Fishery Targets and Limits: Of What? By Whom? Governance and Institutional Considerations

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Myfish Symposium - Athens - October 2015

Recognizing Multiple Objectives in Fisheries: (1) Modelling Approaches

Bio-Socio-Economic Fishery Models: Labour Dynamics and Multi-Objective Management

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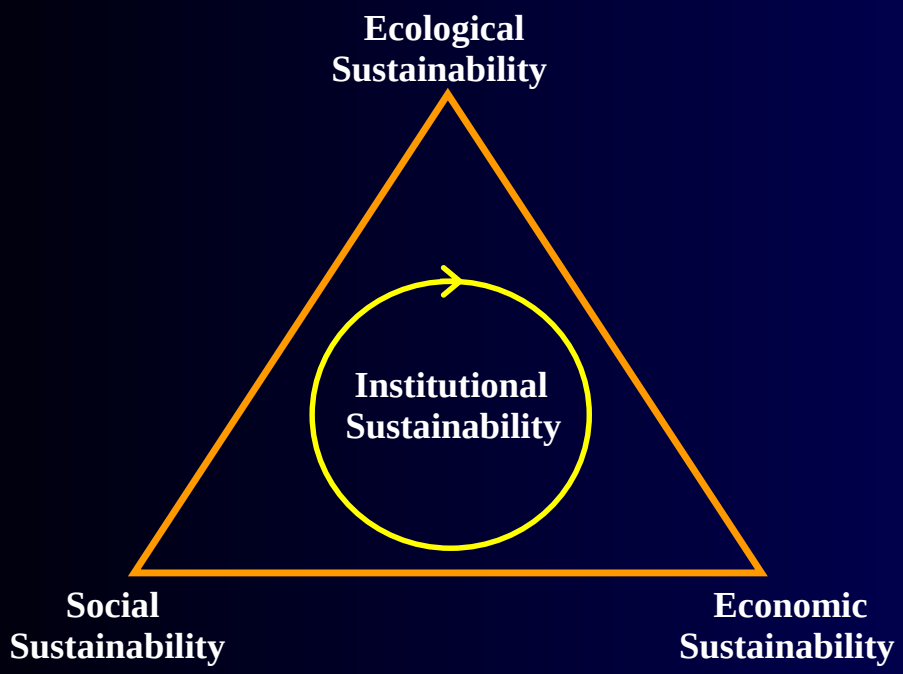
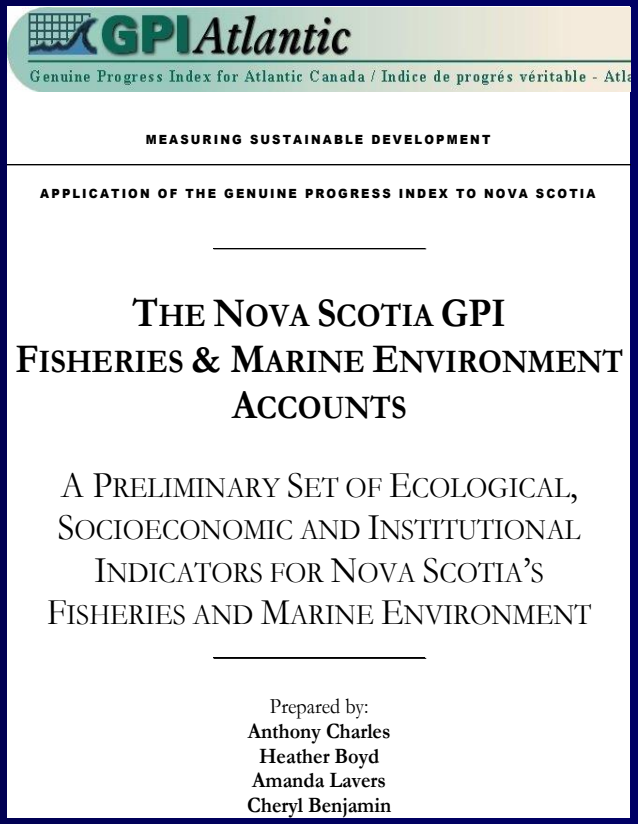
Charles, A.T. 1989. Bio-socio-economic fishery models: labour dynamics and multi-objective management. Can. J. Fish. Aquat. Sci. 46: 1313-1322.

$$\underset{\{h\}}{\text{Max}} \int_0^{\infty} e^{-\delta t} \left\{ a_1[\pi + \lambda G(L - L^*)] + a_2 \left(\frac{\pi}{L} - \bar{Y} \right) + a_3 \left(\frac{E}{L} \right) + a_4 \left(\frac{dL}{dt} \right) \right\} dt$$

Fishery Socioeconomics: A survey. *Land Economics* 64:276-295 (1988)

Recognizing Multiple Objectives in Fisheries: (2) Indicator Frameworks




GPI Atlantic

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Towards Sustainability: The Fishery Experience. *Ecol. Econ.* 11:201-211 (1994)

Canada's Cod Collapse: The Rationale for Targets and Limits

Response: Fisheries Resource Conservation Council formed 1993

- Promoted **participation** in fishery decision-making.
- Combined science with **fisher and local knowledge**
- Ad hoc **targets and limits**, & embryonic **risk assessment**
- Called on fishery science to "study **fishing as a system**".

The Precautionary Approach and 'Burden of Proof' Challenges in Fishery Management. *Bulletin of Marine Science* 70:683-694 (2002).

