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E-Learning Webinars; Dissemination, Communication, Outreach, Capacity Building, Management Advice Provision, Training (Courses/Webinars), Survey and Fishery Manuals/Videos, Stakeholder Engagement, Mesopelagic resources.
Executive Summary
The Deliverable 8.3 Report on 3-4 E-learning Courses or Webinars is a public deliverable (PU) and also a demonstrator (DEM) making it a living document as the e-Learning-webinars are further developed for more models under the MEESO project.

A number of e-learning material and webinars under the MEESO project have been developed and produced:

D8.3.1: E-Learning-Webinar-Video on the TropFishR Package.

This webinar provides an introduction to the TropFishR Package and the model estimation of growth, mortality and gear / fishery selectivity and its application to mesopelagic fish species. The video presents (i) the background and motivation for a potential fishery targeting species in the mesopelagic layer, (ii) length-based methods for population dynamic parameters and stock assessment, (iii) estimation of growth and mortality parameters with the TropFishR model and software package, (iv) application of TropFishR to estimate life-history parameters of mesopelagic fish species, and (v) further steps in relation to estimation of stock status with TropFishR. This is the first model needed for providing population dynamic parameters and initial stock assessment. The output from this model provides input to other length based assessment models such as the S6 model and the broader trophic models under MEESO. An E-Learning-Webinar-Video for the S6 model will during the next year also be produced under the MEESO Project WP5.

Direct youtube link to the video: <https://youtu.be/M8Zzjak2p2Y>

Find slides from the video in:

<https://www.meeso.org/-/media/sites/meeso/outcomes/d8-3-1-learning-tropfishr-document.pdf>

(Associated to EU-H2020-MEESO Project WP5, <https://www.meeso.org/>).

D8.3.2: E-Learning-Webinar-Video on the DISPLACE Model.

This webinar provides an introduction to the DISPLACE Model: A Spatial Bio-Economic Model to support Economically Viable and Sustainable Fisheries – Application to Potential Mesopelagic Fishery. The video presents (i) the background and motivation for potential fisheries targeting species in the mesopelagic layer, (ii) bio-economic models for fishery management strategy evaluation (MSE), (iii) the DISPLACE model covering model structure, input parameters, output measures and estimates, model demonstration, and (iv) an application of DISPLACE to evaluate different management strategies of potential mesopelagic fishery under biological uncertainty

Direct youtube link to the video: <https://youtu.be/Bik-zySJua0>

Find slides from the video in:

<https://www.meeso.org/-/media/sites/meeso/outcomes/d8-3-2-e-learning-displace-document.pdf>

(Associated to EU-H2020-MEESO Project WP5, <https://www.meeso.org/>).



D8.3.3: E-Learning-Webinar-Video on the StrathSPACE Model.

This webinar provides an introduction to the StrathSPACE Model: a discrete-time and discrete-space single-species population model. The presentation outlines (i) the technical challenges in modelling populations that are both physiologically and spatially structured, (ii) the technical innovations deployed in StrathSPACE in order to produce a model that is computationally efficient and hence fast-running enough to carry out parameter explorations (iii) an example of the model outputs (spatial distribution, length distribution and biomass time series) for in implementation involving *Benthoosema glaciale*, including a forecast of stocks up to 2050 under an RCP8.5 climate change scenario.

Direct youtube link to the video: [StrathSpace.mp4](#)

Find slides from the video in: <https://www.meeso.org/-/media/sites/meeso/outcomes/d8-3-5-6-modelling-mesopelagic-fish-with-the-strathspace-approach.pdf>

(Associated to EU-H2020-MEESO Project WP5, <https://www.meeso.org/>).

D8.3.4: E-Learning-Webinar-Video on the cost-benefit analysis of mesopelagic fishing.

This webinar explains the approach taken to include the climate risks of mesopelagic fishing in a tractable cost-benefit analysis from a private and a social perspective.

Mesopelagic fish populations represent an opportunity for fishing companies and food production, but their exploitation also carries substantial environmental risks, not least because these populations play an important role in the oceanic carbon pump. In this e-learning module we explain the methodological approach taken to assess the economic viability of mesopelagic fishing from a private economic perspective, which focuses on the costs and revenues accruing to a single company, and a public economic perspective, which also takes into account impacts on society at large, notably the climate. By focusing on a small, emerging fishery, the analysis can be done in a way that retains analytical tractability. The video explains the line of reasoning behind the method, its core assumptions, and some results of an application to four EU fishing fleets.

Direct youtube link to the video: <https://youtu.be/RuqSEr4svSE>

(Associated to EU-H2020-MEESO Project WP6, <https://www.meeso.org/>).

D8.3.5: E-Learning-Webinar-Video on Vertical_Capture_Strategies.

This webinar discusses different capture strategies for capturing on or quantifying mesopelagic resource levels. Mesopelagic resources are unevenly distributed, and often echosounders are used to direct sampling. The video presents results suggesting that such a strategy may lead to large errors, since backscattering levels are a biased estimator of mesopelagic biomass. The material presented is based on results and experiences from MEESO WP2 and WP4.

Direct youtube link to video: <https://youtu.be/50TqpQJVqNc>

(Associated to EU-H2020-MEESO Project WP2 & WP4, <https://www.meeso.org/>).

D8.3.6: E-Learning Document for Data Handling.

