

FAIRSEA (ID 10046951)

“Fisheries in the Adriatic Region - a Shared Ecosystem Approach”

D 3.3.1 – First advanced school on quantitative methods for EAF application

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| Authors | Simone Libralato, Davide Agnetta [LP-OGS], Giuseppe Scarcella [PP4-CNR], N. Vrgoc [PP01-IOF], S. Sifner [PP10-UNIST] |
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Deliverable 3.3.1

First advanced school on quantitative methods for EAF application

FAIRSEA – Fisheries in the Adriatic Region – a shared Ecosystem Approach

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Contents

| | |
|---|----|
| Acronyms used | 3 |
| Executive Summary..... | 4 |
| INTRODUCTION..... | 5 |
| Contribution of Advanced schools to the project objectives | 7 |
| Contribution of Advanced schools to specific FAIRSEA objectives..... | 7 |
| Contribution of Advanced schools FAIRSEA communication objectives..... | 8 |
| Expected contribution of Advanced schools to the project outputs..... | 9 |
| First advanced school on quantitative methods for EAF application | 10 |
| Organization..... | 10 |
| Contents..... | 13 |
| Invited lecturers..... | 13 |
| Dissemination, flyer and website..... | 16 |
| Applicants and selection process..... | 18 |
| Participants..... | 21 |
| Support | 23 |
| First Advanced school implementation | 24 |
| Definitive agenda | 24 |
| Course material..... | 30 |
| Lectures..... | 30 |
| Assignments and coding | 30 |
| Evaluation of the course by participants | 31 |
| Communication feedback template | 36 |
| Final comments on the course..... | 37 |
| Acknowledgements..... | 37 |
| ANNEXES | 38 |

Acronyms used

| | |
|-----------------|--|
| AMAREMED | Advanced school on Multispecies modelling Approaches for ecosystem-based marine Resource Management in the MEDiterranean Sea |
| CFP | Common Fisheries Policy |
| CMSY | Catches Maximum Sustainable Yield |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| EAF | Ecosystem Approach to Fisheries |
| EAFM | Ecosystem Approach to Fisheries Management |
| EPO | European Patent Office |
| FAIRSEA | Fisheries in the Adriatic Region – a Shared Ecosystem Approach |
| GFCM | General Fisheries Commission for the Mediterranean |
| IVSLA | Istituto Veneto di Scienze Lettere ed Arti |
| JS | Joint Secretariat |
| MICE | Models of Intermediate Complexity |
| NOAA | National Oceanic and Atmospheric Administration |
| OGS | Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS |
| PP | Project Partner |
| SAFS | (School of Aquatic and Fishery Sciences |
| WP | Work packages |

Executive Summary

The FAIRSEA (Fisheries in the Adriatic Sea a Shared Ecosystem Approach) project aims at enhancing transnational capacity and cooperation in the field of an ecosystem approach to fisheries in the Adriatic region by exchanging knowledge and sharing good practices among project partners and external stakeholders.

In this perspective the First advanced school on quantitative methods for EAF application aims at increasing technical skills and capacities in the region also through demonstrative applications. The first Advanced School is entitled AMARE-MED 2019 (Advanced school on Multispecies modelling Approaches for ecosystem-based marine Resource Management in the MEDiterranean Sea, 2019) a contributed to the FAIRSEA specific objective to enhance transboundary integrated competence in the field of ecosystem approach to fisheries.

In particular the 1st offering of the FAIRSEA school held at the premises of the Istituto Veneto di Scienze Lettere ed Arti, Palazzo Franchetti in Venice (Italy) from 1st to 6th July 2029. The AMARE-MED 2019 program included in-depth investigation of (1) options for data-limited situations using the FishPath decision support tool (developed at The Nature Conservancy, in conjunction with CSIRO and NOAA), (2) single and multispecies model theory and application using CEATTLE modelling approach (developed at NOAA), plus (3) an introduction to Monte-Carlo methods for data-limited stock assessment (developed at CNR and GEOMAR). The course was highly technical, with practical hands-on computer activities, assignments and programming also applied to Mediterranean and Adriatic area and data, involving 32 students. Key lecturers were Andre Punt (University of Washington), Natalie Dowling (CSIRO) and Gianpaolo Coro (CNR). In total the AMARE-MED 2019 involved 42 people among students, teachers, assistants and organizers.

After one full week of the first advanced school the evaluation from students was very positive and highlighted the success of the school on the basis of high quality of lectures, the proper organization and the very nice facilities.

INTRODUCTION

The FAIRSEA project aims at enhancing transnational capacity and cooperation in the field of an ecosystem approach to fisheries in the Adriatic region by exchanging knowledge and sharing good practices among partners. The complementary expertise of the partners is shared, interlinked and integrated, considering also challenges and opportunities identified by stakeholders. The best way to reach sustainability, in fact, is to ensure stakeholders' participation in the process that requires time, trust, transparency and efficient steering.

The efforts are embedded in a spatially explicit management platform that will allow to share expertise, create a common pool of knowledge, boost the operational application of the ecosystem approach to fisheries, enhance the competence in complex system dynamics, and foster a consensus on the state of the environment and fisheries in the region. The platform will result in a spatially explicit dynamic tool, integrating cornerstone elements for an ecosystem approach to fisheries that are: water masses circulation and connectivity (module HYDRO), biogeochemical planktonic processes (BGC), distribution of resources (BSTAT), catch and fleet statistics (FSTAT), effort distribution (EFFORT), bioeconomic responses (BIOECO) and food web dynamics (FWM).

The attention to the spatial components in the distribution of the resources, the variability of the oceanographic condition, the management policies and the socio-economic impact is a particularly innovative and extremely valuable aspect. The shared integrated platform will be used as a planning tool to implement demonstrative testing of applicable fisheries policies both at local (subareas) and whole Adriatic scales. Especially, it will provide a scientific basis to formulate and evaluate shared management advice in the local and international participatory processes, answering to the need of reference points knowledge for the optimisation between ecological and socio-economical sustainability. The process developed in FAIRSEA will provide an opportunity to describe best practices and define guidelines for a sustainable fishery management.



Figure 1. Scheme of the different objectives and expected contributions of the FAIRSEA integrated platform, from support to management to participatory approaches, from pooling knowledge **to increase competences and capacities on the EAF.**

Contribution of Advanced schools to the project objectives

The project moves beyond single species assessment to reduce environmental vulnerabilities and safeguard optimal exploitation thus it promotes the most efficient exploitation of fisheries resources. Furthermore, there is a „**need to secure the availability of high-skilled human resources in key sectors to strengthen development patterns in the area**” as well as the “need to support „brain circulation” amongst research institutes/academies and companies as a condition for developing cooperation in the field of blue technologies”. **FAIRSEA set an innovative mechanism that results in a participated, integrated, shared and quantitative ecosystem approach to fisheries that connects and enhances territorial skills and capabilities.** Furthermore, enhancement of high-level skills in the region is guaranteed by capacity building and networking activities foreseen by the project. FAIRSEA central focus, in fact, is not the development of the integrated tool, but the collective participation of institutional, scientific, technical, policy makers and stakeholder partners in the conceptualization, application and analysis as a way to cross-contaminate across disciplines, across boundaries and across technical, institutional and stakeholder levels to foster innovation.

Contribution of Advanced schools to specific FAIRSEA objectives

Enhancing the competencies of project partners and target groups on concepts and analytical methods useful for the implementation of EAF will facilitate further innovations in the sector in forms of new technical management tools, new services in the form of fisheries technical measures and devices. Possibly such innovations, on the long run, can bring new submissions to European Patent Office (EPO).

