

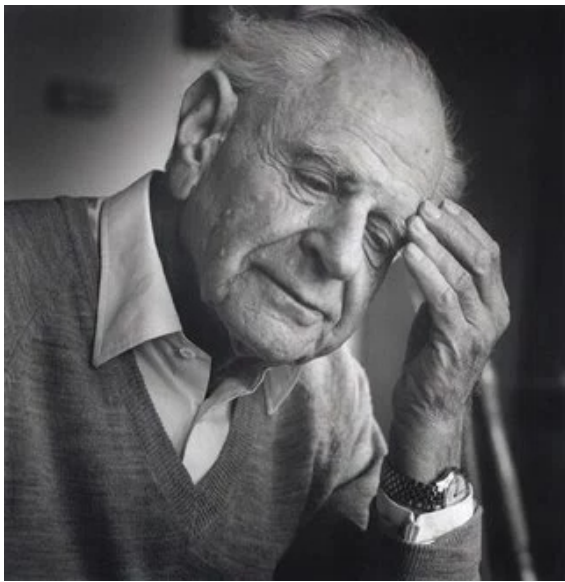
Adventures in Integration: Insights from interdisciplinary transgressions



Edward H Allison
School of Marine and Environmental Affairs
University of Washington



- What is interdisciplinarity and why are we doing it?
- Interdisciplinary practice: fisheries and international development case studies
- Interdisciplinary creativity: serendipity science
- What are we missing?



“We are not students of some subject matter, but students of problems. And problems may cut right across the boundaries of any subject matter or discipline”

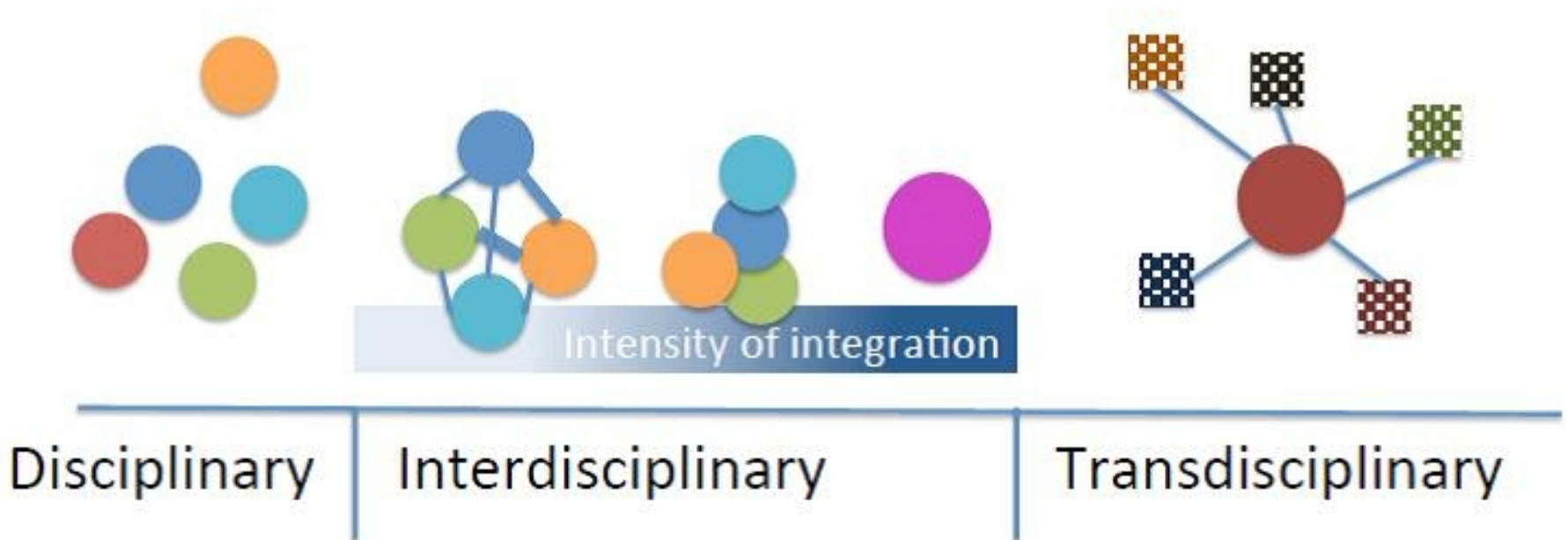
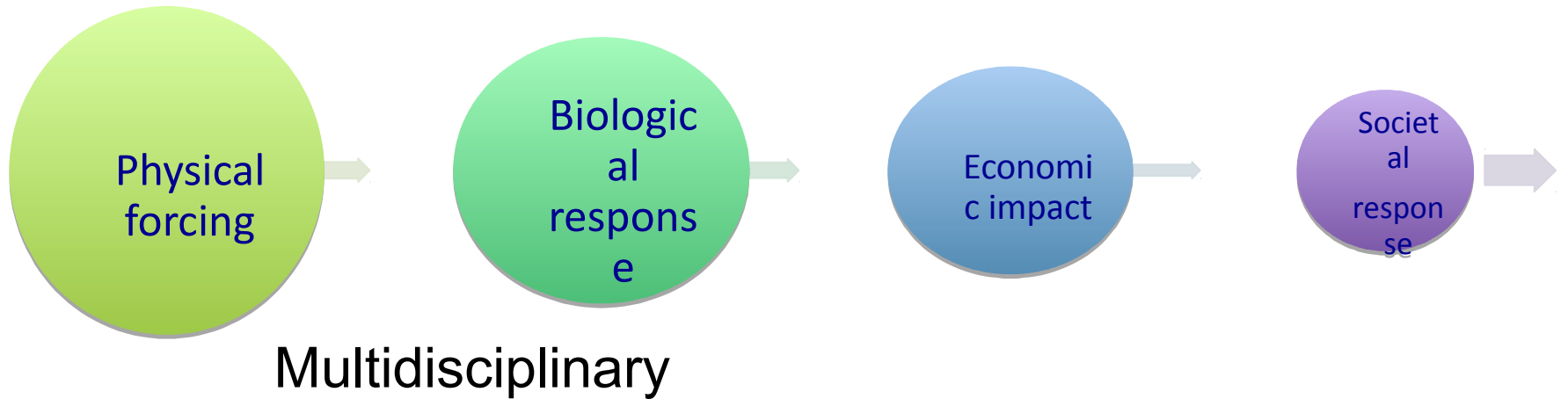
Karl Popper (1963) *Conjectures and Refutations: The Growth of Scientific Knowledge*. New York: Routledge and Kegan Paul, p. 88.

“The world has problems, but universities have departments”

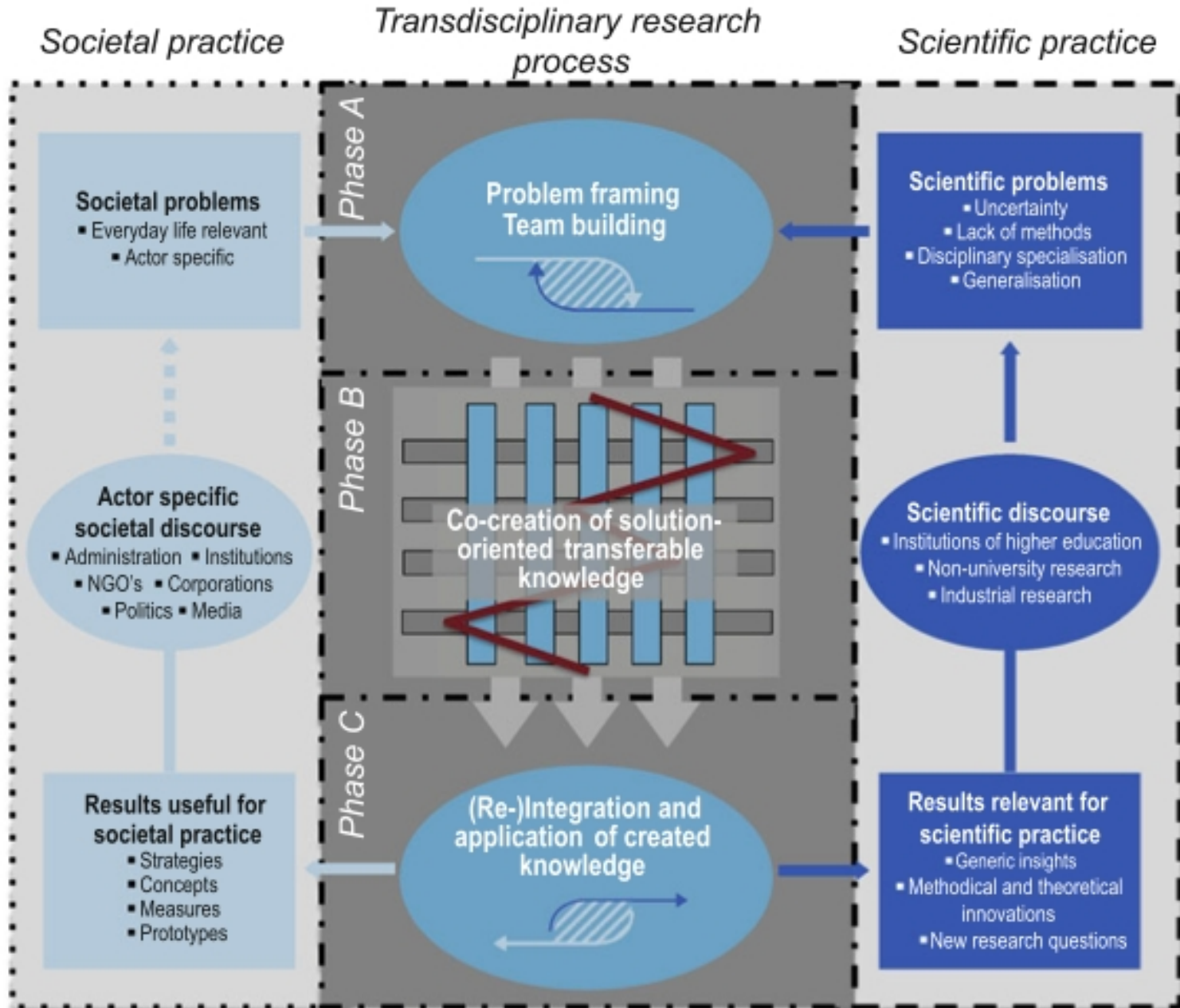
Garry Brewer (1999) The challenges of interdisciplinarity. *Policy Sciences* 32, p328.