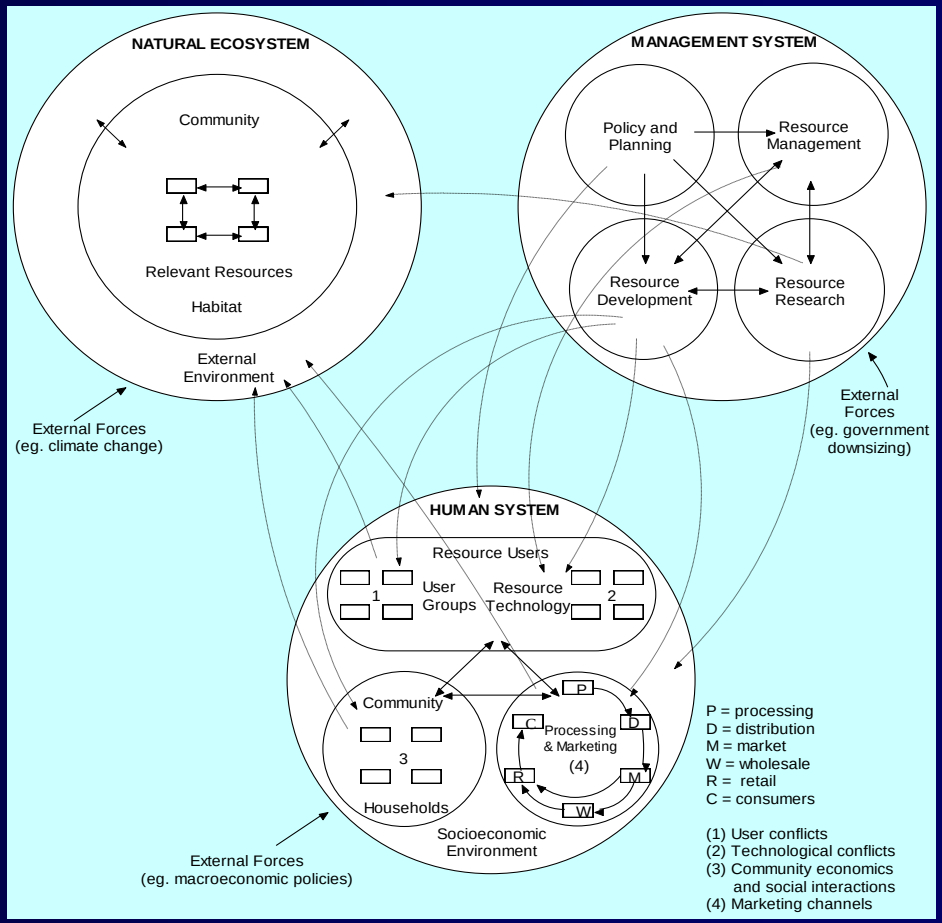
Targets and Limits Across the Fishery System

Fishery science: The study of fishery systems. 1995. *Aquatic Living Resources* 8:233-239.

Sustainable Fishery Systems. 2001. Wiley Blackwell.

Fishery systems and linkages: From clockwork to soft watches. 2007. *ICES Journal of Marine Science* 64:580-587 (with Serge Garcia).

People, oceans and scale: Governance, livelihoods & climate change adaptation in marine social–ecological systems. 2012. *Current Opinion in Environmental Sustainability* 4:351–357.

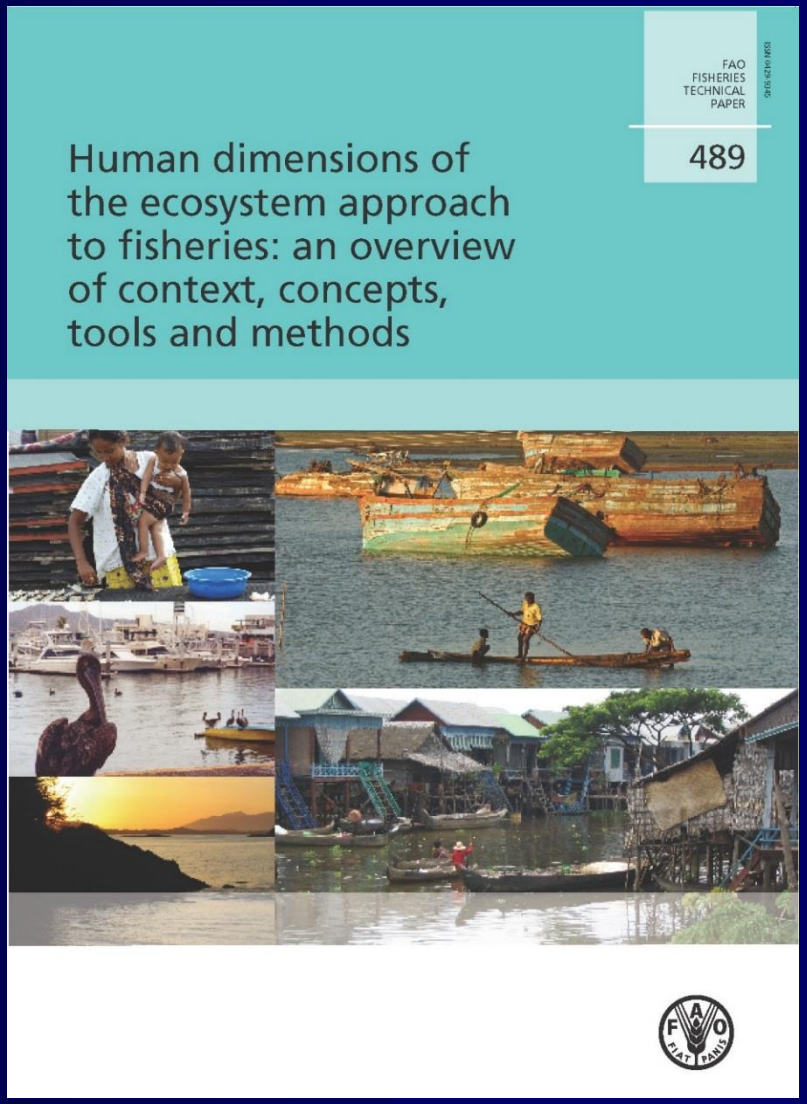


Targets and Limits. Of What?
1. Ecosystem-Based Management

EBM "balances ecological, social and governance principles at appropriate temporal and spatial scales in a distinct geographical area to achieve sustainable resource use"

