**Minutes of the BENTHIS WP5 workshop**

**Haarlem, 05/06/2013 9:00-13:00**

Venue: Hotel Stempels, church room

Address: Haarlem, Netherlands

Local organisor: Katell Hamon, katell.hamon@wur.nl

Sharepoint: <https://teamsites.wur.nl/sites/benthis/WP5%20Economics/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fbenthis%2FWP5%20Economics%2F1%2E%20meetings%2F2013%2D06%2D05%20WP5%20workshop>

Participants: Katell Hamon (LEI), Elena Pagliarno (CNR), Frank Jensen (UCPH), Rasmus Nielsen (DTU-AQUA), Murat Dagtekin (CFRI), Sara Pavone (CNR), Matteo Ferraris (CNR), Roberto Zoboli (CNR)

Aim: Discuss the economic work done in Benthis with contributors of WP5 and how it can be applied in case studies.

**Summary**

Katell Hamon presented the work in progress in WP5, the work plan for the next year and the interactions between the generic methods developed and the case studies. Although WP5 officially started shortly before the meeting (in April 2013, month 7 for tasks 5.1 and 5.2 and in June, month 9 for task 5.3), progress had already been made in all tasks.

WP5 aims to develop generic methods that can be used in the case studies to feed in the analysis of the alternative gear/management to reduce the impact on the bottom. It is not compulsory to use those models in case studies if alternative, comparable models already exist and additional economic analysis can always be done in case studies and discussed in WP5.

Work in progress by deliverable:

* D5.1 Minutes of workshop W3 on integration WP5 and WP6 (month 18)
* D5.2 Documented framework to analyse the economic performances of alternative fishing gears (month 24) --> Static comparative analysis framework in development – first version presented in W3 workshop (month 18)
* D5.3 Documented fleet dynamics module of spatial allocation of fishing effort (month 32) --> Fleet dynamic model using several gears and age structured stocks developed – applications to discard ban and impact quota in progress, presentation in W3 workshop
* D5.4 Report on investment theory, its application in fisheries and the lessons on key factors influencing the investment behaviour --> Investment behaviour literature review started – interviews and modelling to follow

**Task 5.1 framework to analyse the economic performances of alternative fishing gears**

Katell presented the slides provided by IFREMER on the development of the framework (ppt available on the sharepoint and also presented in plenary). The presentation is summarised below:

*In task 5.1 (led by IFREMER) a framework to analyse the economic performances of alternative fishing gears is being developed based on the IAM model (Merzéréaud et al, 2011, Raveau et al., 2012, Guillen et al., 2013). The economic module IAM-SENSECO is developed independently from the IAM model in an R package that works with a user interface (no coding required). The interface allows to test different scenarios based on the user’s data (input in an excel file). Amongst others, some possible uses would be*

* *Sensitivity analysis of economic performances of a fleet/vessel to change in fuel price, CPUE (catch per unit of effort), effort allocation to metiers (or gears), fish prices, variable costs, etc.*
* *Sensitivity analysis of effort allocation to alternative gear depending on price, fuel price, CPUE, etc. using the endogenous effort allocation function.*
* *Analysis of the impact of change in fuel price on economic performances of various effort allocation strategies (between traditional and alternative gears)*

*A first version of the user interface is being tested on the IFREMER data. A first presentation of how to operate the tool will be made in 2014. The operational model will be delivered with a user manual in month 24 and if possible a workshop for application to case studies will be organised at the time.*

*Minimum list of data needed*

*The data should be provided at the fleet or vessel level (depending on the level of analysis) and for all the fishing activities (=” metier”) investigated (old/new gears, for different areas, with different management measures, etc):*

* *Price per species*
* *CPUE per species (CPUE=catch per unit of effort)and métier*
* *Discard rate by species and métier*
* *Effort by métier*
* *Fuel consumption by métier*
* *Fuel price*
* *Other Variable costs by métier*
* *Crew costs*
* *Repair and maintenance costs*
* *Other Fixed costs*

*Additional data (not required but that could be used)*

* *Price and CPUE per market category for each species*
* *Effort per area per metier*
* *Disaggregated variable costs per metier: landing costs, bait costs, ice costs, food costs, gear costs*

*IAM SENSECO is developed to perform static comparative analysis*

All case studies intend to apply the framework but some questions were raised while discussing it and are sent to Ifremer for explanation (claire.macher@ifremer.fr) :