Project specific objective 1: Enhance transboundary integrated competence in the field of ecosystem approach to fisheries

The Capacity building envisaged in FAIRSEA is carried out through advanced schools set on the yearly basis for spreading concepts and methods of EAF. These schools will represent the beginning of a series continuing after the project and respond to the Project specific objective 1 (as from the FAIRSEA Application Form, AF): **Enhance the transnational competencies and skills in the field of EAF** in all network’s members, by crossing and pooling resources and complementary expertise, exchanging and integrating knowledge and sharing the results. The goal is to develop a territorially integrated conceptualization of the EAF beyond existing differences and boundaries, and to strengthen and structure a network for future transnational

plans, **useful in the framework of the Common Fisheries Policy (CFP)**. This will result in reinforcing cohesion and encourage identification and adoption of economic optimal strategies.

Contribution of Advanced schools FAIRSEA communication objectives

The activity 3.3 of the project FAIRSEA has the objective to enhance the scientific and technical capabilities through the establishment of annual advanced teaching events on practical applications and operative quantitative analyses for EAF. The annual advanced schools will provide an in-depth understanding of analytical approaches from single species tools (e.g. SS3 and/or data-poor approaches) to multispecies and holistic approaches (e.g. MICE, GADGET, Ecopath with Ecosim, Atlantis, Osmose, Bemtool, Smart, and others). The summer schools are targeted to experts involved in fisheries management from technical and scientific institutions of the partnership and beyond. The activity 3.3 is expected to result in at least 25-30 people each year (from universities and research institutions, from management agencies, from technical and operative institutions, from advisory agencies participating to summer schools) to be acquainted with quantitative integrated approaches.

The EAF moves fisheries management from the single-species models used in stock assessments, to more complex models that include species interactions, environmental drivers and human consequences. Different models and tools have been developed to tackle this complexity. However, difficulties in understanding the models and related uncertainties by those who make the decisions result in hesitation to use EAF approaches. The advanced schools are going to contribute to communication objective 1 of the project.

Communication objective 1: Informing about possible tools to tackle ecosystem complexity

Explaining how EAF tools work is essential to predicting the effects of fisheries and other drivers. Complexity makes communicating new research about these ecosystems a challenge. Too much complexity can confuse the audience, even one that is scientifically literate. The role of communication is to translate such complexity in a language understandable to non-technical audience and policy-makers involved in fisheries management. This requires the development of tools to effectively disseminate knowledge and inform management in a simple and effective way.

Target groups: Local, regional and national authorities; universities and research institutions; NGOs; education and training organisations

Tactics/approach: Increasing the literacy of Adriatic community on EAF quantitative tools through summer schools on advanced methods for an EAF will allow for a deep understanding of principles and scientific capabilities to tackle ecosystem complexity, thus enhancing technical skills of students, researchers and policymakers.

Expected contribution of Advanced schools to the project outputs

The FAIRSEA contributes to the Program output indicator by involving approximately 60 persons in 10 high level training activities. Two summer schools are going to be organised (WP3) for increasing skills and capacities. At each school 25 people will be jointly trained on high-level technical tools useful for EAF in the region. Furthermore, in 8 technical events for policy makers (WP3) FAIRSEA partnership will encounter local policy makers resulting in a training on general concepts, EAF tools and results. In each meeting, it is foreseen the participation of at least 4 policy makers at local, regional, and national level. Considering the potential participation of same person into both kind of events, it is assumed that the project will thus provide high-level training for approximately 60 persons in the area.

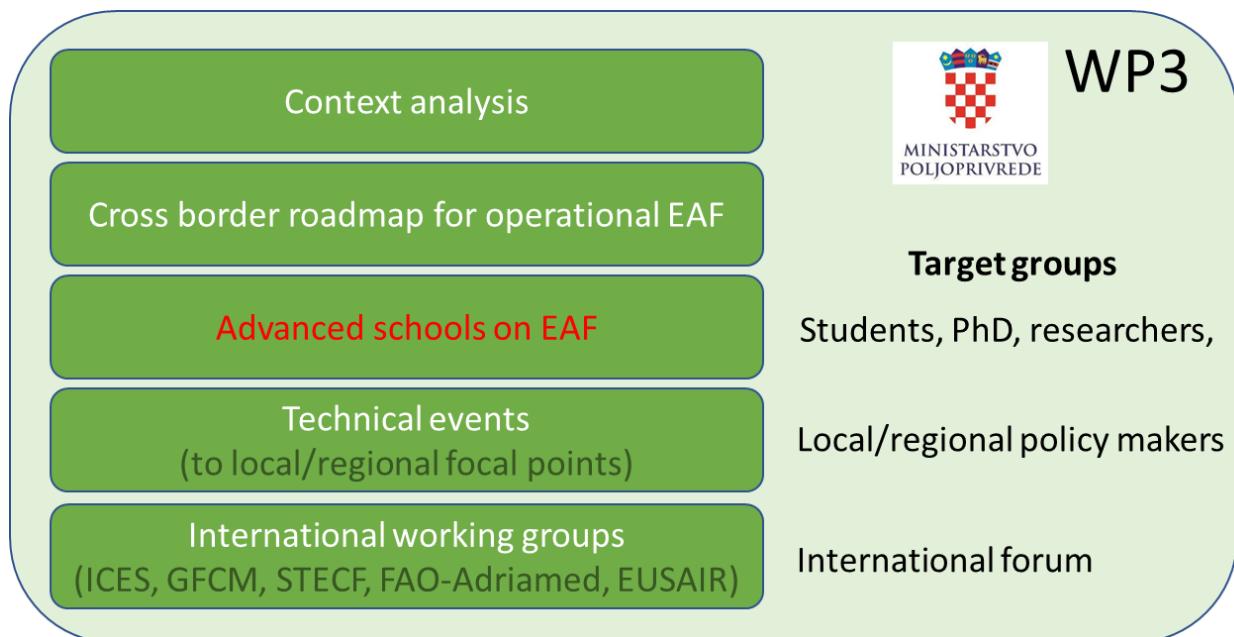


Figure 2. Scheme of the WP3 where the Activity 3.3.1 is embedded.

First advanced school on quantitative methods for EAF application

Organization

The school, that represents the “First advanced school on quantitative methods for EAF application” of the FAIRSEA, was entitled AMARE-MED 2019 (Advanced school on Multispecies modelling Approaches for ecosystem based marine REsource management in the MEDiterranean Sea). AMARE-MED 2019 was organized by Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS in collaboration with CNR-IRBIM and Istituto Veneto di Scienze Lettere ed Arti (IVSLA). AMARE-MED 2019 was held from 1st July to 6th July 2019 at the beautiful historical premises of the IVSLA, Palazzo Franchetti in Venice (Italy).



Figure 3. Palazzo Franchetti in Venice, premises of the Istituto Veneto di Scienze Lettere ed Arti, and venue of the first advanced school, AMARE-MED 2019.

Full description of organization structure is reported in the following.