EBM "recognizes coupled SES with stakeholders involved in an integ-rated and adaptive management process where decisions reflect societal choice"

Long, R.D., A. Charles & R.L. Stephenson. *Marine Policy* 57:53–60 (2015)



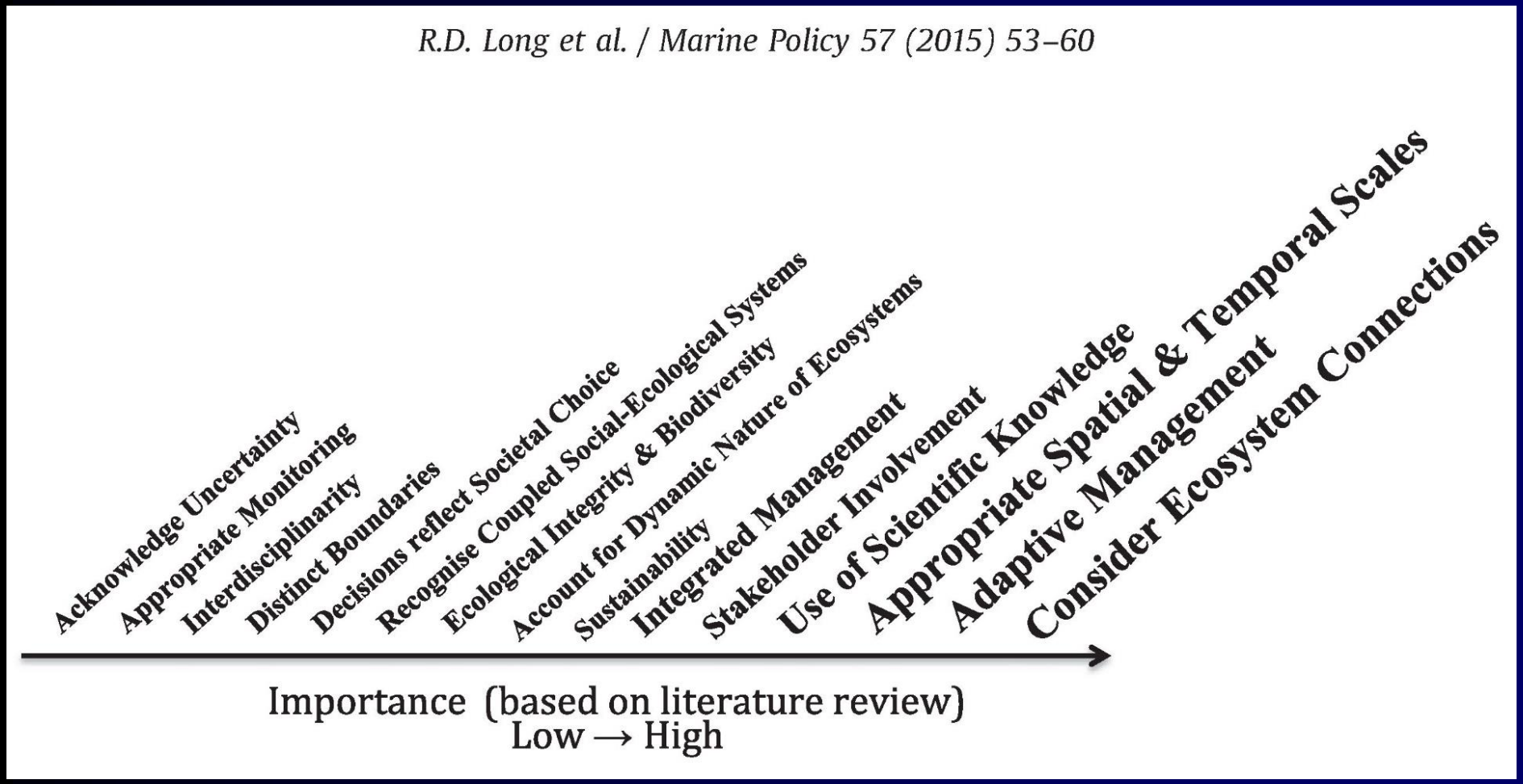
Key Elements of EBM

(Long, R.D., A. Charles & R.L. Stephenson. 2015. Marine Policy 57:53–60)

