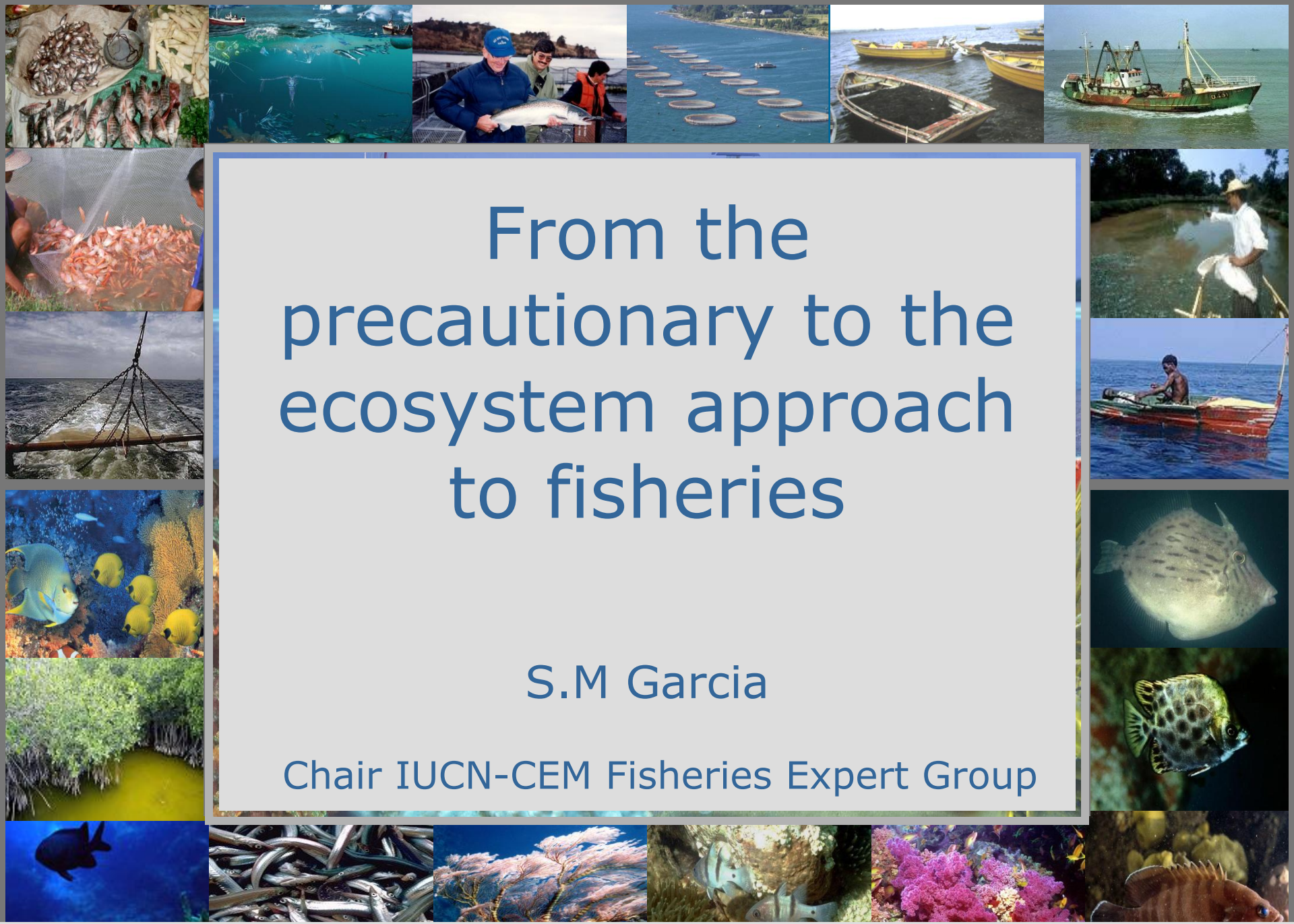

From the precautionary to the ecosystem approach to fisheries

S.M Garcia

Chair IUCN-CEM Fisheries Expert Group

Outline

- Introduction: the origins
- Sustainability indicators
- Precautionary approach to fisheries (PAF)
- Ecosystem approach to fisheries (EAF)
- Conclusions

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Symptoms

- 25% stocks depleted
- Collapses
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- Endangered species
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Direct causes

- Excessive fishing capacity
- Insufficient selectivity
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- Non-deterrent MCS

Deep roots

- Outdated development model
- Inadequate governance
- Chaotic coastal policies
- Unclear entitlements
- Perverse subsidies
- System complexity

Contextual factors

- Demography, Food security
- Global market forces
- Environmental degradation
- UNCED, WSSD, CBD, IPBES
- Millennium assessment
- Non-market values
- Ethics and animal welfare
- Climate change
- Environment advocacy
- Customer awareness

Societal reactions

Outline

- Introduction: the origins
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Sustainable Development

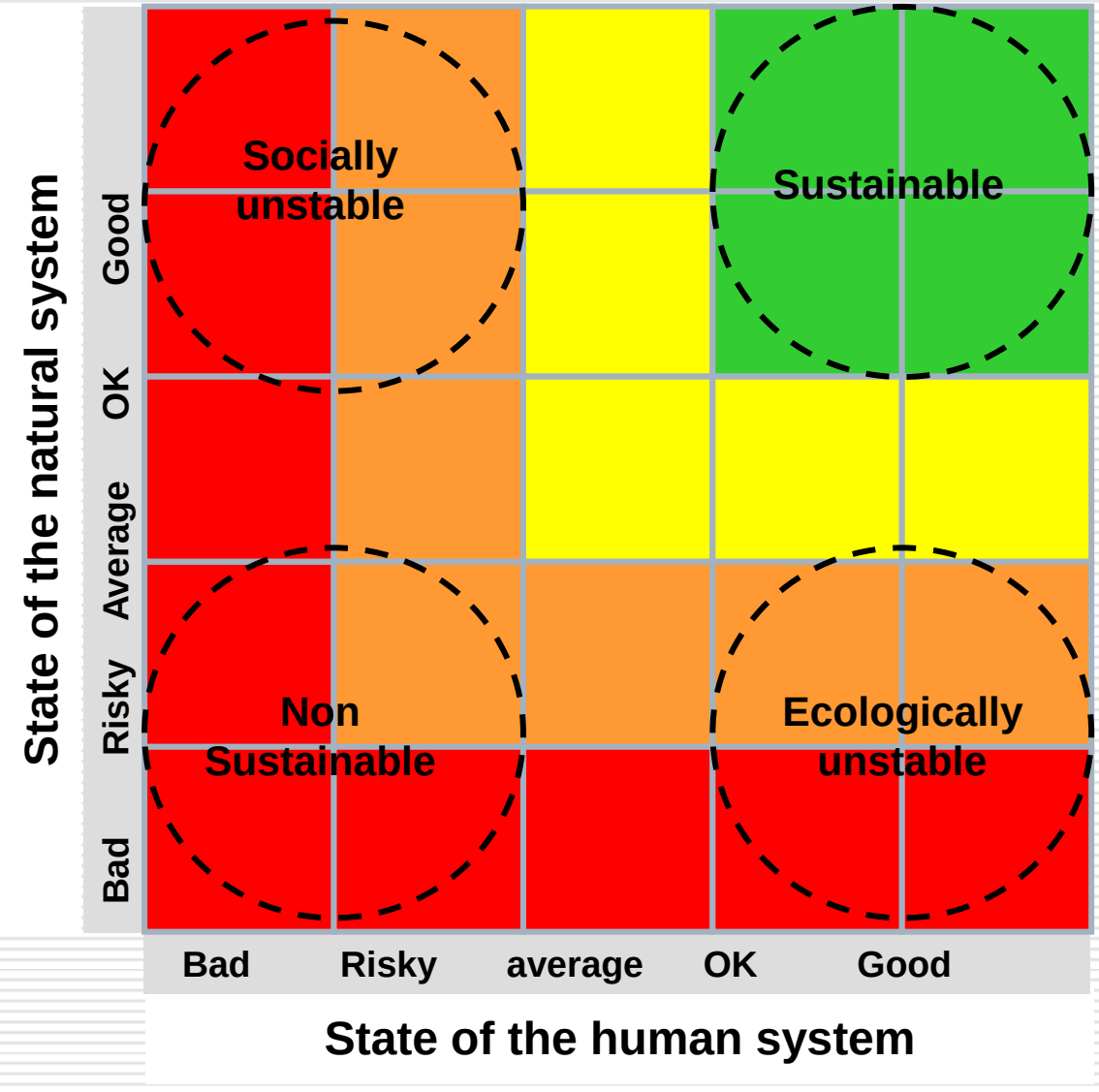
Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (WCED 1987)

The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development conserves ...resources, is **environmentally non-degrading**, **technologically appropriate**, **economically viable**, and **socially acceptable"** FAO Council (1988)

FAO (1989): Sustainable development and natural resources management. Conference. Food and Agriculture Organization of the United Nations, Rome. C 89/2 – Sup. 2. August 1989: 54 p.

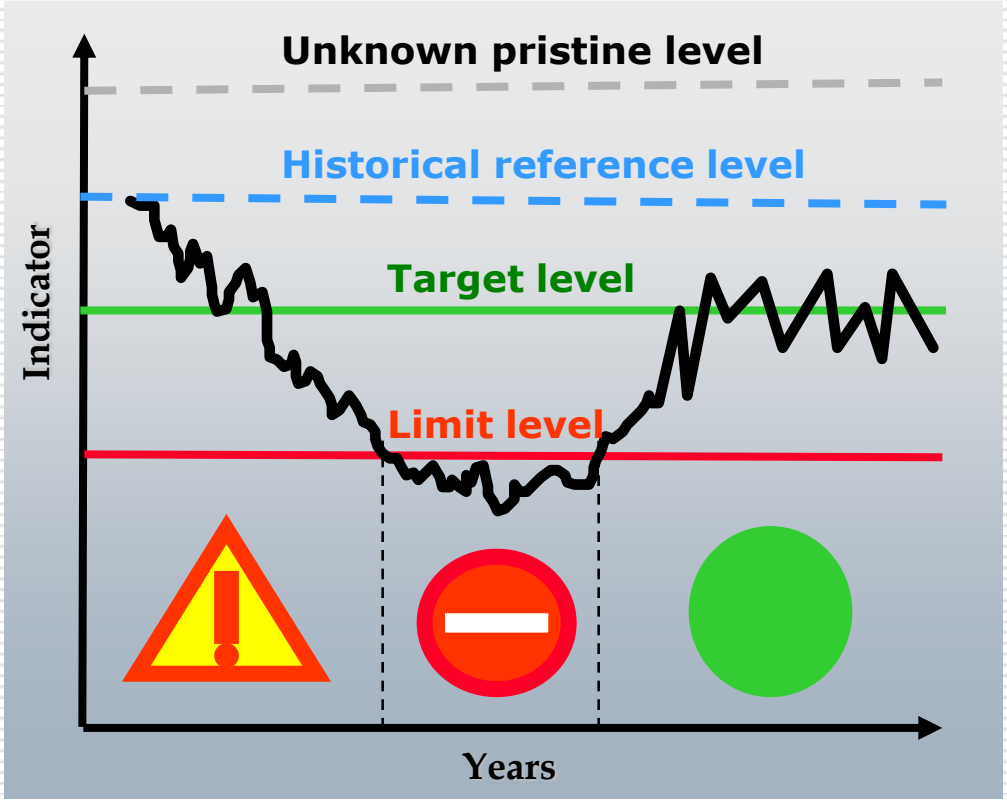
WCED. 1987. Our common future. World Commission on Environment and Development. Oxford University press: 400 p.

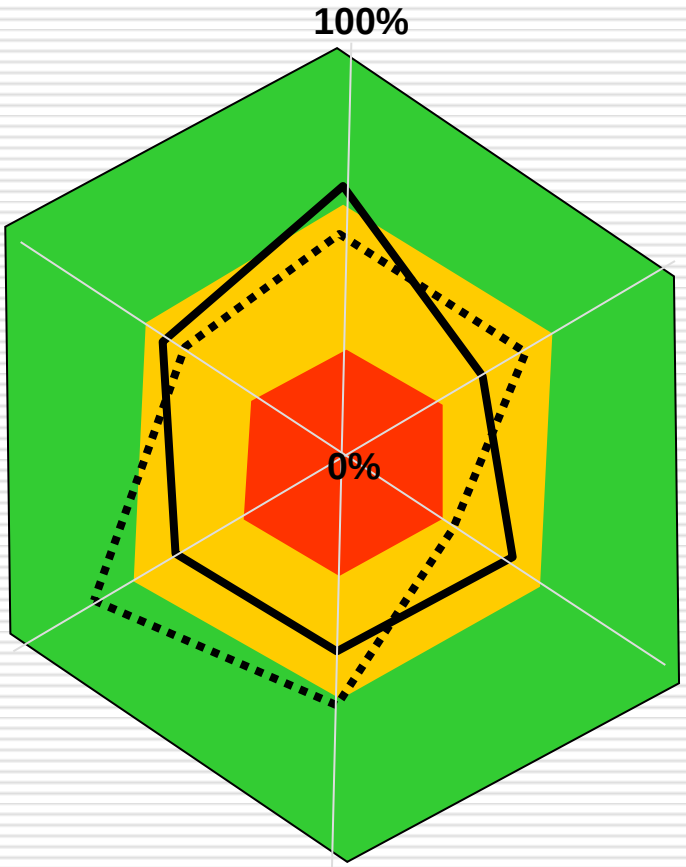
Sustainability barometer



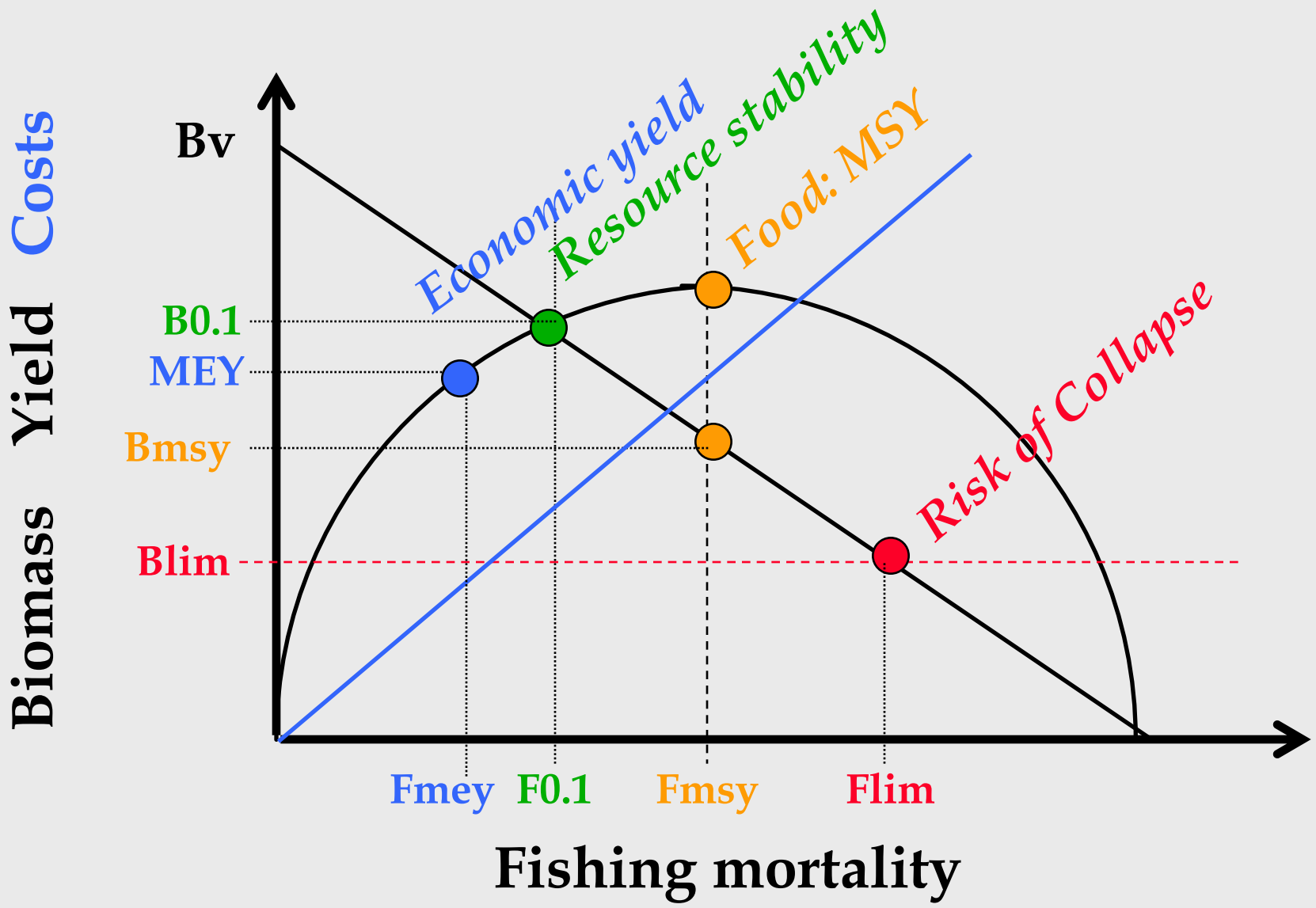
Sustainability indicators

- Provide management dashboard
- Guide policy and management action (foresight)
- Promote transparency & public scrutiny