AMARE-MED 2019

Advanced school on Multispecies modelling Approaches for ecosystem-based marine Resource Management in the MEDiterranean Sea

1st–6th July 2019

Palazzo Franchetti, Venezia (Italy)

Website : <http://echo.inogs.it/amare-med/>

Secretariat e-mail: echo@ogs.trieste.it

LECTURERS

Natalie Dowling (CSIRO, Aus), Gianpaolo Coro (ISTI-CNR, Italy), Andre Punt (UoW, USA)

ORGANIZING COMMITTEE

Simone Libralato (OGS), Davide Agnetta (OGS), Giuseppe Scarcella (CNR)

SCIENTIFIC COMMITTEE

Simone Libralato (OGS), Angelo Bonanno (CNR), Roberto Carlucci (CONISMA), Piera Carpi (Int. Pacific Halibut Comm, USA), Francesco Colloca (CNR), Fabio Fiorentino (CNR), Tomaso Fortibuoni (ISPRA), Marino Gatto (Politecnico Milano, IVSLA), Marco Marani (Univ. Padua, IVSLA), Saša Raicevich (ISPRA), Giuseppe Scarcella (CNR), Svjetlana Krstulović Šifner (Univ. Split, HR), Cosimo Solidoro (OGS), Maria Teresa Spedicato (COISPA), Nedo Vrgoc (IOF, HR)

Local Organizational and logistic support: Lucia Macaluso and Giovanna Palandri (IVSLA)

Website : Valentina Mosetti (OGS)

Communication activities: Francesca Petrera (OGS)

Supporting team: Anna Lucia Tarantino, Alessandra Zanetti (OGS)

Specific contribution to the first advanced school organization

Other than contribution explicitly indicated above, some additional details of the school organization are in the following.

The **Scientific Committee** was involved in the planning the event and its contents, in the different parts of its organization and logistics. In particular:

- all members of the Scientific Committee contributed to disseminate the event, to invite students to participate and to discuss the contents of the school;
- Simone Libralato (OGS), Francesco Colloca (CNR), Giuseppe Scarcella (CNR), Svjetlana Krstulović Šifner (Univ. Split, HR), Nedo Vrgoc (IOF, HR) constituted the committee for selecting the participants from all the applicants;
- Marino Gatto (Politecnico Milano, IVSLA) and Marco Marani (Univ. Padua, IVSLA) greatly contributed to facilitate the involvement and collaboration of the IVSLA;
- Giuseppe Scarcella (CNR), Piera Carpi (Int. Pacific Halibut Comm, USA), Simone Libralato (OGS) helped with the involvement of the invited lecturers.

The **Organizing Committee** was mainly involved in constituting the secretariat of the school, and took care of the logistics and detailed organization of the event.

Notably, the General Fisheries Commission for the Mediterranean (GFCM) secretariat supported the school organization and Elisabetta Betulla Morello (GFCM) contributed with insights and suggestions for its implementation and organization.

Contents

The first school, according to the AF, was expected to cover the following aspects: i) single species approaches in data poor and data rich conditions; ii) looking forward to an EAF context; iii) multispecies approaches for EAF.

The 1st offering of the FAIRSEA summer school included in-depth investigation of options for data-limited situations using the FishPath decision support tool, developed at The Nature Conservancy, in conjunction with CSIRO and NOAA; and of single and multispecies models using CEATTLE developed at NOAA. During the course, an introduction to Monte-Carlo methods for data-limited stock assessment (e.g., CMSY, AMSY) was also given. The course was highly technical, with practical hands-on computer activities, assignments and programming.

Invited lecturers

High profile lecturers were invited to prepare lectures, assignments and exercise. The lecturers of the AMAREMED 2019 were:



André Punt (School of Aquatic and Fishery Sciences, University of Washington – USA)

André Punt is a Professor in the School of Aquatic and Fishery Sciences at the University Washington, Seattle, USA and the currently the Director of the School. He received his B.Sc, M.Sc and Ph.D. in Applied Mathematics at the University of Cape Town, South Africa. Before joining the University of Washington, Dr Punt was a Principal Research Scientist with the CSIRO Division of Marine and Atmospheric Research in Australia. Dr. Punt has been involved in stock assessment and fisheries management for over 30 years and has been recognized for his contributions in this area with awards from CSIRO, the University of Washington, the Australian Society for Fish Biology, and the American Fisheries Society. The research undertaken by Dr. Punt and the MPAM (Marine Population and Management) group at the University of Washington relates broadly to the development and application of fisheries stock assessment techniques, bioeconomic modelling, and the evaluation of the performance of stock assessment methods and harvest control rules using the Management Strategy Evaluation approach. Currently, projects that Dr. Punt is

undertaking with his research group include ecosystem modelling, assessment and management methods for data-poor methods, and understanding the impact of climate change and environmental variation on the performance of assessment and management methods. Dr. Punt has conducted stock assessments for a wide range of species, ranging from anchovies and sardines, to groundfish, tunas, and cetaceans. Dr. Punt has published over 350 papers in the peer-reviewed literature, along with over 400 technical reports. He was a member of a National Research Council panel on evaluating the effectiveness of fish stock rebuilding in the United States. Dr Punt is currently a member of the Scientific and Statistical Committee of the Pacific Fishery Management Council, the advisory committee for Center for the Advancement of Population Assessment Methodology, the Crab Plan Team of the North Pacific Fishery Management Council, and the Scientific Committee of the International Whaling Commission.



Natalie Dowling (Oceans and Atmosphere in Hobart, Tasmania - Australia)

Dr Natalie Dowling is a senior fisheries scientist, with CSIRO Oceans and Atmosphere in Hobart, Tasmania, Australia. She received her B.Sc. (Hons) and Ph.D. in Marine Science at Flinders University, South Australia. She joined CSIRO in 2000, when she was involved with management strategy evaluation (MSE) work for Australia's tropical tuna and billfish fisheries. Currently, her main area of interest is in developing harvest strategies in data-limited contexts, which remains a global scientific and management challenge. Dr. Dowling was responsible for developing harvest strategies for AFMA's small-scale and data-poor fisheries, and has subsequently consulted across a large range of other Australian and international fisheries, focusing on data-limited harvest strategies, assessments, and MSE. She has led projects to develop data-poor fishery harvest strategy guidelines for the Food and Agriculture Organization (FAO). From 2014-2016 Dr, Dowling was a member of the National Center for Ecological Analysis and Synthesis' Science for Nature and People Project (SNAPP) Working Group, "Managing Data Limited Fisheries for Economic and Biological Objectives". Within this Working Group, she initiated and helped to develop the FishPath decision support system. FishPath uses a questionnaire to provide customized guidance to users as to viable data-limited harvest strategy options, given a fishery's specific circumstances. FishPath provides a standardized, comprehensive and efficient means to identify

possible data collection, assessment, and management decision rule options, together with relevant caveats associated with each. Dr. Dowling works closely with The Nature Conservancy (USA) and NOAA as a core member of the FishPath team. Together, this team continues to develop, expand, refine, and apply the FishPath tool to fisheries within Australia, the United States, Peru, Kenya, Mexico, Jamaica, Bahamas, Indonesia and Spain, the latter in collaboration with the Marine Stewardship Council (MSC). Dr. Dowling leads the Australian effort to expand and roll out FishPath in Australia and the South Pacific region. Dr. Dowling also leads an FRDC project on triple bottom line harvest strategies (that address environmental, economic and social objectives) in Queensland. She has a long-term ongoing collaboration with Prof. Marc Mangel, a world-leading theoretical ecologist at the University of California, Santa Cruz. She has published over 30 papers in the peer-reviewed literature.



Gianpaolo Coro (Istituto di Scienza e Tecnologie dell'Informazione "A. Faedo" - CNR, Italy)

Dr. Gianpaolo Coro is Researcher at the "Alessandro Faedo" Institute of Information Science and Technologies of the National Research Council of Italy (ISTI-CNR). He has a Master Degree in Physics and a Ph.D. in Computer Science with Theses in Cybernetics. His research focuses on Artificial Intelligence and Data Mining. He has been working for more than 15 years, both in private companies and public institutes, on Machine Learning and Signal Processing, with applications to Computational Biology, Fisheries, Brain Computer Interfaces, Language Technologies, Computer Vision, and Cognitive Sciences. Currently, the aim of his research is the development of models and Open Science methodologies to process biological data and environmental parameters. He is involved in several European and in International projects and in teaching activities at University of Pisa and at Sorbonne University.