Publication:	CBD	EBM Tools	Grumbine	Christensen	Lackey	NRC	Arkema	Boesch	Forst	NOAA	McLeod	FAO	WWF	
EBM Principles Year:	2000	2010	1994	1996	1998	2008	2006	2006	2009	2007	2009	2001	2002	
Consider Ecosystem Connections	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	11
Appropriate Spatial & Temporal Scales	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		11
Adaptive Management	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	11
Use of Scientific Knowledge	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	10
Stakeholder Involvement	✓			✓		✓	✓	✓	✓	✓		✓	✓	9
Integrated Management	✓	✓	✓			✓	✓	✓		✓	✓	✓		9
Sustainability	✓	✓		✓	✓		✓	✓			✓	✓		8
Account for Dynamic Nature of Ecosystems	✓	✓		✓	✓			✓		✓		✓	✓	8
Ecological Integrity & Biodiversity	✓				✓		✓	✓	✓	✓		✓	✓	8
Recognise Coupled Social-Ecological systems		✓	✓	✓	✓	✓	✓	✓			✓			8
Decisions reflect Societal Choice	✓	✓	✓		✓		✓			✓	✓		✓	8
Distinct Boundaries		✓	✓		✓	✓	✓		✓	✓	✓			8
Interdisciplinarity	✓	✓				✓	✓	✓	✓	✓	✓			8
Appropriate Monitoring		✓	✓	✓			✓	✓	✓		✓		✓	8
Acknowledge Uncertainty	✓		✓	✓			✓	✓	✓	✓		✓		8

Priority EBM Elements

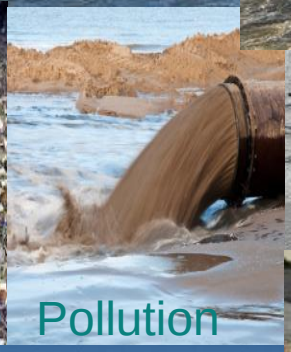
(Long, R.D., A. Charles & R.L. Stephenson. 2015. Marine Policy 57:53–60)



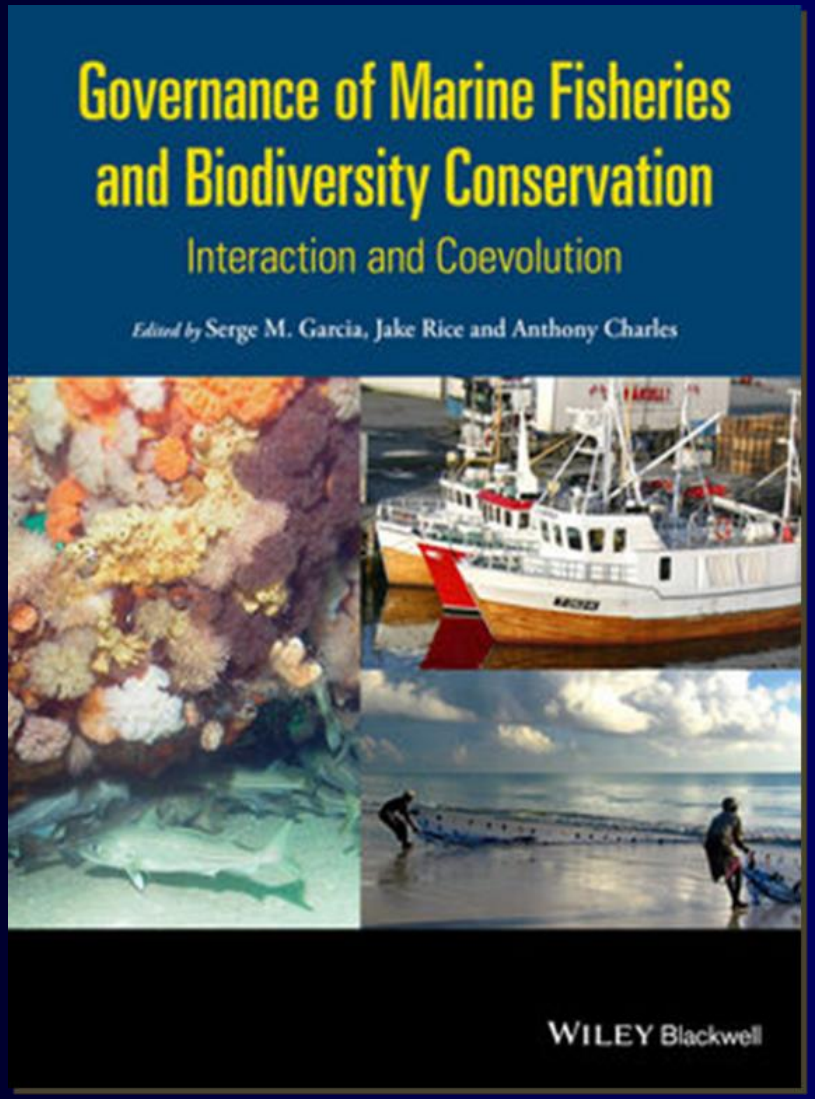
EBM: The Malawi Principles of the Convention on Biological Diversity

5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of ecosystem approach.

