

MareFrame



Scientific Conference “Advances in Ecosystem-based Fisheries Management”

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Are ecosystem models used for management and policy?

A rhapsody with seven tunes,
composed with an
Ecopath with Ecosim (EwE) theme

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Trevor A. Branch @TrevorABranch · 19 May 2016

Punt: there are more than 600 Ecosim models, but none are used to set catch levels by managers. @Ecopath: is that right?

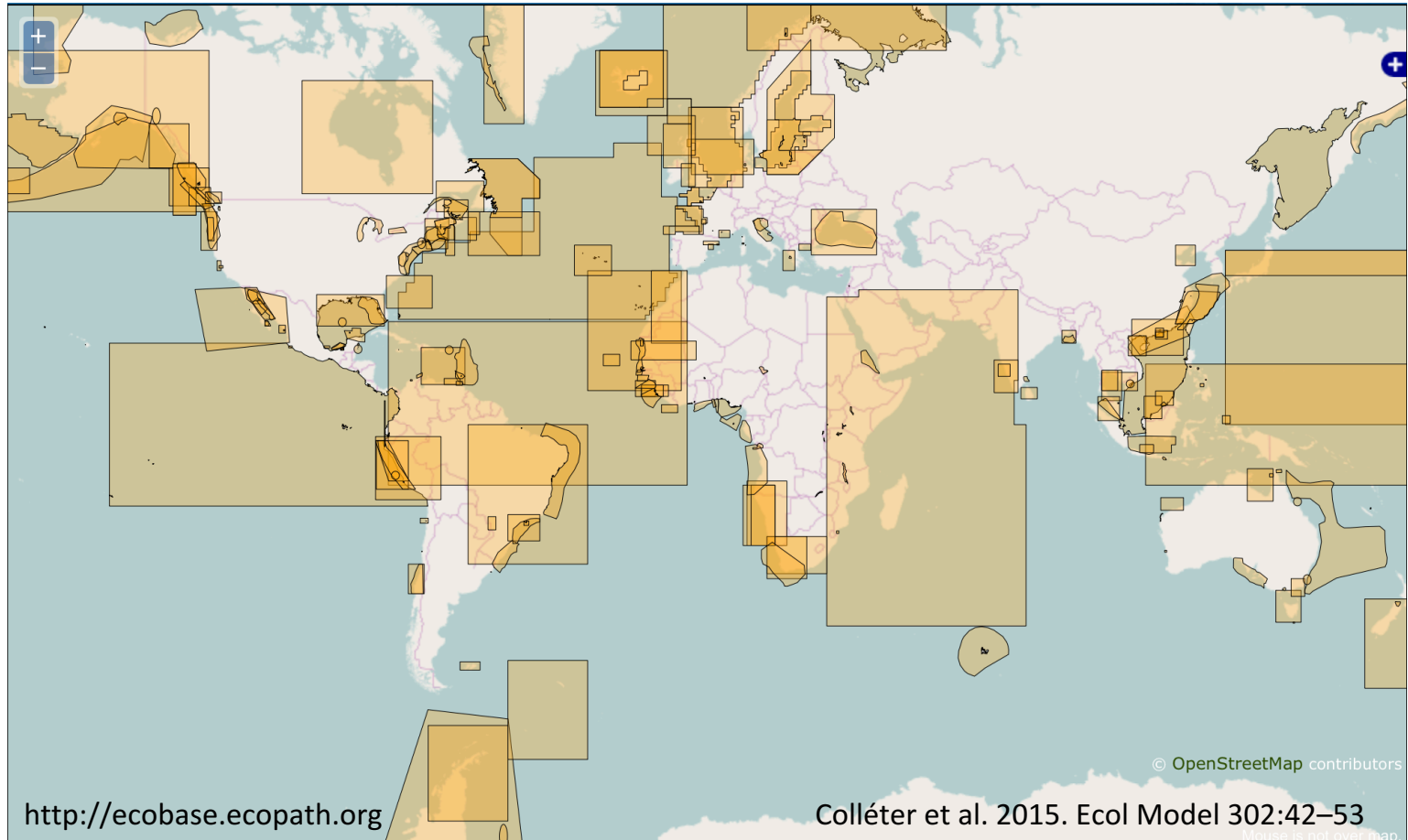




There's demand for EBFM, and there's capacity

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EcoBase: 456 EwE models, 189 for download



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Model status

- Models are gourmets – feed them well
- Increasingly data-driven rigorous applications, including spatial applications integrated with hydrodynamic & biogeochemical models
 - But also many applications not ready for management
 - Modelling is a complex activity that demands rigorous implementation and evaluation



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Focus: Ecopath with Ecosim (EwE)

How is EwE used for management and policy?