Dissemination, flyer and website

A flyer was created to present briefly the first advanced school. The flyer was used in e-mails and also printed and exposed in different premises of FAIRSEA Partners.



AMARE-MED 2019
First advanced school on quantitative methods for ecosystem approach to fisheries application

Single and Multispecies approaches for data rich and data limited conditions

WHEN
01-06 July 2019

WHERE
Venice (Italy)

INFO & REGISTRATION
<http://echo.inogs.it/amare-med>

APPLICATION DEADLINE
15 April 2019

DESCRIPTION
The 1st offering of the FAIRSEA school will include in-depth investigation of options for data-limited situations using the FishPath decision support tool, developed at The Nature Conservancy, in conjunction with CSIRO and NOAA; and of single and multispecies models using CEATTLE developed at NOAA. The course is highly technical, with practical hands-on computer activities, assignments and programming. Candidates must apply through the online form and will be selected (max 30) on the basis of expertise, skills, interest. Candidates from the CBC Italy-Croatia programme area will be supported by the project. During the course, an introduction to Monte-Carlo methods for data-limited stock assessment (e.g., CMSY, AMSY) will be given.

KEYNOTE SPEAKERS

| | | | | | |
|---|--|---|---|---|--|
|  | André PUNT School of Aquatic and Fishery Sciences (Seattle, USA) |  | Natalie DOWLING CSIRO (Tasmania, Australia) |  | Gianpaolo CORÒ CNR (Pisa, Italy) |
|---|--|---|---|---|--|

CONTACTS
ECHO Group at OGS (D. Agnetta, S. Libralato)
Email: echo@ogs.trieste.it

VENUE: Istituto Veneto di Scienze, Lettere ed Arti (IVSLA), Venezia

ORGANIZING COMMITTEE
Simone Libralato, Davide Agnetta, Giuseppe Scarcella

SCIENTIFIC COMMITTEE
Simone Libralato (OGS), Angelo Bonanno (CNR), Roberto Carlucci (CONISMA), Piera Carpi Francesco Colloca (CNR), Fabio Fiorentino (CNR), Tomaso Fortibuoni (ISPRA) Marino Gatto (Politecnico Milano, IVSLA), Marco Marani (Univ. Padua, IVSLA) Saša Raicevich (ISPRA), Giuseppe Scarcella (CNR), Svjetlana Krstulović Šifner (Univ. Split), Cosimo Solidoro (OGS) Maria Teresa Spedicato (COISPA) Nedo Vrgoc (IOF)

European Regional Development Fund

www.italy-croatia.eu/fairsea

Figure 4. The flyer developed and distributed for the first advanced school

The first advanced school on EAF was widely disseminated through dedicated e-mails to selected addresses of the stakeholder mapping (research and technical institutions), but also to networks such as:

- FAIRSEA partnership;
- Euromarine;
- European Society of Ecological Modelling;
- Conisma partners;
- Ecopath Research Development Consortium;
- A list of approximately 400 of scientists, professors and experts in marine ecology.

Moreover, a website (<http://echo.inogs.it/amare-med/>) completely dedicated to the school was created and used to accept online applications.

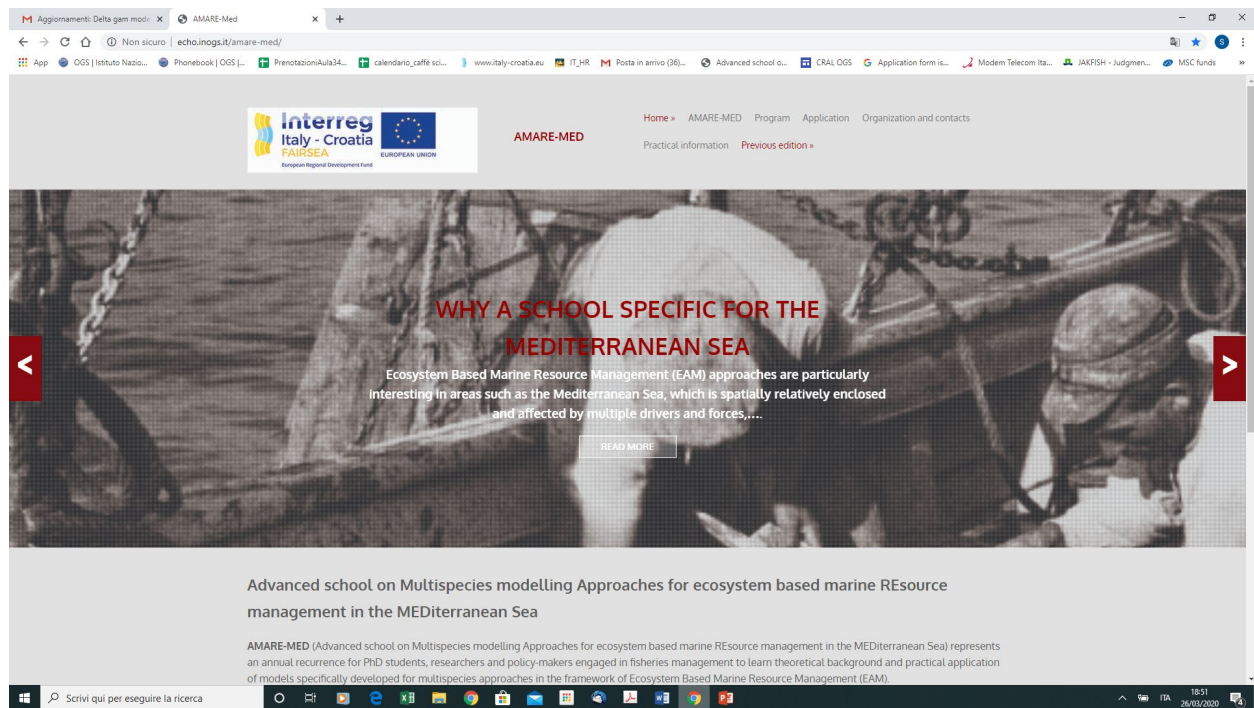


Figure 5. The home page of the First Advanced school on EAF, AMARE-MED 2019.

Applicants and selection process

From beginning of March 2019 to 30 April 2019 were received 98 applications to the school from all over the world through the online application system on the school website.

To understand and summarize the broad interest of the contents of the First Advanced school organized by FAIRSEA, a synthesis of the 22 countries represented by applicants is: Algeria (5), Bulgaria (1), Colombia (1), Croatia (5), Egypt (5), Ethiopia (1), Germany (1), Ghana (1), Greek (2), India (4), Iran (1), Italy (23), Kenya (1), Morocco (12), Palestina (4), Peru (5), Spain (6), Tunisia (8), Turkey (8), Ukraine (2), Vietnam (2).

On another perspective, 19 applicants were from CBC program area; 19 were from adjacent EU countries in the Mediterranean and Black Sea; 8 are from other EU countries; 43 applicants were from non EU Mediterranean and Black Sea countries; 9 are from other parts of the world. These synthesis are done purely to synthesize the broadness of applications, but nationality was not considered for the selection.

The total 98 of applications were considered a very positive feedback but unfortunately it was not possible to allow participation of all candidates and a selection process was implemented.

