Socioeconomic Benefits of LME valuation in context of Climate Change

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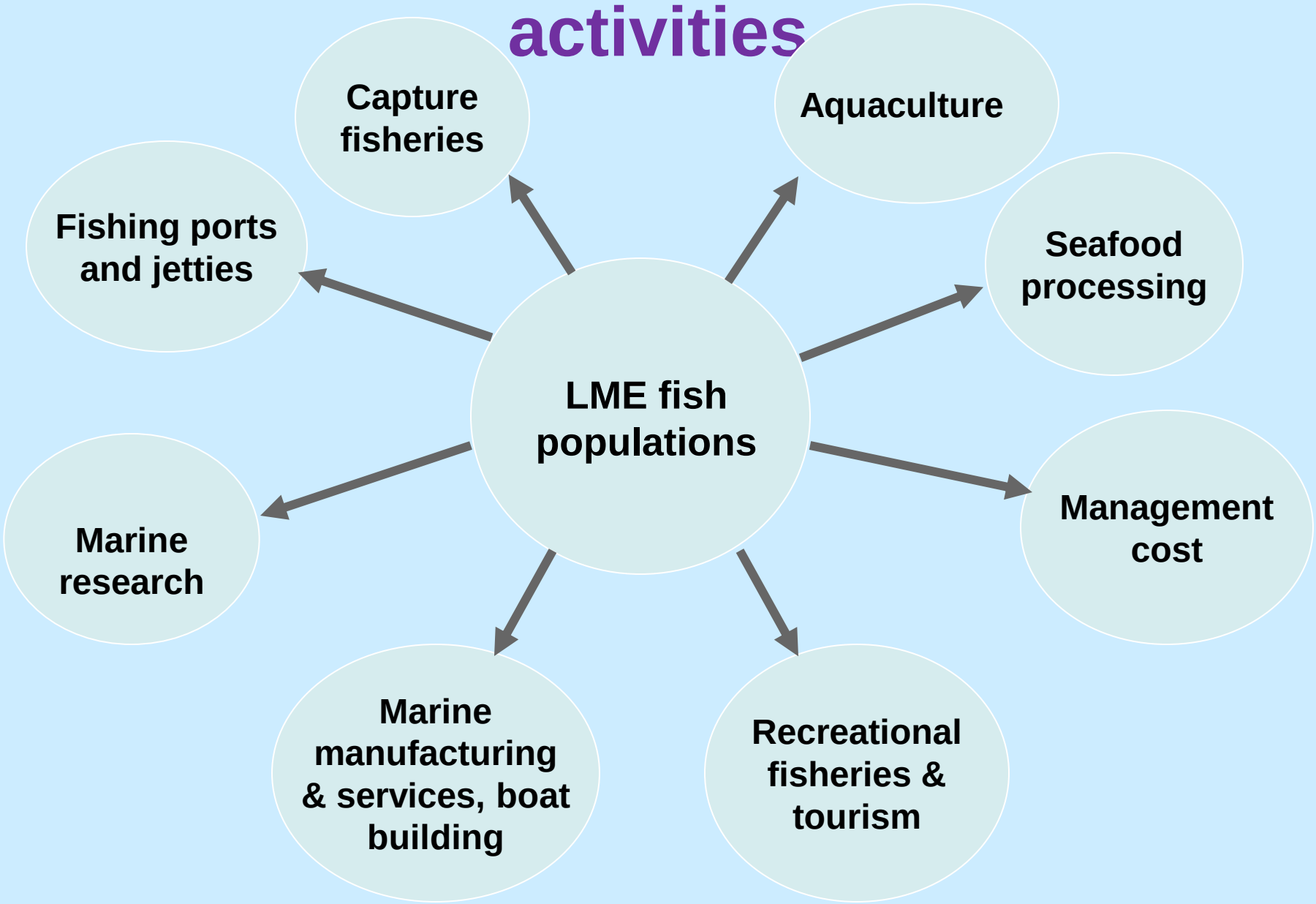
Key messages/outline of talk

- LMEs provide crucial ecosystems services, e.g., fisheries, that are important to people;
- Even without climate change, LME fisheries, in general, are in trouble;
- Climate change will affect the biophysics of the ocean;
- It would therefore impact the socioeconomics and governance of LMEs.

LME Fish as base for many activities



Importance of LME fish to food security

- Annual ocean fish catch is ~80 million t;
- Fish is a good source of protein, micro-nutrients, minerals and essential fatty acids;
- Provides 3 billion people up to 15% of dietary animal protein;
- For low-income food-deficit countries, the contribution of fish to total animal intake is nearly 20%.

FAO, State of World Fisheries and Aquaculture (2009)