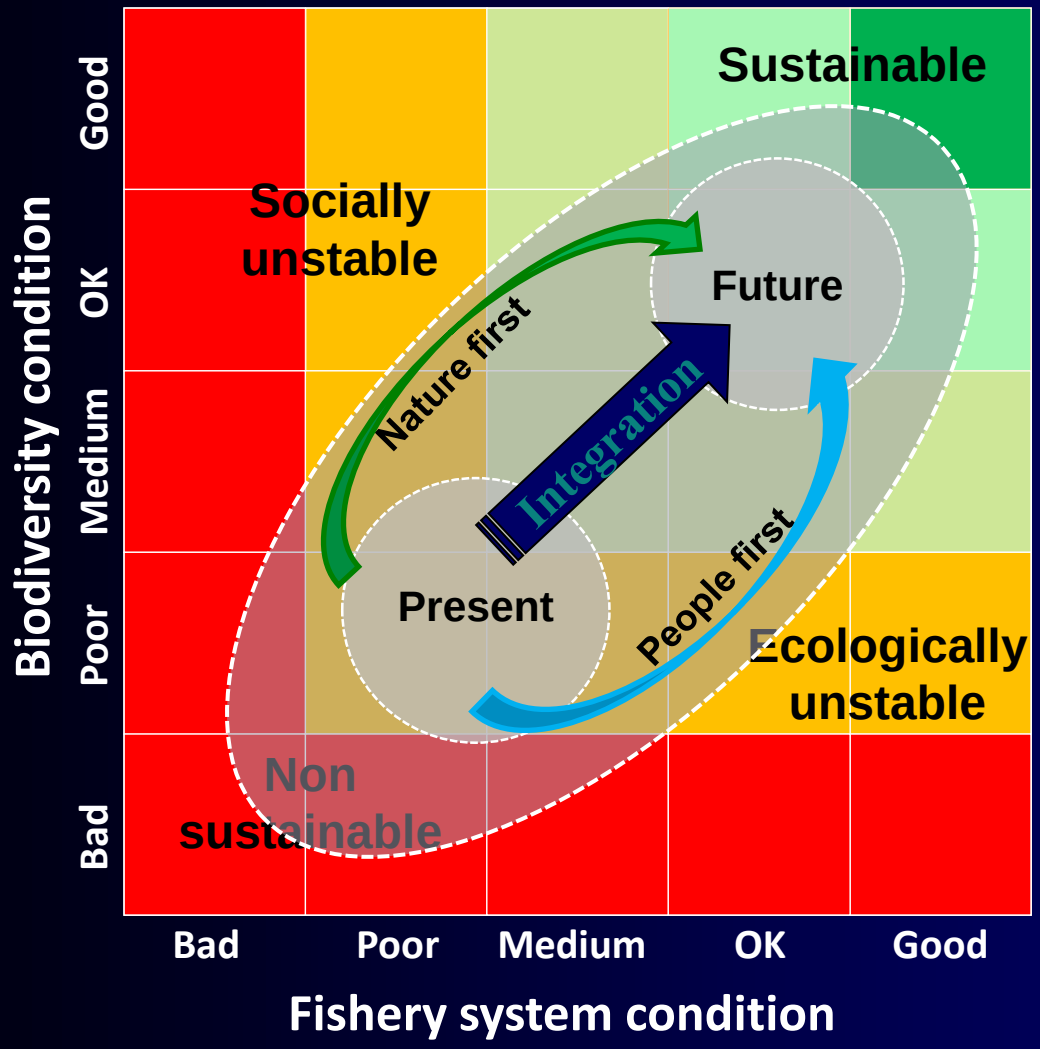
EBM: Beyond the Fishery



Targets & Limits. Of What?
2. Interacting Governance Streams



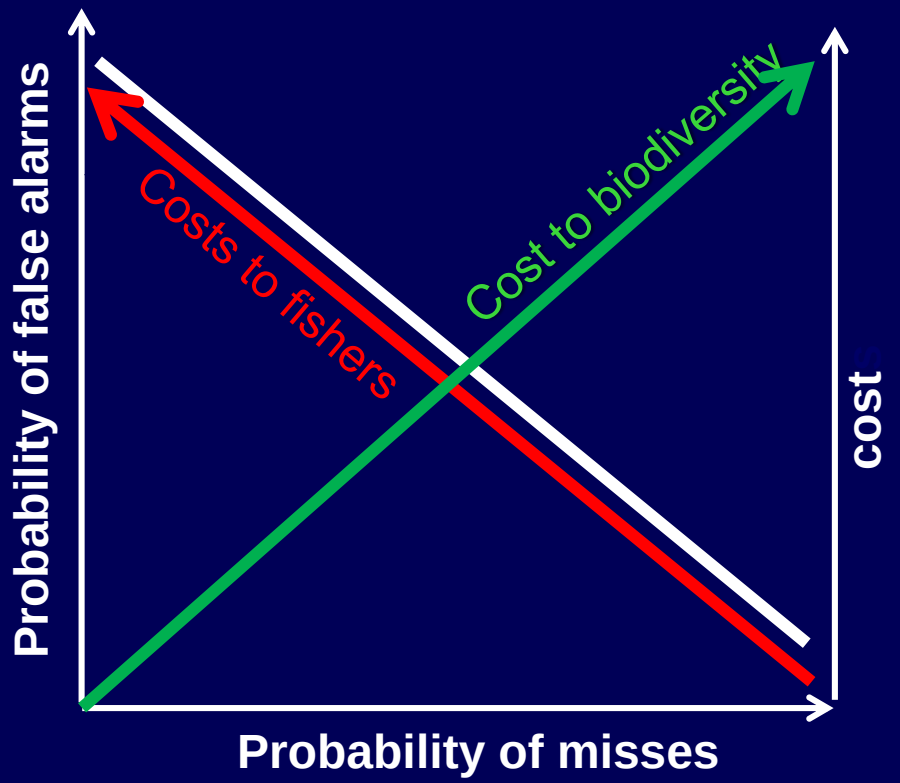
Possible Pathways of Fisheries and Biodiversity Conservation Streams



Convergence is "forced" by external drivers (e.g. global policy trends).