Defining how we work across disciplines

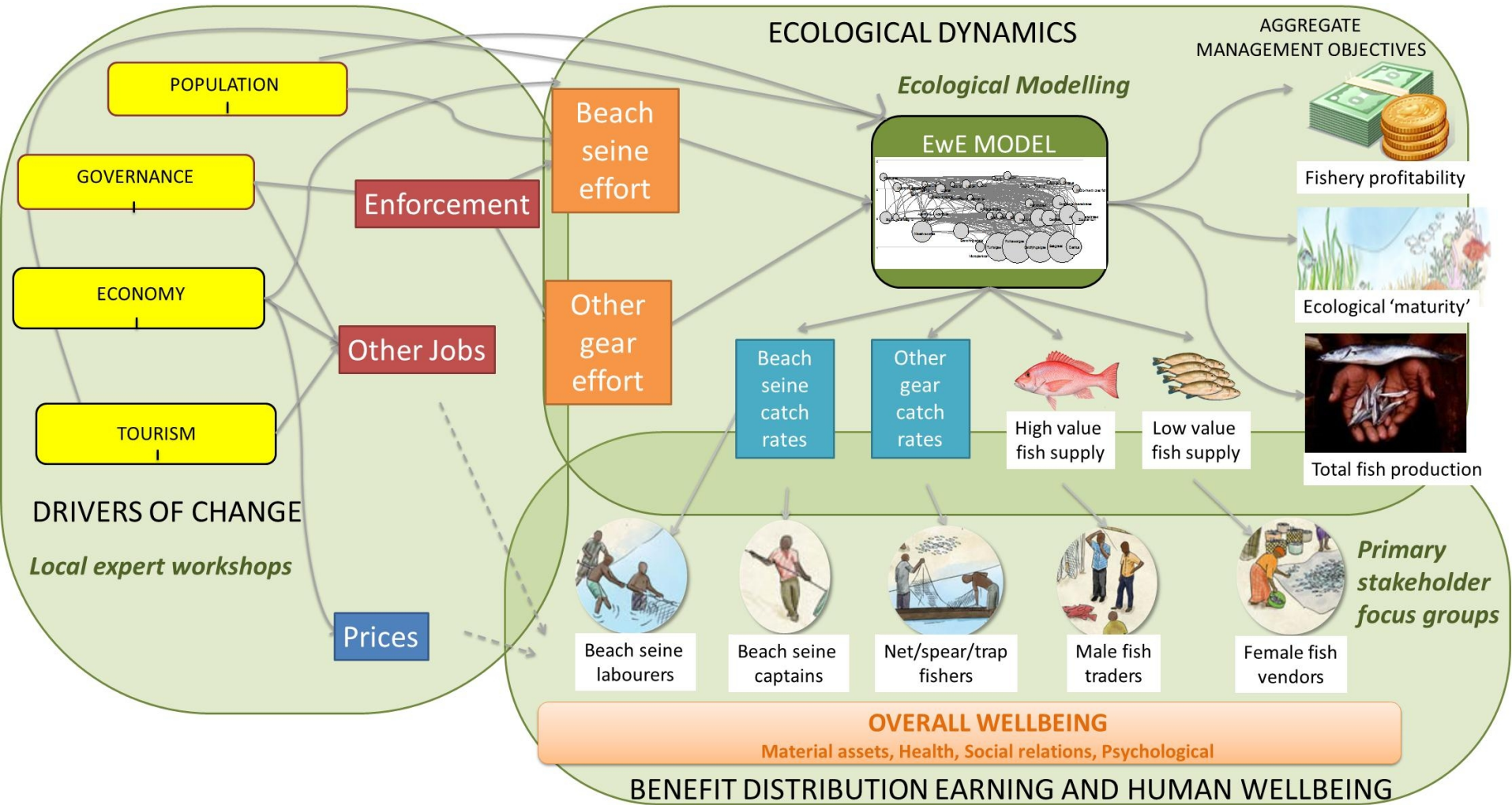


(Various sources: Hadorn et al 2006, Pohl, 2008, Cronin, 2008)




Transdisciplinary integrated assessment

ESPA SPACES project (Tim Daw *et al* SRC)





- What is interdisciplinarity and why are we doing it?
- **Interdisciplinary practice: fisheries and international development**
- Interdisciplinary creativity: serendipity science
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A photograph of a traditional wooden suspension bridge spanning a wide, muddy river. The bridge is constructed from dark wood and thick ropes. Several people are crossing the bridge, including a man in a brown shirt and a child in a red and white patterned shirt in the foreground. The background is filled with lush green tropical vegetation. The image is overlaid with two semi-transparent text boxes: a white one in the top right and a blue one in the bottom right.

Atmospheric sciences
Physical oceanography
Biogeochemistry
Ecology

Economics
Political Science
Anthropology
Sociology
Psychology
Human Geography
Env. History

Climate Change vulnerability analysis framework

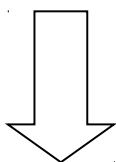
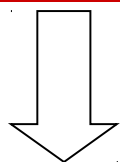
(Allison et al. 2009 derived from IPCC 2001)

EXPOSURE

Nature and degree to which countries are *exposed* to predicted climate change

SENSITIVITY

Degree to which economies & people are likely to be affected by fishery-related changes

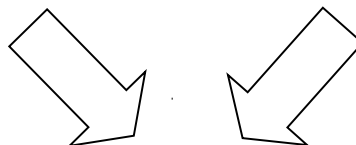


POTENTIAL IMPACTS

All impacts that may occur without taking into account planned adaptation

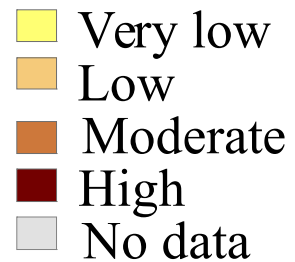
ADAPTIVE CAPACITY

Abilities and resources to cope with climate-related changes



VULNERABILITY

Which national economies are most vulnerable to potential impact of climate change on their fisheries ?



Allison et al 2009 Fish & Fisheries

- 2/3 of most vulnerable are Least Developed Countries

Over 400 million of the world's poorest depend on fish for food. How will they adapt to climate change?



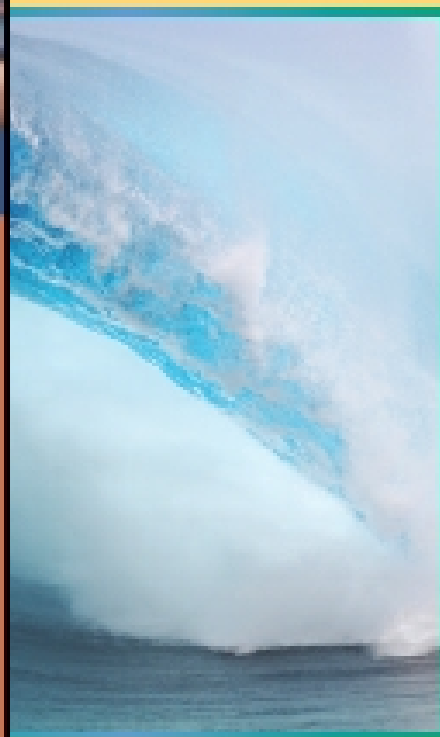
© PaCFA/DOF/FAO/IFAD

Find out what's at stake

Don't let fish slip through the climate change net

Fisheries and aquaculture

Climate adaptation and



Oceans Day at Copenhagen

The Importance of Oceans, Coasts, and Small Island Developing States in the Climate Regime

December 14, 2009

8:00 to 22:00

Venue: European Environment Agency, Copenhagen

Featuring H.S.H. Prince Albert II of Monaco
Indonesian Minister Dr. Fadel Muhammad
Grenada's UN Ambassador Dr. Dessima Williams
US NOAA Administrator Dr. Jane Lubchenco
and other World Leaders

Changing oceans

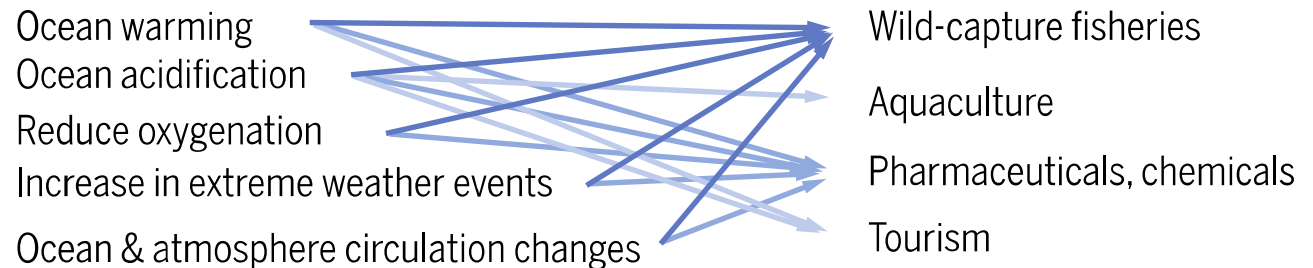


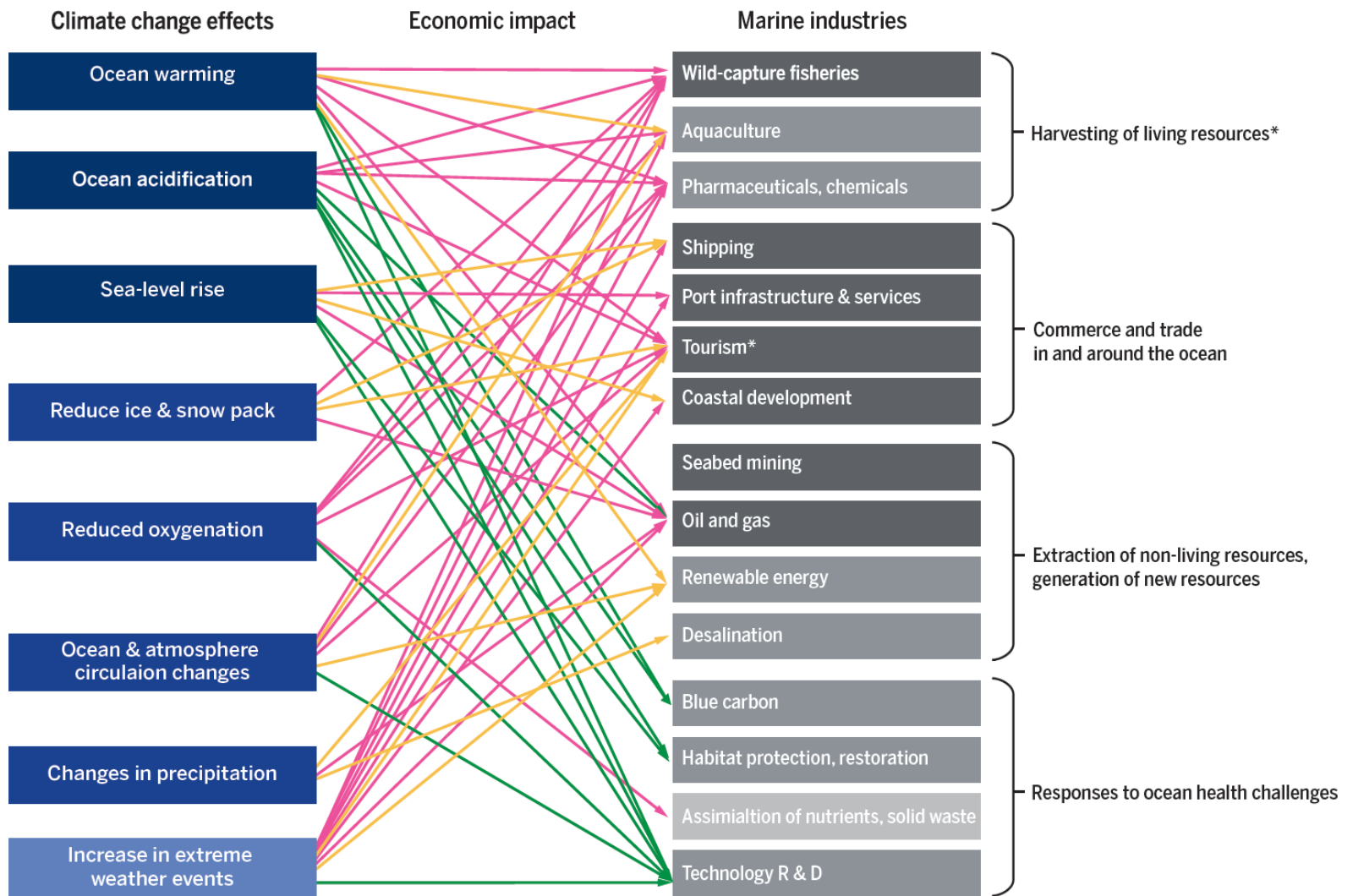
Sectors of the ‘blue economy’ that are based on living marine resources are all predicted to be negatively impacted under anthropogenic GEC

Confidence in effects

- Very high
- High to very high
- High
- Medium high
- Medium
- Low

*IPCC confidence levels assigned to impacts on marine industries





Confidence in effects

- Very high
- High to very high
- High
- Medium high
- Medium
- Low

***IPCC confidence levels assigned to impacts on marine industries**

Ocean warming	Wild-capture fisheries
Ocean acidification	Aquaculture
Reduce oxygenation	Pharmaceuticals, chemicals
Increase in extreme weather events	Tourism
Ocean & atmosphere circulation changes	

Type of impact on marine industry

- Positive
- Negative
- Neutral or ambiguous

Level of industry development

- Established
- Emergent
- New

**How can you get people to trust the science?
How could you convey the importance to society of climate change
impacts on the oceans?**



Engaging citizens in climate action:

“Fear won’t do it”

(O’Neill & Nicholse-Cole, 2009. *Sci. Comm.* 30(3))



“non-threatening images that relate to every-day emotions and concerns tend to be the most engaging”