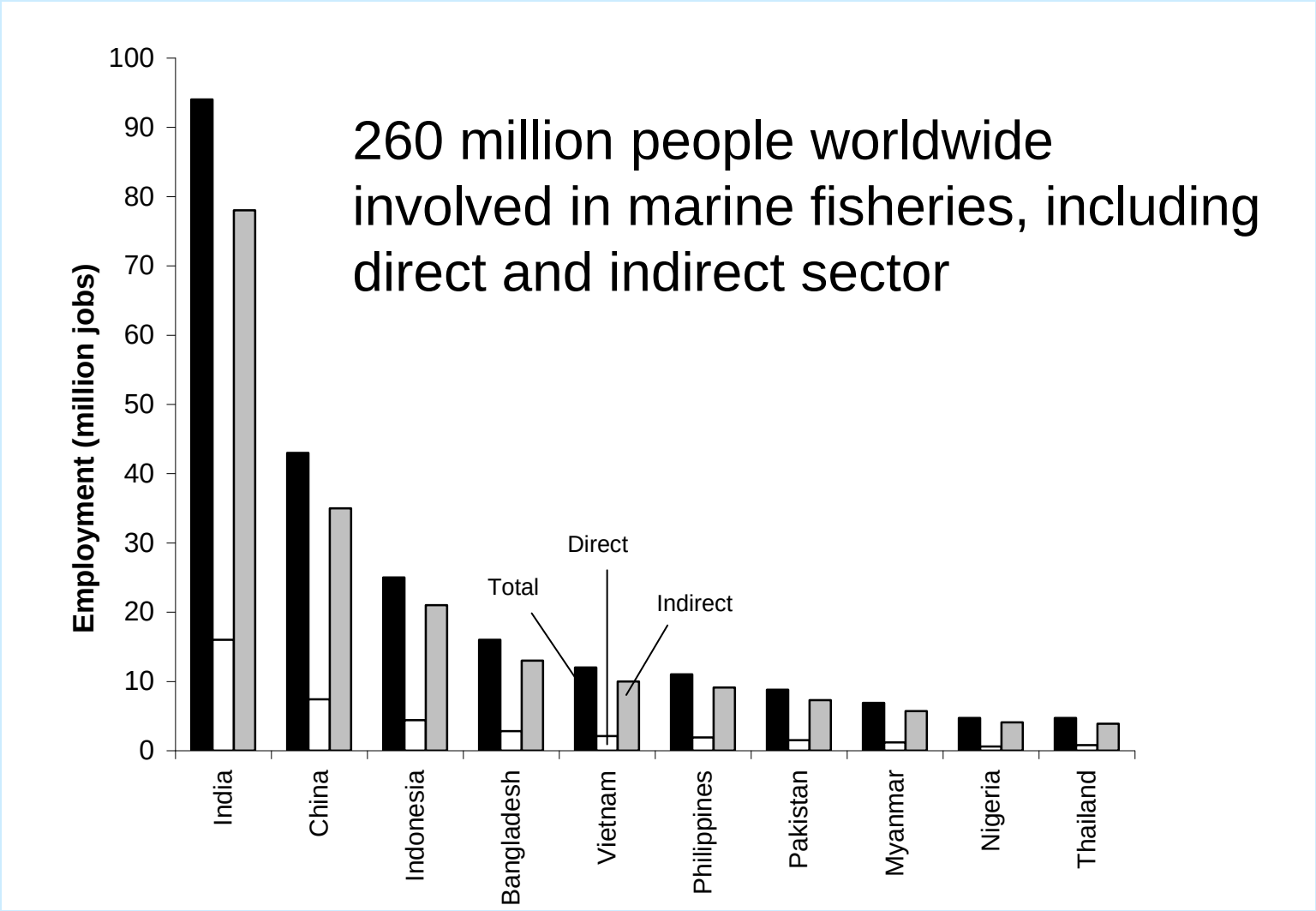
Fisheries values from LMEs worldwide

Total annual catch=80 million t

Gross revenues from marine capture fisheries worldwide are estimated at between US$ 80 and 85 billion annually (FAO, 2009);

Total impact throughout the global economy is between US$ 220 and 235 billion in 2003 (Dyck & Sumaila, 2010).