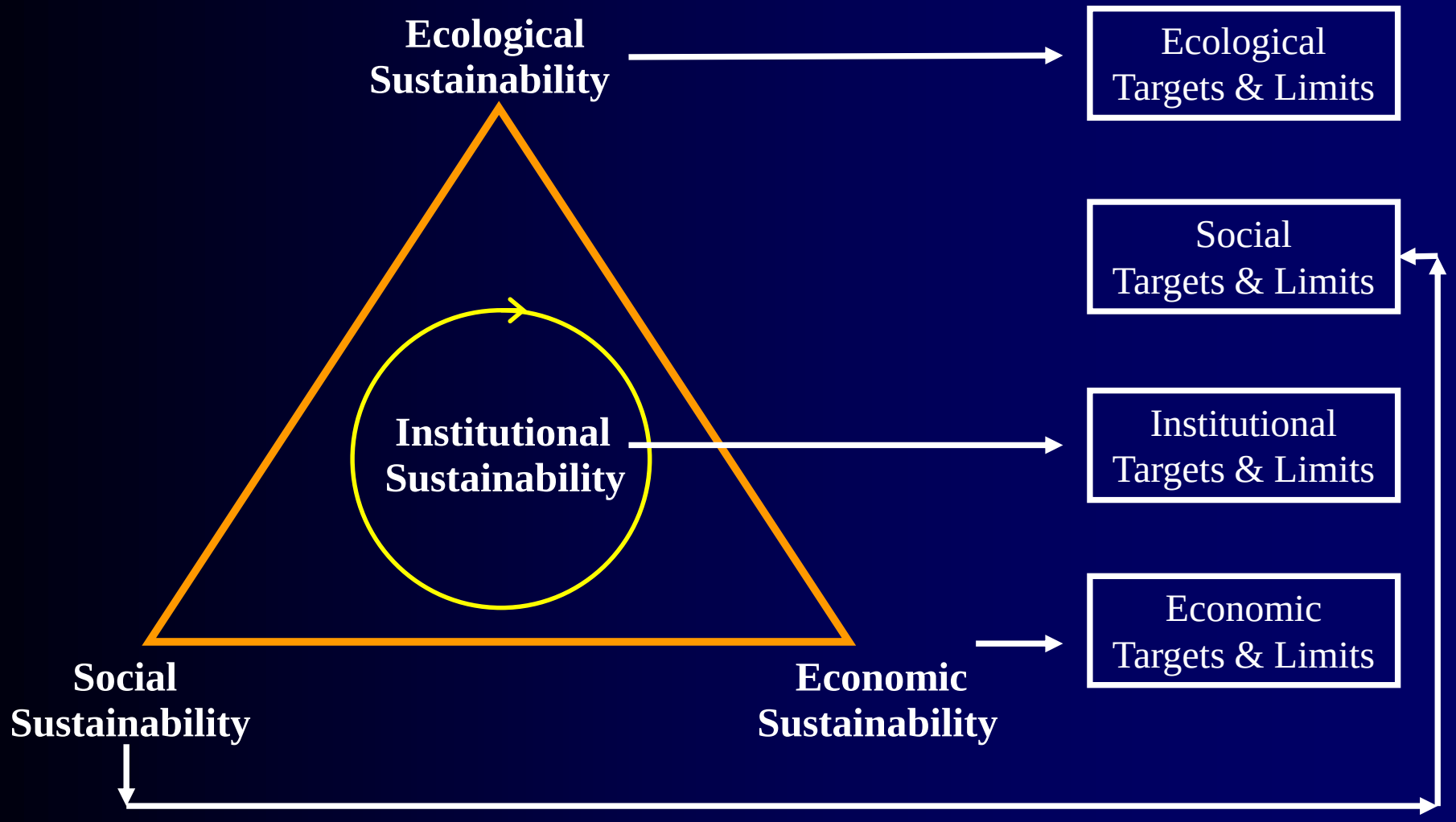
Co-evolution is emergent property of the system, and will be higher with interdependence.

Targets and Limits Depend on Risk Tolerances



- **Miss**: no action taken, fishing damages biodiversity.
- **False Alarm**: action taken but no benefit, -ve impact on fishing.
- Biodiversity bears costs of misses.
- Fishers bear cost of false alarms.
- Differing risk tolerance of streams.
- Reverse for socioeconomic risk.

Targets and Limits. Of What?
3. Pillars of Sustainability



Economic Targets and Limits

Conventional	Ecological Economics
Total Landed Value	Natural Capital & Fish Stock Value
Total Processed Value	Depreciation in Natural Capital
Fishery Gross Domestic Product	Value of Ecosystem Services
Value of Fishery Exports	Diversity of Employment Sources
Profit per Fisher	Economic Diversity in Community
Return on Investment	Debt Levels of Fishers

Charles, A., C. Burbidge, H. Boyd and A. Lavers. 2009. *Fisheries and the Marine Environment in Nova Scotia: Searching for Sustainability and Resilience*. GPI Atlantic, Tantallon NS Canada, 55p.

Charles, A., H. Boyd, A. Lavers and C. Benjamin. 2002. *The Nova Scotia GPI Fisheries and Marine Environment Accounts: A Preliminary Set of Ecological, Socioeconomic and Institutional Indicators for Nova Scotia's Fisheries and Marine Environment.* GPI Atlantic, Tantallon NS Canada, 76p.

Social Targets and Limits

Explicit social component is needed in ecosystem-based management, yet relatively few frameworks include social pillar of sustainable development.

Targets

Choose ones that can be set at scale of the fishery, possibly by aggregating / averaging across multiple local areas.

For example:

employment, health, equity, stability, community well-being

fisher age distribution, diversity of licenses and employment.

Limits

Avoid undesirable social outcomes (precautionary approach) especially for highly vulnerable fishery components.

For example:

"do not exceed X% decline in fishing population"

"do not exceed X% decline in coastal community well-being".