A selection process was conducted under the principles of non-discrimination and equal opportunities for all was carried out considering skills, expertise, programming capabilities related to the aims of the school and motivation.

The selection committee was composed by: Simone Libralato (OGS), Francesco Colloca (CNR), Giuseppe Scarcella (CNR), Svjetlana Krstulović Šifner (Univ. Split, HR), Nedo Vrgoc (IOF, HR).

Several details were collected in the application form online that facilitated the selection and the selection committee defined scores for each relevant information for the purposes to select the best candidates considering the principles above. Criteria considered were:

1. Highest degree obtained (score 0-3: None = 0; Bachelor's degree = 1; Master's degree = 2; Doctoral degree= 3);
2. List of selected publications (score= 0-3);
3. Motivation/interest for the school (score = 0-3);
4. Knowledge of programming (score= 0-3: None =0; Basic = 1; Good= 2; Expert user=3);

5. Knowledge on basic population dynamics (score= 0-3: None =0; Basic = 1; Good= 2; Expert user=3);
6. Knowledge on predation models (score= 0-3: None =0; Basic = 1; Good= 2; Expert user=3);

The selection committee had possibility to access to application form details including the curriculum vitae submitted by each participant. Skills and motivational/interest to the EAF concepts and tools were evaluated with particular care by the committee that had one week for evaluating the candidates.

Then on Skype meeting on 8th and 9th May 2019, the selection committee discussed the scores and defined the final ranking order of 98 applicants based on the sum of the scores obtained in criteria 1,2,3,4 and 5. The criteria 6 was considered too specialist.

It was considered an opportunity to have applicants from outside the CBC program area because:

- These applicants allows to bring the transnational and shared EAF approaches and concepts developed in FAIRSEA beyond the CBC program area (in particular the EUSAIR region and the Mediterranean and Black Sea areas);
- Applicants from other EU countries or other parts of the world can bring the highly qualified expertises and experiences of those countries with benefits for the school.

The final ranking is thus obtained **under the principles of non-discrimination and equal opportunities.**

In spite the original logistics was considering 25-30 students participating to the AMARE-MED 2019, giving the large number of applicants it was made an effort for having the largest number possible to grant also quality lectures. **Therefore, from the list of applicants ranked by the sum of scores (obtained in criteria 1-5) the first 33 applicants were selected.**

The list of selected students is reported in the following table in alphabetical order.

| | | |
|----|------------------------------|---|
| 1 | Gizem Akkus | Institute of Marine Sciences, Turkey |
| 2 | Marco Anelli Monti | Università Ca' Foscari, Italy |
| 3 | Enrico Nicola Armelloni | National Research Council (CNR-IRBIM), Italy |
| 4 | Matteo Barbato | University of Padova, Italy |
| 5 | Olfa Ben Abdallah | Institut National des Sciences et Technologies de la Mer, Tunisia |
| 6 | Giulia Cipriano | Università degli Studi di Bari Aldo Moro, Italy |
| 7 | Lorenzo D'Andrea | University of Rome - Tor Vergata, Italy |
| 8 | Francisco de Castro | Agri-Food and Biosciences Institute, United Kingdom |
| 9 | Reda Fahim | Arab Academy for Science ,Technology & Maritime Transport, Egypt |
| 10 | Simone Franceschini | National Inter-University Consortium for Marine Sciences, Italy |
| 11 | Roberta Frleta | University of Split, Croatia |
| 12 | Juan Gil Herrera | Instituto Español de Oceanografía, Spain |
| 13 | Maurizio Inghosso | Università degli Studi di Bari Aldo Moro, Italy |
| 14 | Ayman Jghab | Institut National de Recherche Halieutique, Morocco |
| 15 | Yevhen Leonchyk | Southern Research Institute of Marine Fishery and Oceanography, Ukraine |
| 16 | Doris Criscely Lujan Paredes | Marine Biodiversity Exploitation and Conservation, France |
| 17 | Francesco Masnadi | National Research Council (CNR-IRBIM), Italy |
| 18 | Anas Mokdad | National Institute of Oceanography and Applied Geophysics, Italy |
| 19 | Ricardo Oliveros-Ramos | Inter-American Tropical Tuna Commission, USA |
| 20 | Fikret Ondes | İzmir Kâtip Çelebi University, Turkey |
| 21 | Diego Panzeri | National Institute of Oceanography and Applied Geophysics, Italy |
| 22 | Nabyendu Rakshit | Visva Bharati University, India |
| 23 | John Ramírez Téllez | Institute of Marine Science of Barcelona, Spain |
| 24 | Pasquale Ricci | Università degli Studi di Bari Aldo Moro, Italy |
| 25 | Giovanni Romagnoni | COISPA Tecnologia & Ricerca, Italy |
| 26 | Martina Scanu | National Research Council (CNR-IRBIM), Italy |
| 27 | Paula Silvar Viladomiu | Galway-Mayo Institute of Technology, Ireland |
| 28 | Frane Škeljo | University of Split, Croatia |
| 29 | Moritz Stäbler | Leibniz Centre for Tropical Marine Research, Germany |
| 30 | Filali Tahar | National Research Center for Fisheries and Aquaculture, Algeria |
| 31 | Edgar Torrejon | Interdisciplinary Center of Marine Science, Mexico |
| 32 | Marco Torri | National Research Council (CNR-IAS), Italy |
| 33 | Nika Ugrin | University of Split, Croatia |

Table 1. Applicants selected by the Committee for participating to AMARE-MED 2019.

Participants

Only one selected applicant had to decline the decision of the Selection Committee due to an unforeseen parallel activity he was selected for (GFCM course). The 32 students that effectively participated to AMARE-MED 2019 had nationality and affiliation country that demonstrated a very broad international participation to this FAIRSEA activity (see Figure 6 and 7).

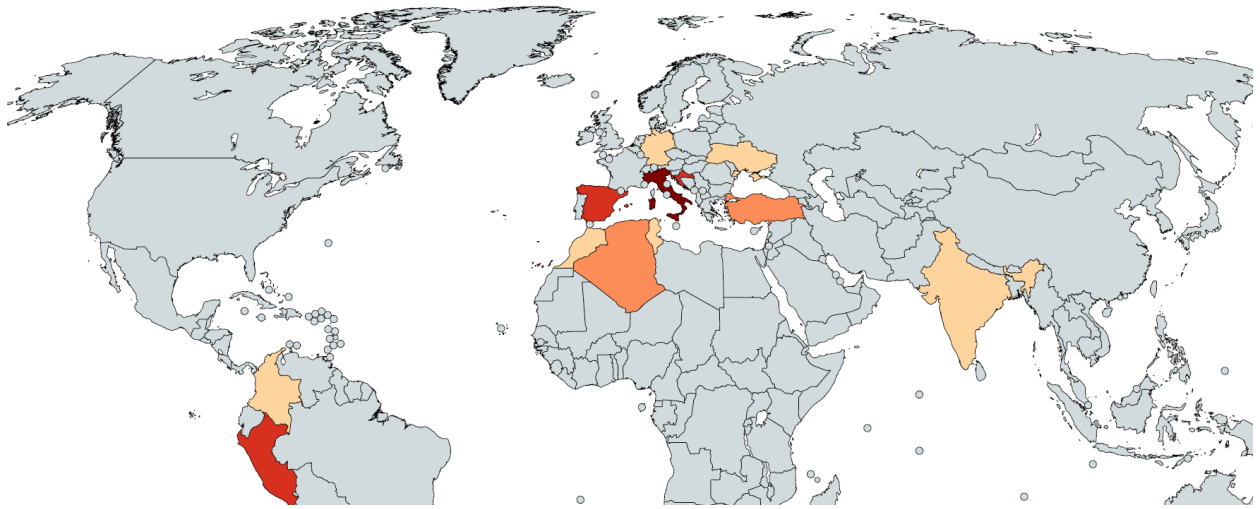


Figure 6. Participants by nationality (light orange=1; orange =2; red =3; dark red >=4).