**24 HOURS UNTIL THE
PACIFIC WARRIORS
COME FACE TO FACE
WITH BIG COAL**

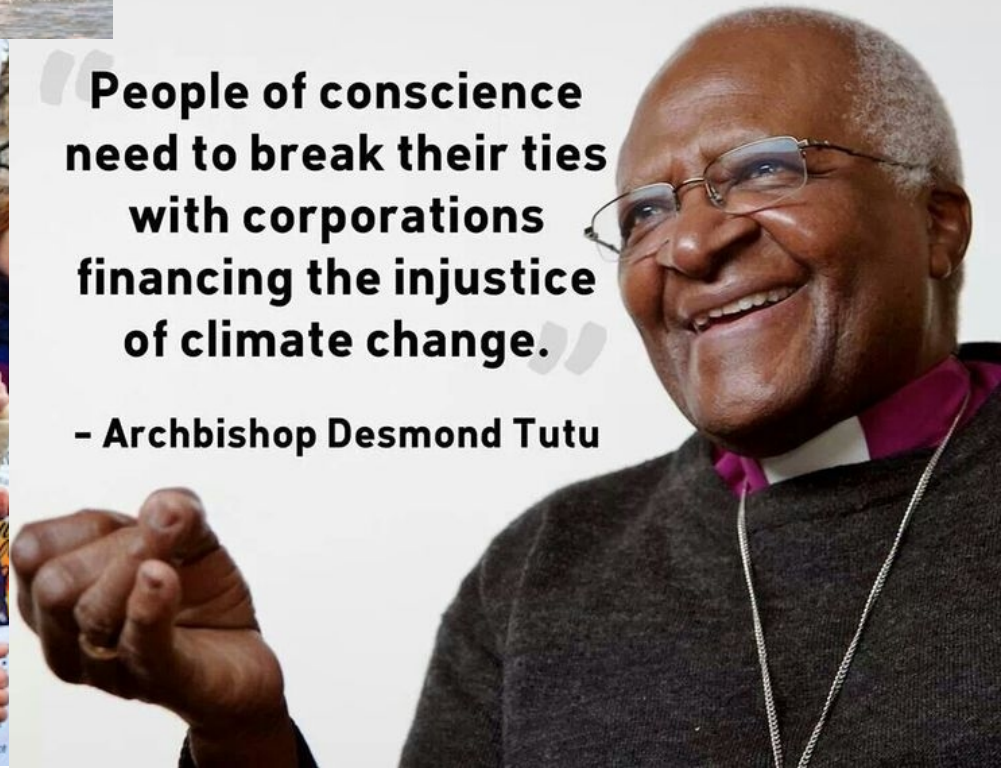


Civil Society responses to climate change



**People of conscience
need to break their ties
with corporations
financing the injustice
of climate change.**

- Archbishop Desmond Tutu





\$50 billion per year

Arnason et al, 2009, *The Sunken Billions*, The World Bank

IUU Fishing

Subsidies

Maritime crime

Loss of CC adaptive capacity

Loss of ecosystem services

Human rights violations

Food insecurity

Poverty

**Hidden societal costs
of the deficits in
fisheries governance**

Alternative livelihoods in fisheries





Total global costs of piracy per year = \$ 7-12 Billion
(One Earth Foundation, 2010)

– not all attributable to failing fisheries governance!

IMPOSSIBLY CHEAP

Abuse and Injustice in Bangladesh's
Shrimp Industry



A report produced by EJF supported by Humanity United



Protecting People &

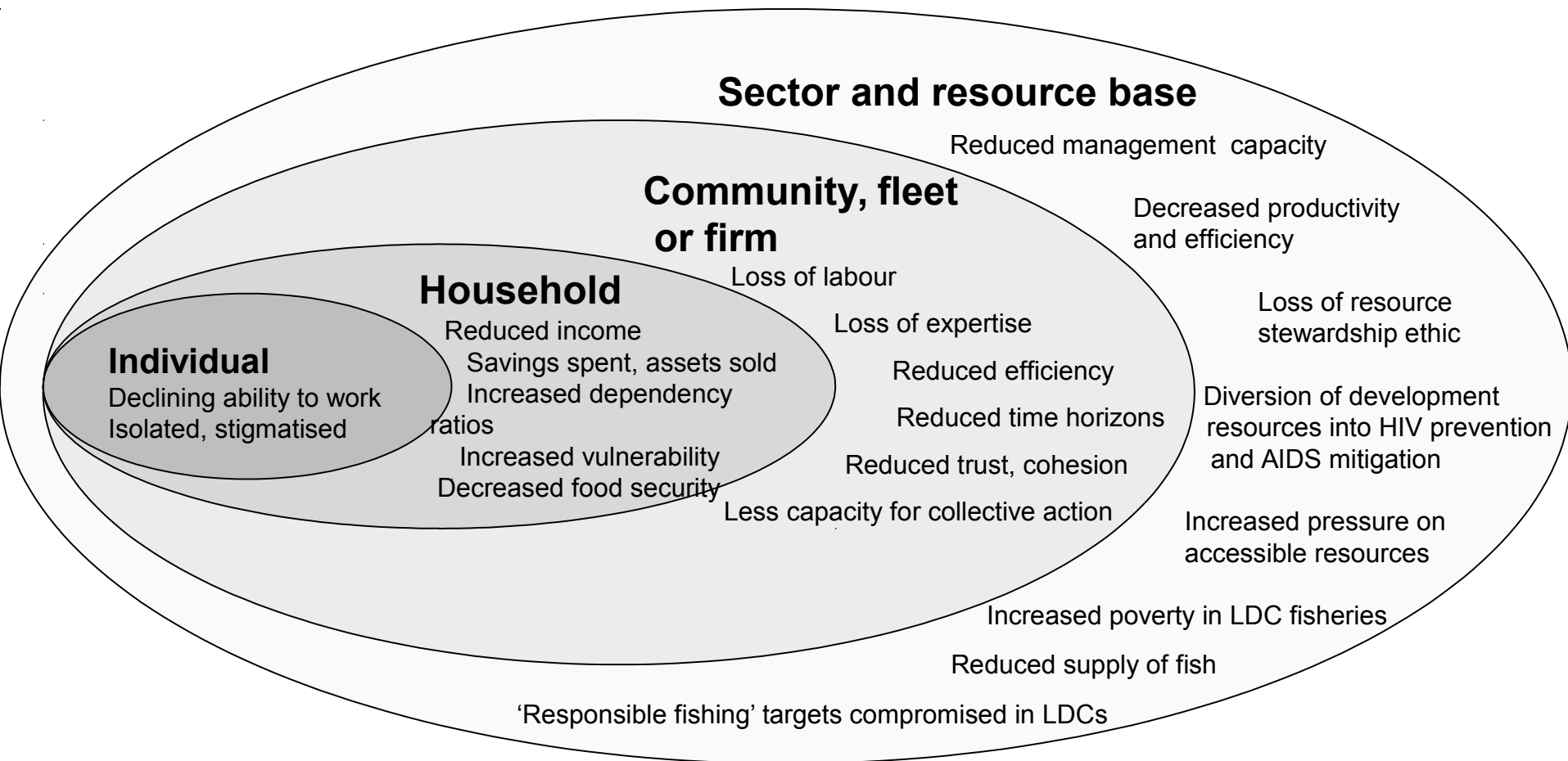
**Ethical consumption:
violations of human
rights in global seafood
value chains**



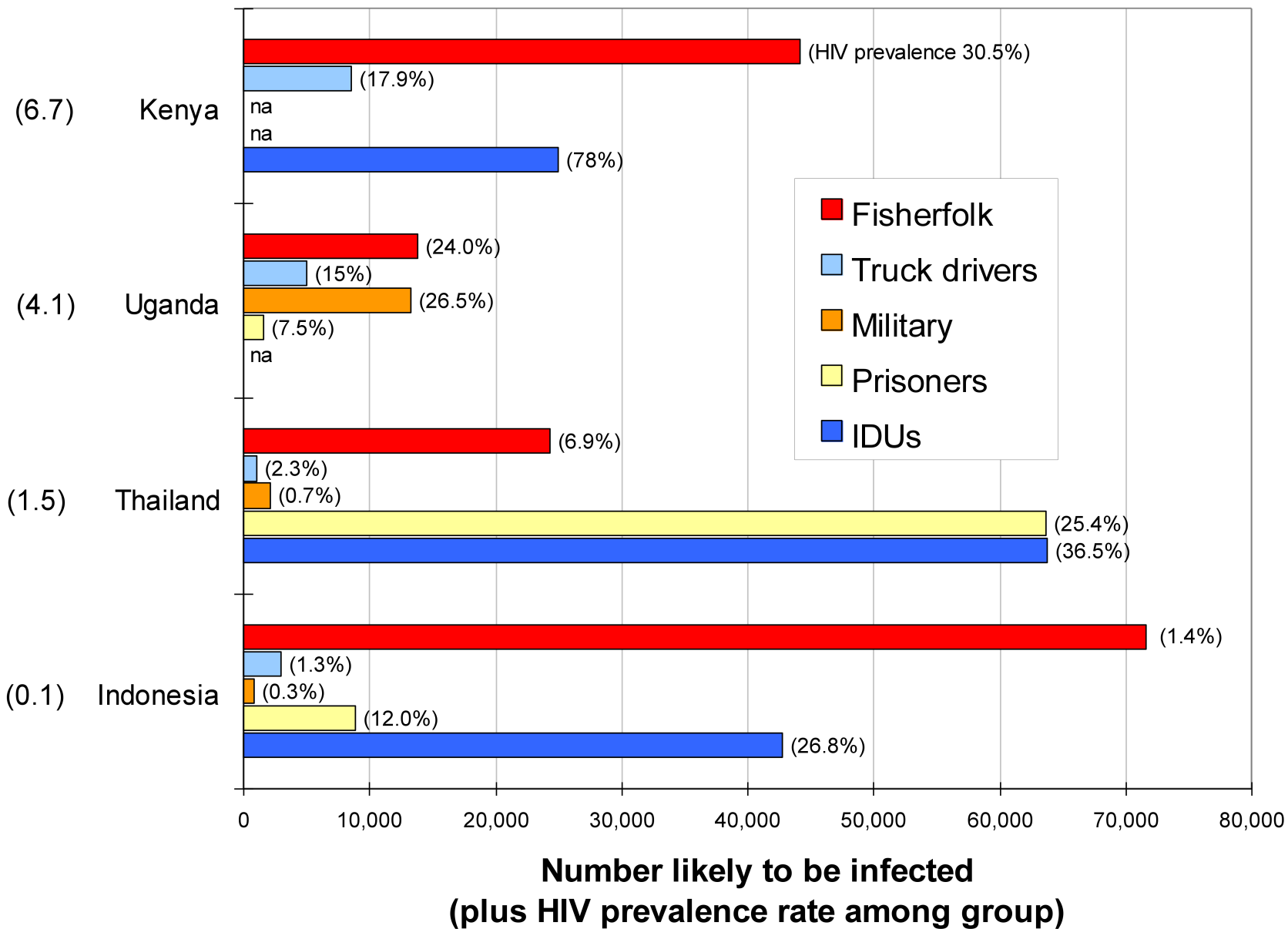
SLAVERY AT SEA

The Continued Plight of Trafficked Migrants in Thailand's Fishing Industry

The impacts of HIV/AIDS at different social and economic scales in the fisheries sector



HIV prevalence in fishing communities and other groups at risk





HIV/AIDS research impact

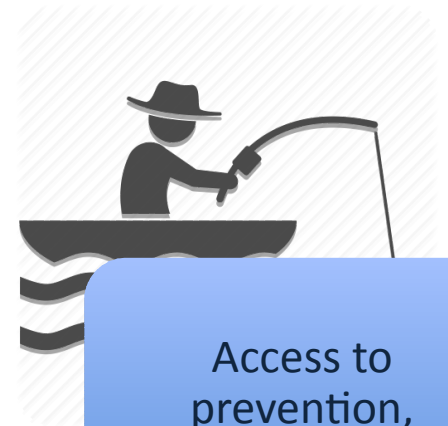
<http://impact.ref.ac.uk/CaseStudies/CaseStudy.aspx?Id=1436>



Fish & Fisheries
AIDS
AIDS Care
African Affairs
Science



Policy workshops
– FAO, WorldFish
Fisherfolk included
in National AIDS
Response plans in
15 countries
SIDA, NORAID,
GTZ