1. Fisheries management
2. Fishing regulations
3. Indicators
4. The fisheries sector
5. Spatial management
6. Environmental impact assessment
7. Climate change



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1. Fisheries management

- As integrative tool to evaluate ecological, economic and social impacts of management (US NE FMC)
- Setting and evaluating reference points
 - FMSY (Libralato, Mackinson, Nordic Think Tank)
 - Forage fisheries (MSC, Lenfest)
 - Overfishing limits for non-target species (US N.Pac FMC)
- For tradeoff scenarios
 - Culling of marine mammals, cormorants? (Neira, Dalsgaard)
 - Shrimp trawling impact on key fish species? (US GoM FMC, Walters)
- As operating model for MSE (CEFAS, NMFS)

2. Fishing regulations

- Fisheries Management Plans
 - STECF Multi Annual Plans (NSMAP - Mackinson)
 - Reef management & rebuilding (US GoM FMC, Chagaris)
- Bycatch & Bycatch Reduction Devices (US GoM FMC, Walters)
- Gear selectivity
 - Square vs diamond mesh (WWF, Coll)
- EU's Landing Obligation
 - Ecological, social and economic impacts
(Italy - Libralato, DiscardLess - Andonegi, MINOUW - Fonseca)

3. Indicators

- Marine Strategy Framework Directive (MSFD)
- EwE used to quantify 6 of 11 descriptors and majority of indicators
- Applied to all EU regional seas (JRC, Piroddi)
- Ecosystem Report Cards (US N.Pac FMC, Aydin)

EU-JRC Toolbox for MSFD

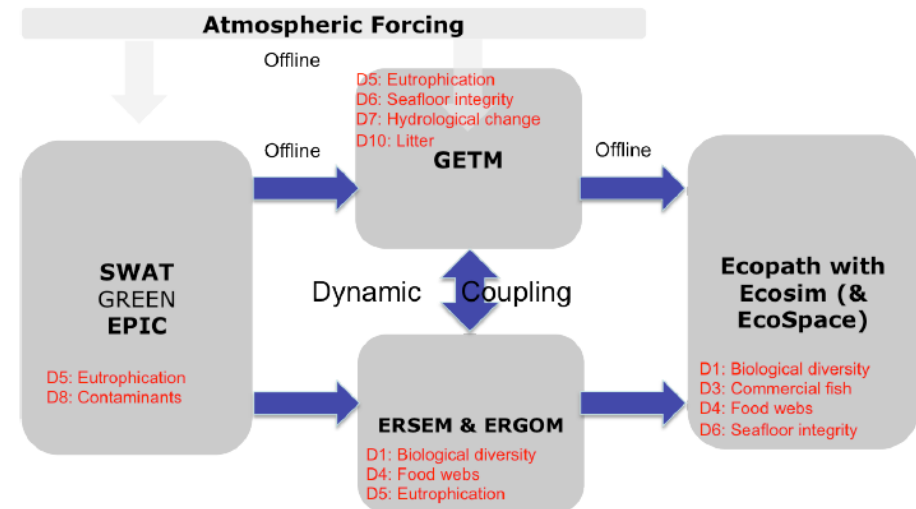
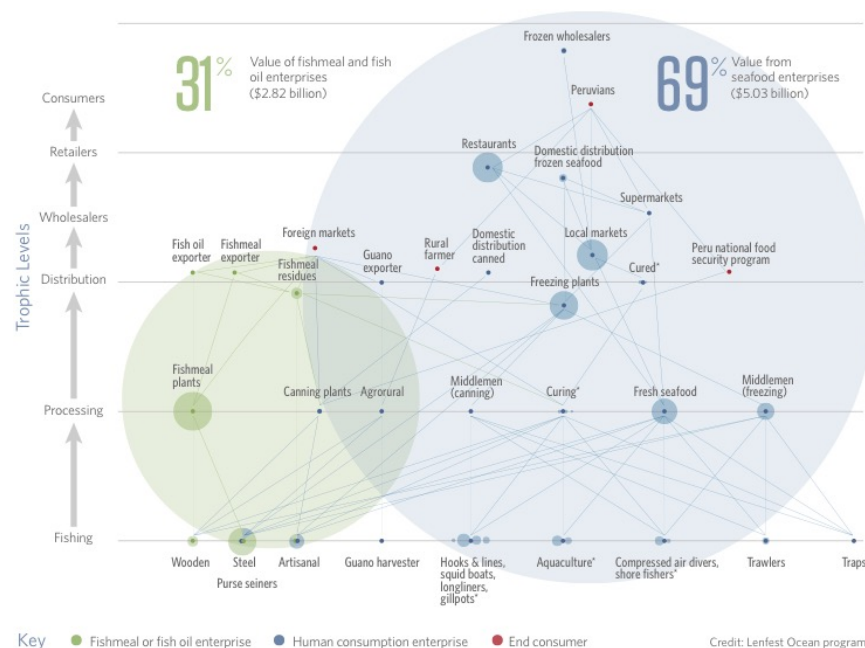