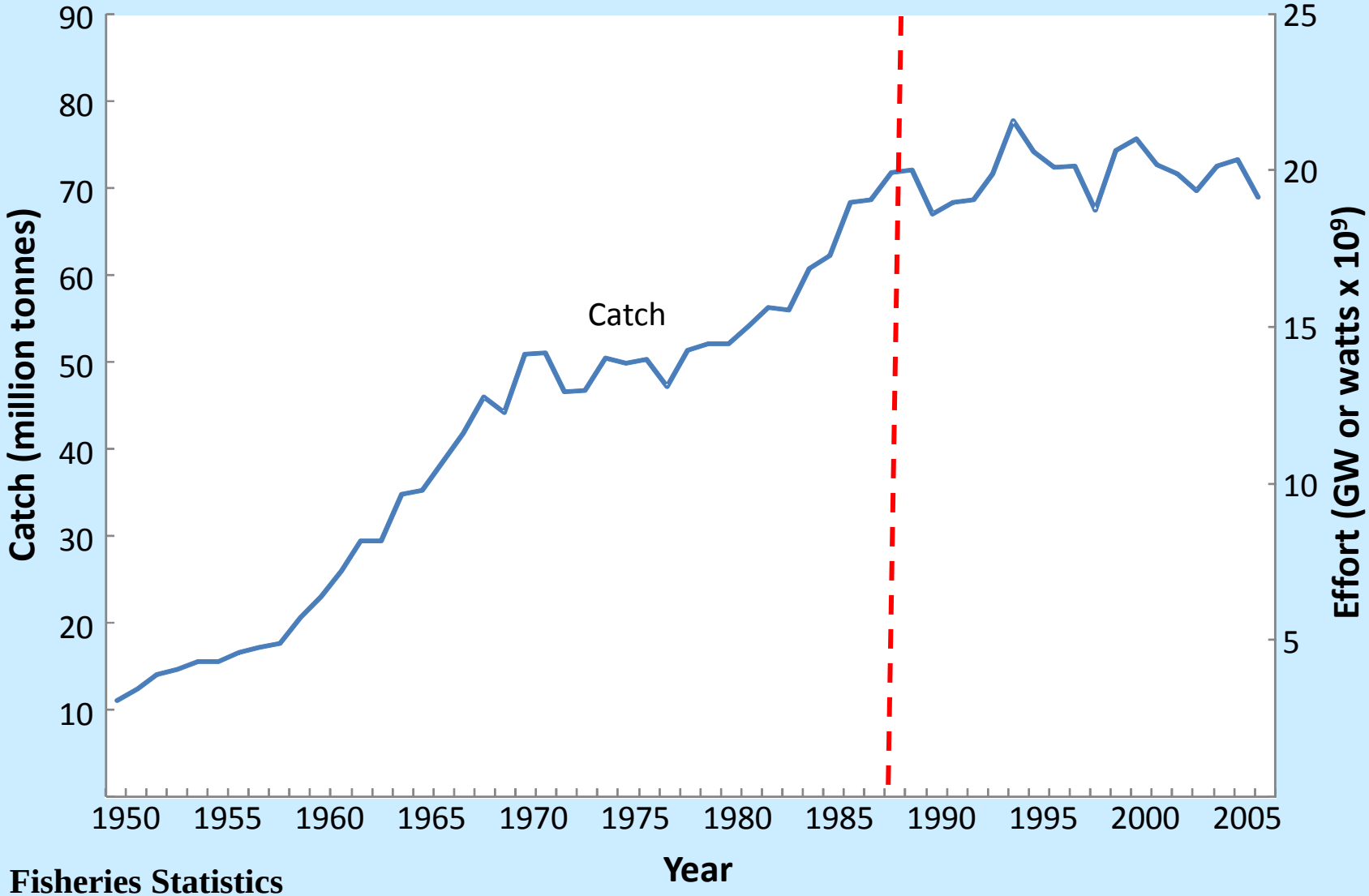
Contribution of LMEs to employment



Top 10 countries providing marine employment

Teh and Sumaila (2011): *Fish and Fisheries*

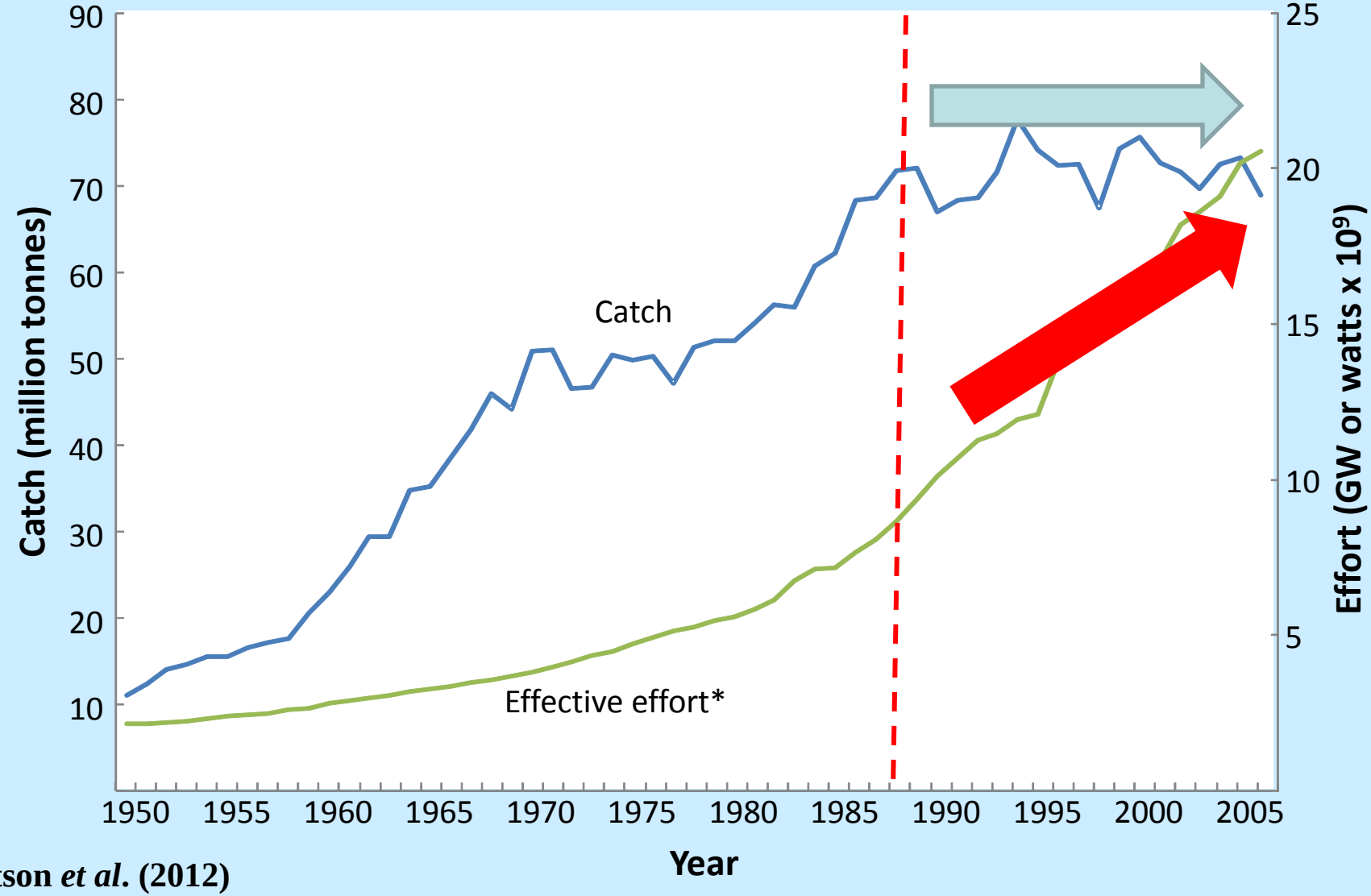
Global LME catch and effort



FAO Fisheries Statistics

*Effective effort indexed on 2000 based on average 2.42% increase annually

Global LME catch and effort



Watson *et al*. (2012)

