Developing a bioeconomic model to foster discussions among stakeholders. An application to Indonesian Blue Swimming Crab fisheries

Sébastien Metz[1], Dessy Anggraeni[2], Geoff Tingley[2], Jack Whalen[2], Juan Manuel Garcia-Caudillo[2], Jim Cannon[2]

Affiliations:
[1] Sakana Consultants
[2] Sustainable Fisheries Partnership Foundation

With the financial support of the The Rockefeller Foundation

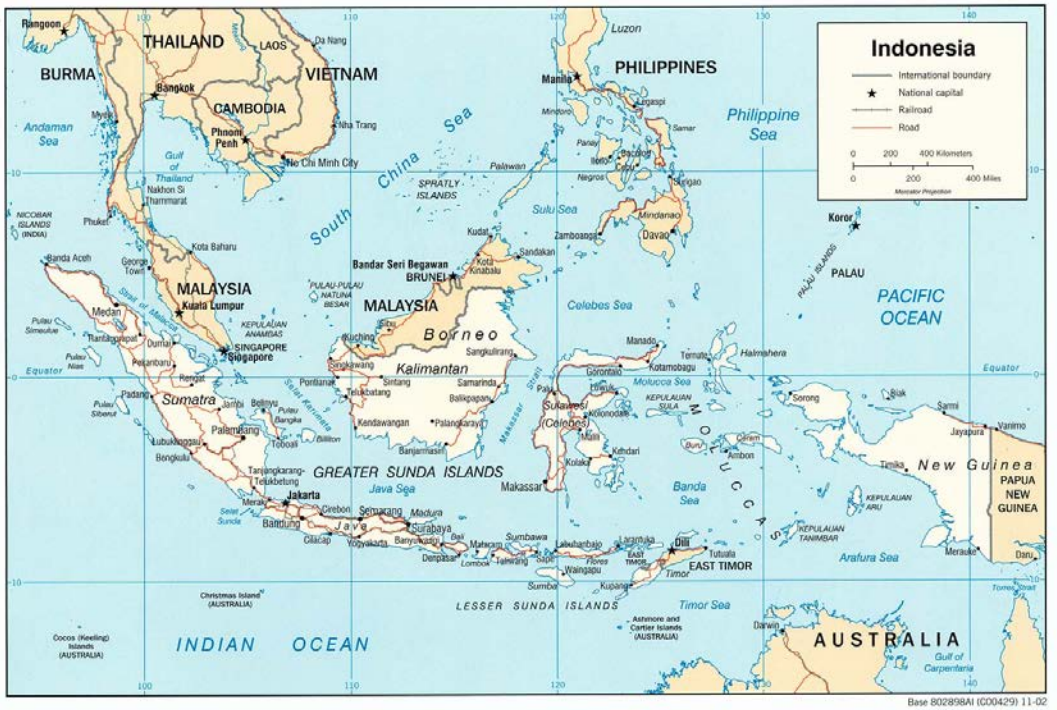
Objective of this work

- Supporting transition work in Indonesia by providing a tool to foster discussion among stakeholders
  - for expert led meetings
  - to implement “serious” games
- This presentation is about how we’ve built a bieconomic model for a meeting held in Semarang at the beginning of 2015