Fisheries Criteria & Indicators



Outline

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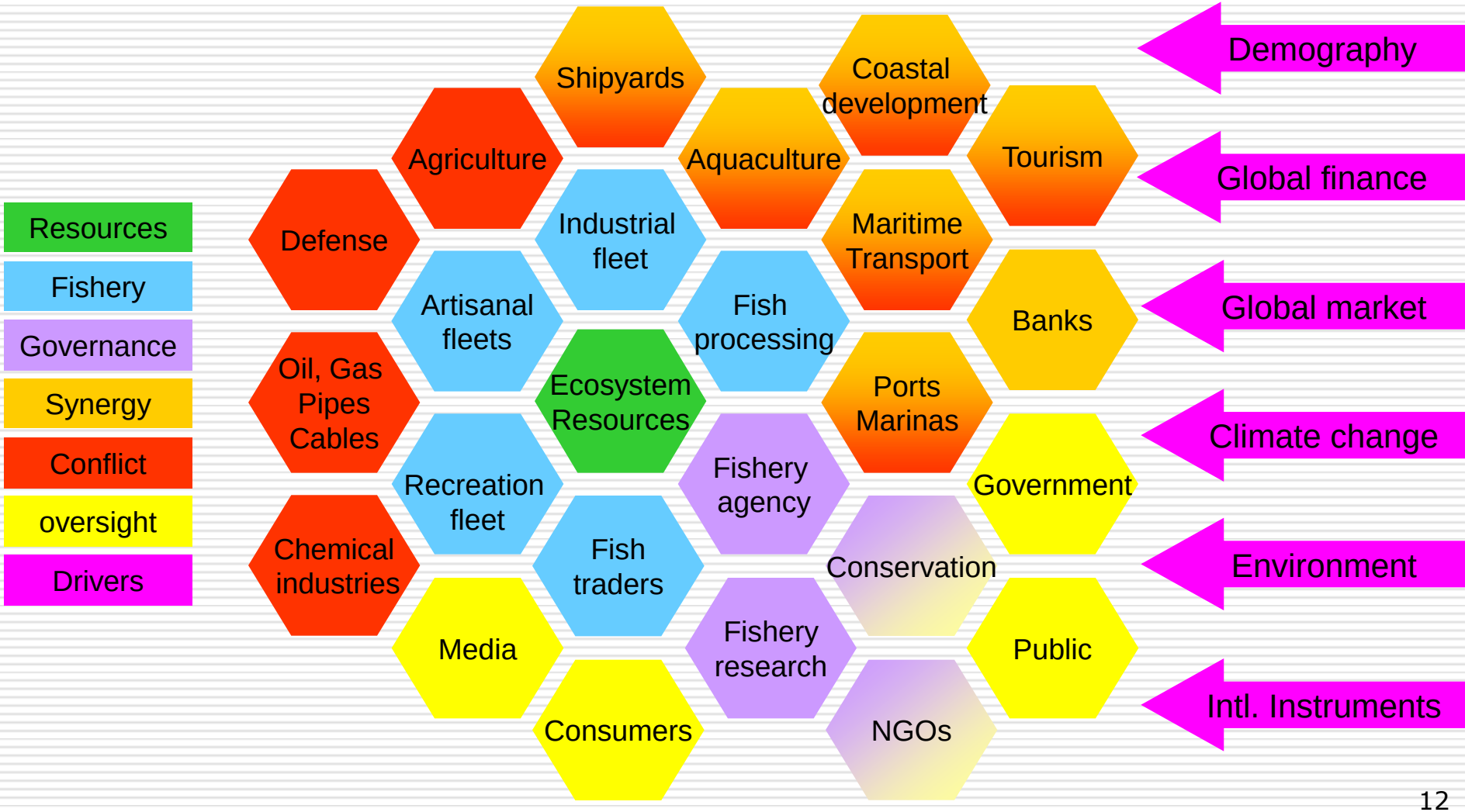
The fishery system



Precautionary Principle

PRINCIPLE 15

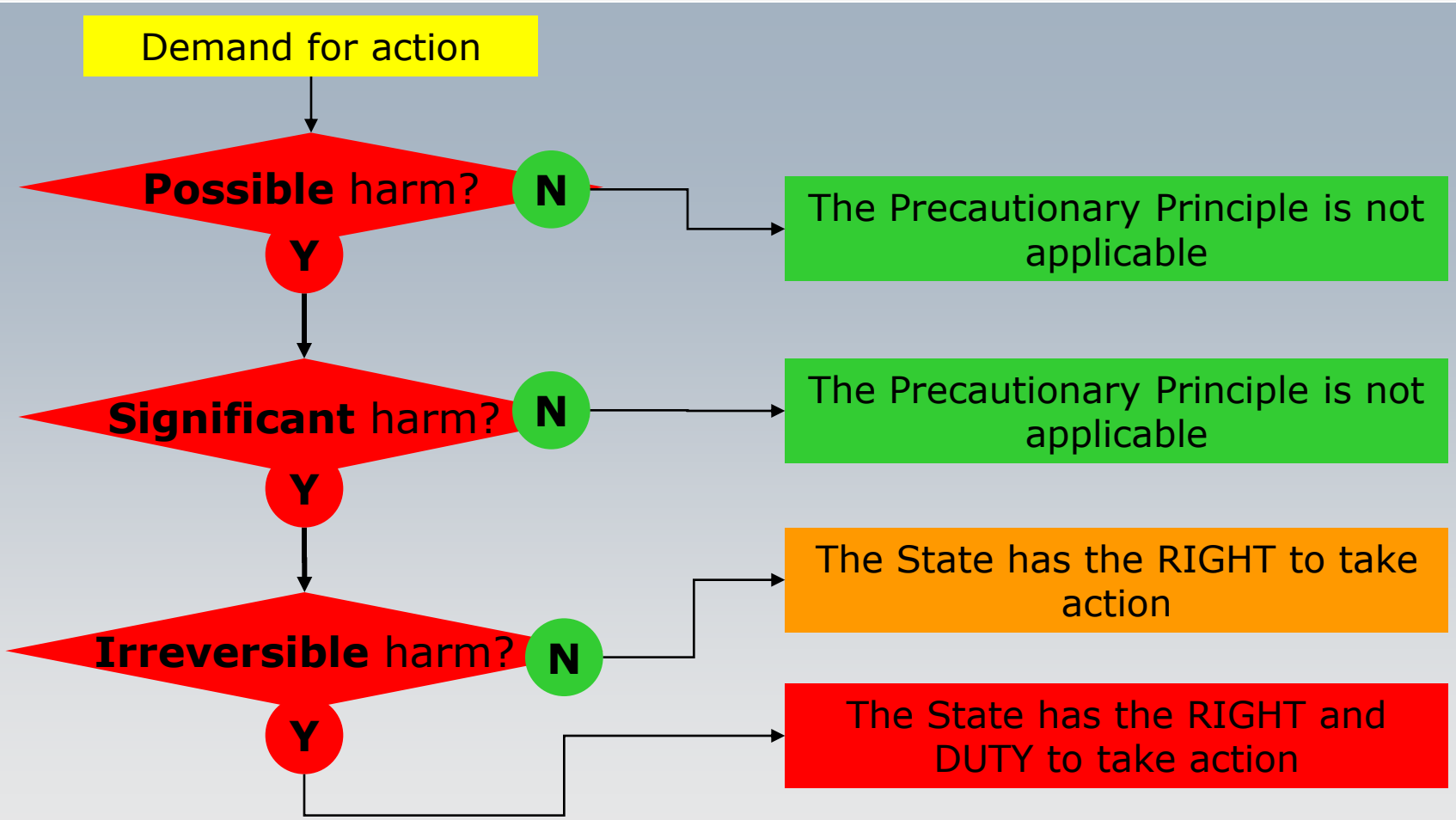
In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities.

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Threat of harm	**Uncertainty**	**Pressure for action**
Obligation of precaution	**Tailored to capacity**	**Action without delay**

Rio Declaration on Environment and Development (UNCED, 1992)
www.un-documents.net/rio-dec.htm

The rationale



According to Throuwbost 2006)

FAO Code of Conduct

General Principle 6.5

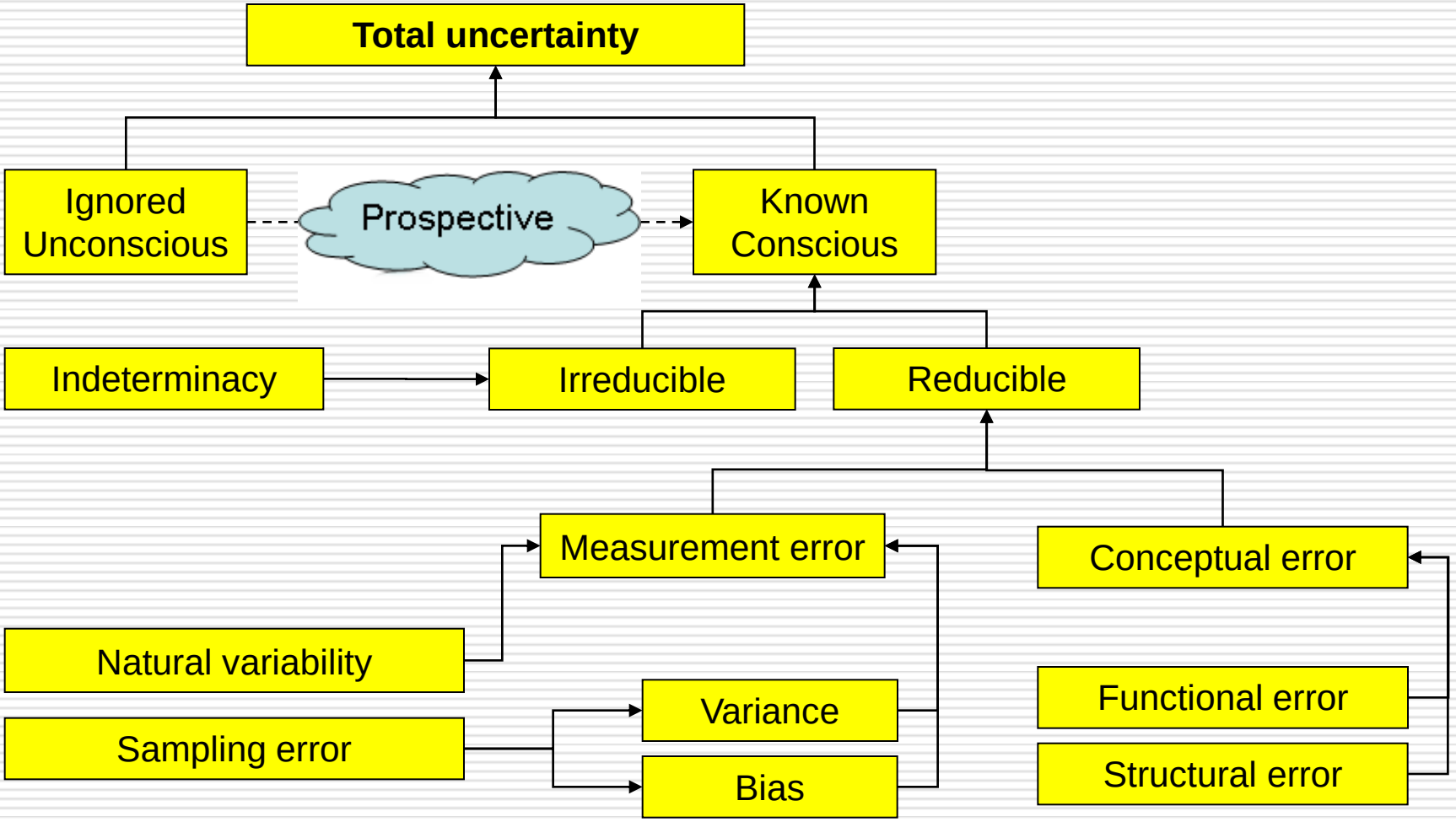
States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available.

The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment.