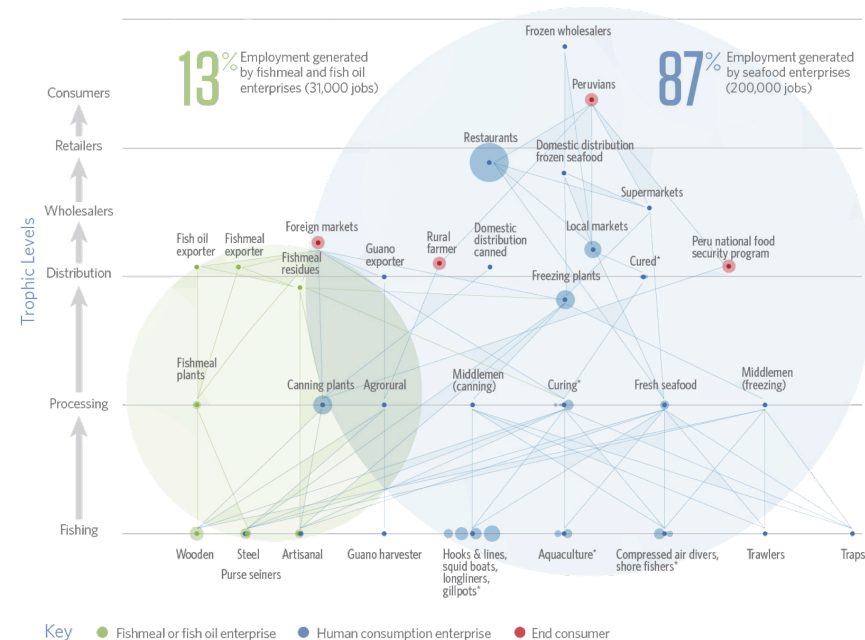
Figure 3. Basic relations of MSFD descriptors with available JRC models.

4. The fisheries sector

- Evaluating ecological, economic and social tradeoffs
- Peru value chain work impacts policies in Peru: there's more than anchoveta (Majluf, de la Puente)



Credit: Lenfest Ocean program



5. Spatial management

- EwE-Ecospace was developed to evaluate MPAs, but surprisingly few applications have impacted management
- CSIRO developed spatially-explicit MSE framework to assess impacts and trade-offs for the northern prawn fishery – operational tool for EBFM (Bustamante)
- Marine trophic transfer of radioisotopes
 - Nuclear accident toolbox (IRSN & IAEA)
 - Release of ^{14}C from nuclear reprocessing (Tierney)

6. Environmental impact assessment

- Mississippi River delta land loss
 - Ecological and economic impacts of mitigation scenarios evaluated through coupled hydrodynamic, vegetation and ecosystem models
(Coastal Protection and Restoration Authority, de Mutsert)
- Amazon River dams (416 now, 334 planned)
 - Ecological and economic impact of dams on artisanal fisheries informing public policy and management
(Federal Environmental Agency of Brazil, Cavalho & Angelini)

6. Environmental impact assessment

- Ecological impacts of marine renewable energy?
 - Wave energy west of Scotland (SAMS, Heymans)
 - Wind energy off Helgoland (Opitz)
- Major infrastructure development
 - Federal Impact Assessment of a new container terminal in the Fraser River estuary
 - Multi-model evaluation of impact on productive capacity and potential extent of habitat restoration (Port of Metro Vancouver, Christensen)



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7. Climate change

- Linked to Earth System models to evaluate potential impacts of climate change – impacts policies through IPBES, IPCC, FMCs, ...
- Global model for scenario evaluations used as part of model ensemble (Fish-MIP, Christensen & Coll)
- West Pacific (W.Pac FMC, Polovina)



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Conclusions

- EwE used widely for EB(F)M
 - not for fisheries tactical management
- Key areas for management and policy initiatives
 - Reference points and indicators
 - Spatial management
 - Environmental impact assessments
 - Climate change
- We have the EBM hammer, looking for nails



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Big Band

Eider Andonegi, Ronaldo Angelini, Francisco Arreguin-Sanchez, Kerim Aydin, Alida Bundy, Rodrigo Bustamante, Adriana Carvalho, Villy Christensen, Marta Coll, David Chagaris, Tim Daw, Santiago de la Puente, Paulo Fonseca, Beth Fulton, Sheila Heymans, Simone Libralato, Steve Mackinson, Kim de Mutsert, Henrik Österblom, Ellen Pikitch, Chiara Piroddi, Jeff Polovina, Keith Sainsbury, Lynne Shannon, James Simons, Tony Smith, Jeroen Steenbeek, Kieran Tierney, Sebastian Villasante, Colette Wabnitz, Carl Walters, Mariska Weijerman



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