Context:
Blue Swimming Crab (BSC) in Indonesia

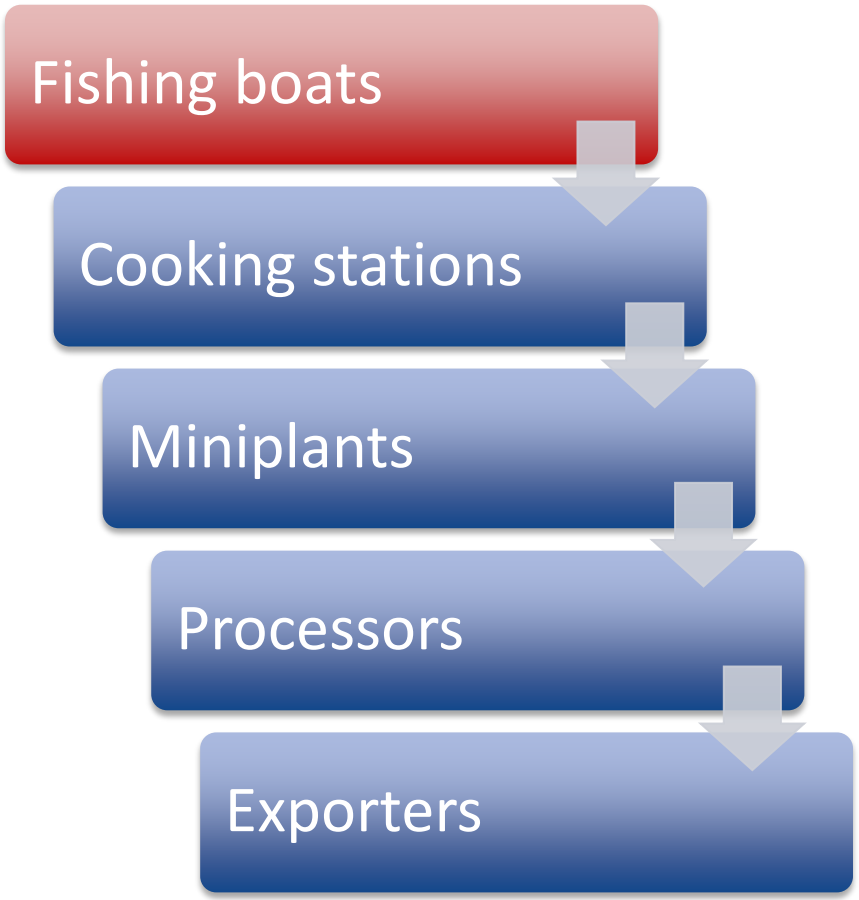
- ~65,000 fishermen
- ~13,000 pickers working in miniplants and cooking stations
- Production in 2009: 35,000 tonnes of, more than 7 times the landings in 1990
- Mainly exported, representing 8% of fishery product export value in 2011
- Main market = USA (more than 50% of exports)
- Weak management framework
- FIP initiated in 2008

Our case study is based on the Betahwalang village (central Java)