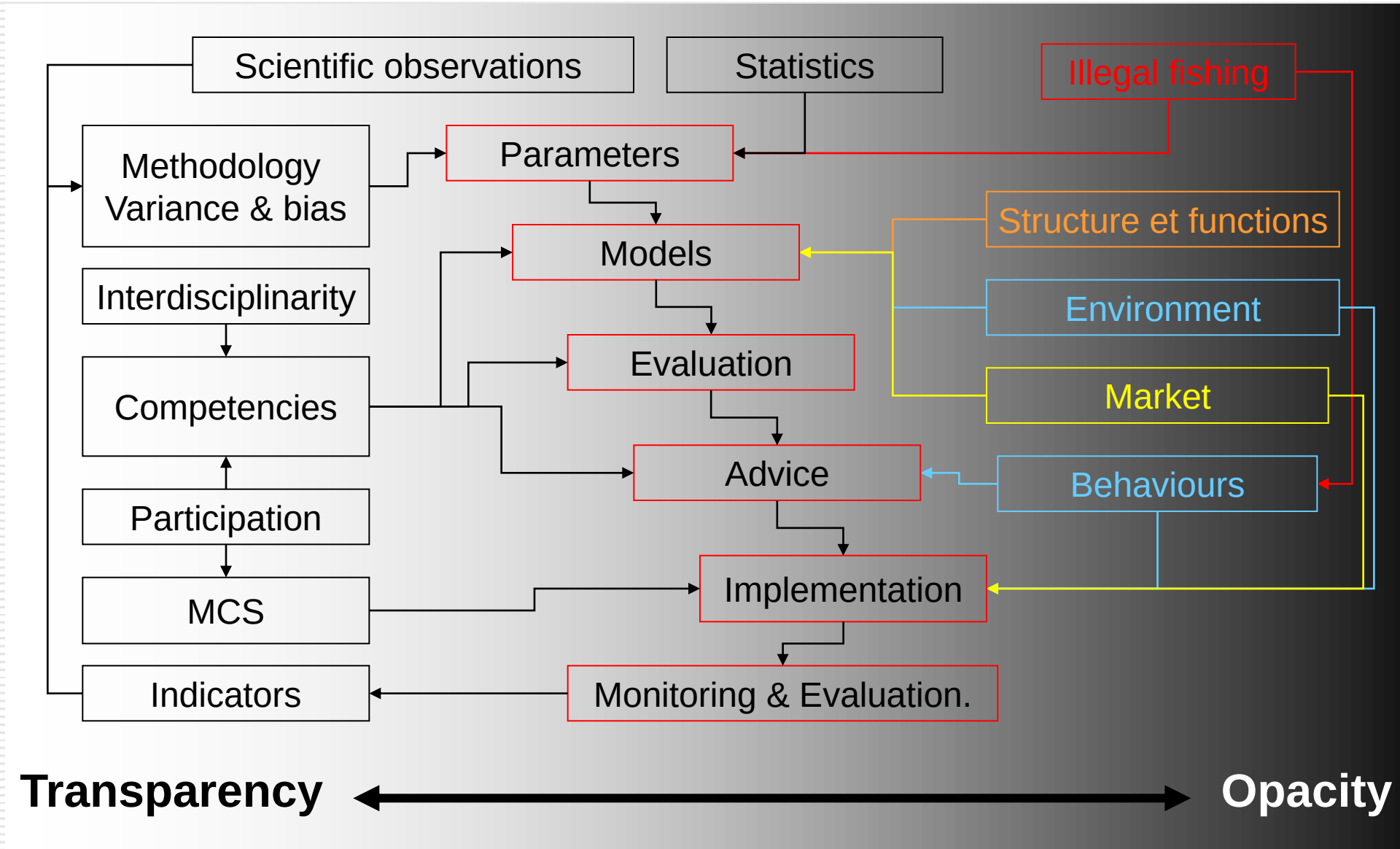
Sources of uncertainty

- Assessments
  - *Quality of fishery-dependent data*
  - *Consideration of contextual data (e.g. environment, socio-economy, technology)*
  - *Robustness of assessment methods*
  - *Models realism, oversimplification*
  - *Statistical variance*
  - *Assessment process (participation, disciplines)*
- Unknown objectives: of decision-makers and industry
- Unknown future response of stakeholders
- Interferences with other national policies (e.g. environmental, economic)