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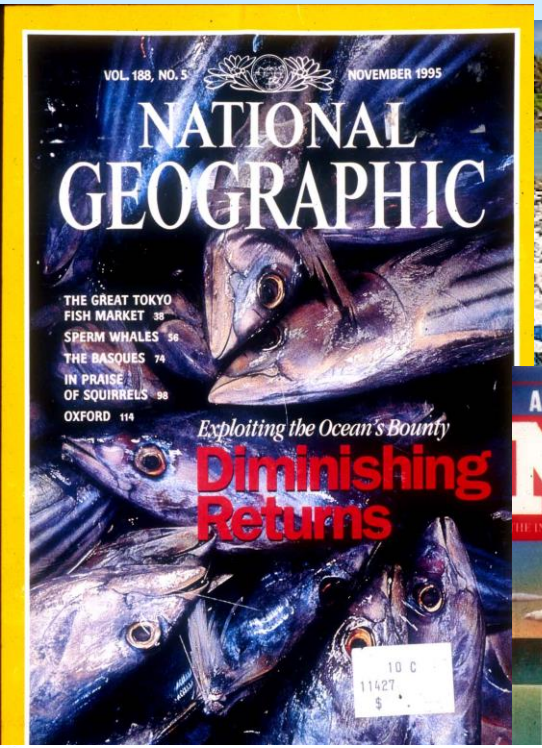
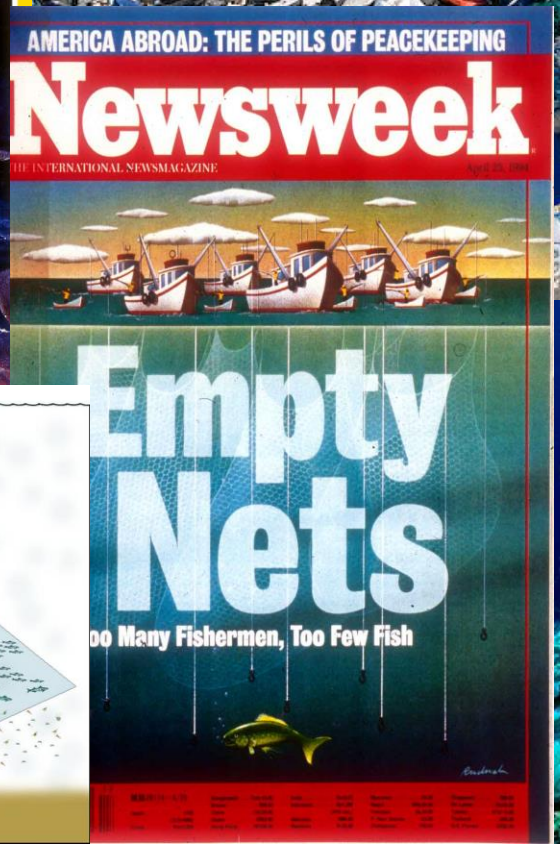
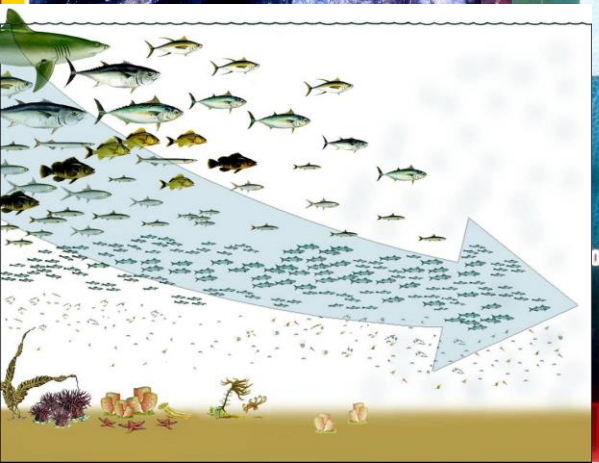
Human impacts on marine ecosystems







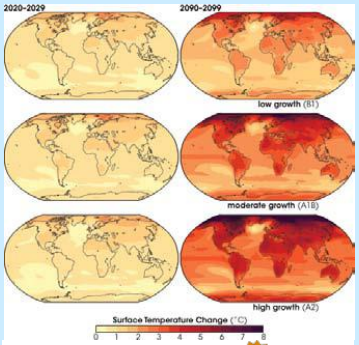
Climate change biophysical impacts

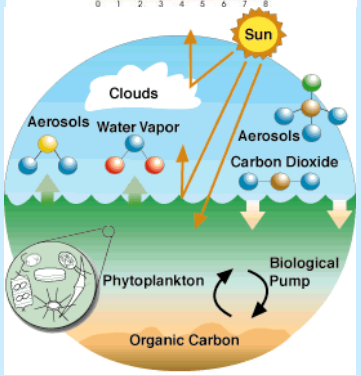
Physical change in the ocean

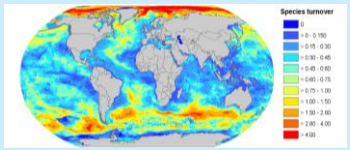
- ↑ SST;
- retreat of sea ice;
- ↑ acidification;
- ↑ coastal hypoxic & oxygen min. zone;
- ↑ sea surface level.

Biological / ecological change in the ocean

INDIVIDUAL	• Physiology; • Growth; & • Body size.
POPULATION	• Distribution; • Abundance; & • Recruitment.
COMMUNITY	• Species composition; • Invasion/extinction.
ECOSYSTEM	• Productivity; & • Species interaction.