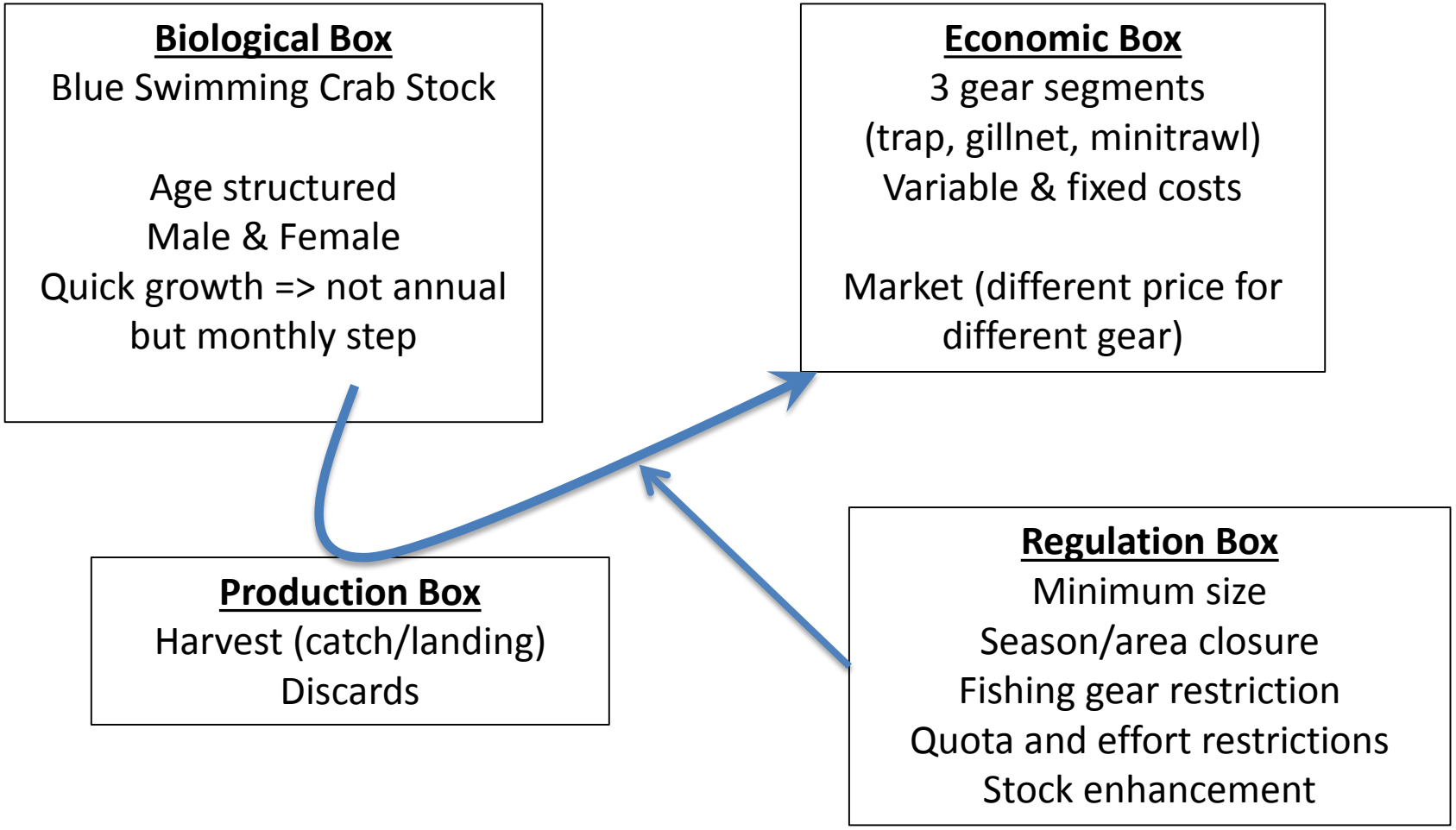


Supply chain structure

- Artisanal fleet: wooden boat, from 6 to 12-13 meters
- Three gear type: Net – Trap – Trawl
- Crew: from 1 to 3
- Day boat, except for large trap vessels (cook crab onboard)
- Crab cooked few hours after the catch
- Crab peeled in miniplants
- Main issue: no effective management



Model Structure: the fishery



The usual suspects

$$N_{t+\Delta t} = N_t \cdot e^{-M \cdot \Delta t}$$

$$Catch_t = W_t \cdot N_t \cdot e^{-F \cdot \Delta t}$$

$$Profit_t = Catch_t \cdot Price_t - (Effort_t \cdot Vcosts + Fcosts)$$

Key assumptions

- Simulation model over 15 years (180 periods)
- 36 age classes
- Monospecific fishery
- Fishery is isolated: no other fleet segment involved
- 2 areas onshore (small crab) / offshore (large crab)
- Fishermen = price takers: the local supply has little to no effect on ex-vessel price
- Fishermen are owning their vessels – in reality, this may be slightly different as there might be some vertical integration (miniplant owners partly/fully owning boats)

Management Options

1. Minimum Legal Size
2. Forbid the landing of berried females
3. Impose the closing of inshore zone
4. Impose seasonal closure
5. Catch limitation (quota)
6. Effort restriction (less fishing days)
7. Modify the gears (selectivity)
8. Stock enhancement