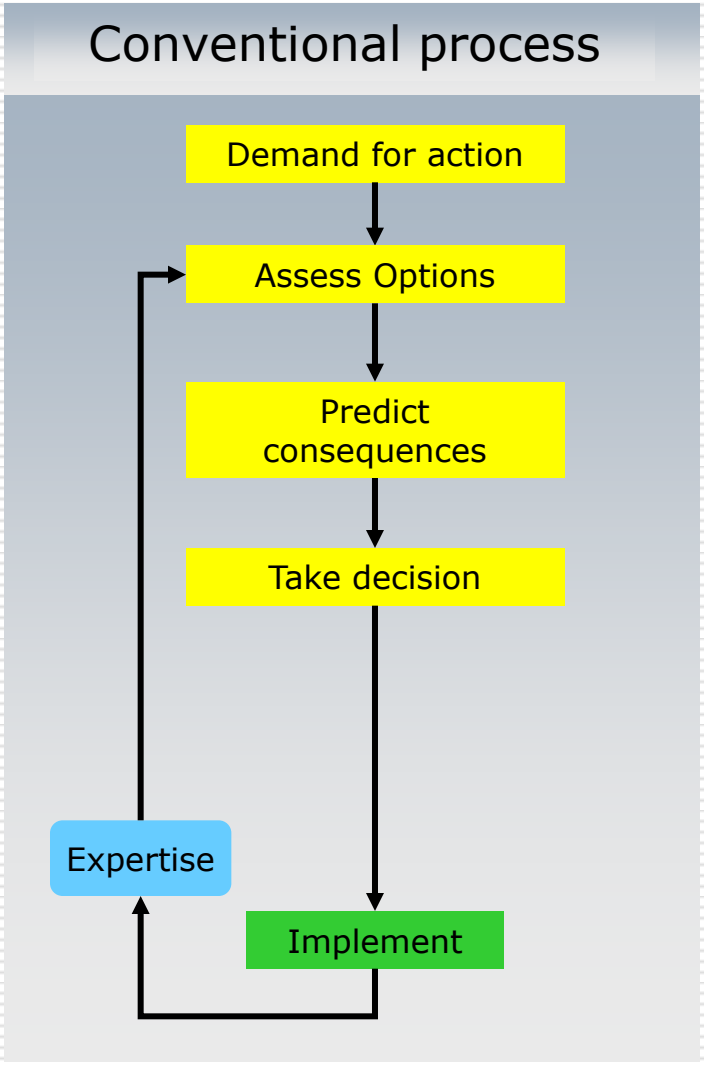
Forms of uncertainty

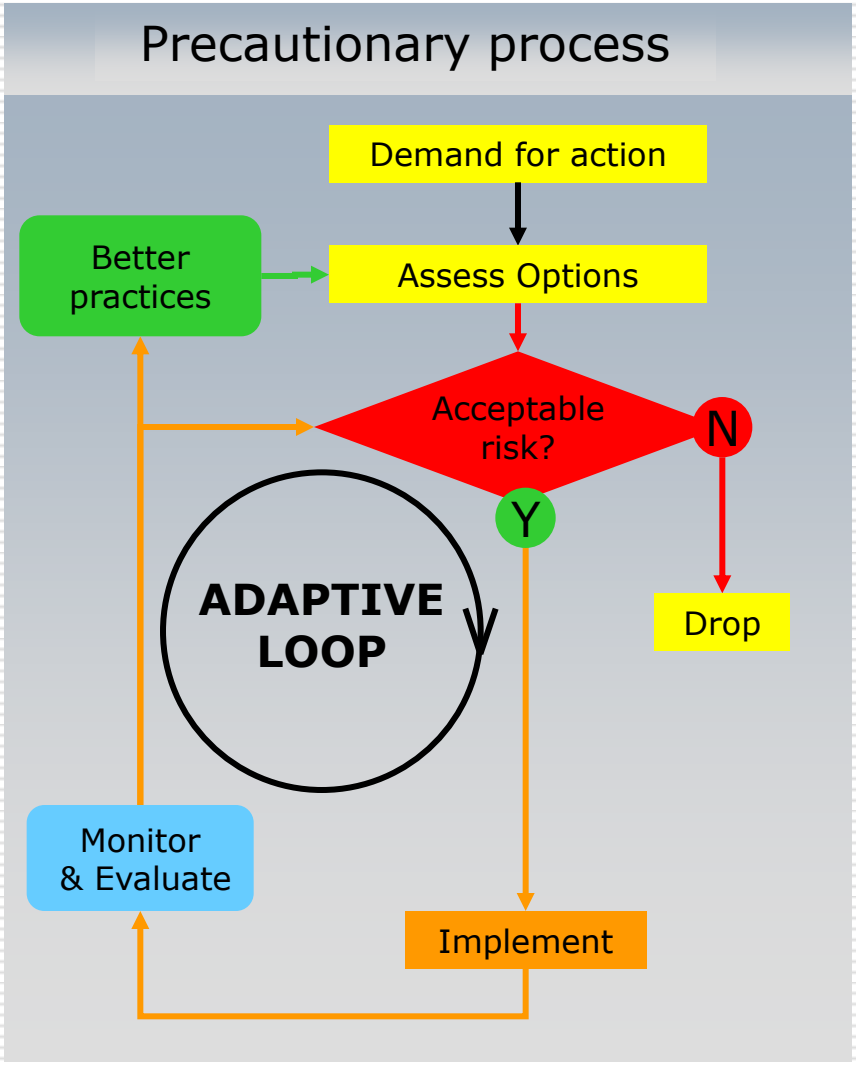


Uncertainty and decisions

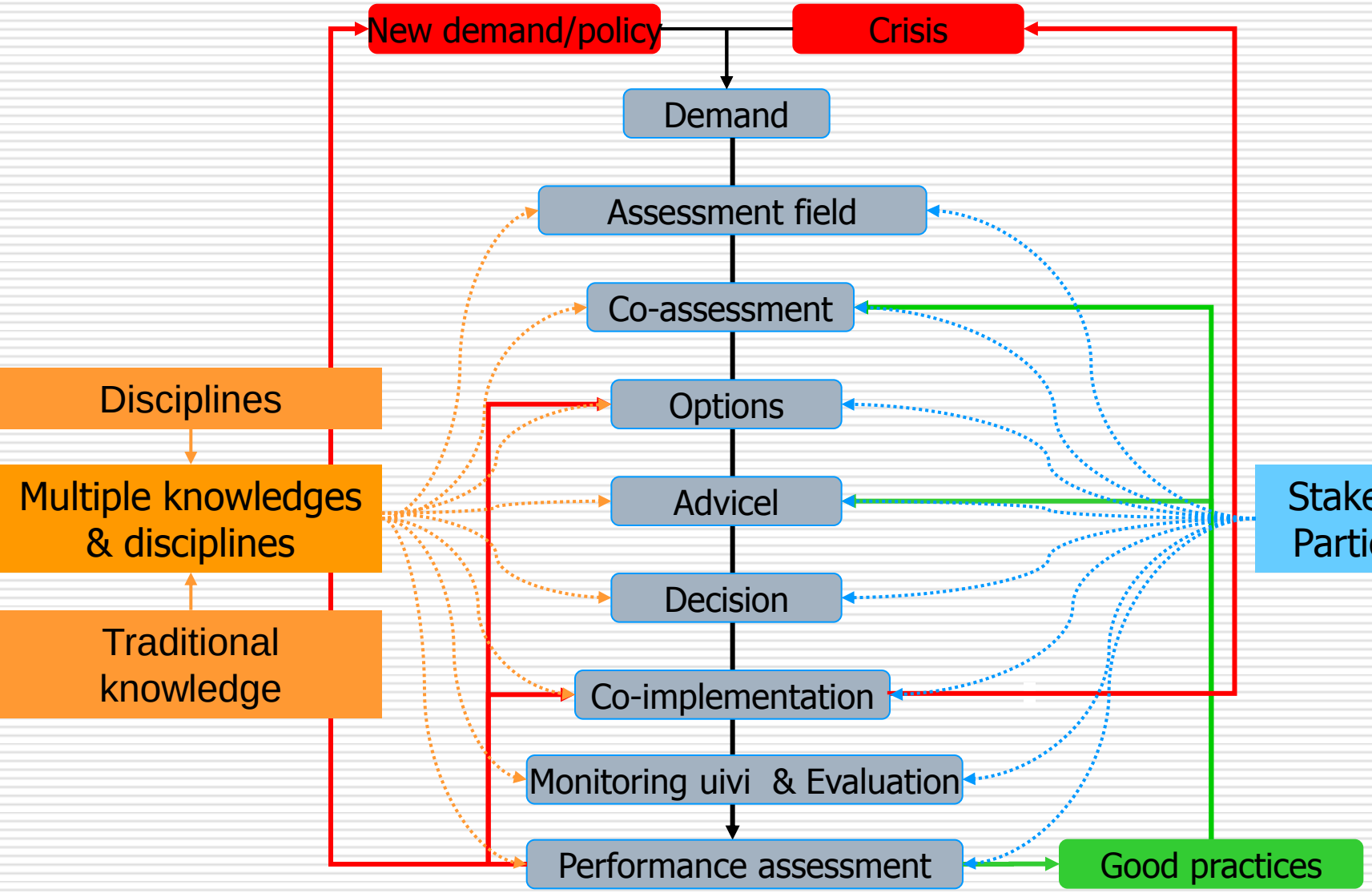


The adaptive loop

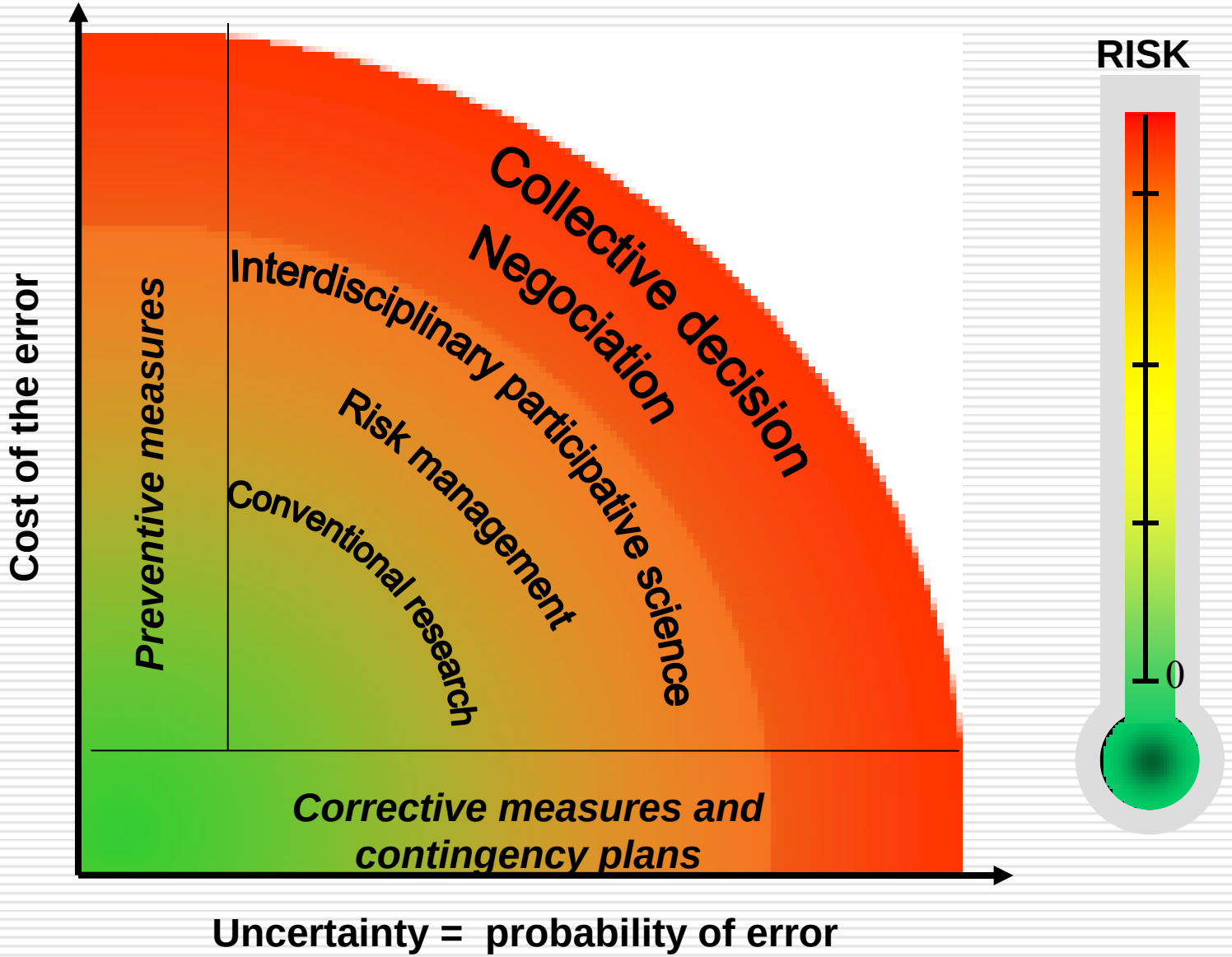




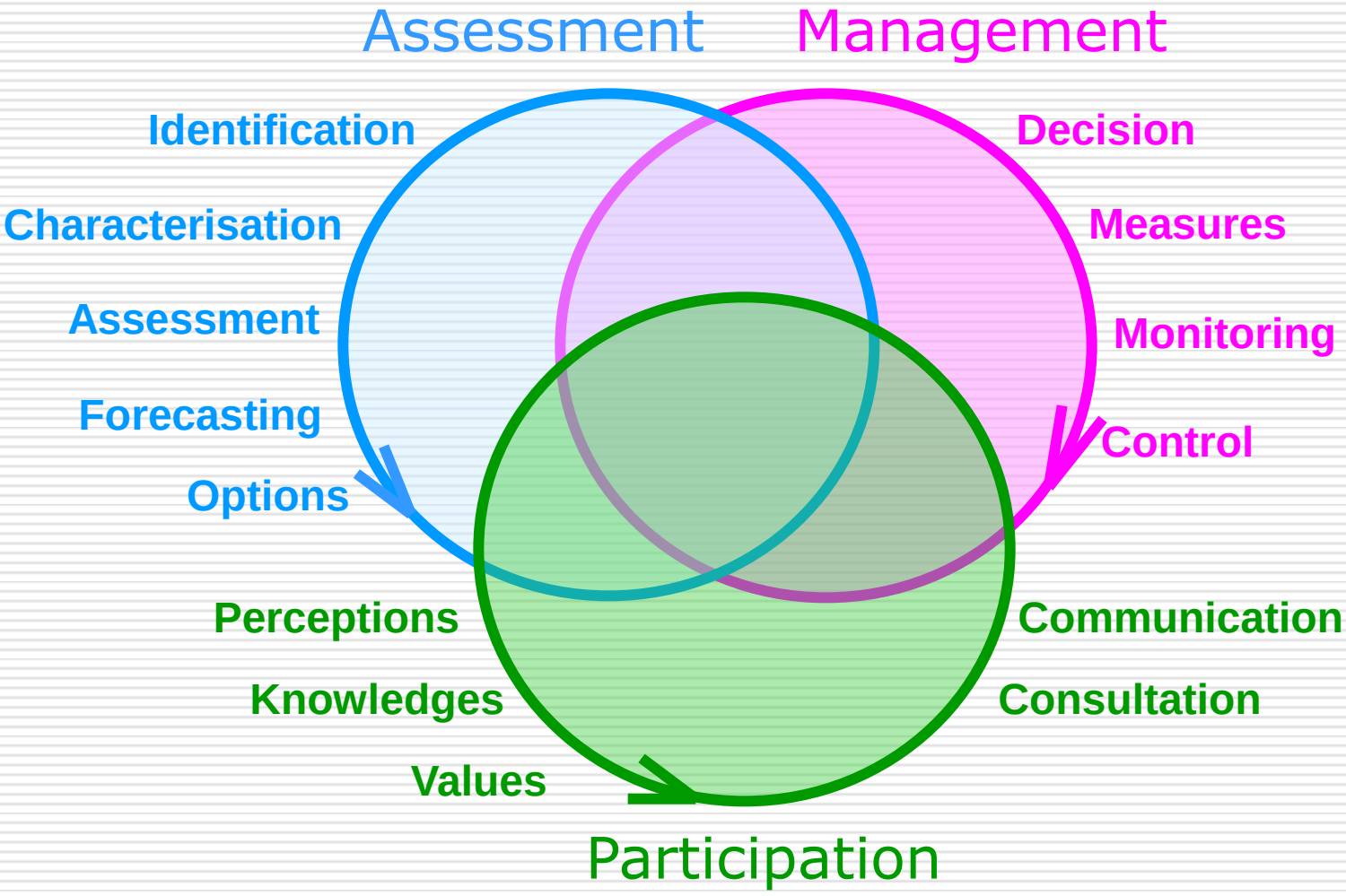
Adaptive management



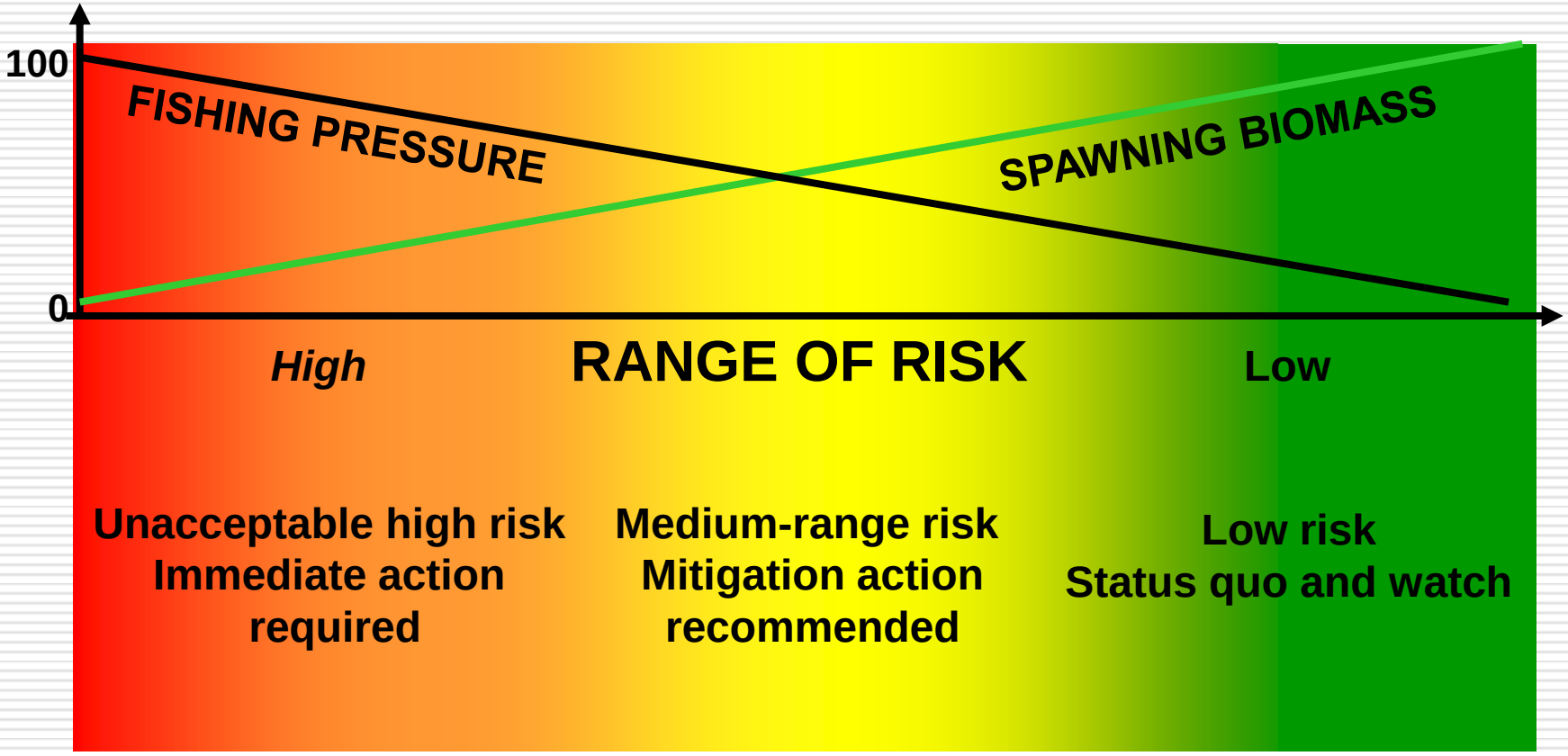
Risk, science & decision



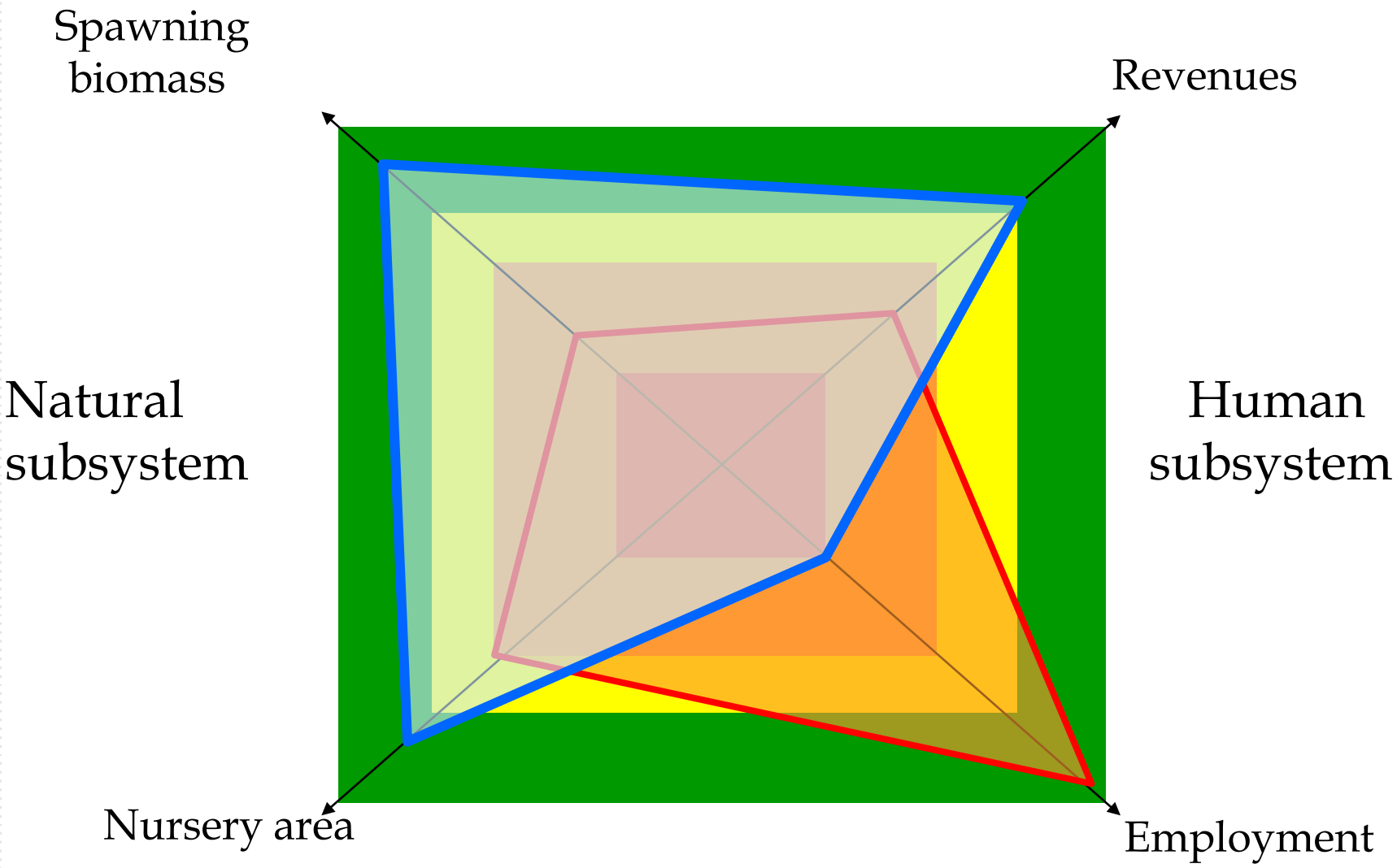
Risk management



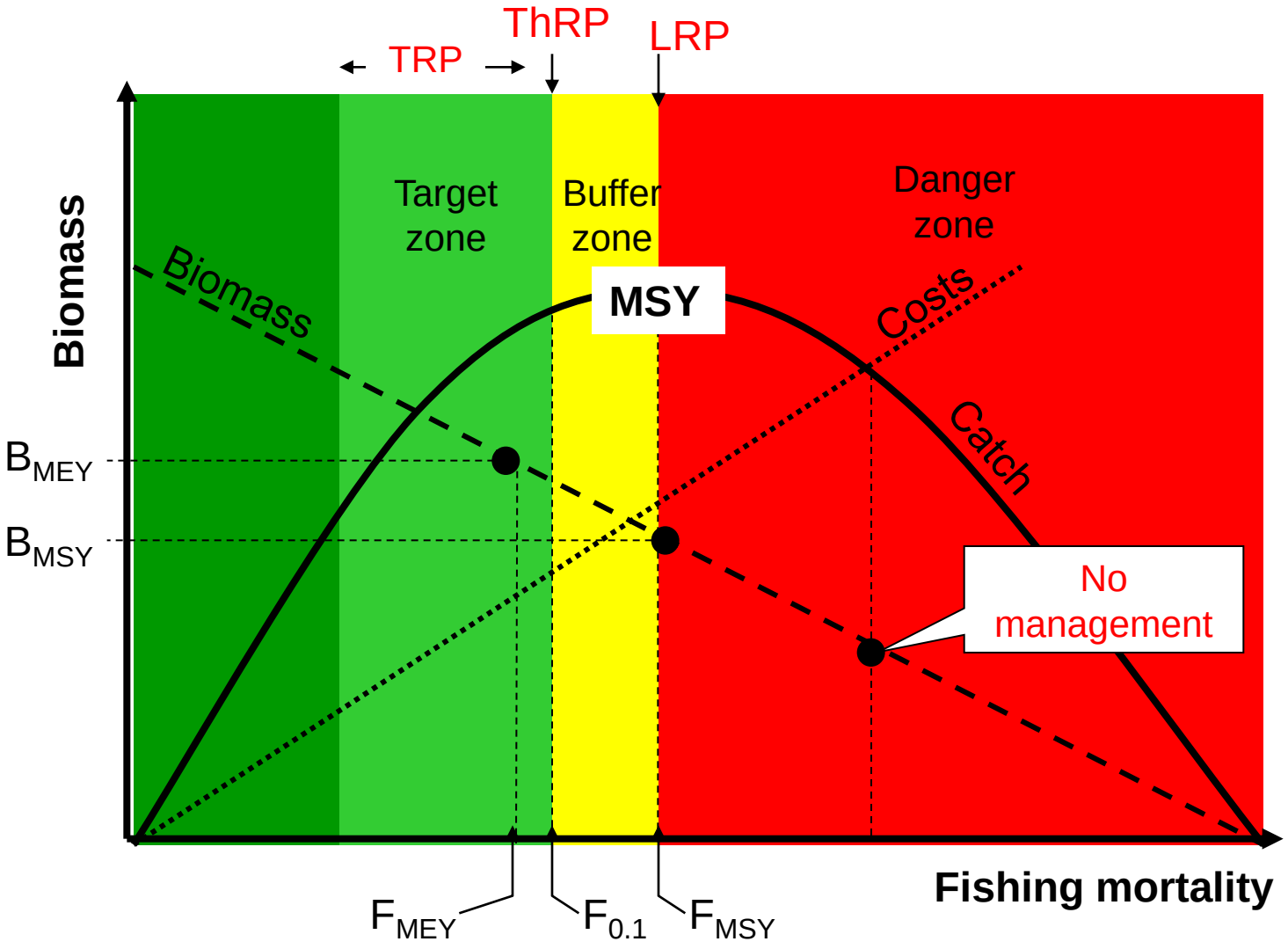
Use of indicators



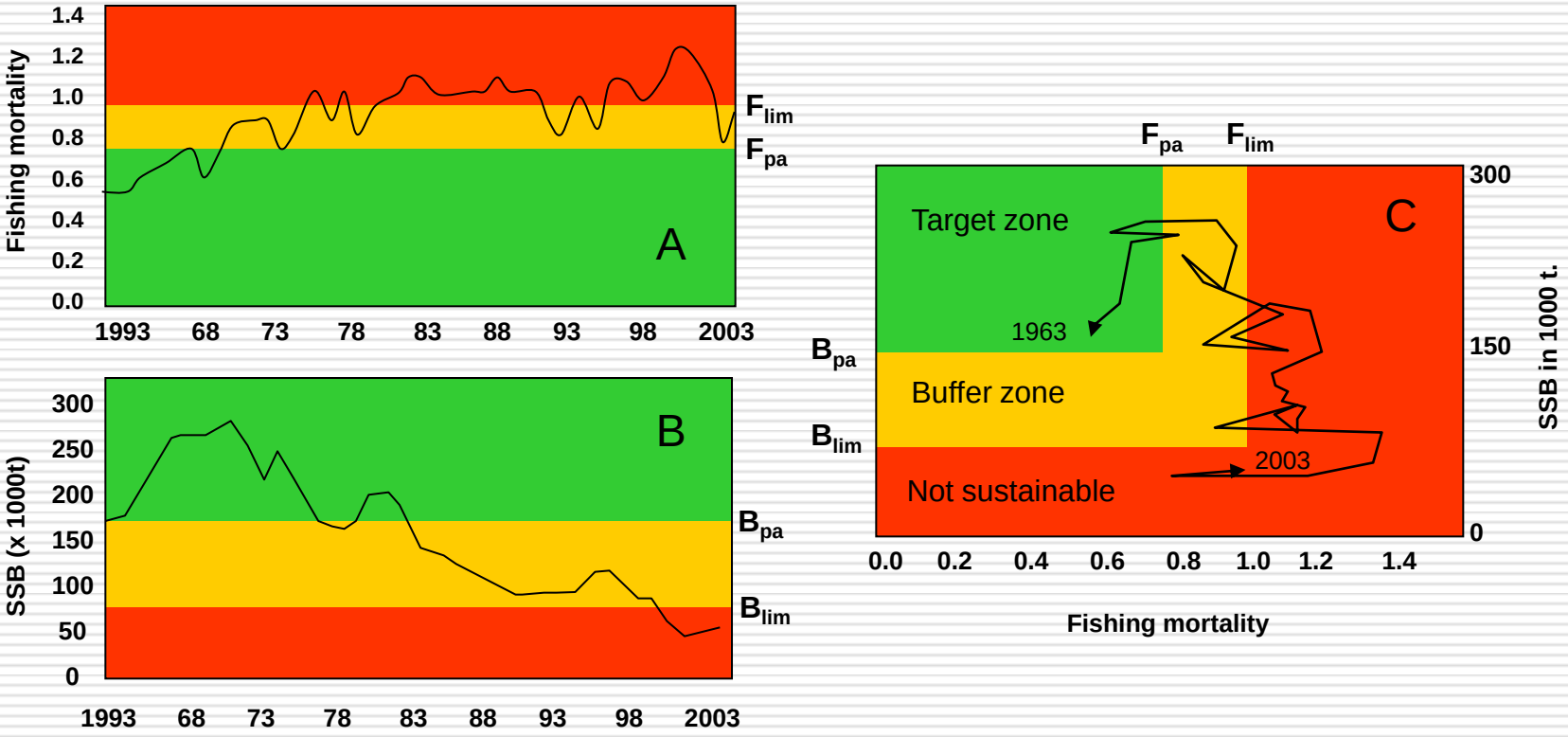