Cheung *et al.* (2010); Hoegh-Guldberg and Bruno (2010); Brander (2010)

Climate change implications

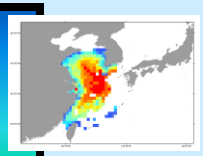
- It will result in changes in the following:
  - Catches and food security;
  - The economics of fishing
    - Catch (landed) values;
    - Cost of fishing;
    - Profits to fishing companies;
    - LME-based fisheries job.
  - The governance and management of human-coastal environments.

Sumaila *et al*. (2011) *Nature Climate Change*; Miller, Sumaila *et al. (2013): Canadian J. Agric. Econ.*

Methods

Global climate change projections

Predicted future species distribution



Species composition in each LME

Catch potential & landings (t)

Gear type composition

Ex-vessel price of each species ($/tonne)

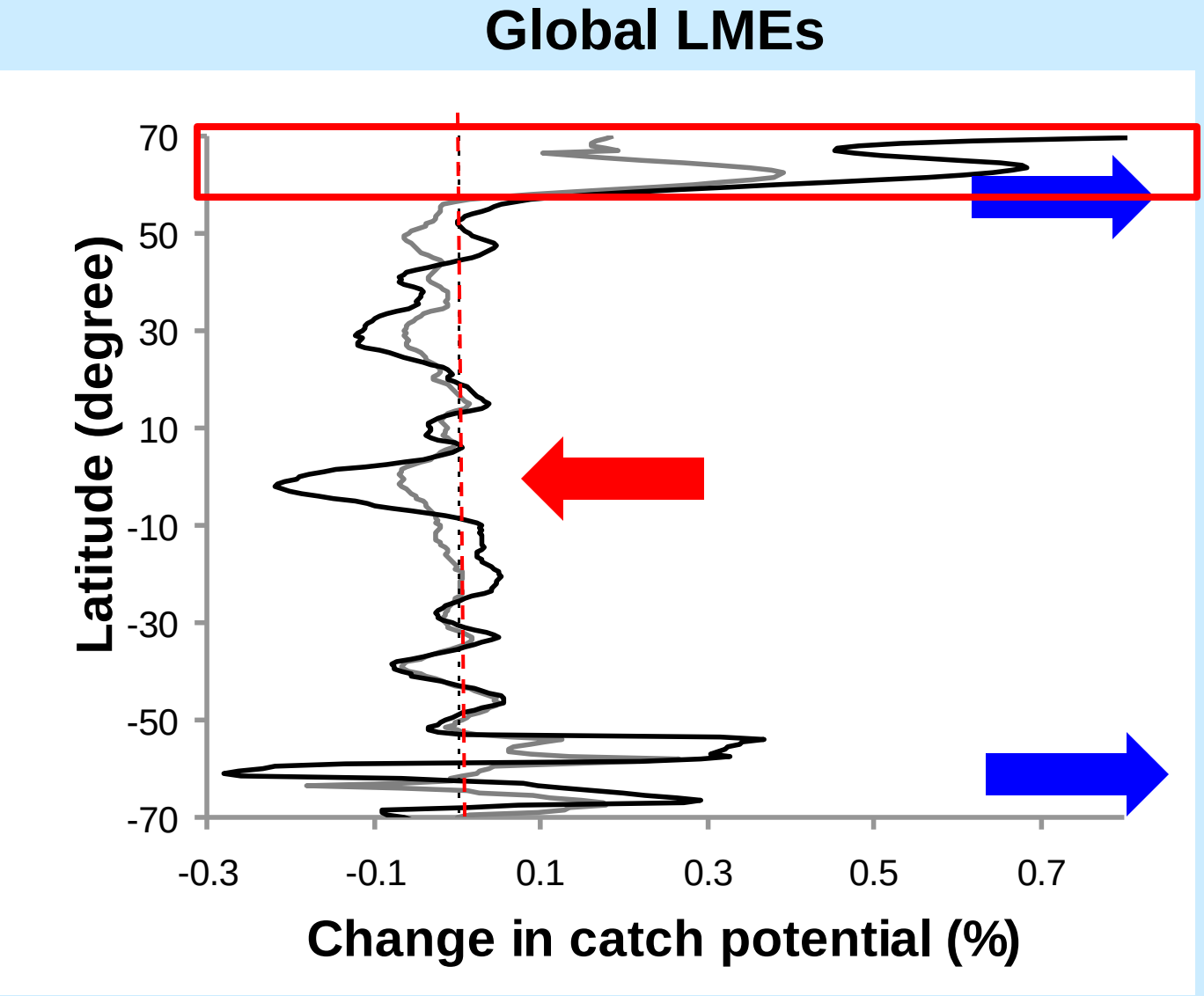
Unit variable cost ($/tonne)

Total variable fishing cost ($)