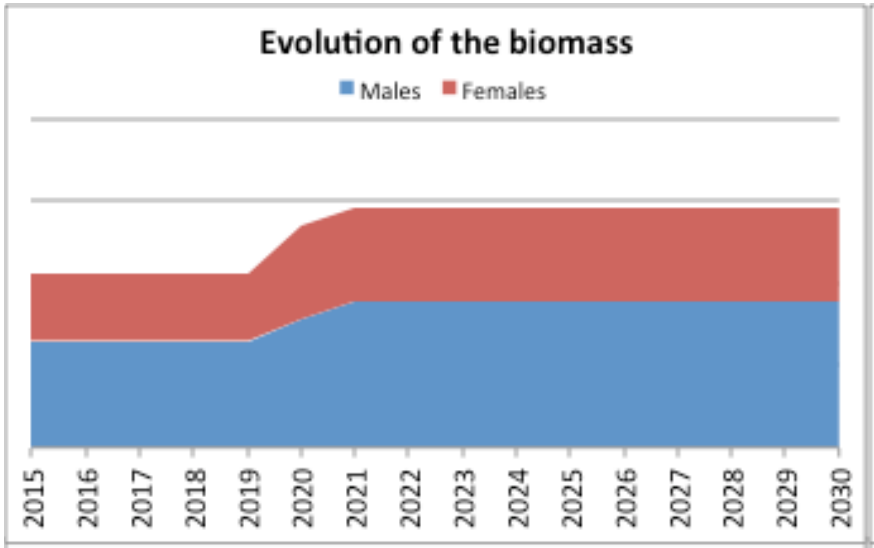
The workshop setting

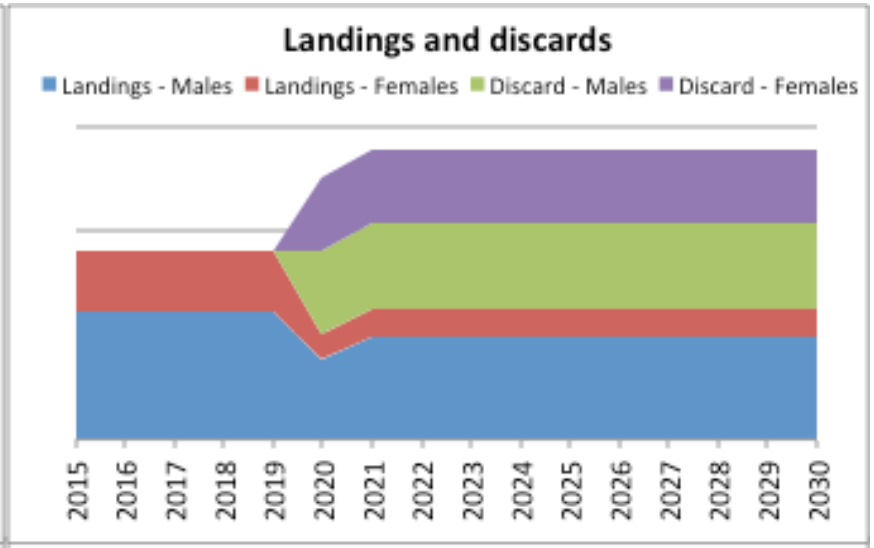
All type of stakeholders represented:

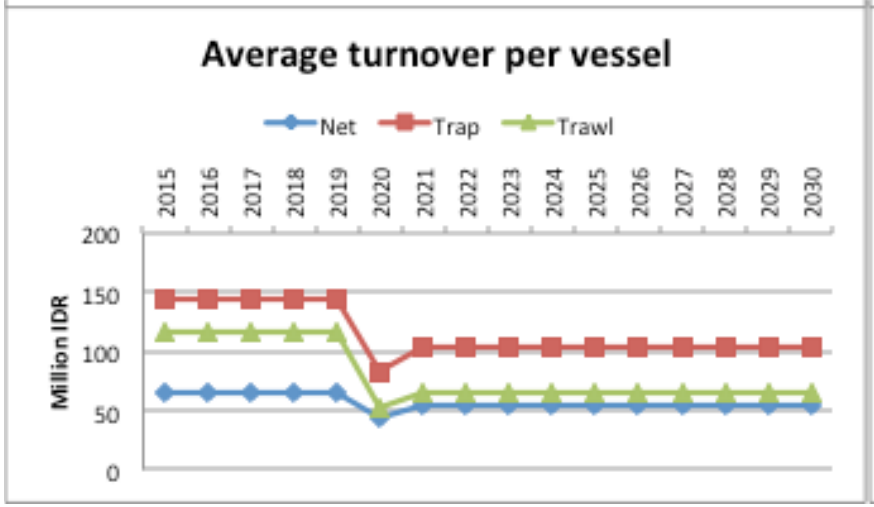
- Fishermen (the 3 gear groups)
- Head of the local village
- Local scientists
- Local and central administration
- Exporters

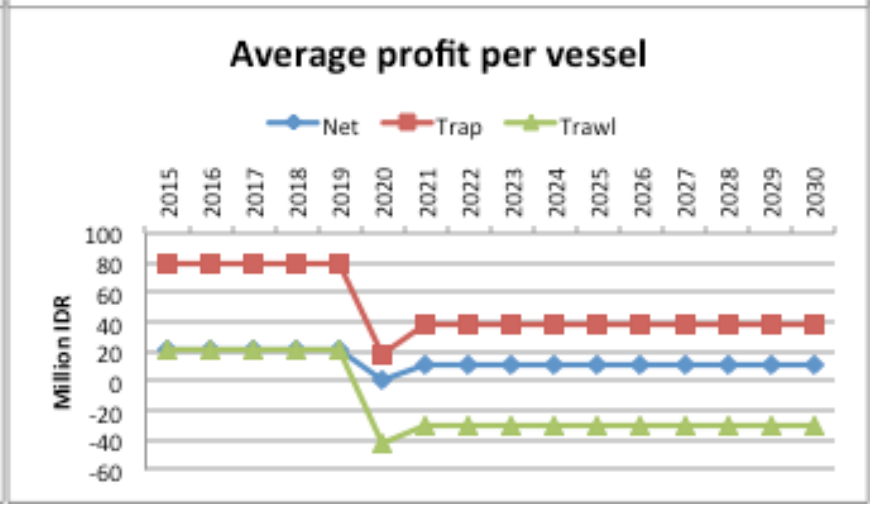
- Model projected on screen (excel file)
- Depending on discussion, conditions of the model are adjusted to show potential outcome