Risk diagram



PA of the conventional model

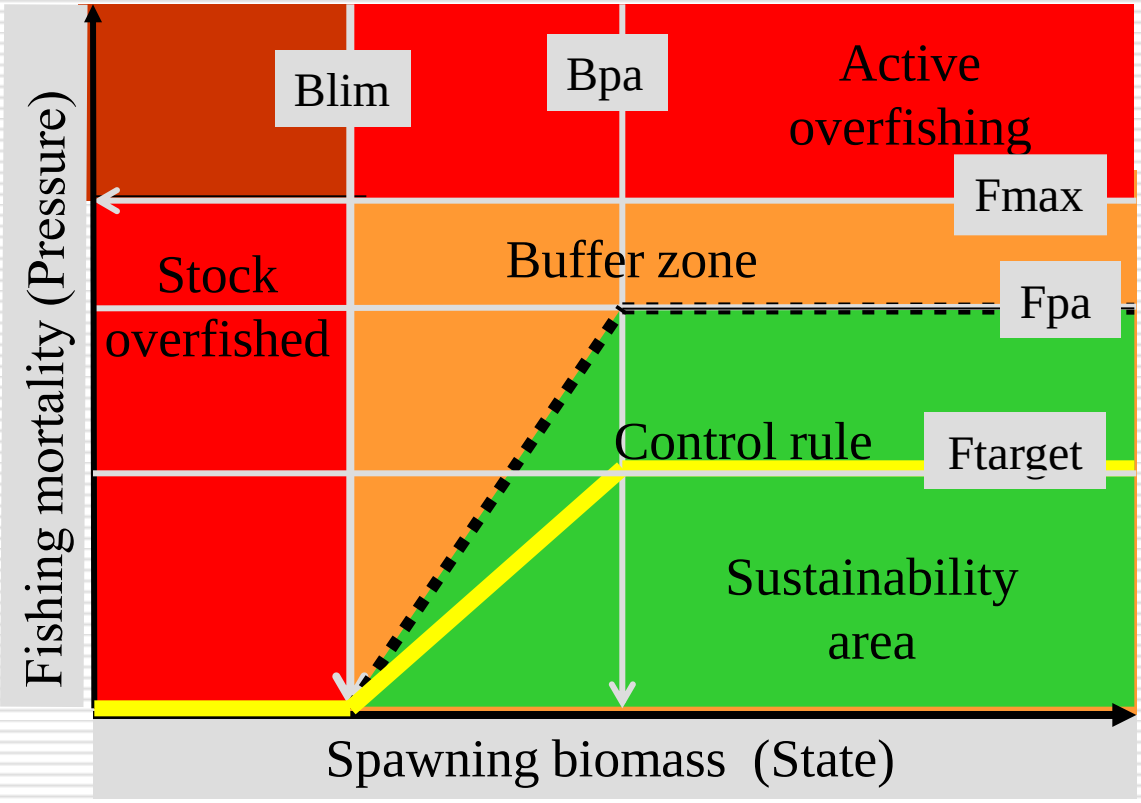


PA dashboards

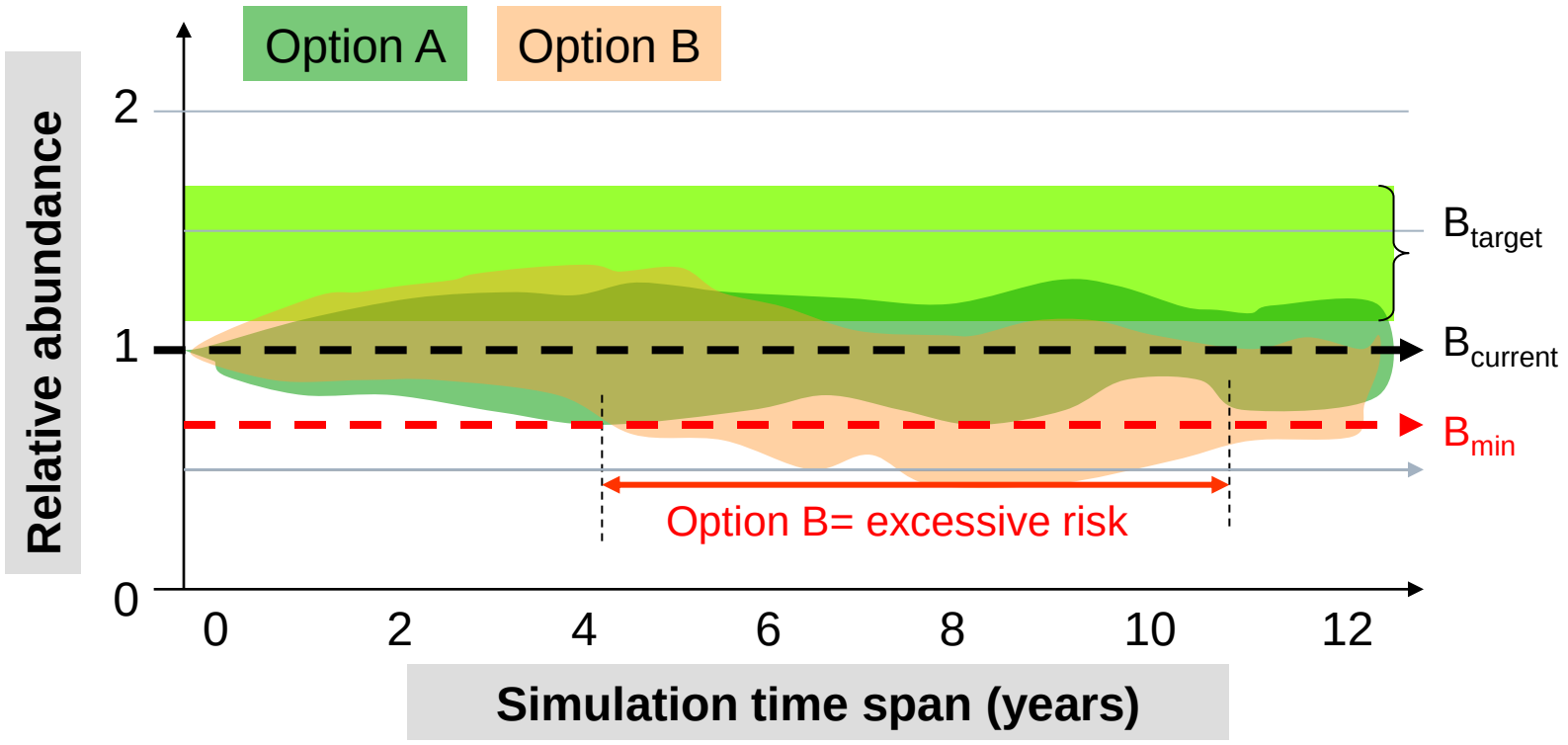


Cod in sous-zone IV (Mer du Nord), Divisions VIId (Manche Est), and IIIa (Skagerrak) (CIEM 2004)

Harvest control rules

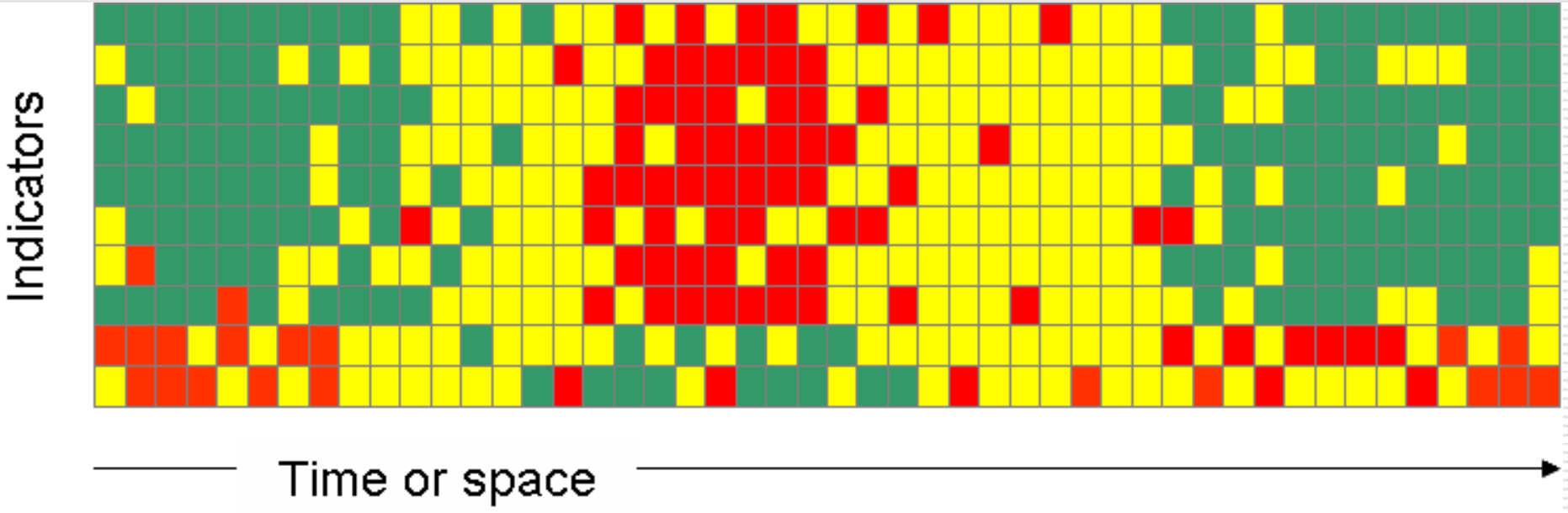


Operational Management Procedures

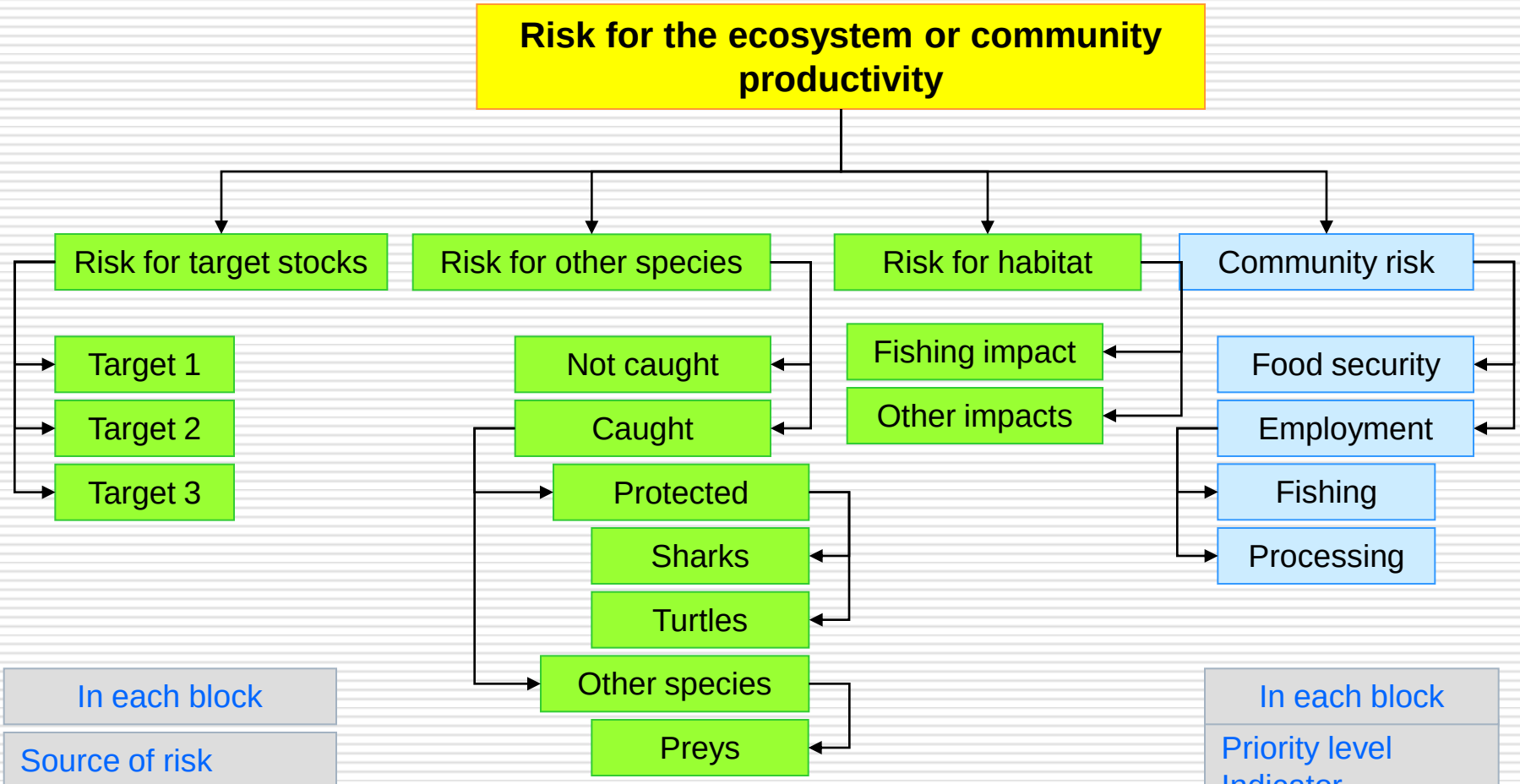


Theoretical example based on Hill et al. 2007. Model uncertainty in the EAF. Fish and Fisheries, 8: 315-336