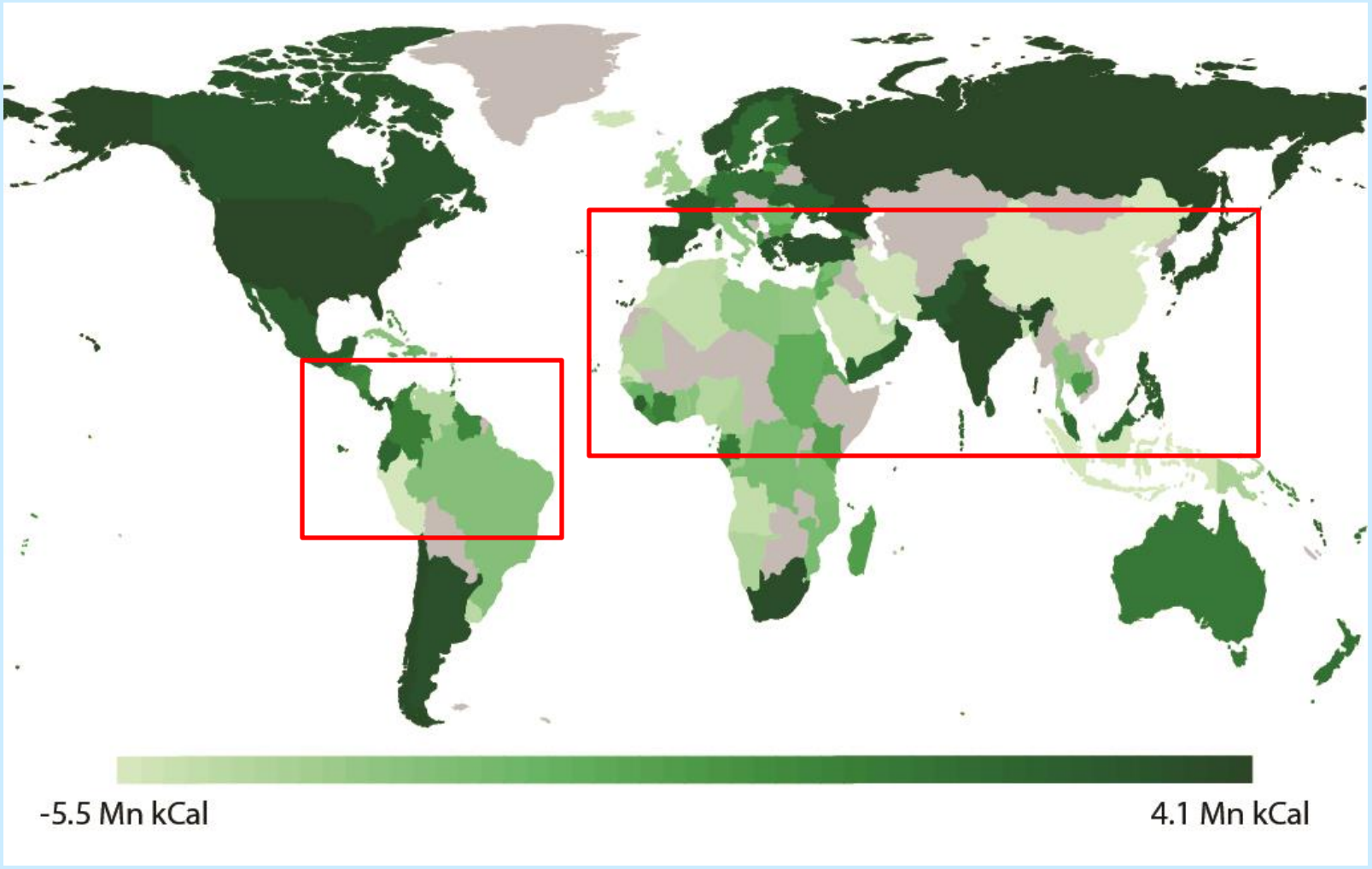
Landed Values ($)