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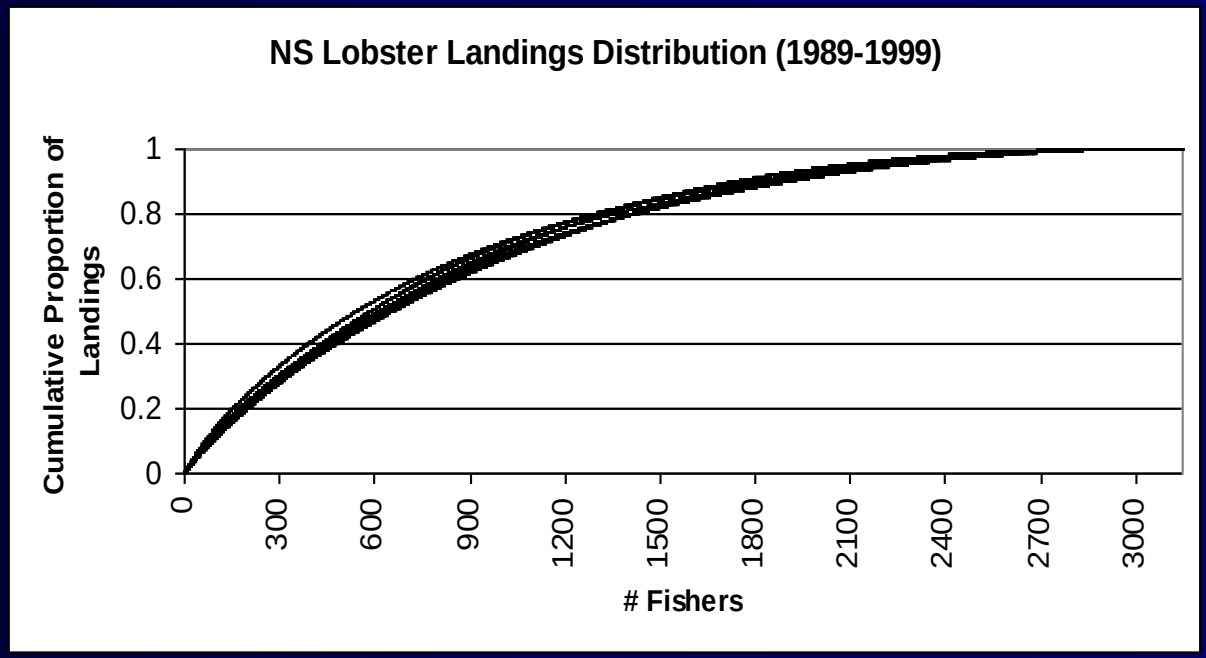
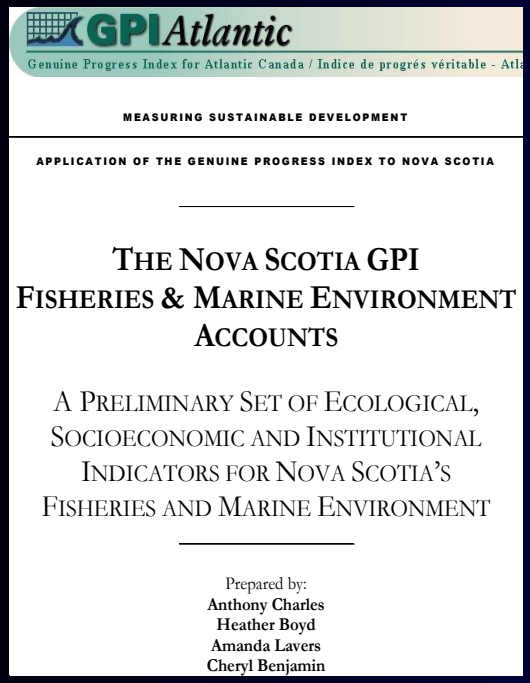
Example: Distribution of Benefits (Equity) in Fisheries

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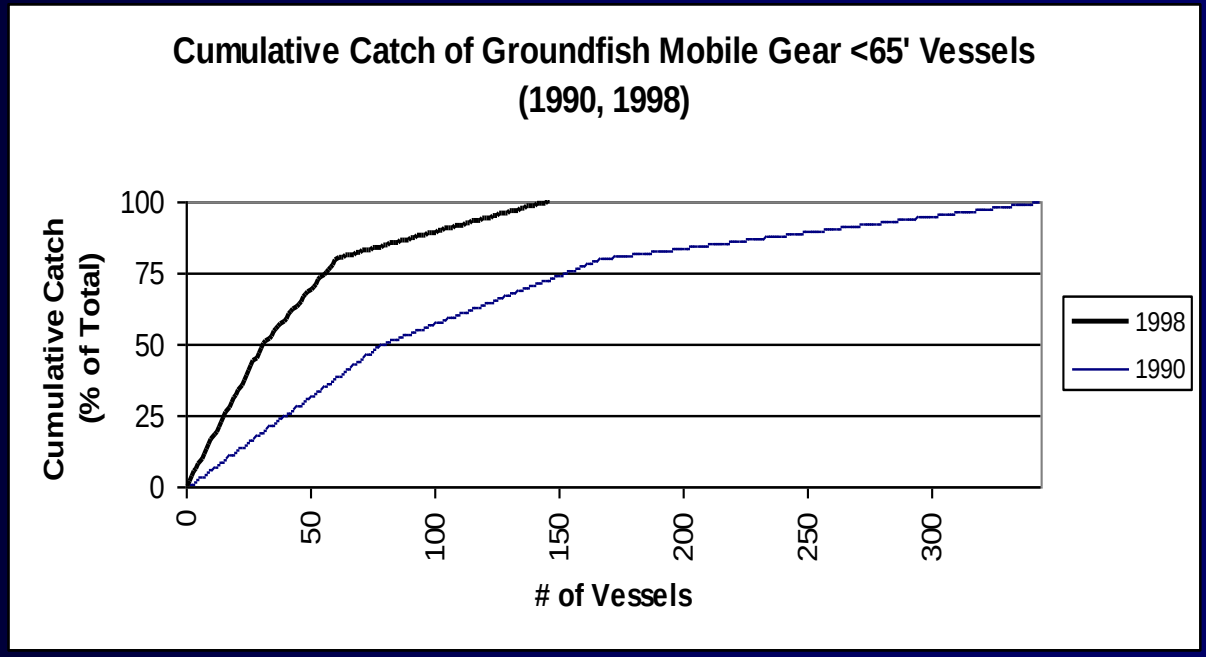

Institutional Targets and Limits?