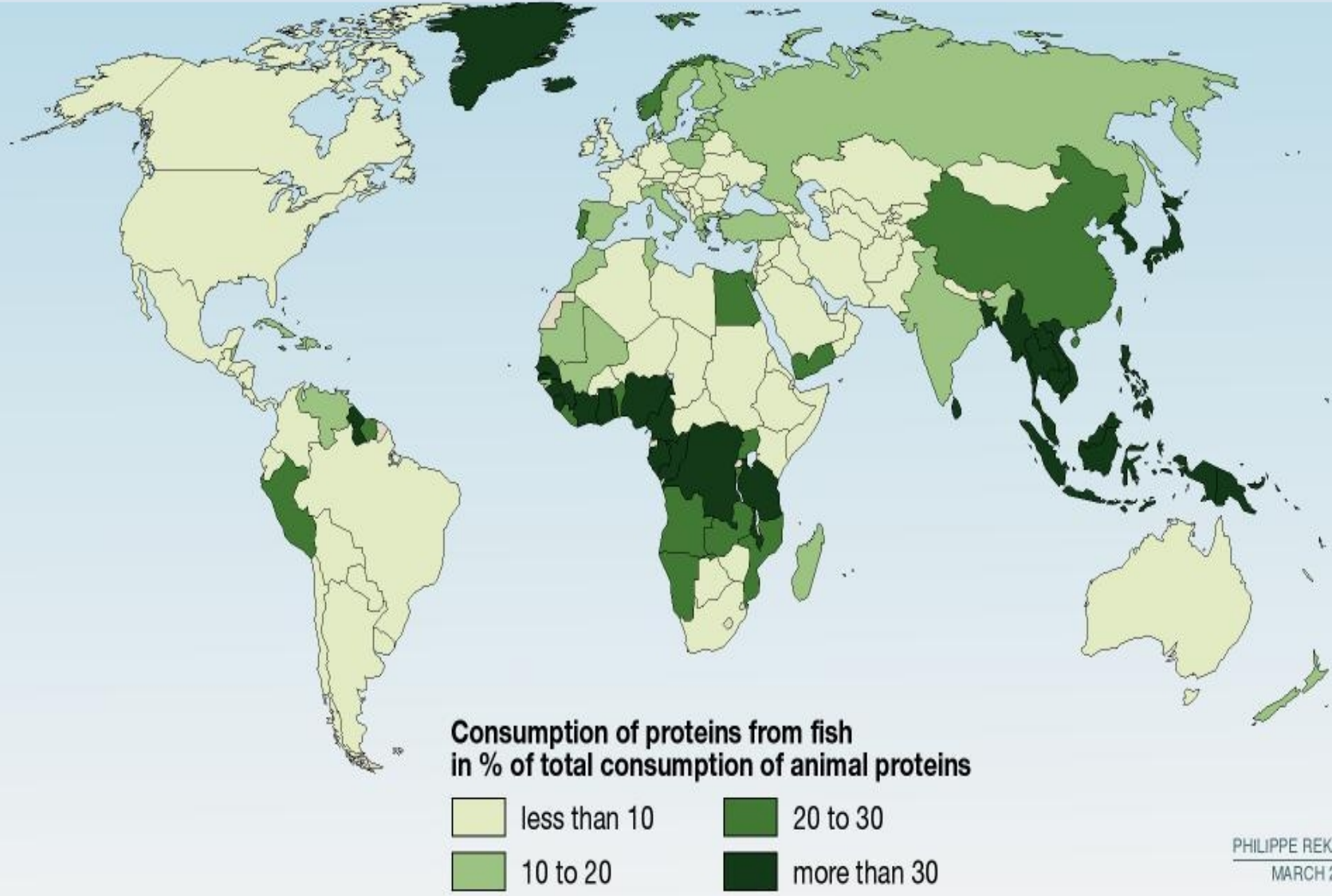


Access to
prevention,
treatment, care
Access to ART
AIDS Vaccine trials

Seafood, food security and nutrition



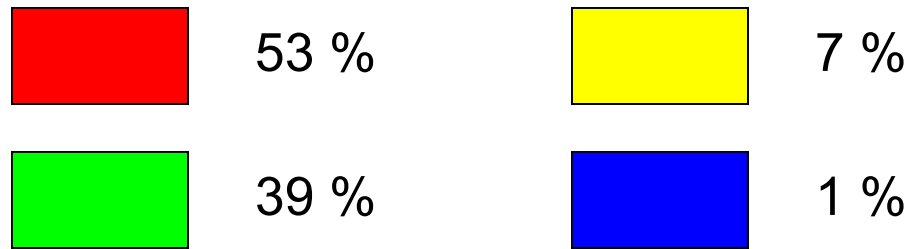
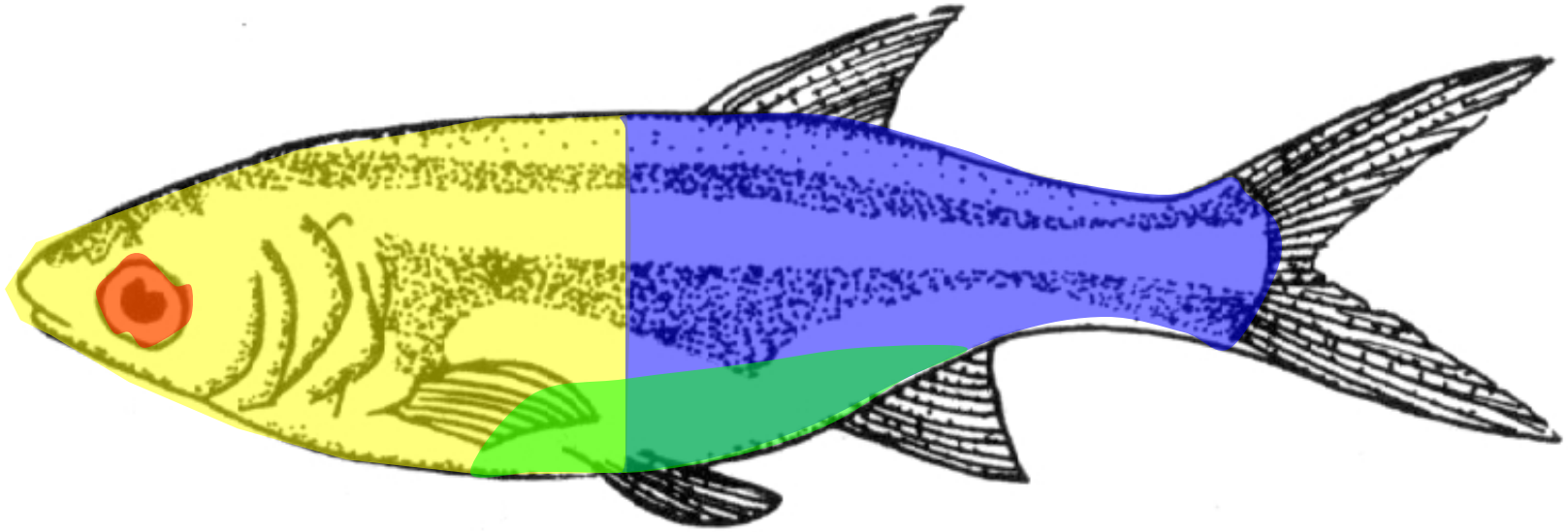
Fish and food security analysis: it's not just about "protein"



PHILIPPE REKACEWICZ
MARCH 2008

Source: Earthtrend database, World Resources Institute (WRI), Washington ; Faostat, Food and Agriculture Organization of the United Nations (FAO).

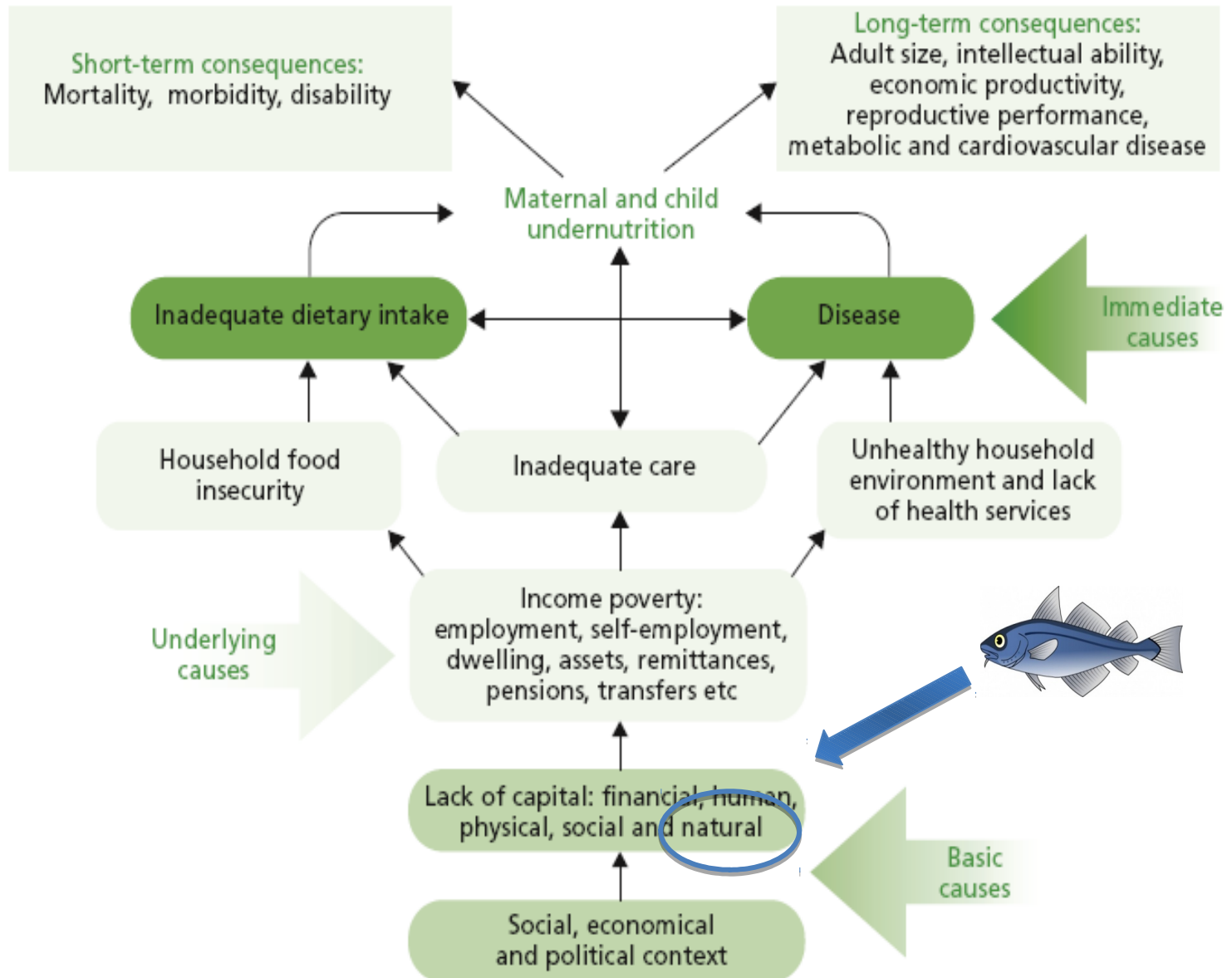
The nutritional value of fish depends on which species you choose, what parts you eat and how you cook it



Distribution of Vitamin A in *mola*, a small (4 cm) freshwater fish from Bangladesh