Economic rents in each EEZ

Latitudinal average changes in potential catch

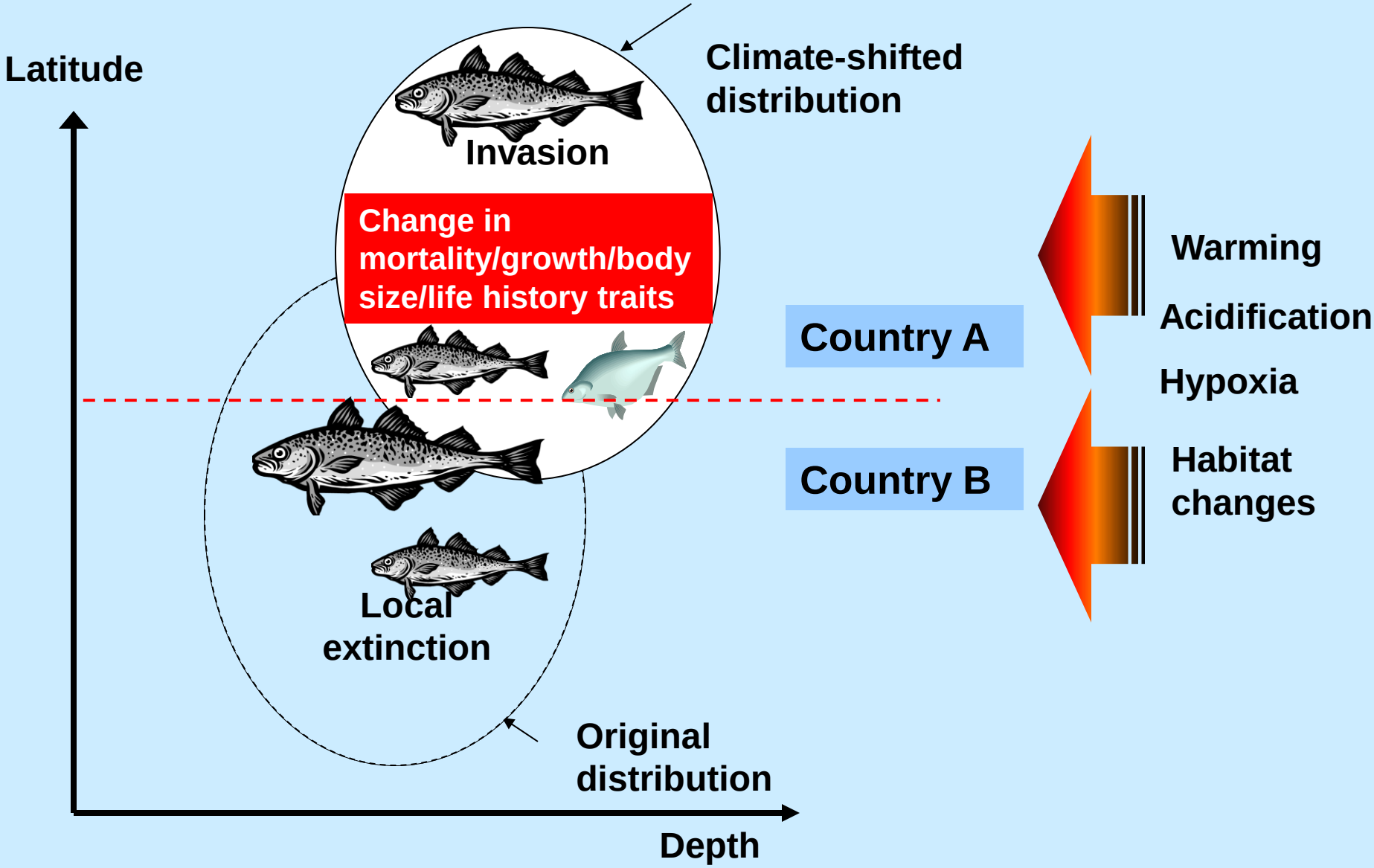


Distribution of fish protein under climate change



Dyck & Sumaila (in prep.)

Management implication of climate change and ocean acidification



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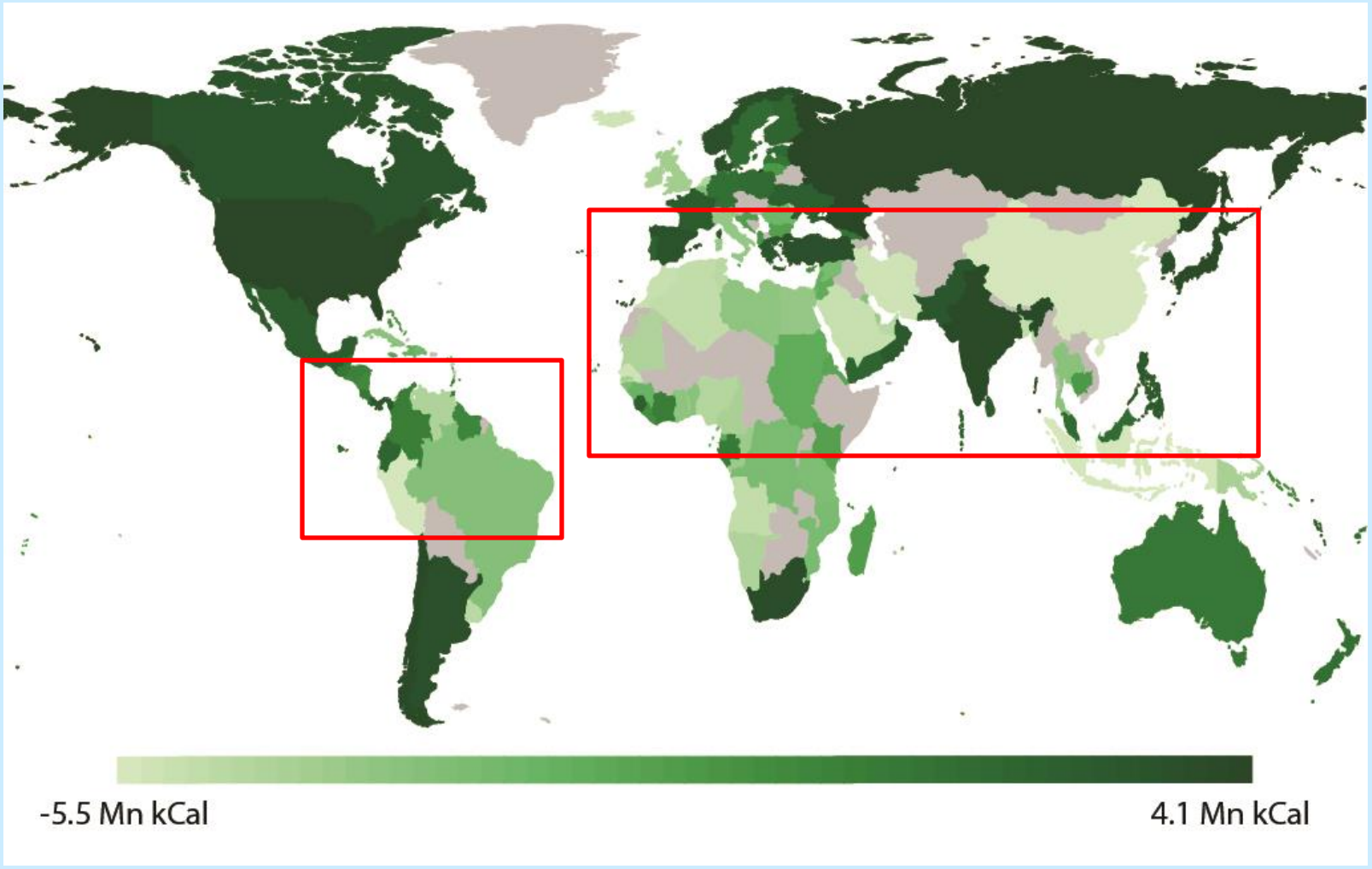