1. In the model, using the effort report option 2 applied on a fleet, the α would be different between vessels so can this be captured? Sensitivity analyses of the results to the a will be added. The possibility to parameterize for several vessels and get aggregated results considering a a value for each vessel was not really the objective here, we could think about that anyway 🡪 who would be interested in?
2. For some new gears it is not possible to choose between different gear options for a vessel, a change is permanent. Can this diffusion be captured by the α? Options of allocation of effort by metier enable to allocate all the effort to the same gear. Using α, dynamic of effort allocation becomes endogenous, when α=1, effort allocation is based only on usual allocation and when α=0, effort allocation is based only on profits maximization. Analyses are however static so processes of diffusion cannot be represented here.
3. If working for a fleet, can we put individual data in input that are then aggregated?

same as 1., it was not really the objective, it could be possible technically but maybe by reducing possible interactions through interface with the user and just providing the aggregated results 🡪 who would be interested in that?

1. The model doesn’t estimate relationships between variables they are predefined (e.g. how costs change with effort/revenue, etc.). It would be good to have a list of all those assumptions so that people can estimate if it describes their case study appropriately.

Marginal variable costs of the effort and fuel consumption are indeed assumed to be constant in the model proposed as a default assumption. If other assumptions are more reliable for a case study, we could try to see if it could be taken into account🡪 please let us know what would be the most appropriate assumptions for your CS

As a general comment, the partners liked the simple approach that means that the framework can be applied in all cases but for some cases with data and experience, people would like to go beyond the static economic performances and integrate other types of benefits and costs, especially social ones, in their case study (see Appendix 1 for a brief description of cost-benefit analysis). This mean that they would still use the static analysis to estimate some of the monetary benefits and costs but would also like to estimate the value of non-monetary benefits using other technics.

The issue of 'ecosystem services evaluation' has been raised but the scope of WP5, which excludes explicit evaluation of ES, has been confirmed; however: (i) CBA might somewhat include non-market economic values, including ecosystem service value, depending on information, and (ii) the issue of ES might be somehow addressed within WP6 (e.g. within Multicriteria Analaysis approaches) even in the case there will not be activities of ES evaluation/appraisal in Benthis. This will be discussed with the WP6 leader. Of course, by comparing the economic results of different gears/management, some of them being 'more environmental', the value of the environment is indirectly captured in WP5 by the (possible) opportunity costs of new more environmental gears.

This implies that the alternative gears are clearly defined in terms of their environmental advantages (we will need input from WP4). In this regards, the different nature of different environmental advantages should be made clear: if they are about energy consumption (and emissions) they can be seen as a mixed private-public good with a component of private benefit accruing to the fisher (saving energy) and the society (saving emissions); in the case of lower impact on the sea bed the benefit is more of the public good kind with no (direct) benefit to the fisher, which is quite different.

Two important points about the cost-benefit analysis:

1. This is not mentioned in the WP5 description but is written in the case study description (sigh!).
2. It may overlap with some of the WP6 work on the multi-criteria analysis

It would be useful if the case studies who intend to apply cost-benefit analysis prepare some discussion slides for the integrated workshop WP5-WP6 in planned March 2014.

**Task 5.2 fleet dynamics module of spatial allocation of fishing effort**

Katell presented briefly the model concept and applications based on information provided by IMARES (summary below).

*The short-term model on fleet adaptations & management is being developed by IMARES (task 5.2 leader). The size structure of fish stocks has been introduced to the dynamic state variable model. The model has been applied to compare the response of a fleet to the use of different gears and to the introduction of a discard ban with their economic consequences. They are currently introducing “impact based quotas” (quota based on the impact on the bottom/ecosystem).*

Some case study representatives were worried that the model had to be applied in all case studies and it is not the case. If there is a fleet dynamics model already in use in the region/case study, every case study is free to choose the existing model. The model developed in 5.2 will be available to everyone who wants to try and apply it. A demo presentation of the model should be done in 2014 and the fully documented model will be delivered in month 32. In the meantime if people want more information, you can contact janjaap.poos@wur.nl.

**Task 5.3 development of investment model**

Task 5.3 just started but CNR already started the literature review on investment behaviour to identify drivers of investments and to give us the base-line for real option theory. Matteo Ferraris gave us a description of where we currently stand on real option theory (but no ppt presentation).