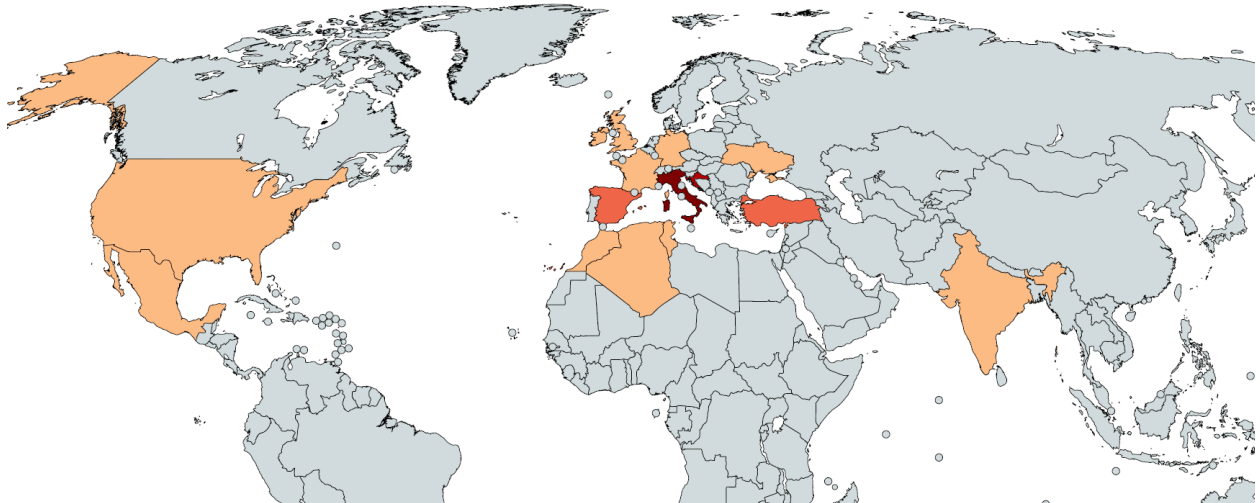


Figure 7. Participants by affiliation (light=1; orange =2; red =3; dark red >=4).

Participants from the Italy-Croatia CBC program area were 14 (3 from Croatia and 11 from Italy). Other 3 participants were from Italy (out of the CBC program area), 2 from Spain and Turkey, and 1 from Algeria, France, Germany, India, Ireland, Mexico, Morocco, Tunisia, UK, Ukraine, USA.

To the activity, other than the **32 selected participants** and the **3 teachers** participated **2 assistants**, i.e., Igor Celic (OGS) and Grant Adams (UoW), **1** representative of the AMAREMED Secretariat, i.e., Davide Agnetta (OGS), and **3** members for the Scientific Committee, i.e., Simone Libralato (OGS), Cosimo Solidoro (OGS) and Giuseppe Scarcella (CNR) **for a total of 41 participants to the AMAREMED 2019 activity.**



Figure 8. Group photo of the First Advanced school on EAF, AMARE-MED 2019.

Support

No fee was requested to selected students for attending the AMAREMED 2019. All AMAREMED 2019 participants were provided with:

- free access to conference rooms and facilities at IVSLA;
- Course materials;
- Gadgets;
- Lunches;
- Coffee breaks;
- Participation to excursion;
- Social dinner.

Thanks to FAIRSEA project 22 selected applicants that requested in the online application form were supported for travel and accommodation. **Moreover, other 5 applicants received the full support (travel and accommodation) of the FAO General Fisheries Commission for the Mediterranean and Black Sea (GFCM).**



Figure 9. Gadgets provided to participants to the First Advanced school on EAF.

First Advanced school implementation

The school developed in 6 full days from Monday 01 July 2019 to Saturday 06 July 2019. Two days lecture were given on Monday-Tuesday by N. Dowling. Half a day lecture was provided on Wednesday 03 July by G. Coro. The other half of the Wednesday was conceived as a social event with excursion and social dinner. In the last three days (Thursday 04 July to Saturday 06 July) the lectures were given by A. Punt. Detailed agenda in the following.

Definitive agenda

Welcome Monday 01 July (09.00-10.00)

Giovanna Palandri, Chancellor of IVSLA

Cosimo Solidoro, Director of the Oceanography Chapter, OGS

Simone Libralato, FAIRSEA Coordinator on behalf of the Scientific and organizing committee
Logistics, students quick self-introduction, Introduction to the school, introduction of the teachers (09:00-10:00)

Day 1 Monday 01 July (10.00-17.00): Teacher Natalie Dowling (CSIRO, Australia)

10:00: Introduction, Overview

10:15: A. Challenges of multispecies assessment in the data-limited space

*11:00: **Coffee break***

11.30: B. Introduction to FishPath and “bottom up” engagement philosophy

*12:00: **Lunch Break***

13:00: Demonstration of FishPath software (assessment section)

14:00: Assignment #1: Working through the assessment component of FishPath for the case study fishery

14:45: C. Confronting and refining FishPath output

*15:00: **Coffee break***

15:30: Work in groups to discuss FishPath output and refine options

16:30: Presentation and discussion of option shortlists

17:00: Closing of the day

Day 2 Tuesday 02 July (09.00-17.00): Teacher Natalie Dowling (CSIRO, Australia)

09:00: Recap from Day 1

09:15: D. The evolution of assessments, with emphasis on catch- and length-based methods

*10:15: **Coffee break***

10:45: Assignment #2: Catch-only or length-based assessments

12:00: **Lunch break**

13:00: E: Empirical multi-species assessment options: multi-indicator decision frameworks

13:45: Assignment #3: Developing a multi-indicator decision framework

15:00: **Coffee break**

15:30: Discussion of multi-indicator frameworks

16:30: F. Roundup of issues, concerns/pitfalls and advantages of empirical assessment approaches

17:00: Closing of the day

Day 3 Wednesday 03 July (9.00-13.00): Teacher Gianpaolo Coro (ISTI-CNR, Italy)

09:00 Introduction to the single-species CMSY model

09:45 Assignment #1: using the D4Science cloud RStudio IDE

10:00: **Coffee break**

10:30 Assignment #2: executing the CMSY model in the cloud RStudio IDE

11:15 Multi-species extension of CMSY: 400 EU stocks analysis

Multi-species CMSY for regional applications: Adriatic Sea stocks analysis

12:00 Assignment #3: executing the multi-species CMSY model

13:00: **Lunch break**

Half Day Excursion: visit to the Lazzaretto Nuovo Island and Social dinner

Day 4 Thursday 04 July (9.00-17.00): Teacher Andre Punt (SAFS, UoW – USA)

09:00: A. Introduction and Overview (check computers, TMB, etc)

09:30: B. Single-species age-structured modelling (recap)

10:00: **Coffee break**

10:30 C. Fitting models to data (general)

12:00: **Lunch Break**

13:30 D. Fitting models to data (likelihoods, data, Optimum and TMB)

14:45: **Coffee break**

15:15: D. Continued

16:15: Assignment #1a: Fitting a model using optim

17:00: Close (and homework)

Day 5 Friday 05 July (09.00-17.00): Teacher Andre Punt (SAFS, UoW – USA)

09:00: Recap from Day 4

09:15: Assignment #1a: Fitting a model using TMB

10:15: Coffee break

10.45: E: MICE and multispecies models

12:00: Lunch Break

13:15: F: CEATTLE (run with me as we go through the examples)

14:00: Assignment #2: Running (multiple) single species models using CEATTLE

15:00: Coffee break

15:30: Assignment #2 continued

16:15: G: Diet and ration inputs for CEATTLE

17:00: Close (and any homework)

Day 6 Saturday 06 July (9.00-17.00): Teacher Andre Punt (SAFS, UoW – USA)

09:00: Recap from Day 5 (and any homework recap)

09:15: H: Multispecies control rules, projections and outputs

10:15: Coffee break

10.45: Assignment #3: Fitting CEATTLE in multi-species mode

12:00: Lunch break

13.15: Assignment #4: Multispecies trade-offs #1

15:00: Coffee break

16.00: Assignment #4: Multispecies trade-offs #2 (preparation and presentations)

17.00: Photos and certificates

18.00: Closure of AMARE-MED 2019.



