based on monthly data from Russian customs and EUROSTAT Comext databases for 2013-2014. Trade flows affected by the trade ban had a share of 2.8% (6.4 billion euro) to the total annual Russian imports of 2013. Fish and seafood import represented 13% (2.2 billion euro) in relation to the total flow of products affected by the ban, 55% of fish and seafood imports to Russia were originating from the countries listed in the ban. The major trade flows affected internationally is imports of salmon, herring and trout from Norway and cold-water shrimps from Canada. The impact for the EU is limited. The main trade flows, which might be affected in the EU are cold-water shrimp and trout from Denmark, small pelagics from Eastern and Northern Baltic countries, UK and Ireland, oyster from France, sea-bass and seabream from Greece. The analysis is showing quite high flexibility of seafood trade, e.g. import of salmon from Norway has been partially substituted by an increase of import from Chile and the Faroe Islands in few months after the ban; the cold-water shrimps import from Denmark, Canada and USA has been partly compensated by imports from Greenland; movement of herrings from Denmark to Faroes Islands and increase of herring export from Iceland and Faroes Islands to Russia shows some redirection of Danish trade flows.

Keywords: Seafood, Trade

Posters

Being Deviant in the Blue Growth: A Qualitative Sociological Approach to Explain Ecopreneurship in Aquaculture

Lasner Tobias

Abstract: The imbalance between wild-fish supply and the increasing demand for seafood grows. Modernising the aquaculture sector and its intensification seem to be the only possibility to close this gap. Moreover, to extend aquaculture production is institutionally embedded by the EU 'Blue Growth' strategy. In contrast, intensive conventional aquaculture is not uncontroversial discussed by the European public, which have become more and more sensible for conservation topics since the 1980s. Simultaneously, some fish farmers started to search for new opportunities in case of alternative production methods and niche markets. With innovative methods they try to combine economic profitability with a high awareness for aquaculture practices, which can be seen as ecological-friendly. From an innovation-theoretical point of view, those ecopreneurships can be divided into the adoption of software and the adoption of hardware innovations: idea-based organic practices and technology-based recirculating aquaculture systems. Using the sociological Grounded Theory approach, biographical interviews with fish farming ecopreneurs, and conventional fish farmers as contrast group, were conducted. The ecopreneurs were the first, who introduced ecological innovations in their fisheries communities. That is why, to analyse their decision-making inside the innovation-adoption process is most remarkable to understand the guiding individual perspectives and patterns, which lead to an ecopreneurship in aquaculture. Building on a heuristic interview analyses as well as of sociologies of social change, diffusion of innovations and the economic concept of entrepreneurship, the paper will develop a middle-range theory of ecopreneurships in aquaculture, which addresses the apparently simple question: why do some fish farmers adopt an ecological innovation, and some do not? The results show, that behind economic efficiency, the ecopreneurs' decision-making process is highly influenced through a complex of ecological perspectives like bio-centrism and social aspects like identity and community acceptance. By trend, those fish farmers, who had a strong ecological motivation, who were embedded into a 'green-minded' social network and who had a solid identification with 'their' innovation, were willing to take higher economic risks than their conventional colleagues. The paper argues that qualitative interviews can provide a deep understanding of fish farmers' perspectives to enable better explanations of ecopreneurial activities.

Keywords: Qualitative Research, Aquaculture, Ecopreneurship

The "Menaide" small scale driftnets: an example of selective and traditional fisheries, sustaining the economy of small coastal villages in Italy

P. Sartor, P. Carbonara, G. Lembo, A. Lucchetti, R. Sabatella, M.T. Spedicato

Abstract: Small scale driftnets fisheries, using nets of limited length and mesh size have been historically used by the Italian artisanal fisheries without environmental concerns; one example is the fishery for anchovy (*Engraulis encrasicolus*), performed with a small driftnet called "menaide".

The introduction, in the 70s-80s, of driftnets with larger meshes and greater length, targeting swordfish and tuna, created environmental concern, due to the incidence of unwanted catches (e.g. mammals, turtles). The current EU regulation prohibits driftnets higher than 2.5 km and their use to catch large pelagics and large sharks. In the context of a specific study promoted by EU to characterize the small scale driftnets in Mediterranean, the "menaide" fisheries were studied in detail. From March to October 2013, information on fishing effort, gear characteristics, catch composition, and economic parameters was collected by means of interviews, logbooks and embarks in several Italian harbours. About sixty vessels were identified in the "menaide" fisheries, especially in southern Italy; the involved vessels were < 12 m length and operate close to the coast. The average net length was < 500 m, the mesh size was 20-30 mm. The anchovy, dominated the catch (75-100%), discard was negligible, the not authorised and the protected ones were absent. All the catch of anchovy was composed by specimens greater than the size at first maturity and the minimum landing size. The "menaide" fisheries generate more employment of the other small scale fisheries of the same areas, also for the associated activities due to the processing of the product. The economic value of the anchovies landed from "menaide" is higher than that of the anchovies caught from other fisheries. The "menaide" fisheries are also characterised by low economic costs, both concerning the fuel consumption and the costs of gear purchase and maintenance. These aspects provide robust evidences to implement specifically oriented management measures, which could ensure the regulated activity of these fisheries.

Keywords: anchovy, Fishery Management, Small-Scale Fisheries

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