Some possible limit and target reference points could relate to:

- Acceptability of governance regime
- Robustness of management (to produce decent success even with faulty understanding and imperfect controllability)
- Management portfolio (not too narrow, not too broad)
- Participation in decision-making (not too low, not too high)
- Effectiveness of incentives and institutional design
- Level of financial and organizational viability
- % of resources allocated for science & conservation.

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Framework

Comprehensive set of sustainability objectives

In response to

Canada's Policies and International Obligations

require

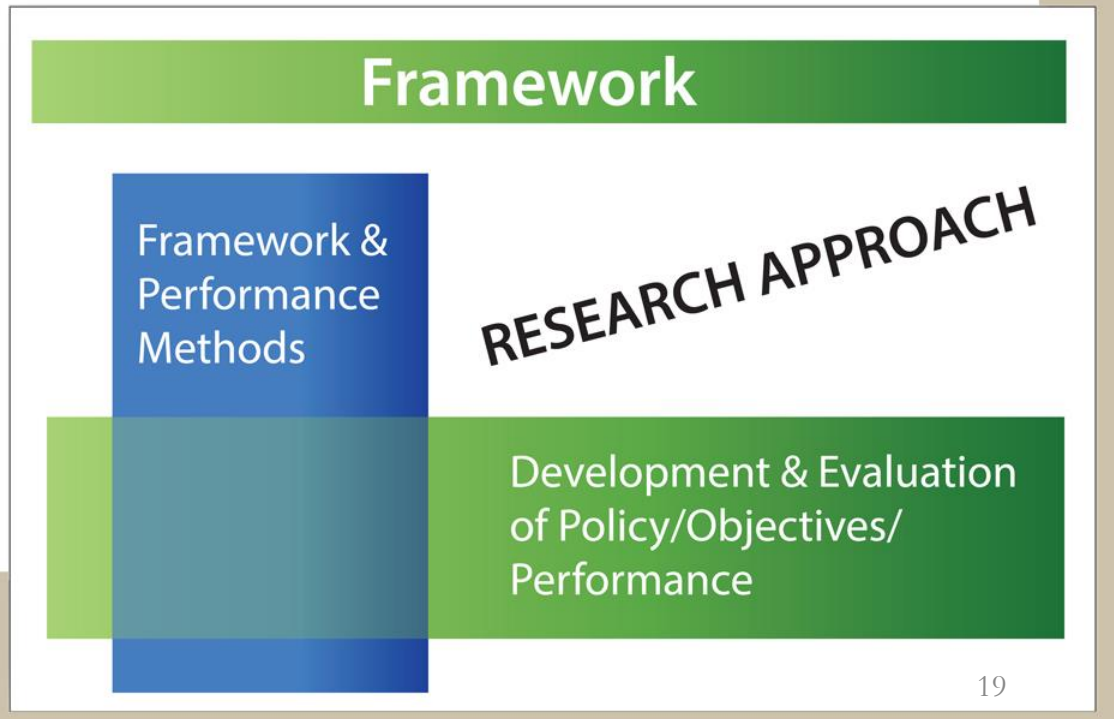
New/Different Info and Relevant Performance Indicators

Ecological
- Productivity
- Biodiversity
- Habitat

Social and economic
- Sustainable communities
- Health and well-being
- Ethical fisheries
- Economic/financial viability
- Distribution of access and benefits
- Regional economic benefit

Institutional
- Institutional arrangements
- Good governance
- Participatory decision-making
- Effective management

Sustainable Fisheries Framework
Canada's Sustainable Development Strategy
2004 Policy Framework for Management of Fisheries
2002 Canada's Oceans strategy
UNCLOS, Code of Conduct
...

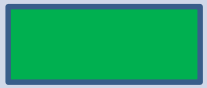
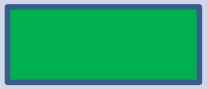


CFRN

Compare Scenarios/options

Management options

Objectives

	Scenario A	Scenario B	Scenario C
Ecological - - -	acceptable	acceptable	improvement
Economic - -			
Social - -			
Institutional - -	No change required	More participatory	Participatory and easily implemented

Scenarios may be compared in several ways…relatively, qualitatively or quantitatively

Targets and Limits. By Whom?

Choices of the priority goals, and subsequently targets & limits, will depend on who is invited and who can attend the meetings.

1. Many do not know what is meant by, or included in, “social aspects”;
2. For a meeting on fisheries, everyone puts on their ‘fishery blinders’, so social aspects may be downplayed compared to economic, ecological;
3. Education may be needed on how fishery choices (e.g. of fleet types) affect social outcomes (employment, community cohesion, health, etc.).

Must consider access issues, e.g. representatives of more industrial fisheries may be better able to afford attendance at meetings where this is discussed.

Outcomes may depend on whether processing / post-harvest is included, and on whether those beyond the fishery are included.

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