Synoptic analysis



Multi-criteria risk analysis



Risk matrix

Probabilité \ Impact		Nil	Very low	Low	High	Very high
		1	2	3	4	5
Very rare	1	1	2	3	4	5
Rare	2	2	4	6	8	10
unlikely	3	3	6	9	12	15
Possible	4	4	8	12	16	20
Occasional	5	5	10	15	20	25
Frequent	6	6	12	18	24	30

X Weight

The result is a risk matrix ranging from 0 to 30

Analyse des risques: réponses

Risk	Index	Documentation required	Action foreseen
Negligible	0	short	No direct action
Weak	1-6	Complete justification	Indirect management
Moderate	7-12	Complete assessment	Some specific additional measures
High	13-20	Complete assessment	Strengthening of current measures probably necessary
Extreme	21-30	Complete assessment	Strengthening of current measures certainly necessary

PAF dilemmas

- Advantage: if properly applied, may reduce risk of negative outcomes
- Drawback: if wrongly applied may make things worse. Its radical application may stall development (*the main risk for humans is to accept no risk)*
- The threshold problem: how to define an "acceptable" level of impact?
- The burden of proof: how and to whom can it be allocated?
- The standard of proof: should be adapted to the level of risk.

Selected conclusions on the PAF

- The PAF represents an alternative to the ill-defines brokerage and negotiation processes of the past in which biological, social, economic and political factors were considered in a non-transparent manner
- It applies precaution in all processes of development and management, minimizing the risk of catastrophic events
- It tracks uncertainty and accounts for it in redesigned research and decision-making processes, involving multiple disciplines and important stakeholders
- The use of indicators and an adaptive management process ensures social learning, improving performance with time
- Its degree of sophistication can be tailored to the context
- WE are still learning how to apply the PAF coherently and consistently
- We are not applying at all in the large majority of the world fisheries

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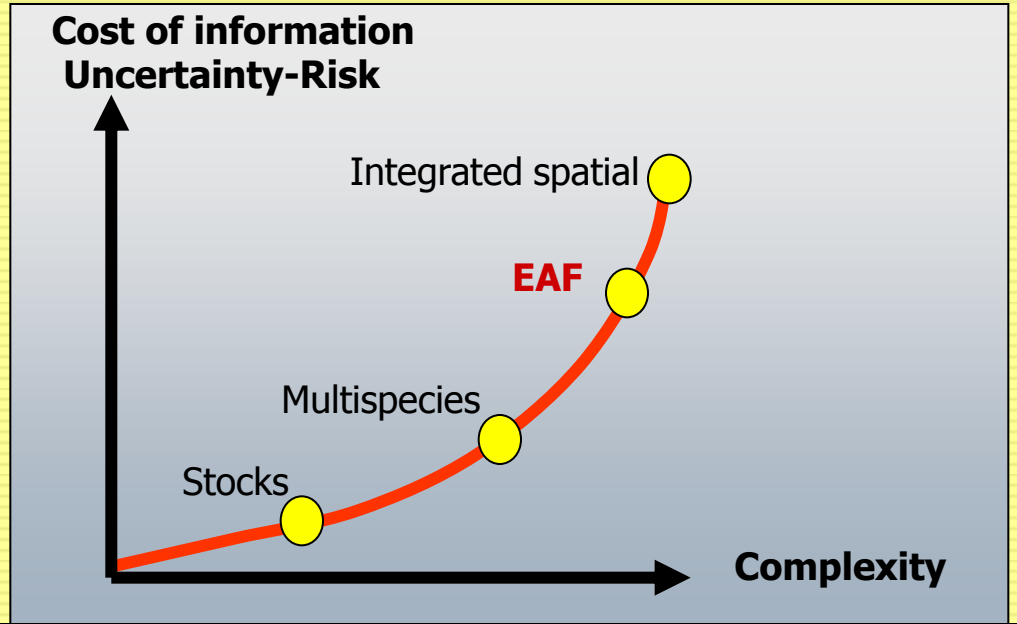

The fisheries syndrome

Symptoms

- 25% stocks depleted
- Collapses
- 20 M t of discards
- Endangered species
- Modified food chains
- Degraded habitats
- Poor economic conditions
- Rising conflicts
- Unreliable statistics
- IUU
- Loss of image

Direct causes

- Excessive fishing capacity
- Insufficient selectivity
- Misreporting
- Non-deterrent MCS

Deep roots

- Outdated development model
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- UNCED, WSSD, CBD, IPBES
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- Climate change
- Environment advocacy
- Customer awareness

Environmental concerns

- Overfishing and depletion
- Fishing impact on habitat: destructive practices
- Bycatch and discards
- Endangered species and growing risk of extinction
- Changes in species composition and the food chain
- Fishing-induced genetic modifications
- The amount of fish reduced to fish meal
- Pollution, red tides, fish contamination
- Introduction of invasive species
- The need to account for natural variations
- The need to foresee climate change impact

Formal foundations

- 1972: Stockholm Conference on the human environment
- 1982 UN LOSC: sustainable development
- 1987: The Brundtland Report
- 1992 UNCED and the CBD
- 1995 FAO CCRF and UNFSA
- 2001 FAO Reykjavik Conference
- 2002 WSSD

Concepts development

- 1960s: humanistic views of the ecosystem (in the US)
- 1970s-1980s: The US process
  - Progressive integration of disciplines
  - New institutional arrangements
  - Involvement of stakeholders
- 1992: Australian National Strategy for ESD
- 1995: US Interagency Ecosystem Management Task Force
- 1995: First elements in the Code of Conduct and UNFSA .
- 1995: Introduced as a principle in CBD COP2
- 2000: 12 principles, 5 operational guidelines in CBD COP 5
- 2001: EAF concept at the FAO Reykjavik Conference
- 2002: EA and EAF stresses by WSSD-2012 deadline
- 2003: 2003: FAO Guidelines

Early dates: Hartje, Klaphake and Schliep. 2003. US process: Malone, C. R. 1997. The federal ecosystem management initiative in the united states. http://www.state.nv.us/nucwaste/yucca/malone01.htm

EA Definition (CBD)

The ecosystem approach is a strategy for the **integrated** management of land, water and living resources that promotes **conservation** and **sustainable use** in an **equitable manner**.

An ecosystem approach is based on the application of appropriate **scientific methodologies** focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that **humans** with their cultural diversity are an integral component of many ecosystems

Decision V/6 of the Conference of the Parties to the Convention on Biological Diversity. CBD Decision VII/11 Annex 1 (2000)

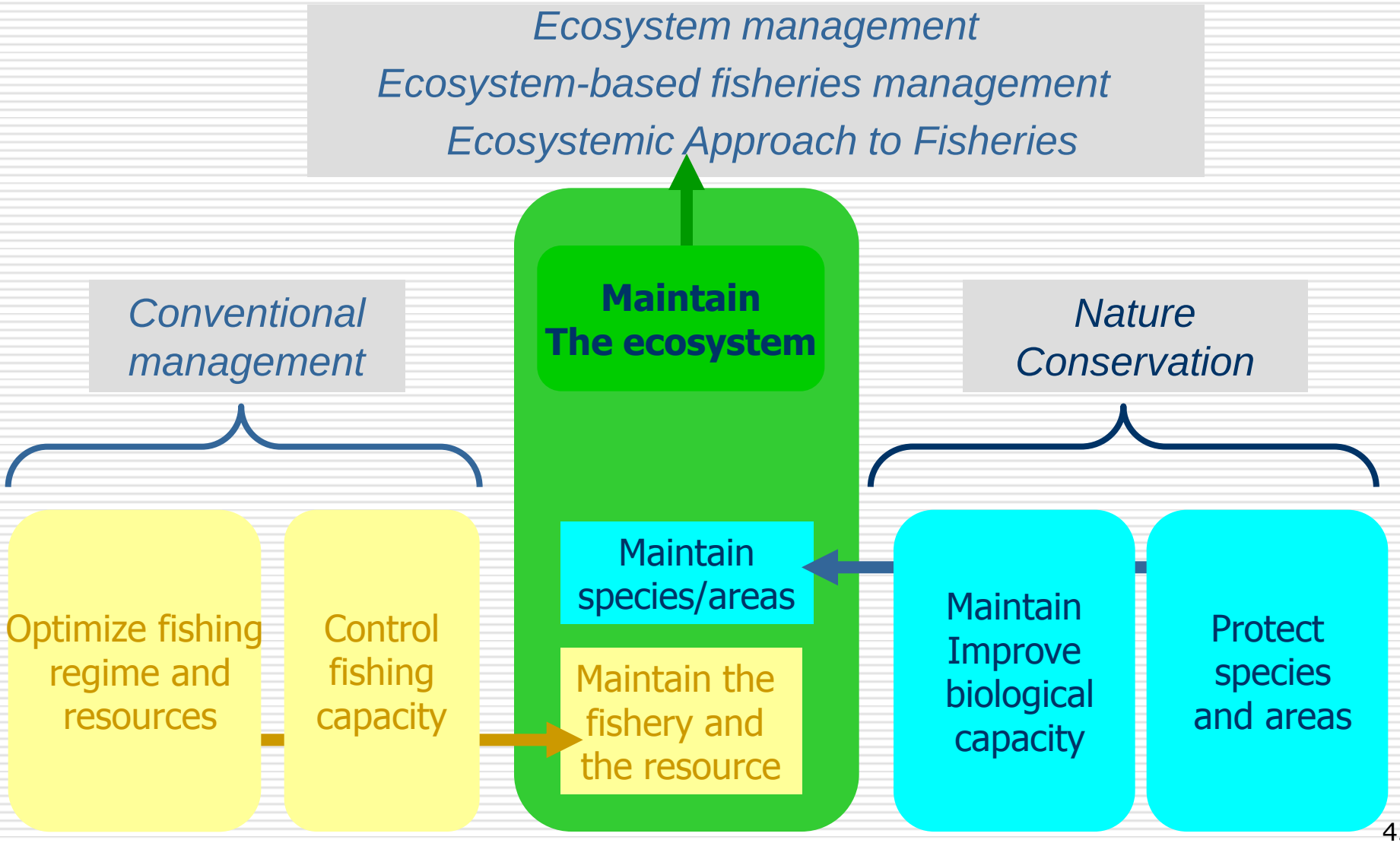
EAF Definition

An ecosystem approach to fisheries strives to **balance diverse societal objectives**, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an **integrated approach** to fisheries within ecologically meaningful **boundaries.**

The purpose of an ecosystem approach to fisheries, therefore is to plan, develop and manage fisheries in a manner that addresses the **multiple needs and desires of societies,** without jeopardizing the options for future generations to benefit from the full range of **goods and services** provided by marine ecosystem.

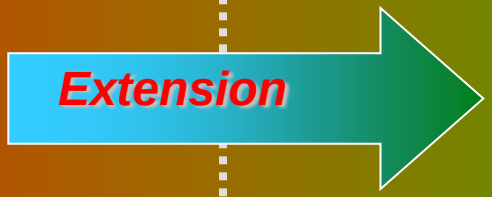
FAO Technical Guidelines on EAF (FAO, 2003)