Image: Shakuntala Thilsted, WorldFish Center

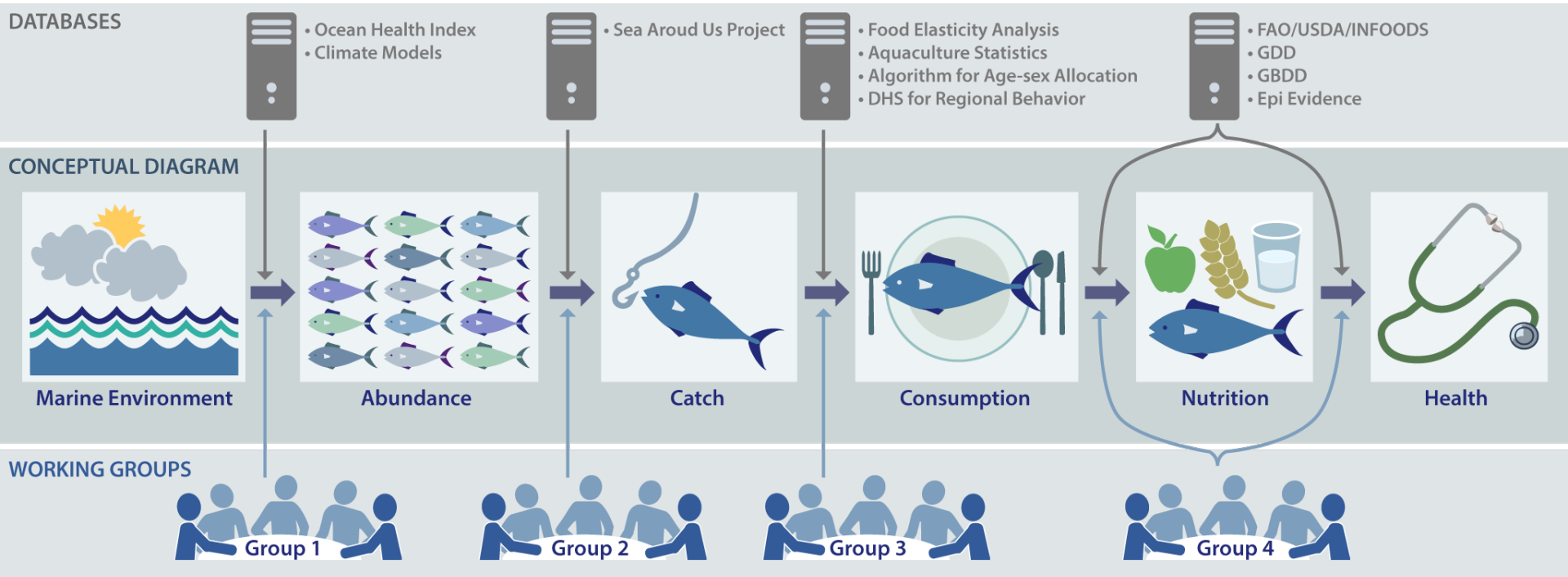
The centre of your system is at the periphery of someone else's:



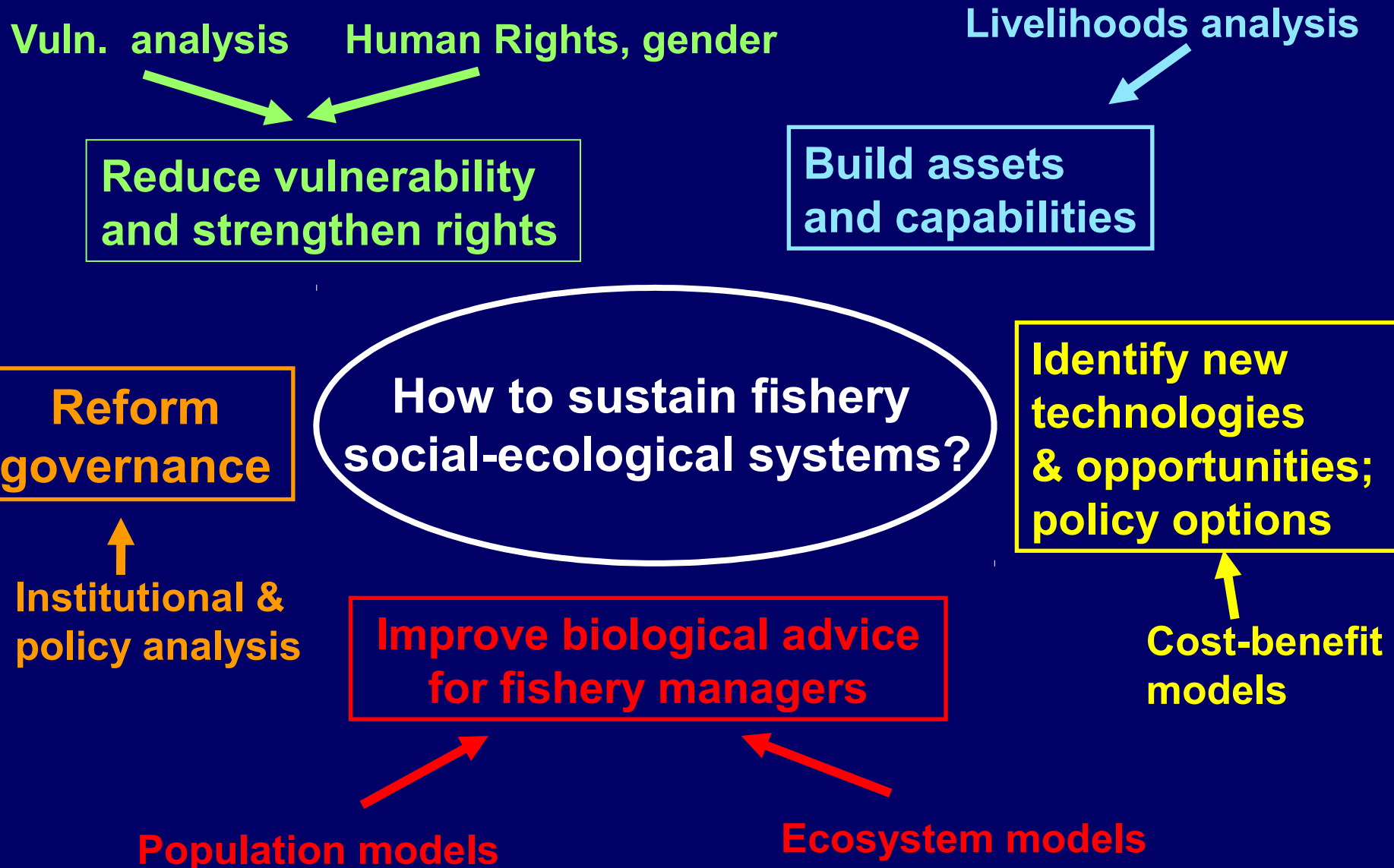
(Source: Lancet, 2008)

Quantifying the health impacts of change in fish availability

SESYNC project 2016-2018



Interdisciplinarity enlarges the scope for sustainability action



nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

SKYWATCHER

MIND MARVEL

INVISIBLE HAND

DOC QUANTUM

CAPTAIN MEDICA

INTERDISCIPLINARITY

Why scientists must work together to save the world **PAGE 305**

CONTROL-X

BIOLOGENE

ENVIRONMENT

SOMETHING IN THE AIR

Links between pollution and premature mortality **PAGES 300 & 307**

ETHNOGRAPHY

LIFE WITHOUT BORDERS

Mixed legacy of Victorian explorer Richard Burton **PAGE 319**

MEDICINE

SELF-DEFENCE COURSE

New technologies can make sense of human immunity **PAGE 409**

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17 September 2015 £10

Vol 525, No. 7569



Interdisciplinarity

Why scientists must work together to save the world

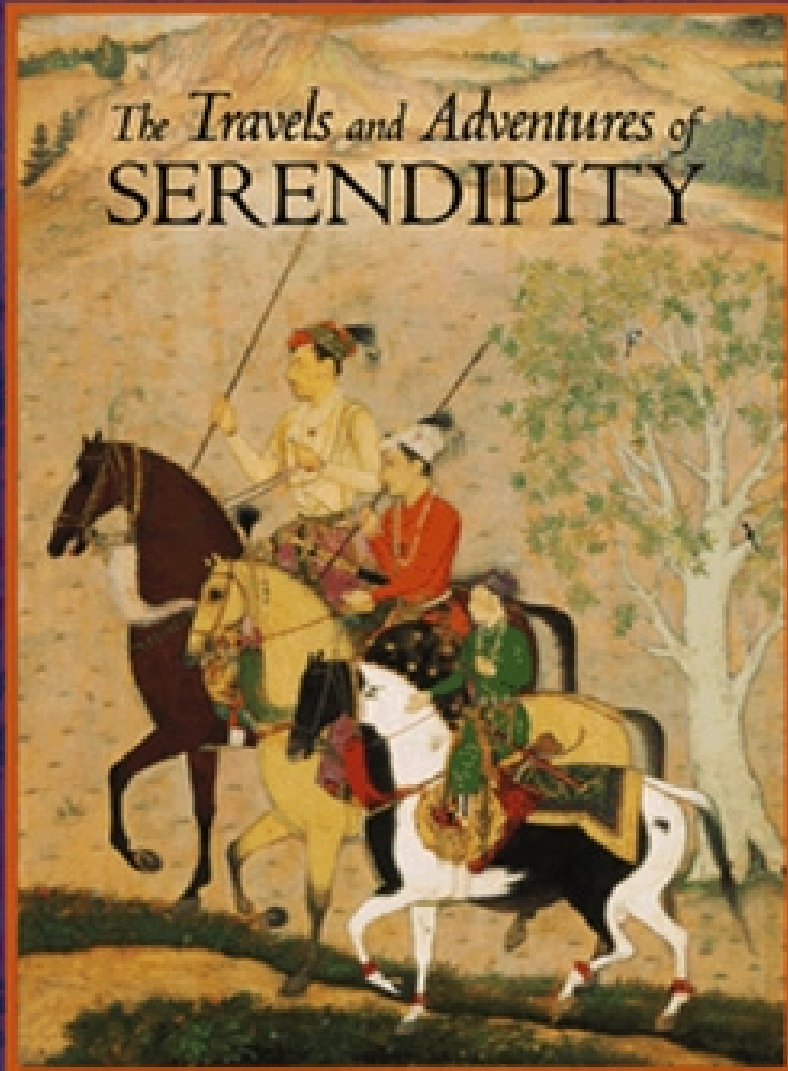
The instrumental argument has been made...

...but what about, creativity, surprise, excitement and fun?