*Real option theory is a method that is used to simulate investment with a stochastic future. It has been used on entry-exit in the field of oil extraction and renewable energy.* There are some few applications of the real option in fisheries too, in the case of entry-exit stratega with an empirical application in the California market of salmon. Moreover, real option can be seen as a model to study:

* Exit-abandon a project with a positive salvage value
* Investment-disinvestment option in a new-old project (comparison) in a competitive market
* Flexibility to react to uncertainty and change of input (i.e. new and different gears)

CNR is preparing the literature review on investment and should have 2 documents ready by the end of 2013:

* List of potential drivers of investment
* Summary on the theory of real option theory

The model of investment will then be developed in collaboration between UCPH, LEI, CNR and IFREMER. UCPH will start developing the theoretical model on Danish data once the review has been completed. It should be possible to use the cost-benefit analysis to benchmark the real option theory model. The investment decision could be modelled by logit/probit/tobit functions because real option theory can use probability.

In parallel to the literature review, LEI is planning to conduct interviews in the North Sea case study to ask fishers using traditional and innovative gears what motivate their decision to change gear or not. Those interviews could be used to select the drivers for the case study if used ex-post or to validate the estimation of the parameters of the investment model if used ex-post. Birgit de Vos will be developing the questionnaire in September 2013 and will circulate it to the partners who are willing to conduct similar interviews. For this a preliminary list of drivers from the literature would be useful.

**Future plans for the WP5**

A common workshop WP5-WP6 is planned for month 18 (March 2014). It will probably be held in Rome in parallel to the WP2-WP3-WP4 workshop.

Preliminary plans for the workshop include:

* Presentation of IAM SENSECO
* Presentation of the fleet dynamic model
* Presentation of the literature review and if available, first results of the Danish investment model
* Discussion about the cost-benefit analysis and the multi-criteria analysis (planned in WP6)
* Discussion about the (socio-)economic indicators to produce for the management strategy evaluations

**References**

Merzéréaud, M., Macher, C., Bertignac, M., Frésard, M., Le Grand, C., Guyader, O., Daures, F., Fifas, S. (2011). Description of the Impact Assessment bio-economic Model for fisheries management (IAM). Amure Electronic Publications, Working Papers Series D-29-2011, 19 p. <http://www.umr-amure.fr/electro_doc_amure/D_29_2011.pdf>

Guillen, J., Macher, C., Merzéréaud, M., Bertignac, M., Fifas, S., and Guyader, O. (2013) Estimating MSY and MEY in multi-species and multi-fleet fisheries, consequences and limits: an application to the Bay of Biscay mixed fishery. Marine Policy 40, 64-74.

Raveau, A., Macher, C., Méhault, S., Merzereaud, M., Le Grand, C., Guyader, O., Bertignac, M., Fifas, S., and Guillen, J. (2012) A bio-economic analysis of experimental selective devices in the Norway lobster (Nephrops norvegicus) fishery in the Bay of Biscay. Aquatic Living Resources 25(03), 215-229.

**Appendix 1 Cost-benefit analysis (text provided by Frank Jensen, UCPH)**

More environmental friendly gear affects society in many ways. For example there is a change in landings, biodiversity and bottom at the sea. These changes are measured in different units. In addition, there is both advantages and disadvantage of more environmental friendly gears. We want to compare the effects of going from one gear type to another. If we only have one effect (advantage) we may compare the effect with the cost (disadvantage). Then, the gear with the highest effect-cost ratio is selected. When we have multiple effects (benefits) we shall convert the effects to a common unit. One measurement unit that can be selected is money. With money as unit we can perform a cost-benefit analysis. The, the gear with highest benefit compared to cost is selected. When choosing among various gears time is important. The benefits and costs have different time profiles. In this case discounted benefits and discounted costs are compared. With respect to benefits and costs we have both market and non-market goods. Market goods can be valued with market prices. Concerning non-market goods the issue of valuation arises. There are several methods for finding the value of non-market goods. First, revealed preference methods can be used. These methods use information from actual markets to find a value of non-market goods. Two revealed preference methods is the hedonic pricing method and the travel cost method. The hedonic method uses the fact that the price of a market good vary with the value of non-market goods. Thus, a house price will vary with the nature near the house. The travel cost method uses the fact that resources are used in order to consume non-market goods. For example, travel and time costs are used in order to consume a recreational good. Second, stated preferences methods can be used. In these methods a hypothetical value of a non-market good are found by use of surveys. Two possible methods are contingent valuation and contingent choice. In contingent valuation people are asked about the total value of the goods. In contingent choice people is requested to choose between pairs of hypothetical goods a values. Third, benefit transfer may be used. Here benefit estimates from other studies is used to value the good. In this project we will use benefit transfer to value non-market goods.