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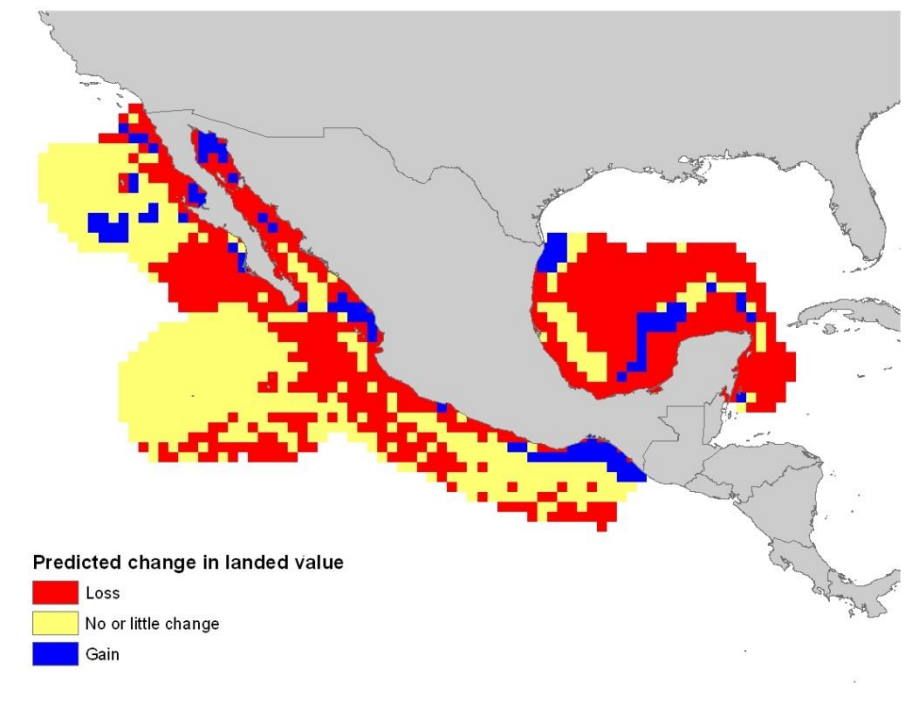
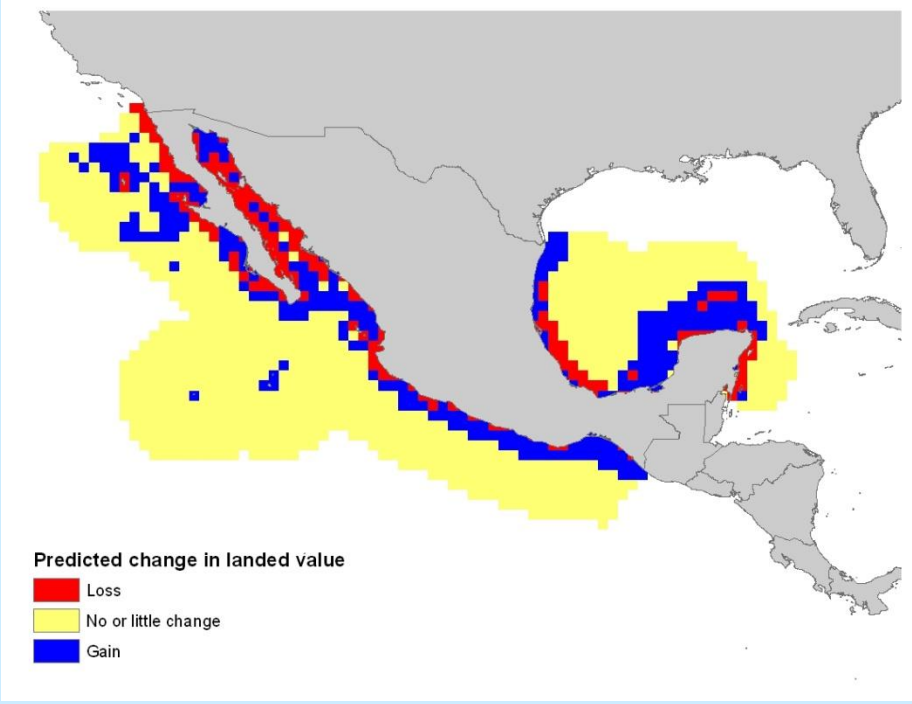
Example: Change in landed values in Mexican EEZ

SEVERE climate change scenario



MILD climate change scenario



Sumaila, Lam & Cheung (2015)

Implications for resource sharing/allocations

England | Northern Ireland | Scotland | Wales | UK Politics | Education | Magazine

24 August 2010 Last updated at 11:56 GMT

Why is Britain braced for a mackerel war?

By Andrew McFarlane
BBC News Magazine

Mackerel stocks had recovered well during the past decac

Britain is said to be bracing itself for a re-run of Iceland - except this time the fish being fought Yet, until recently, few were interested in a fish unclean.

WORLD NEWS

Fishery

Mackerel war could hurt Iceland's EU bid

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EU warns Iceland, Faroes over 'mackerel war'

25 August 2010, 20:50 CET

— filed under: Iceland, fish, environment, Headline1, Faroes

(*BRUSSELS*) - Iceland and the Faroe Islands are overfishing mackerel way above a level deemed safe for the survival of the fish, the European Union's executive arm said Wednesday.

Fishing boat

Iceland's fishing policies, notably its refusal to share its cod fishing waters, has been identified as a thorny issue to resolve with the EU in the North Atlantic island's bid to join the 27-nation club.

Oliver Drewes, the European Commission's spokesman for maritime affairs, said the dispute over mackerel would be discussed with Iceland and the Faroe Islands at a technical meeting in September.

"They are overfishing more than which is justifiable on the basis of scientific evidence," Drewes said at a news briefing.

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11/10 19:42 CET

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Acknowledgements

- Global Ocean Economics
- The *Sea Around Us* projects.
- The UBC Global Fisheries Cluster

- Thanks very much for your attention!

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