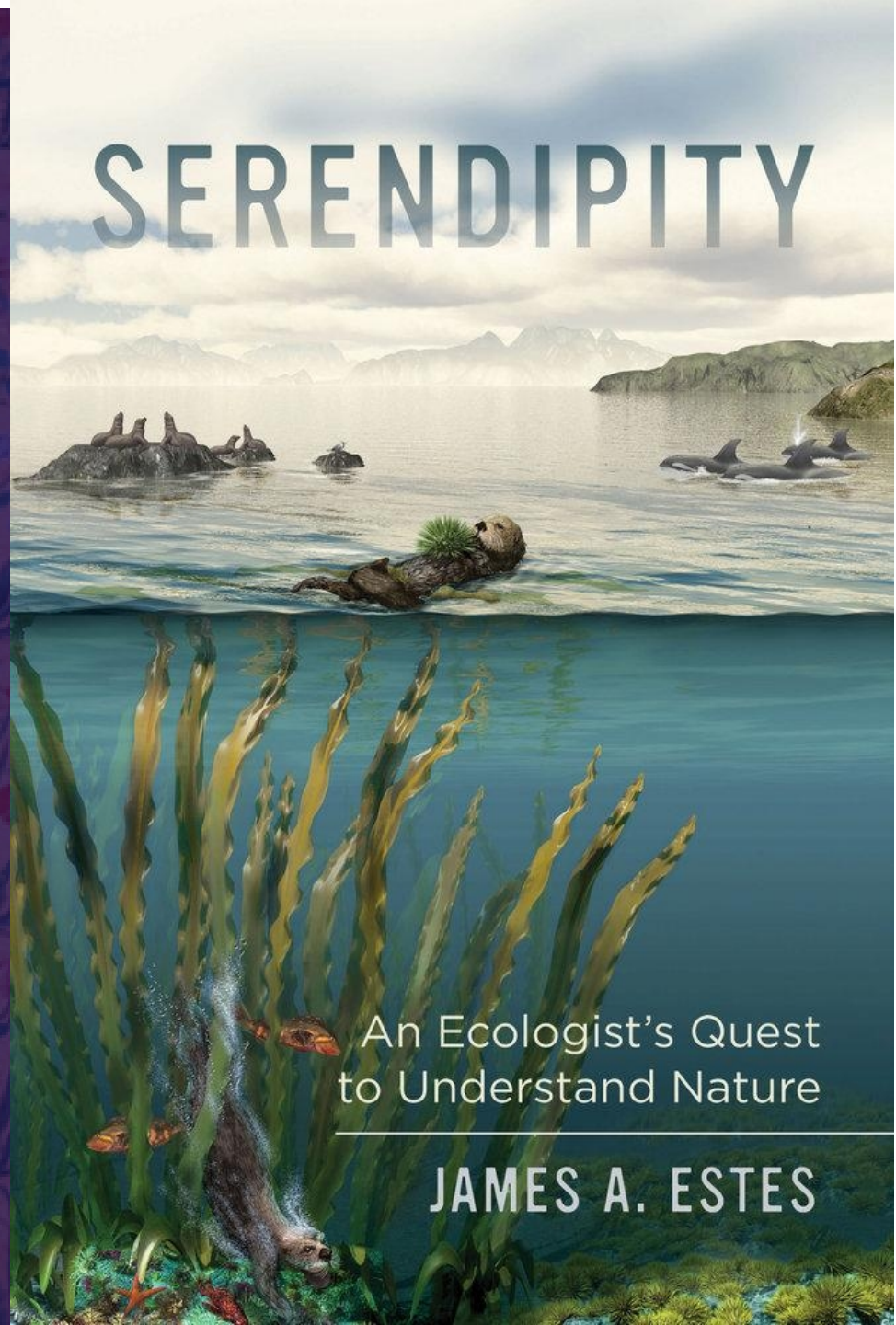


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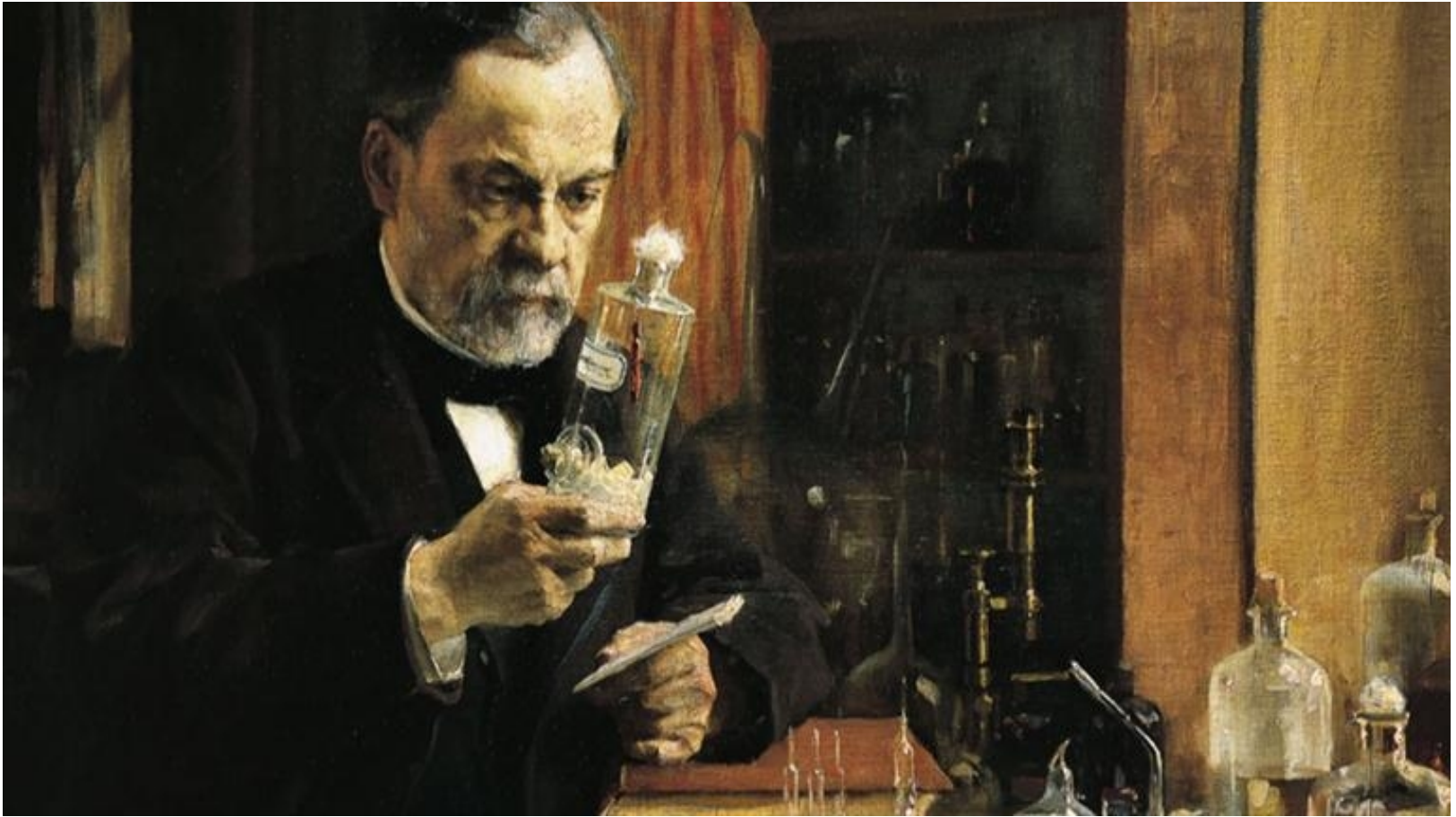
ROBERT K.
MERTON & **ELINOR
BARBER**



SERENDIPITY



Sérendipité = hasard + sagacité

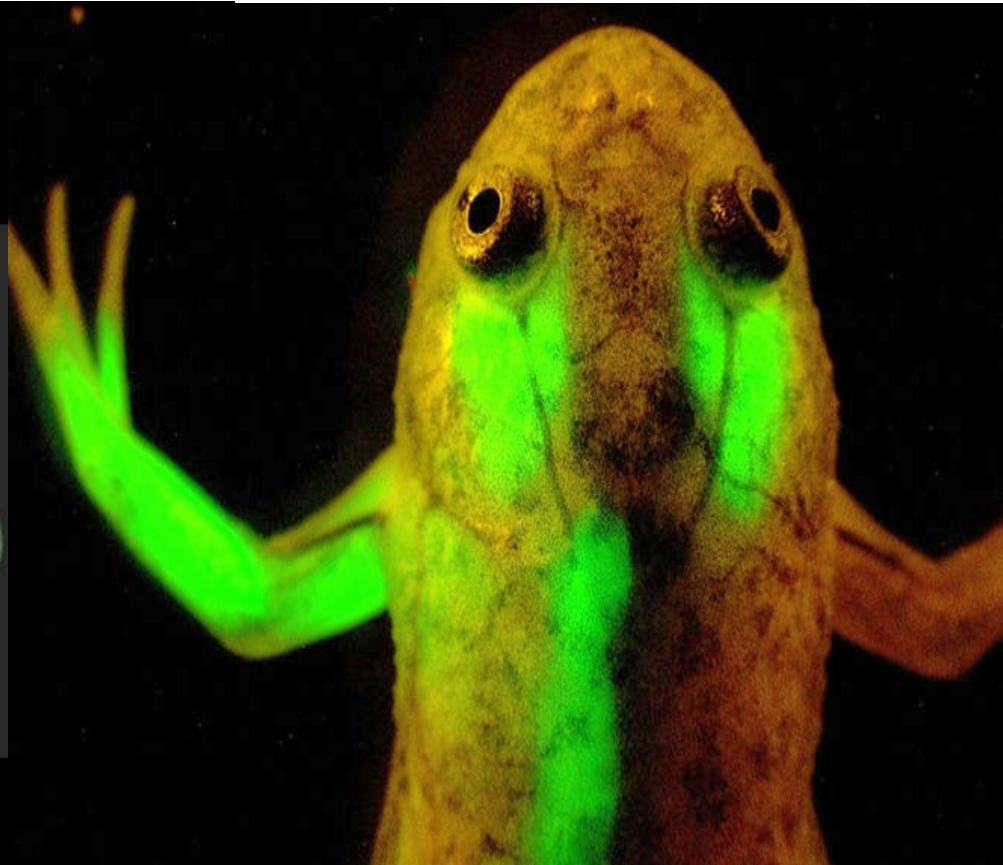


“Le hasard dans les découvertes scientifiques ne sourit qu’à ceux qui y sont préparés” – *Louis Pasteur*



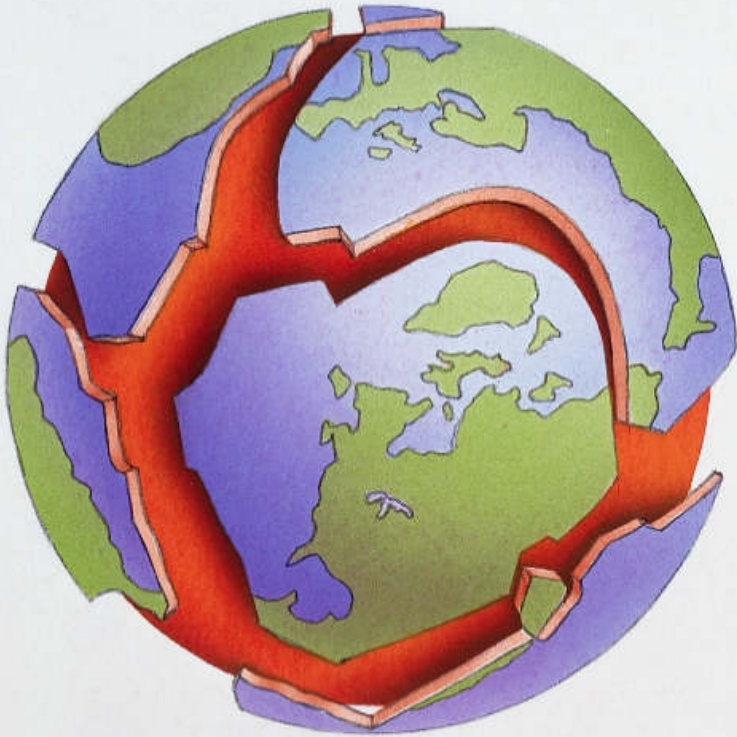
From jellyfish natural history to gene markers

Aequorea victoria



Shimomura, O. (2005). The discovery of aequorin and green fluorescent protein. *Journal of microscopy*, 217(1), 3-15.

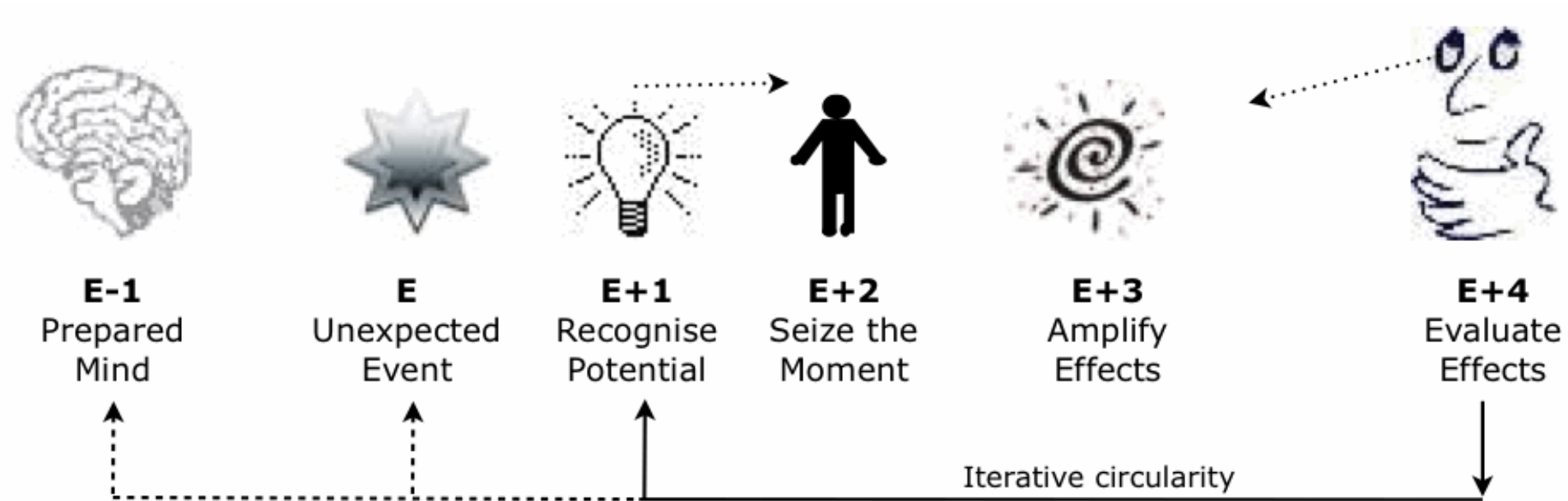
Transformative ideas from interdisciplinary research: plate tectonics