The encounter of two concepts

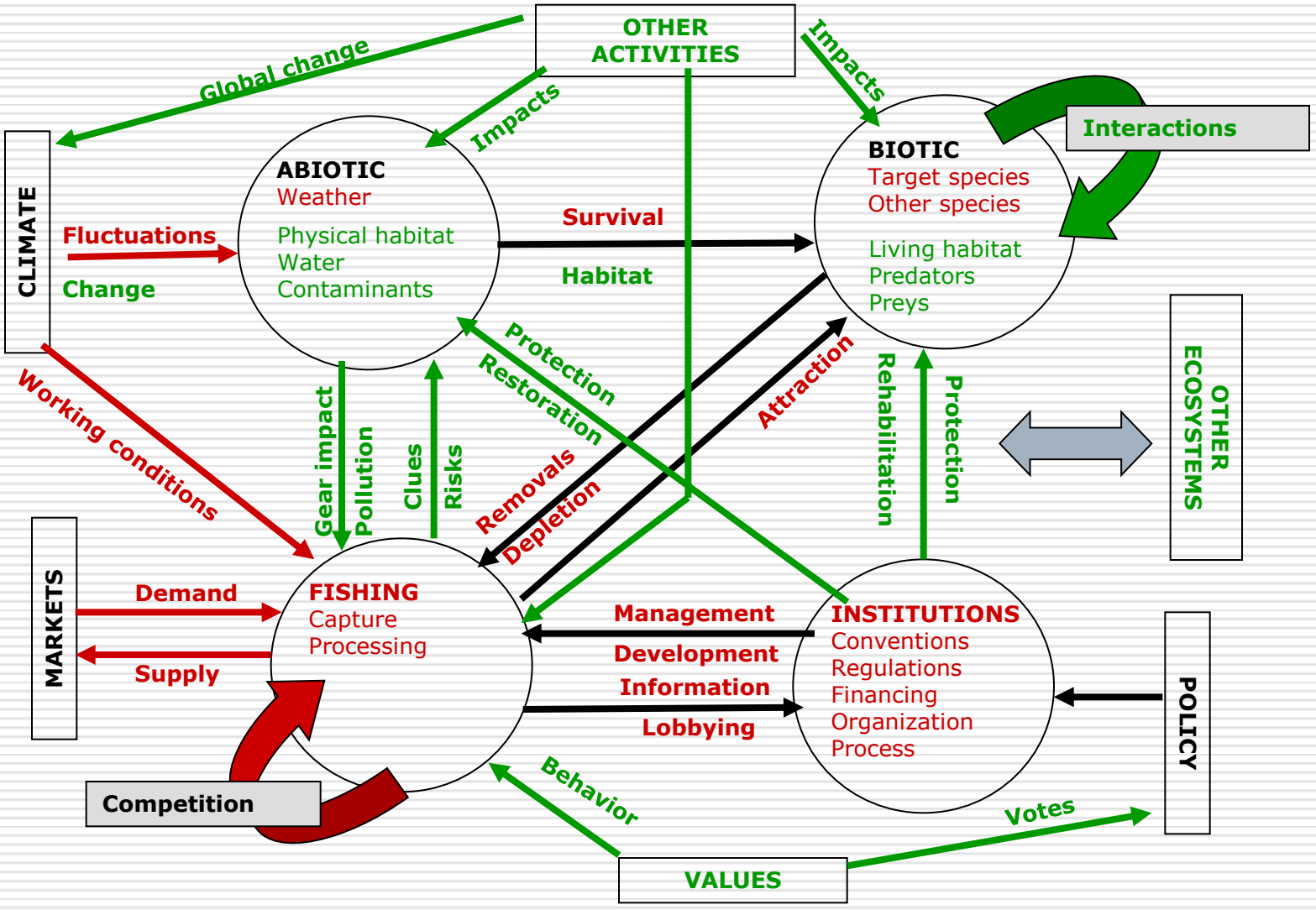


Paradigm shift

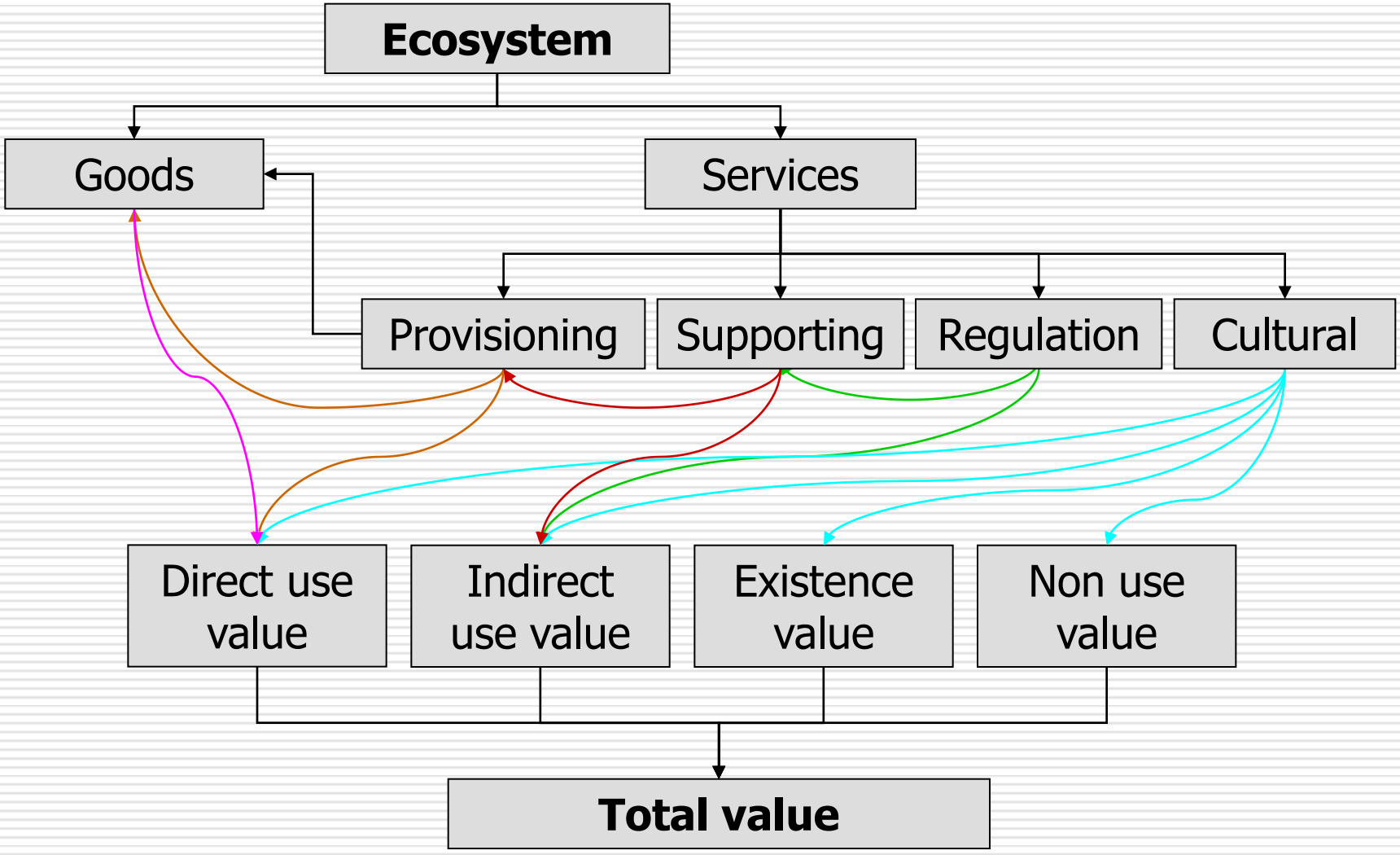
Conventional approach		Ecosystem approach
Few objectives		Multiple objectives
Sectoral		Integrated & cross sectoral
Target / non target species		Biodiversity & environment
Stock / fishery scale		Multiple nested scales
Predictive and rigid		Prospective and adaptive
Scientific knowledge		Multiple extended knowledge
Prescriptions		+ Incentives
Top-down		+ Bottom-up + Interactive
Corporate		Participatory
Opaque, lobbied		Public / Transparent



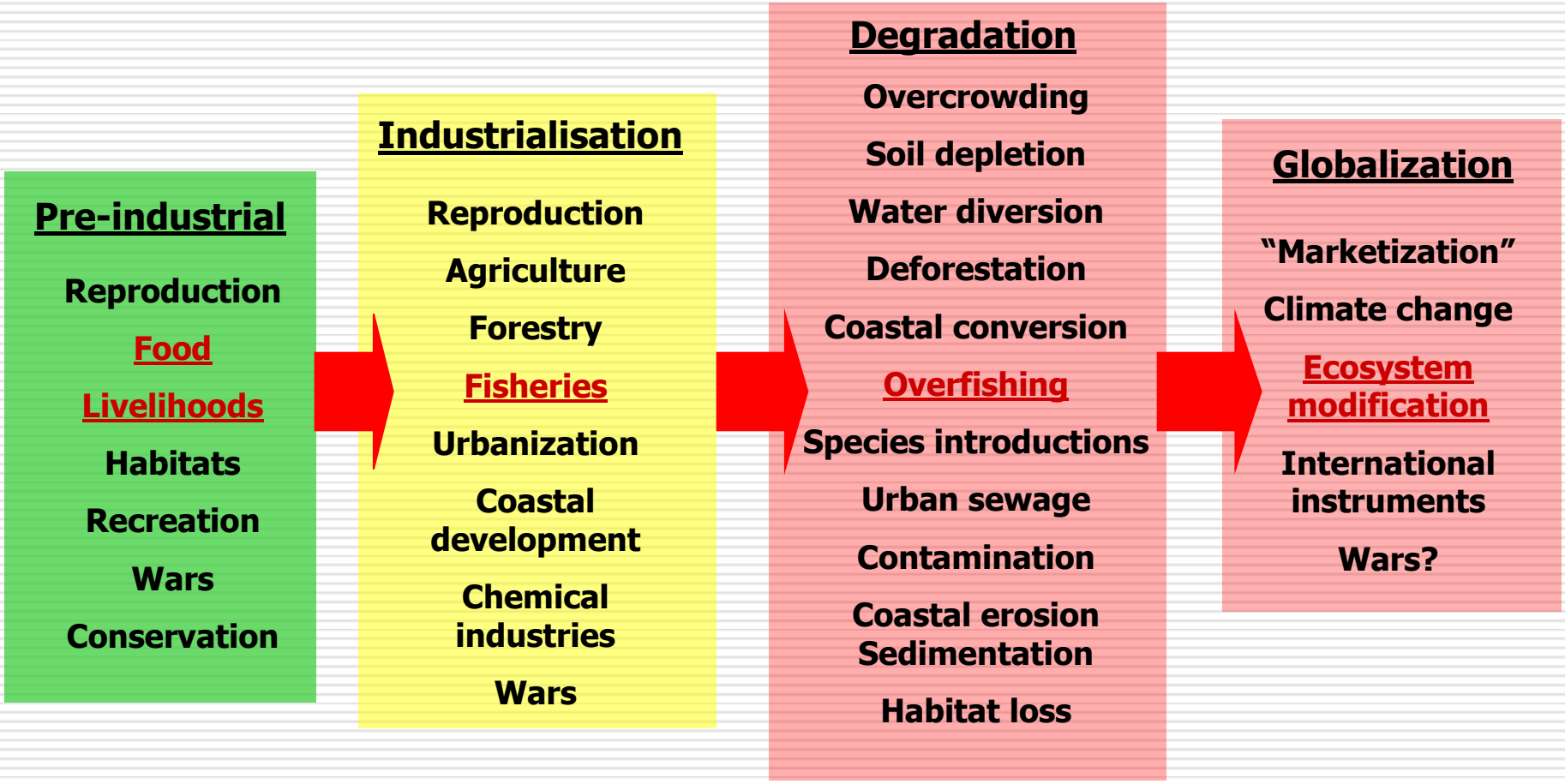
Adding ecosystem elements



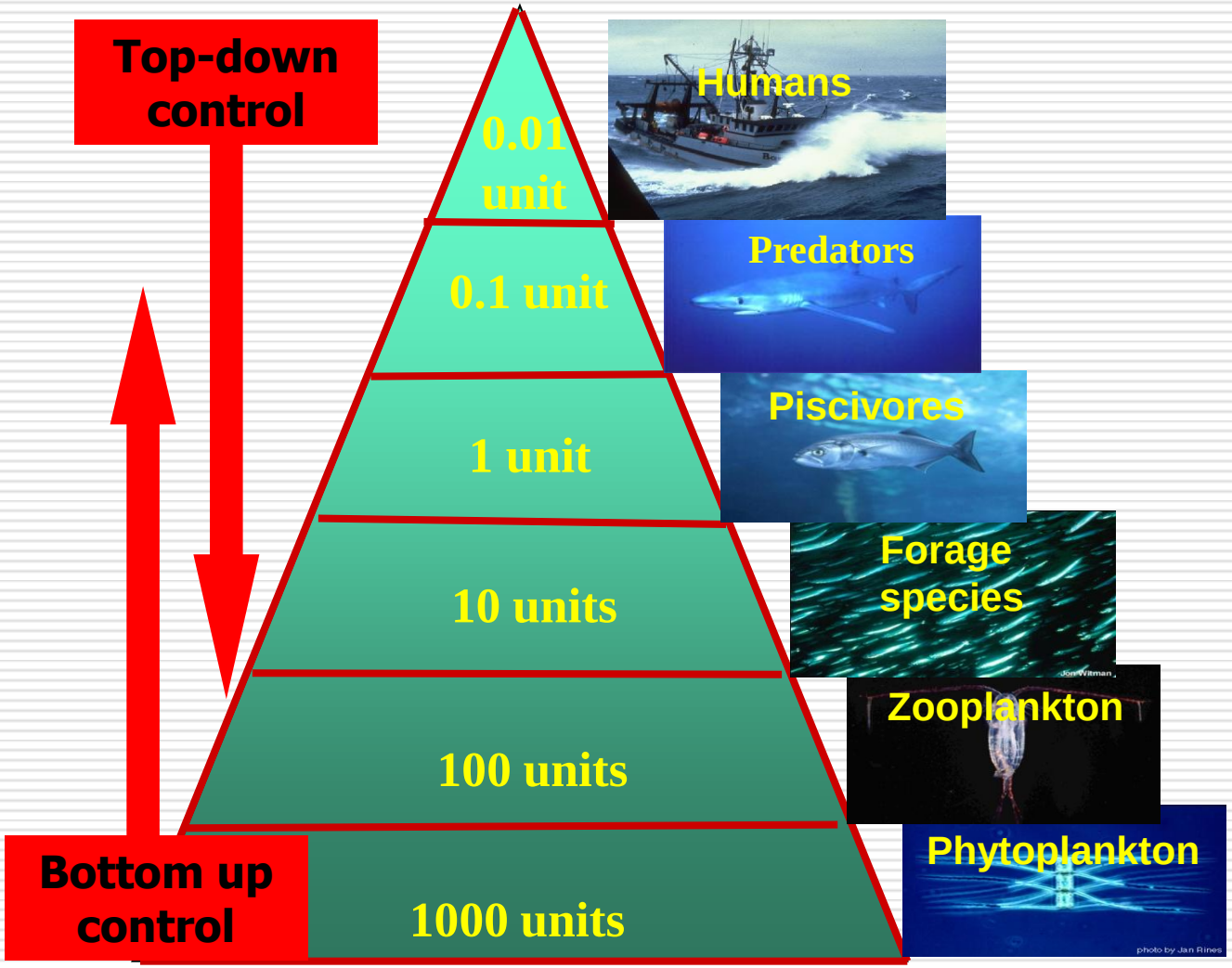
Ecosystem services



A systemic syndrome

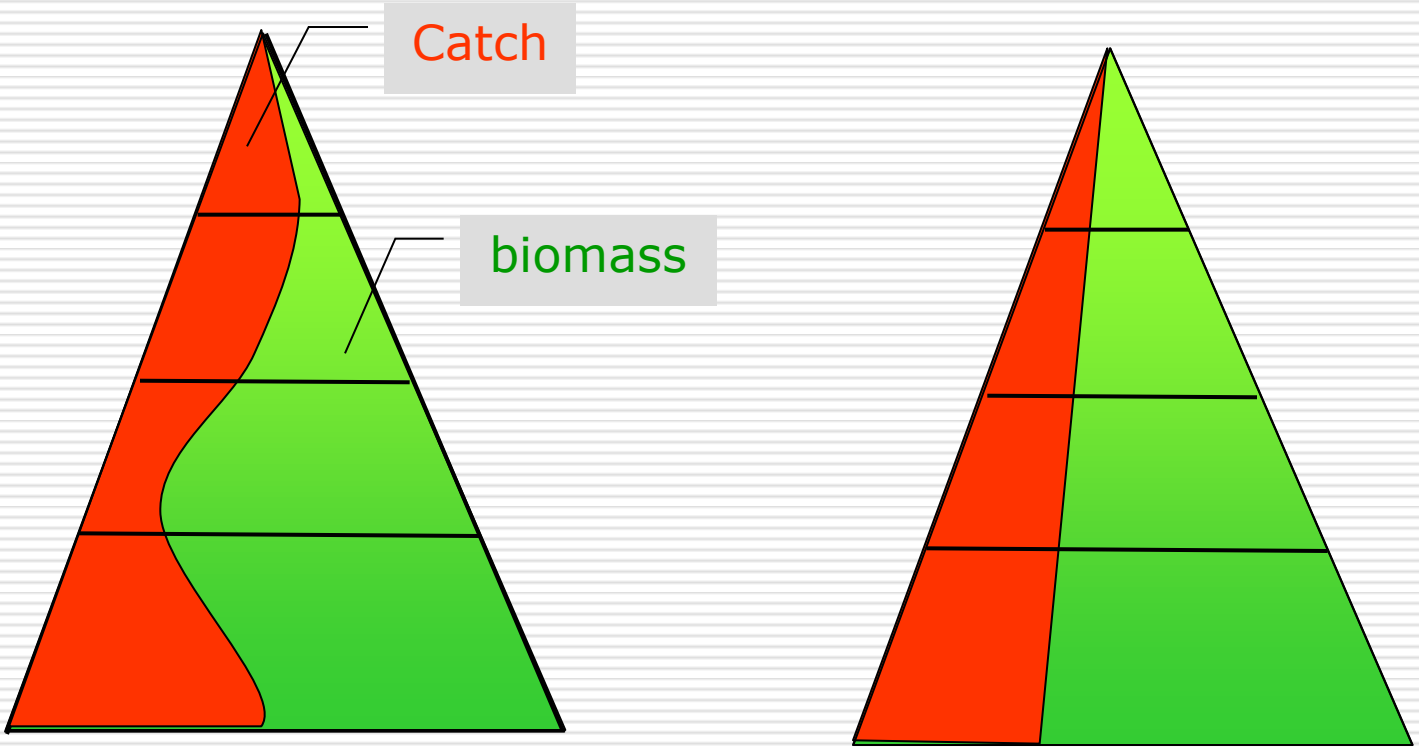


The trophic chain



If transfer efficiency is 10%

Selection for balanced harvest?