Figure 10. Natalie Dowling starting the lecture



Figure 11. The participants to the AMARE-MED 2019

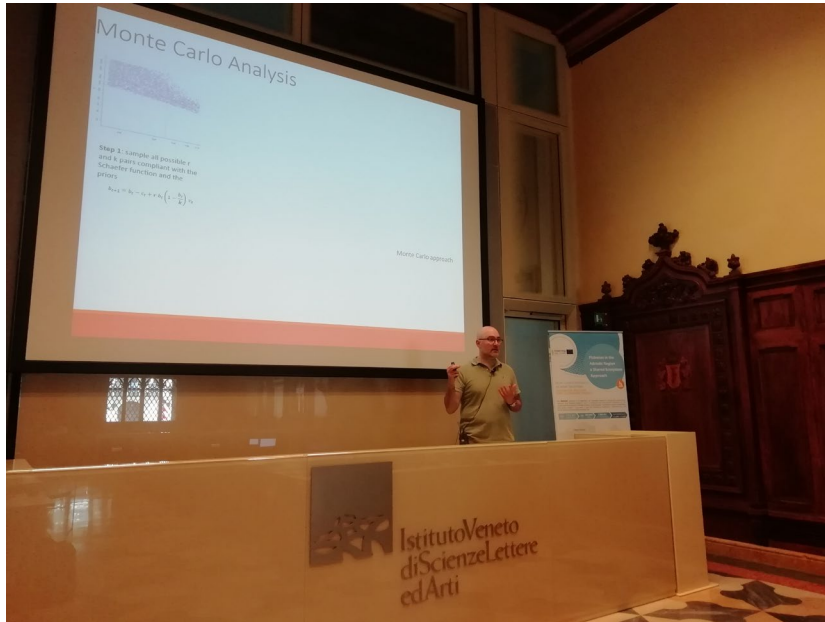


Figure 12. Gianpaolo Coro lecturing



Figure 13. Starting the excursion in the lagoon of Venice



Figure 14. Social dinner in a local typical restaurant in Venice

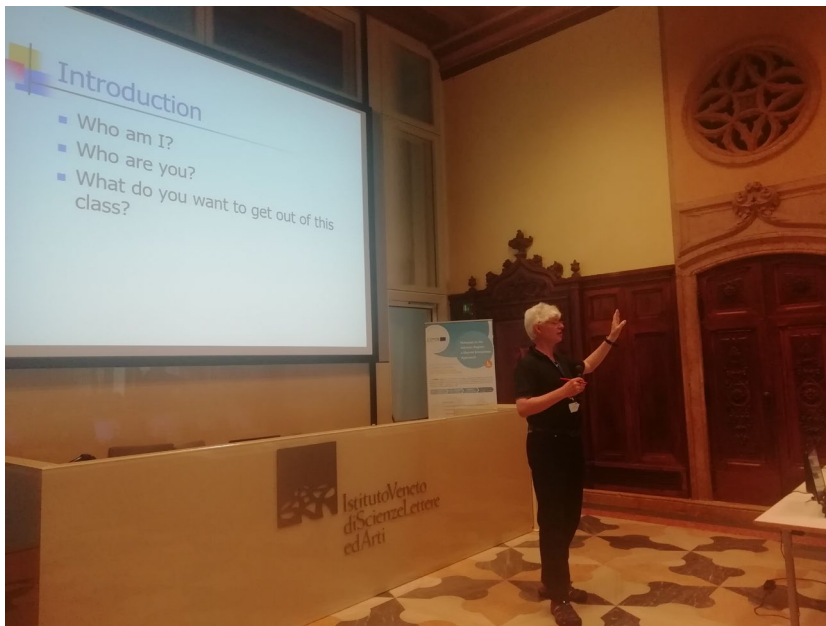


Figure 15. Andre Punt starting his 3 days lecturing

Course material

The course material included lectures, assignments, references, softwares and photos all made available to participants through a dedicated sharepoint (Sharepoint_AMARE-MED2019). The material collected includes:

Lectures

Fishpath classes (1 pptx, *AMAREMED 2019 lectures.pptx* of all lectures given by N. Dowling)

CMSY class (1 pptx, *CMSY-Lecture.pdf* of the lecture given by G. Coro)

CEATTLE classes (8 pptx, *Day 1 - Lecture A.pptx; Day 1 - Lecture B.pptx; Day 1 - Lecture C.pptx; Day 1 - Lecture D.pptx; Day 2 - Lecture E.pptx; Day 2 - Lecture F.pptx; Day 2 - Lecture G.pptx; Day 3 - Lecture H.pptx*; of the lectures given by A. Punt)

Assignments and coding

Fishpath classes:

AMAREMED 2019 assignments.docx

FishLife_ex.R

CEATTLE classes:

Assignment #1.docx with code

Assignment #2.docx with code

Assignment #3.docx with code

Assignment #4.docx with code

SOFTWARES: Fishpath, CMSY and DevTools installing material.

Selected Scientific papers on CEATTLE, data limited methods, CMSY, MICE, fisheries models.

All the material is available upon request.

Evaluation of the course by participants

All participants to AMAREMED 2019 were provided in the last day of the course with a questionnaire for their evaluation of the activity carried out. The completion of the questionnaire was anonymous and voluntary. Not all questions were answered. In total 27 questionnaires were received: of these one was produced by one of the teachers and thus removed from the synthesis reported here. The first 14 questions were given and asked to provide an evaluation from 1 (very low) to 5 (very high). The questionnaires with evaluations in between two categories (e.g. between 3 and 4) were assigned to the lowest category. Then the questionnaire included a question on specific suggestions (question 15) and a space for notes and comments.