Setting a minimum landing size at 10 cm

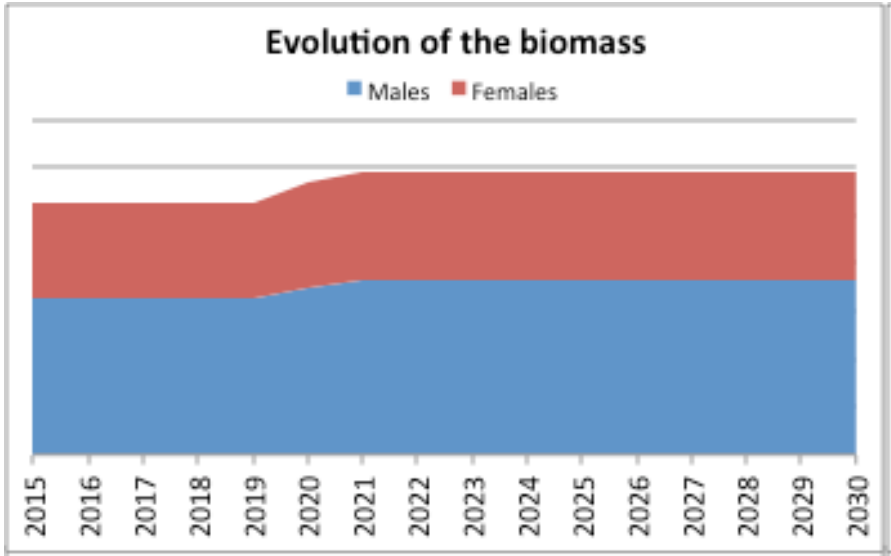


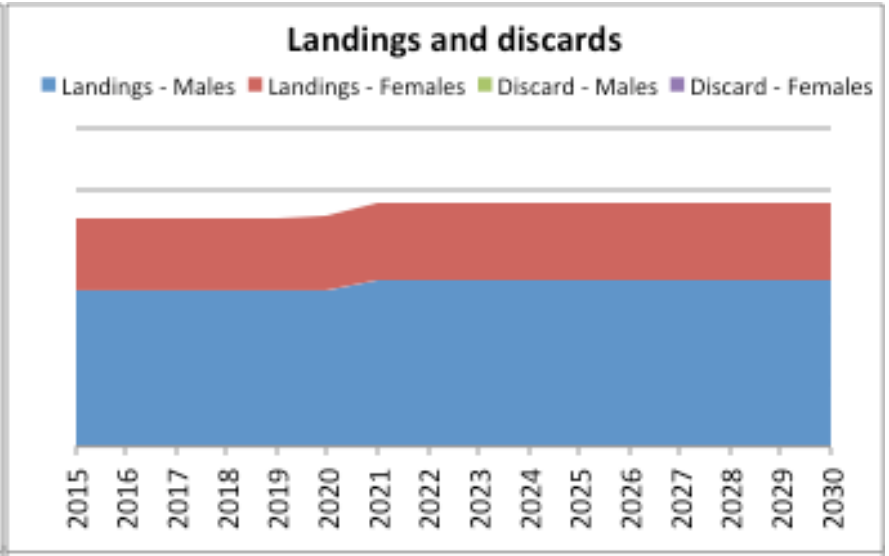


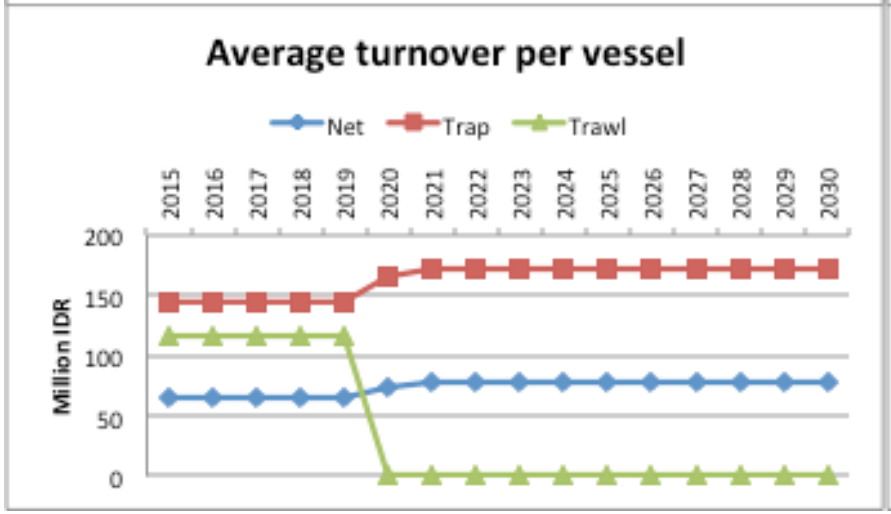


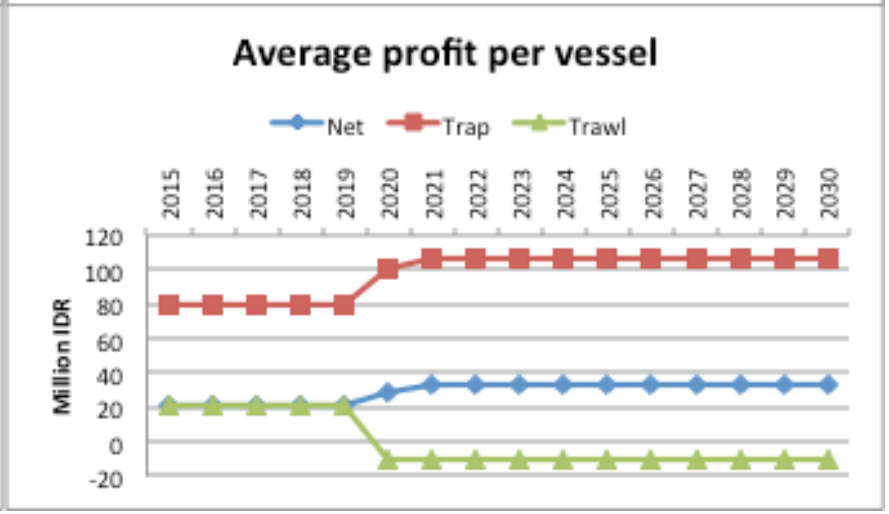


Ban on mini trawl

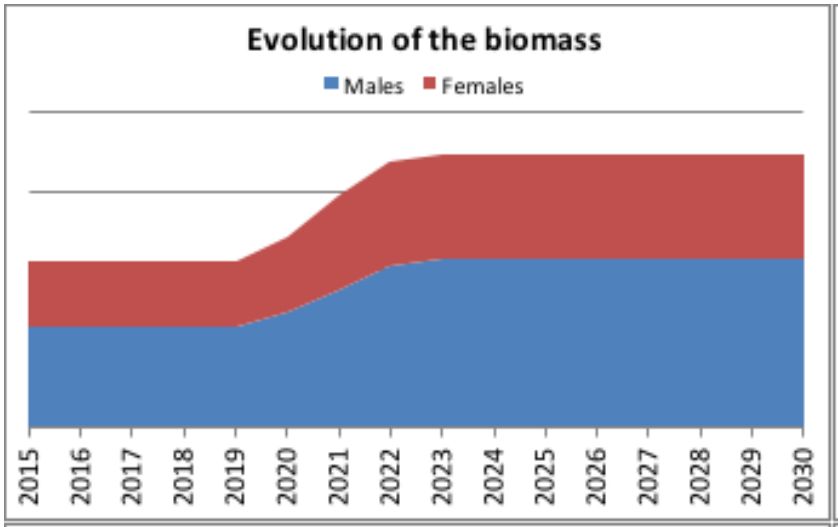


