From single species through multi-species to ecosystem models

fish610.055 Fisheries and ecosystem models

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April 10, 2018

Classical single species models (assessment models)

Two main classes of single-species models:

- bulk biomass models
- age structured models

These are sometime chosen to match data structure, but not always

Fitting methods

- Statistical
- "by hand"

Methods vary, from just making the model output "look like" the trends in the data to complicated nonlinear methods of minimisation.

Multispecies models

Added complexity:

- multiple species
- biological interactions
- technical interactions

The species may or may not be caught in the same gear(s)
A species may be predators or prey

Ecosystem models

Typical desired additions:

- hydrography (currents)
- spatial factors

Example: Atlantis
Further reading, best practices: url{http://www.fao.org/3/a-i0151e.htm

Socio- economics

In EAFM we typically also want to take into account:

- social issues (e.g. employment)
- economics (e.g. profitability of the fisheries)
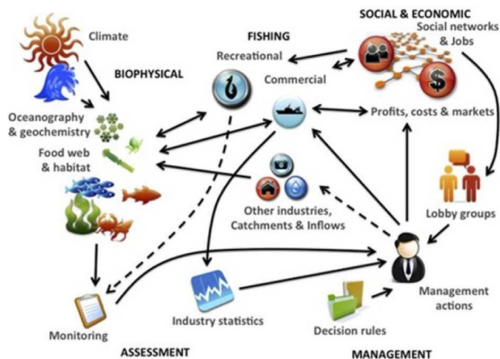
Including everything

Figure : Figure (c) CSIRO, see website link for Atlantis: https://research.csiro.au/atlantis/

Classification of models (a)

Further reading: Models for an ecosystem approach to fisheries by Plaganyi, published by FAO in 2007. `http://www.fao.org/tempref/docrep/fao/010/a1149e/a1149e.pdf`

- bulk-biomass vs age/length disaggregated
- temporal vs equilibrium
- strategic vs tactical [long-term yield vs assessments]
- single vs multispecies
- single vs multifleet
- spatial vs non-spatial
- stock component details: age, length, maturity, sex, . . .

url{http://www.fao.org/tempref/docrep/fao/010/a1149e/a1149e.pd (more in other lectures)
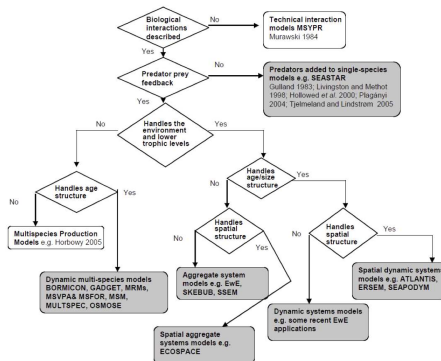
Classification of models (b)

Figure : Plagányi, É.E. 2007. Models for an Ecosystem Approach to Fisheries. FAO Fisheries Technical Paper No. 477. Rome, FAO. 2007. 108p. ISBN 978-92-5-105734-6.