Scored questions

The questionnaire was composed of 14 questions with evaluation score. In the following the 14 questions given:

- 1. Information: How well were you informed about the objectives of this course?**
- 2. Expectations: To what extent do you consider that this training course met your expectations?**
- 3. Relevance/Work: How relevant to your work do you consider the content of this training course?**
- 4. Efficiency: How do you consider the ratio between the number of subjects lectured within the course and the time allocated for each topic?**
- 5. Interest: How interesting did you consider this course to be?**
- 6. Concrete Need: To what extent did you consider the training was oriented to concrete needs and problems?**
- 7. Comprehension: To what extent do you consider that you have understood the content of the course?**
- 8. Difficulty Level: How appropriate do you consider the difficulty level of this training course?**
- 9. Pace: How appropriate do you consider the pace of this training course?**
- 10. Trainer preparation: How do you consider the preparation of the trainers?**
- 11. Learning material: Were the learning aids and materials of a good standard?**
- 12. Use: To what extent will you be able to use what you have learned in this course?**
- 13. Logistics : What do you think about the logistic and general organization of the course?**
- 14. Overall evaluation: What is your overall evaluation for this course?**

| AMARE-MED 2019 evaluation form | | | | | | Comments (each questionnaire divided by "...") |
|---|----------|-----|--------|------|-----------|--|
| COURSE CONTENT | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | average score |
| | very/low | low | medium | high | very/high | |
| 1. <u>Information</u> : How well were you informed about the objectives of this course? | | | 3 | 14 | 9 | 4.2 |
| 2. <u>Expectations</u> : To what extent do you consider that this training course met your expectations? | | | 1 | 19 | 6 | 4.2 |
| 3. <u>Relevance/Work</u> : How relevant to your work do you consider the content of this training course? | | | 5 | 8 | 13 | 4.3 |
| 4. <u>Efficiency</u> : How do you consider the ratio between the number of subjects lectured within the course and the time allocated for each topic? | | | 12 | 9 | 5 | 3.7 |
| 5. <u>Interest</u> : How interesting did you consider this course to be? | | | | 9 | 17 | 4.7 |
| 6. <u>Concrete Need</u> : To what extent did you consider the training was oriented to concrete needs and problems? | | | 4 | 15 | 7 | 4.1 |
| 7. <u>Comprehension</u> : To what extent do you consider that you have understood the content of the course? | | | 10 | 10 | 5 | 3.8 |
| 8. <u>Difficulty Level</u> : How appropriate do you consider the difficulty level of this training course? | | | 7 | 14 | 5 | 3.9 |
| 9. <u>Pace</u> : How appropriate do you consider the pace of this training course? | | 1 | 7 | 9 | 8 | 4.0 |
| 10. <u>Trainer preparation</u> : How do you consider the preparation of the trainers? | | | | 6 | 20 | 4.8 |
| 11. <u>Learning material</u> : Were the learning aids and materials of a good standard? | | | | 12 | 14 | 4.5 |
| 12. <u>Use</u> : To what extent will you be able to use what you have learned in this course? | | 2 | 9 | 10 | 5 | 3.7 |
| 13. <u>Logistics</u> : What do you think about the logistic and general organization of the course? | | | 1 | 10 | 14 | 4.5 |
| 14. <u>Overall evaluation</u> : What is your overall evaluation for this course? | | | | 14 | 12 | 4.5 |

TABLE 1: Summary table of the 26 questionnaires in terms of the 14 scored questions. The table in column 1-5 report the number of questionnaires reporting the indicated score. An average score was also reported as a synthetic mean of evaluation. Comments received are also reported (each comment provided divided by a semicolon).



FIGURE 16: Scores obtained for the 14 questions of the questionnaire a. X-axis report the number of questionnaires

Open question

15. Suggestions? Do you think is better to have one single method or more methods in one course? What would you change? What would you keep?

(list of answers received)

- *it's a good thing to have multiple methods;*
- *I suggest to have more time on each topic; one or two methods with a lot of work on laboratories;*
- *I think that this depend on the topic;*
- *IN case each single method needed to be better investigated because they are very interesting and complex;*
- *it depends on models, we can have one method (as ceattle) in details or a few like CMSY or LBSPR;*
- *maybe one or max two methods would be a good idea;*
- *I believe that developing a critical sense is crucial for a scientist, so I will always prefer to learn different methodologies;*
- *max two methods;*
- *I prefer one single method 3 days on theory and 2,3 days on practice;*
- *I would suggest to cover better the basics like maths and stats, so that students have a better grasp of what do they deal with especially for mice models.*
- *ONe method to be highly treated;*
- *2/3 methods is good; it would be better to have only one method or more time (Maybe more days);*
- *it is hard to answer maybe I would prefer to examine in the deep one or two methods only;*

Comments

Any other comment you want to share:

(list of answers received)

- *Trainers must have more time to explain more how models works;*
- *Trainers must also explain more how to construct the dataframe and how data to be used for the models, as it is the most difficult part;*
- *More time should be done to the CMSY method to understand the different scenarios;*
- *Give more importance to the methods worked on poor data;*
- *Ceattle is very intersting method, CMSY and LBSPR are useful*
- *This course was very opening my mind and made me more critical about decision to make in selecting strategies thank you;*
- *keep organizing it;*
- *I would suggest to give a detailed description of models (pros and cons) in comparison with other models and wht are the benefits in using it rather than sharing their normal use (CMSY);*
- *As an ecosystem modeller it is my first exposure to this type of modelling that means fisheries management modelling, so I'm happy to having this program and I think that this type of fisheries management is required in our country where lots of fisheries faces high degree of overfishing so in the future I want to work on this type of work and this course motivate me for doing this;*
- *Very intersting course very useful very good organization; cool location; climate change problems analysis have not been discussed in the course in my opinion also stock assessment has to cope with them sooner or later*

Communication feedback template

The questionnaire above was considered to fill the questions reported in the CFT of the FAIRSEA project.
Number of answers as in the following:

- 1. Were you satisfied with the content of this event?**
 - a. Completely Satisfied (13)
 - b. Very Satisfied (8)
 - c. Somewhat Satisfied (5)
 - d. Dissatisfied
 - e. Very Dissatisfied

- 2. Were you satisfied with the implementation method of this event?**
 - a. Completely Satisfied (5)
 - b. Very Satisfied (9)
 - c. Somewhat Satisfied (12)
 - d. Dissatisfied
 - e. Very Dissatisfied

- 3. Were you satisfied with your own contribution/performance during this event?**
 - a. Completely Satisfied (5)
 - b. Very Satisfied (10)
 - c. Somewhat Satisfied (10)
 - d. Dissatisfied
 - e. Very Dissatisfied

- 4. Is your expectation satisfied by this event?**
 - a. Completely Satisfied (6)
 - b. Very Satisfied (19)
 - c. Somewhat Satisfied (1)
 - d. Dissatisfied
 - e. Very Dissatisfied

Final comments on the course

Overall the course was positively evaluated. According to the answers provided some participants found the course pace too hard to follow (question 9) and also the methods discussed not always in use in the context on which they are working/studying (question 12) possibly due to the lack of available data. Trainers preparation (Question 10), learning material (Question 11) and interest (Question 5) were very positively evaluated. The overall evaluation was very positive (Question 14).

Acknowledgements

The Organizing Committee is indebted to Elisabetta Betulla Morello (FAO-GFCM) that provided suggestions for the school organization and that helped with the support by the General Fisheries Commission for the Mediterranean (GFCM).

ANNEXES

1-Amaremed 2019 flyer



AMAREMED2019_Flyer_def.pdf

2 - List of participants signed every day



AMAREMED2019_List of Presence.pdf

3 – Introductory lecture by S. Libralato



AMAREMED_Opening_1_July2019.pdf

4- Lectures N. Dowling



AMAREMED 2019 lectures.pdf

5 – Lecture G. Coro



CMSY-Lecture.pdf

6- Lectures A. Punt



Day 1 - Lecture
A.pdf



Day 1 - Lecture
B.pdf



Day 1 - Lecture
C.pdf



Day 1 - Lecture
D.pdf



Day 2 - Lecture
E.pdf



Day 2 - Lecture
F.pdf



Day 2 - Lecture
G.pdf



Day 3 - Lecture
H.pdf

7 – evaluation reports of the School



AMAREME2019_eval
uations_received.pdf