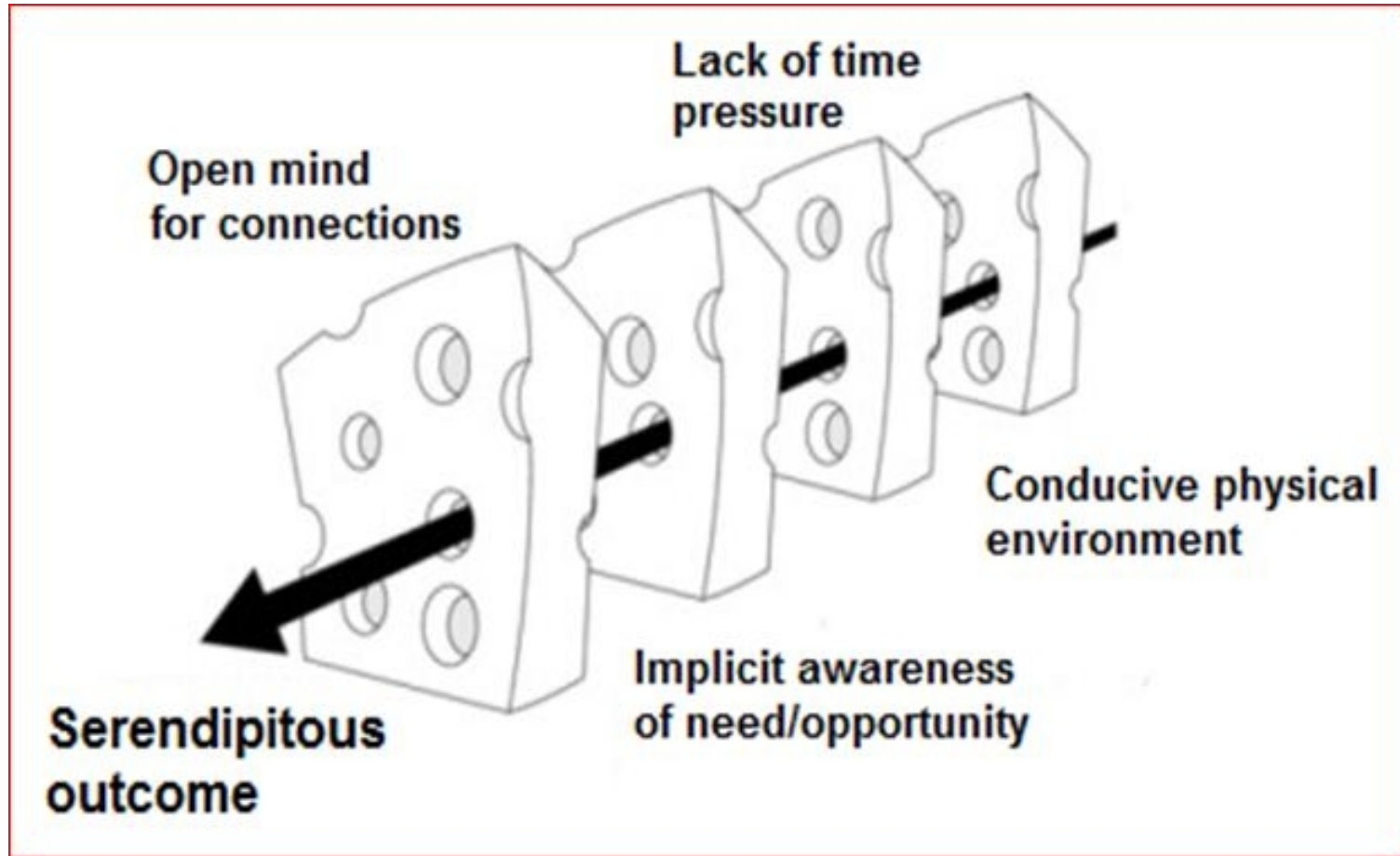
"The acceptance of continental drift has transformed the Earth sciences from a group of rather unimaginative studies based upon pedestrian interpretations of natural phenomena into a unified science that holds the promise of great intellectual and practical advances."

John Tuzo Wilson (1908 – 1993)

Becoming a serendipitous scientist



Can Serendipity be planned?



Makri, S. & Blandford, A. (2011). " What is serendipity? – A workshop report " *Information Research*, 16(3)

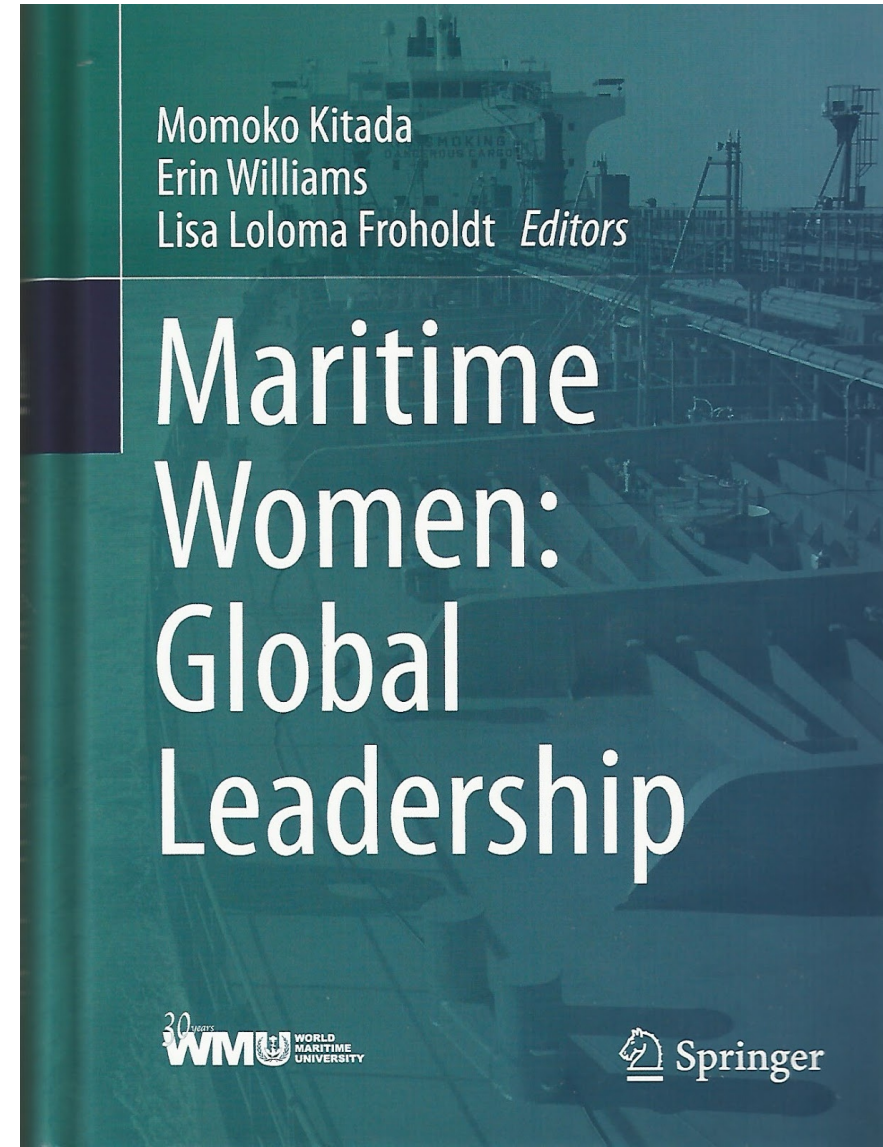
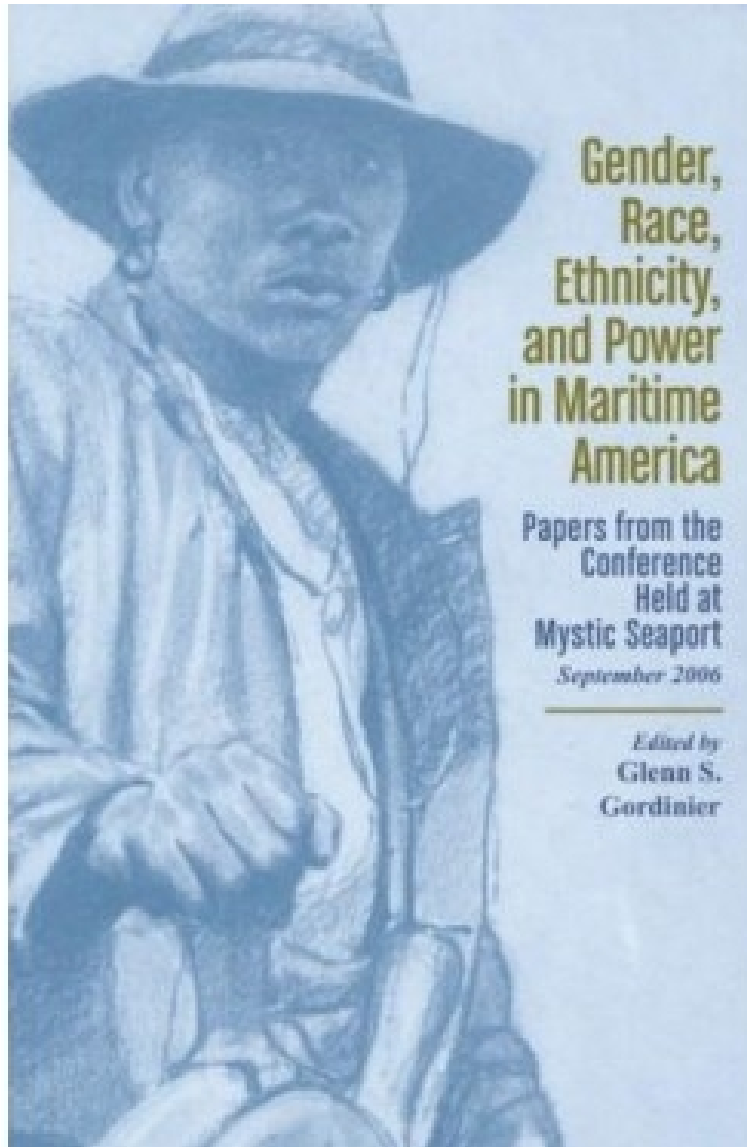


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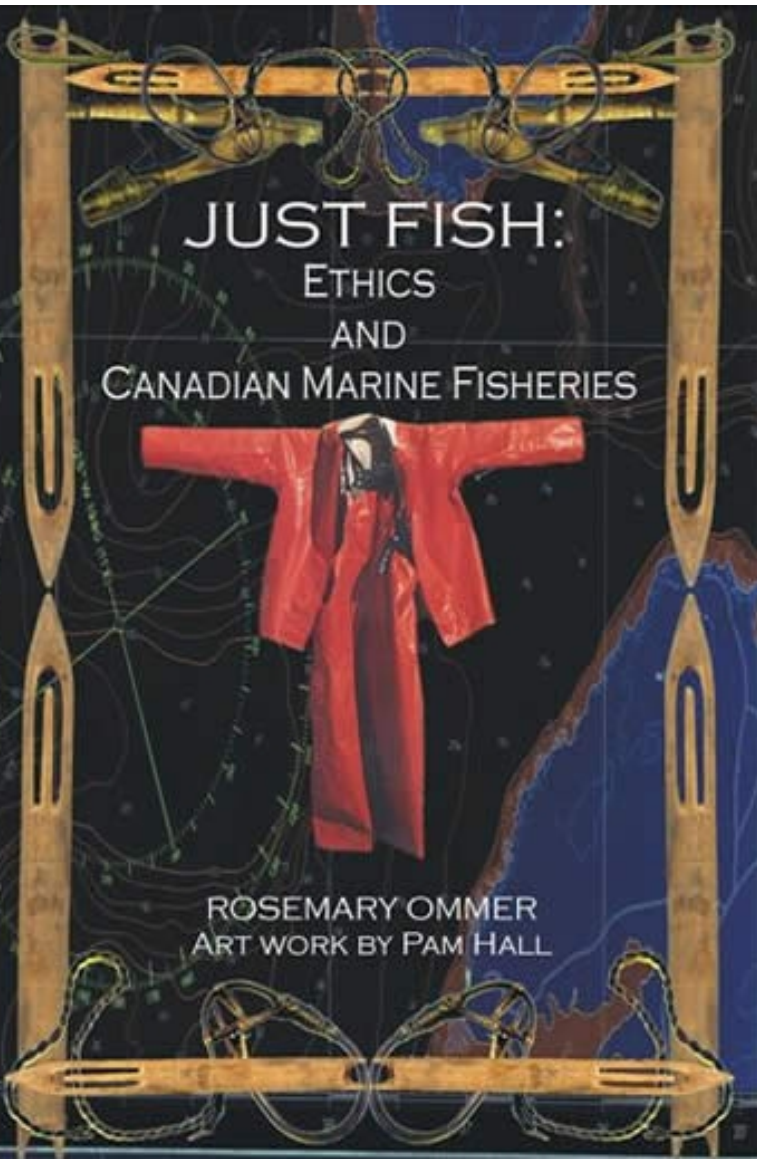
We don't seem to study power, explicitly e.g. 'blue grabbing'
-Bennett et al *Marine Policy* 2016