The D8.3 e-learning document for data handling under WP1 from March 2021 provides guidance on and gives (i) an introduction to the data portal and data management, (ii) a description of the ICES acoustic and biotic data formats including acoustic data formats, biotic data formats, acoustic data model, and vocabulary validation and submission, (iii) a presentation of ICES oceanographic data, (iv) an outline of cruise summary reports, (v) the details of the ICES metadata catalogue, and (vi) a guidance on the MEESO metadata record format.

Direct link to pdf-version E-Learning Document and Guidance:

<https://www.meeso.org/-/media/sites/meeso/outcomes/d8-3-e-learning-document-wp1-mar21.pdf>

(Associated to EU-H2020-MEESO Project WP1 and WP8, <https://www.meeso.org/>).

The general outline for those webinars is given below.

OUTLINE FOR E-LEARNING MATERIAL / WEBINARS

Target Audience:

(1) Applied researchers in fisheries science, resource assessment and management advice - notably those eventually involved in pelagic and mesopelagic fishing and resource management advice;

(2) University students (MSc, BSc and PhD) involved in marine resource and fisheries research, assessment and management advice programmes.

The target audience determines what background knowledge we assume and how general/specific we are with regard to the various models and methodologies. The target audience is assumed to be interdisciplinary researchers with some background in marine biology or ecology and/or fisheries economics who potentially are dealing with new fisheries and fisheries resources on a relatively poorly understood, poorly monitored, and maybe even poorly managed resource basis. We use *Maurolicus* and *Benthosema* as case study examples of such potential resources and fisheries, but the learning material is also relevant to other fisheries, such as data-poor fisheries in developing countries. This implies both the specific models and their data requirements but very importantly also how the various models and methodologies deal with the uncertainties as well as with the data that *are* available and the assumptions that need to be made as consequence of lack of information. Besides the models, we accordingly also discuss the models as examples of various ways to deal with uncertainty rather than as learning material in their own right alone.



Models / Methodological approaches covered and the background and purpose for their use as examples and case studies:

- 1) The report include e-learning material and webinars for 3-4 different models and approaches used in MEESO and will be updated during the next half year to include even more MEESO models.
- 2) The e-learning material and webinars are made by the respective model developers / key users and model applicants / method and approach developers.
- 3) The e-learning videos are typically in form of around 20-30 minutes video presentation with around 15-40 power point slides presenting the background, the method, the method application and its output (and in some cases with animation of model runs and model output provision) for each model application / methodological approach with focus on the application to the mesopelagic system as well as on the uncertainties herein as examples.
- 4) Besides the above listed under target audience, the angle of attack and the introduction in the presentation as well as the context/reason/justification for making the e-learning material or webinar is the current mesopelagic situation and problem as an example (case study) with the purpose of addressing and solving this. This is to focus the presentation to the background and current context of MEESO, the actual problem to be solved (including lack of knowledge), the purpose of addressing the situation/problem (to achieve further knowledge), the specific aims, the reasoning and justification for selecting this model / methodological approach to address the current problem for the mesopelagic system (as an example), the needed and available information, and the application of the approach, and finally the outcomes. Consequently, the e-learning material and webinars are the models and methodological approaches applied in context of MEESO, i.e. case studies and examples in context of the focus mesopelagic stocks / communities / economic systems.
- 5) What is the problem to be solved and the purpose for developing and using the model in MEESO to address the problem? What is the context and the problems it addresses:
 - a. What is the problem (e.g. data limited situation of assessing the mesopelagic stocks / community / trophic levels)?
 - b. What is the purpose in relation to solving this problem?
 - c. What is the reasoning and justification for choosing and using this specific model / methodological approach to address the problem (including level of information and advisory/research context/situation)?
 - d. Given this context how is the model application / methodological approach with respect to setup/structure, conditioning, input parameters, data provision and data needs (and monitoring) for input

- parameters, lack of knowledge and information and according necessary assumptions to be made, necessary conditions (e.g. computer power capacity, expertise needed, etc.);
- e. Context including reference to general literature, guidance, user manuals, links, etc. to the models / approaches, shiny apps, etc., etc.

Application of models / methodological approaches:

- 6) Application/Implementation: The e-learning material and webinars show examples (as case studies) of how to apply and run the model / methodological approach in current mesopelagic context;

Application and Implementation outcomes:

- 7) Model / Methodological approach outcomes: The e-learning material and webinars show examples of output in current mesopelagic context, and give examples of interpretation of the results, as well as highlight uncertainties and biases. Finally it elaborate on how the output can be used in current context of e.g. a management advice problem – and what it should not be used for.
- 8) The learning outcomes of the e-learning material or webinars include the following: After having gone through and/or completed the material or webinar the users should be able to:
 - a. Identify key 'knowns' (i.e. variables for which data/information is available) and 'unknowns' (i.e. variables for which data / information is not available) in MEESO context, e.g. in relation to a management advisory problem;
 - b. Describe the type/level of uncertainty for each key variable and outcome: do we have an estimate, a range, a scenario, or absolutely nothing?
 - c. Identify major risks in addressing the MEESO problem, e.g. a management advisory problem as done;
 - d. Design an approach to evaluate alternative policies (or management strategies) or monitoring and data sampling that utilizes whatever information is available, while acknowledging the uncertainties and taking into account major risks identified.