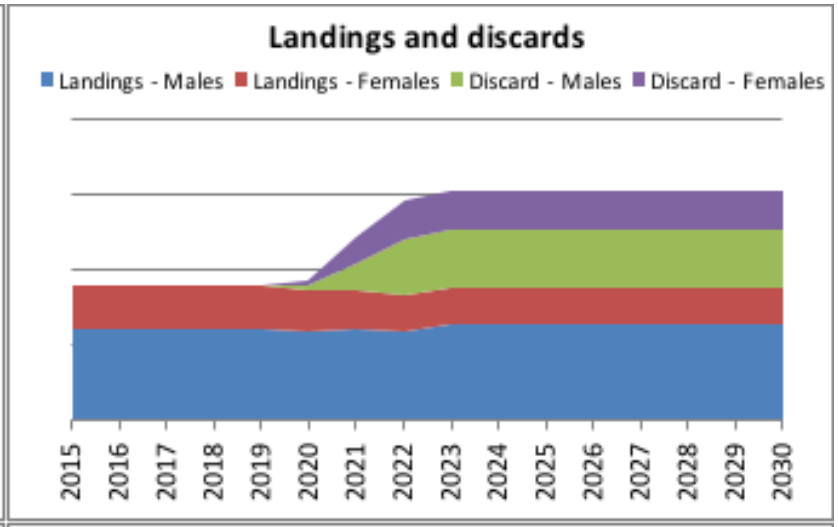


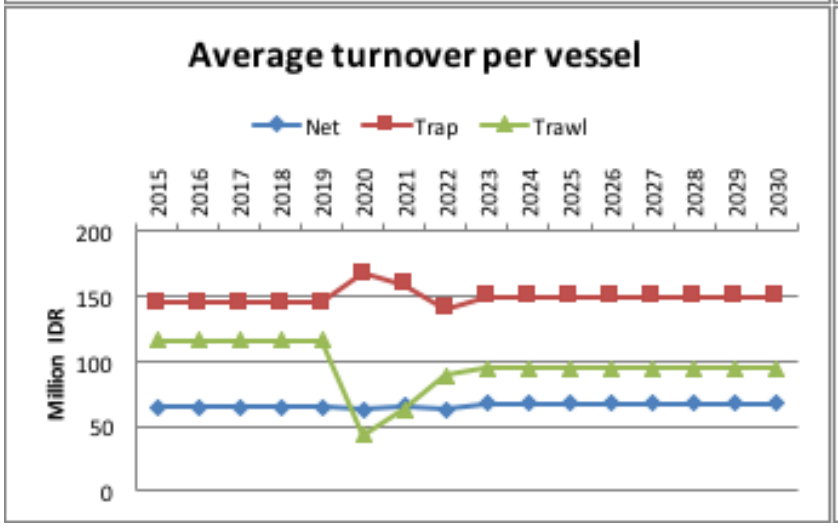


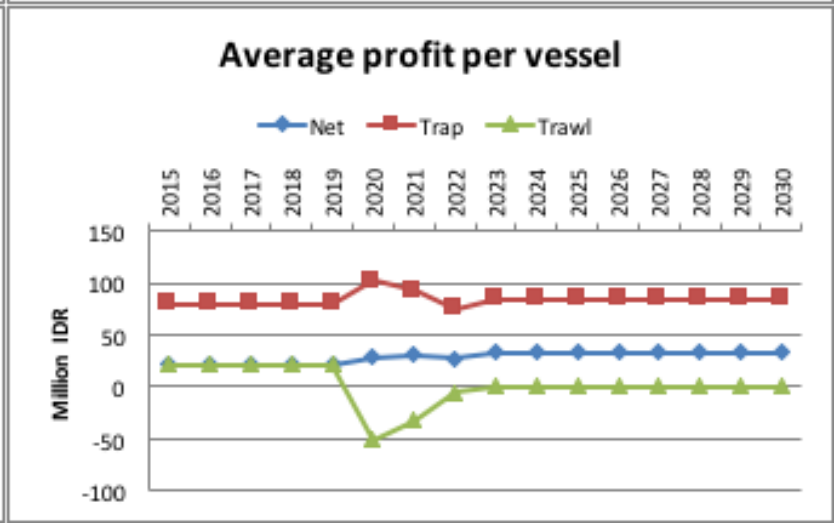


Mixed approach: gradual increase of MLS, seasonal closure, gear change (trawl)









Next steps

- Implementation of control document, to force the implementation of minimum landing size plus
- Project started on three areas (East Lampung, Madura, South East Sulawesi)
  - Aim: evaluating the effect of the control document
  - Data collection – biology & economy
  - Data Integration in model(s)

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