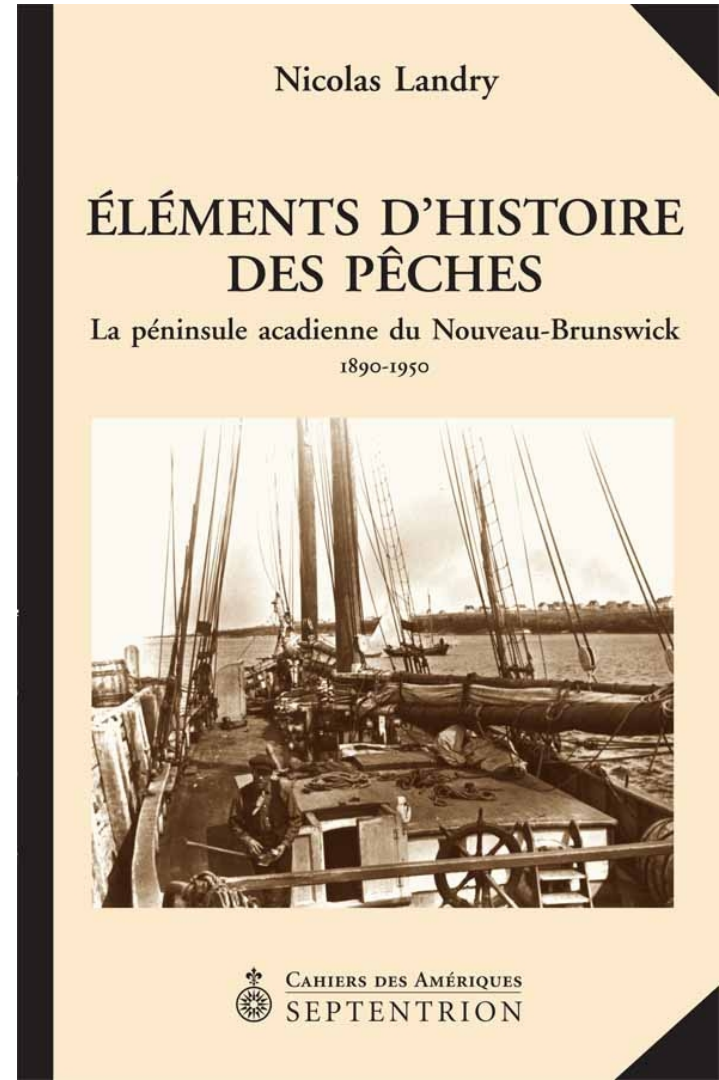
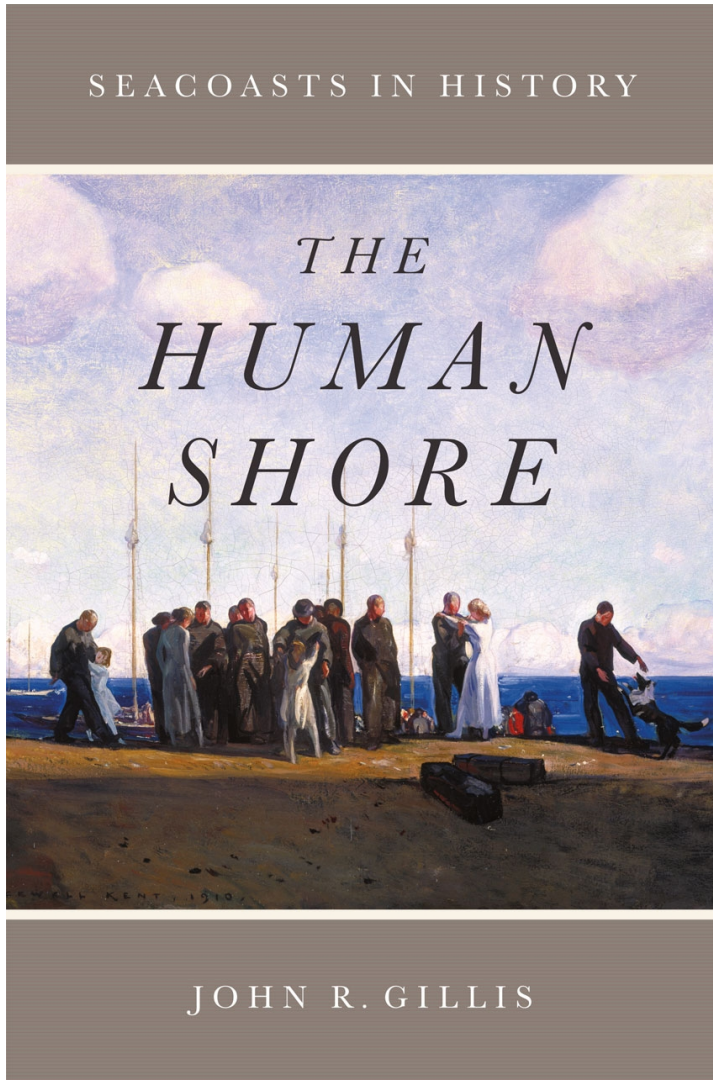
We don't sufficiently account for social differences (and historical injustice) in our 'human dimensions' work ...



We use economics more than we use ethics
when framing policy advise



Our policy advisory work tends to be ahistorical...



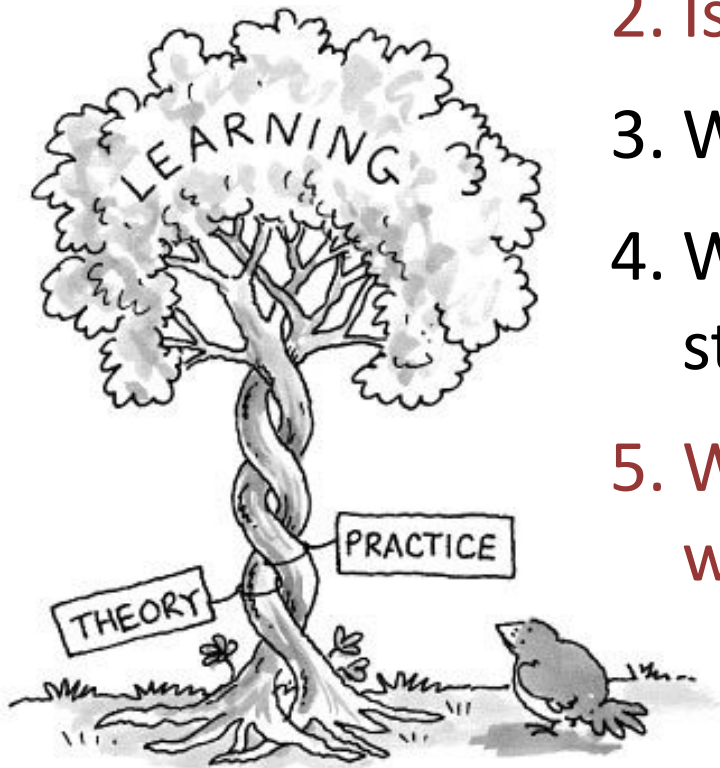
Synthesis



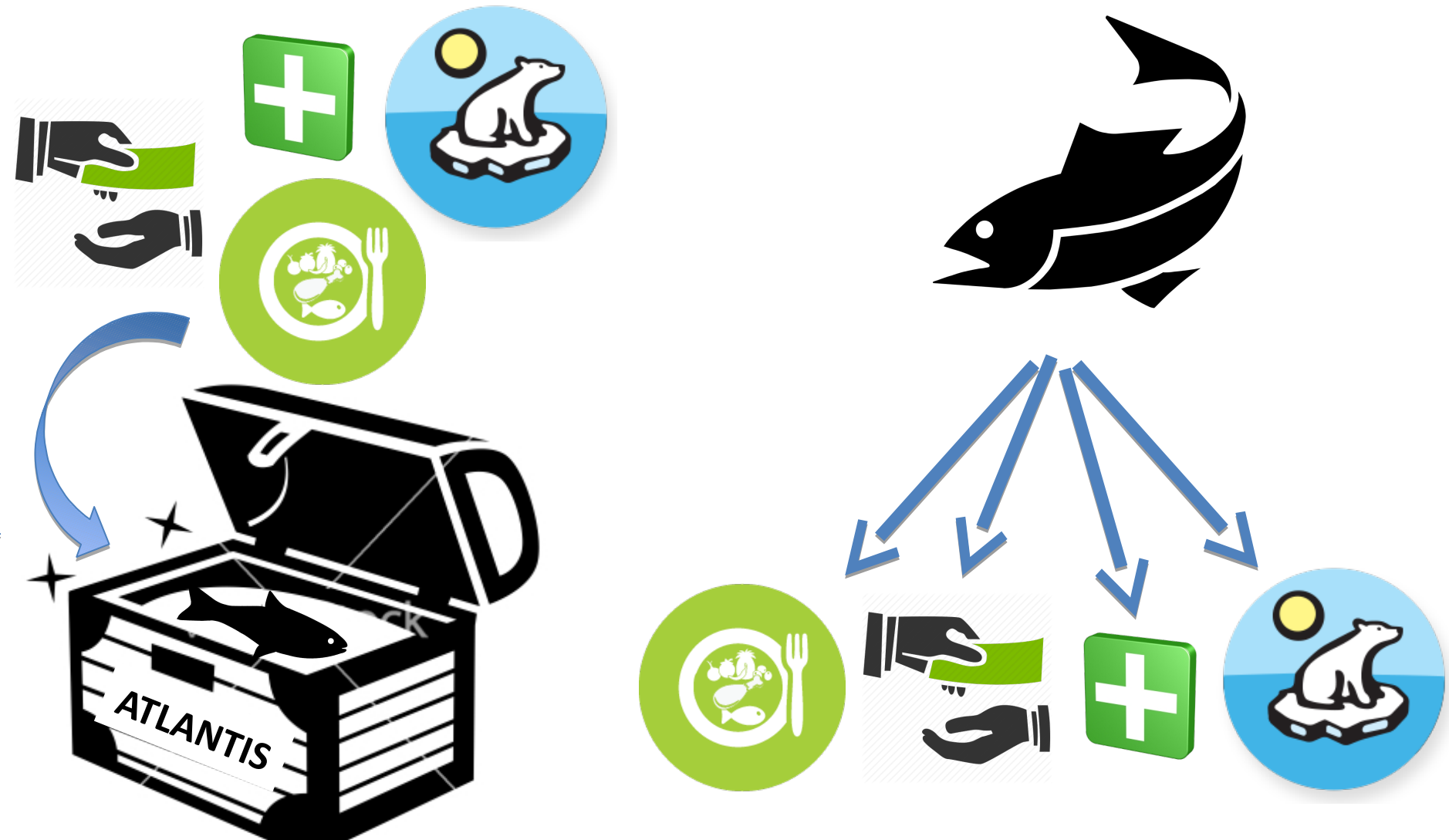
Five fundamental questions for societally-relevant trans-disciplinary research

(Flyvberg, 2003, in Jentoft, 2007)

1. Where are we going?
2. Is this desirable?
3. Who benefits and who is losing out?
4. Which mechanisms of power make us stay on course?
5. What should be done if we are on the wrong track?



Two complementary ways to pursue interdisciplinary policy-relevant research



Interdisciplinarity and policy integration: The “Health in all policies” approach





Marine and coastal issues can only be adequately understood when studied from a range of perspectives

Interdisciplinarity needs disciplines

Interdisciplinary theory can be a site of innovation and surprise



“The fact of our imperfect understanding should not be allowed to feed our anxiety and so increase the need to control. Rather our studies could be inspired by a more ancient, but today less honoured, motive: a curiosity about the world of which we are part. The rewards of such work are not power but beauty.”

Gregory Bateson., 2000 *Steps to an Ecology of Mind*. University of Chicago Press. (Originally published 1972 by Ballantine Books), p269.