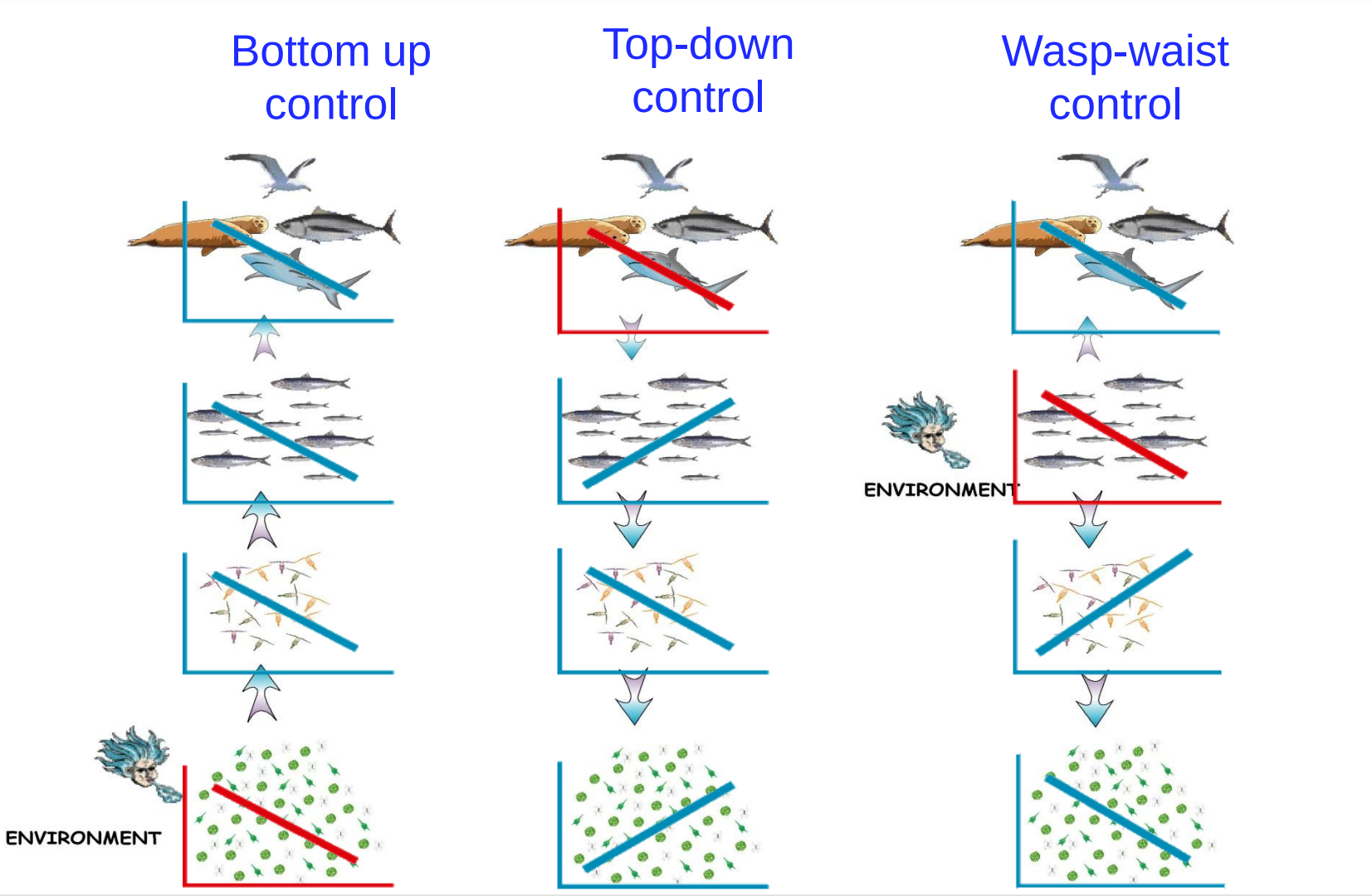


Unbalanced harvest

Balanced harvest?
e.g. 30% flat

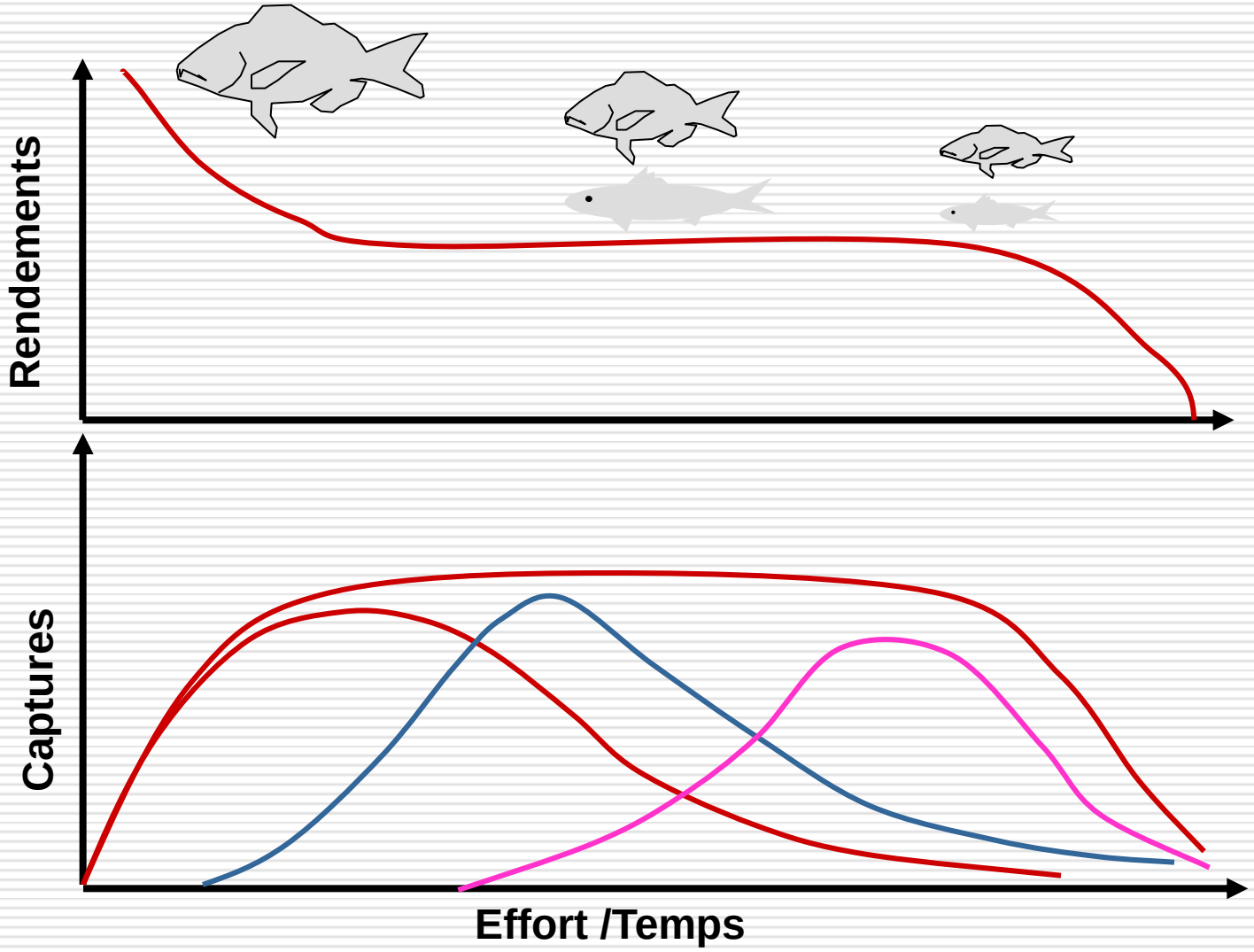
With what consequences?

Predator-prey relations



Cury, Shannon et Shin 2003

Multispecies aspects



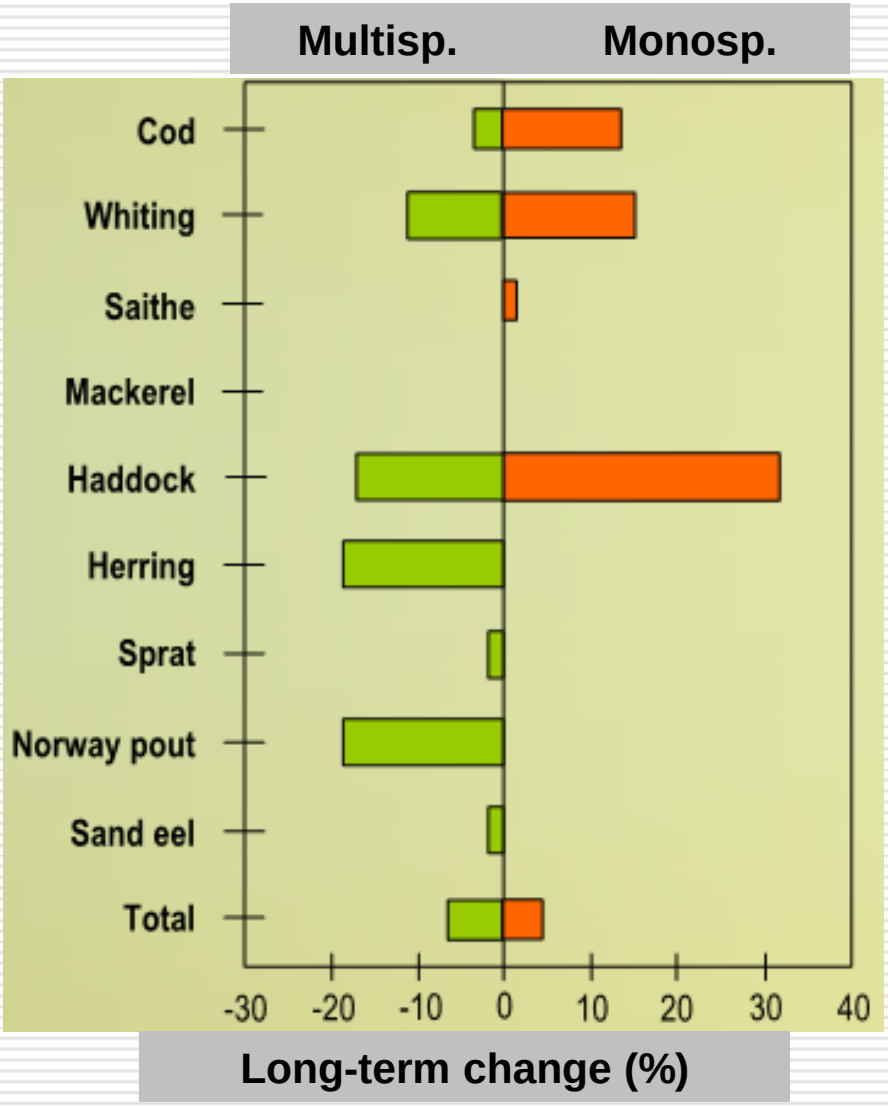
Welcomme 1995

Impact on assessment

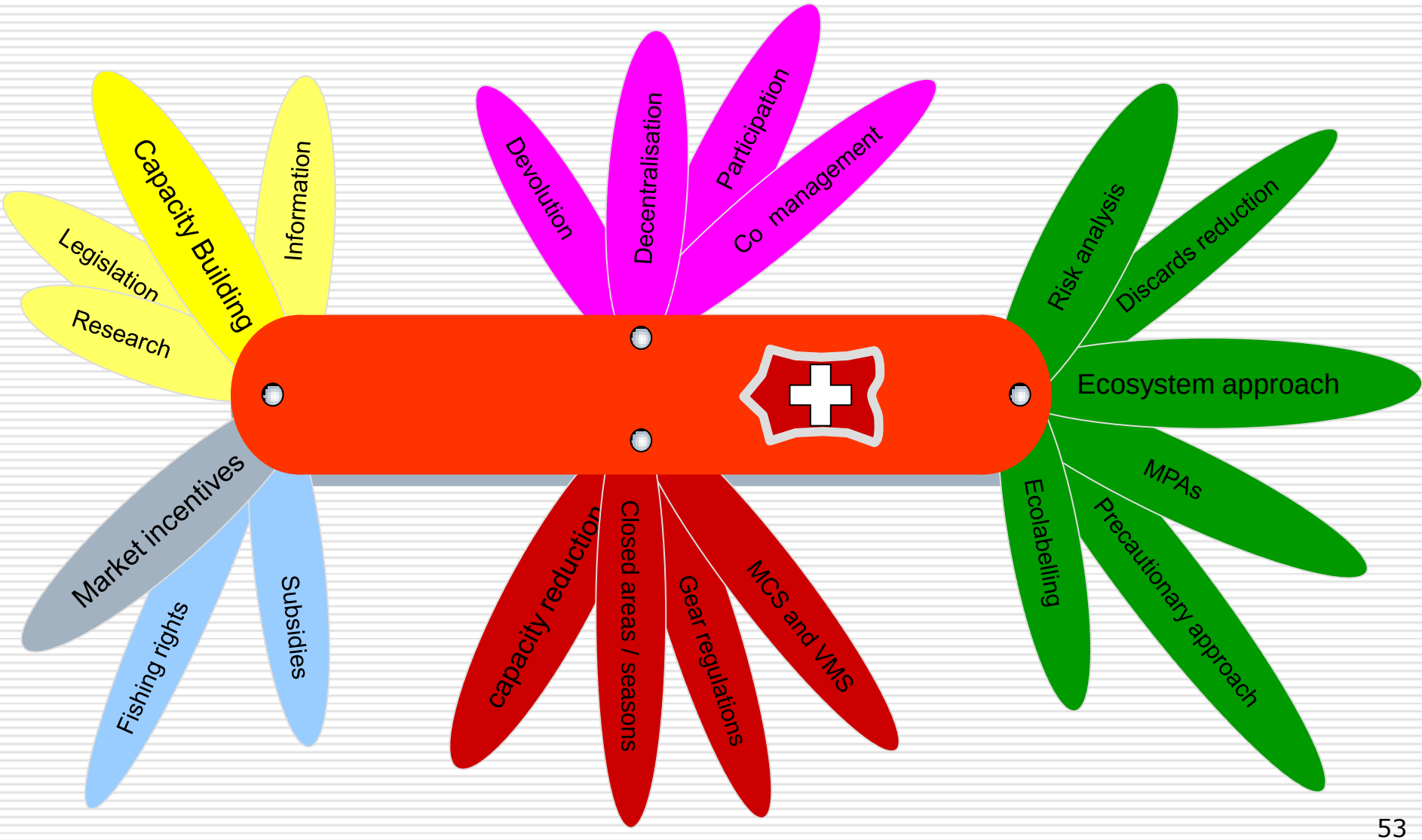
Long-term change in landings (in%) when passing from 80mm to 120 mm mesh for Cod.

The difference is the result of the additional predation of large fish released by the larger mesh size.

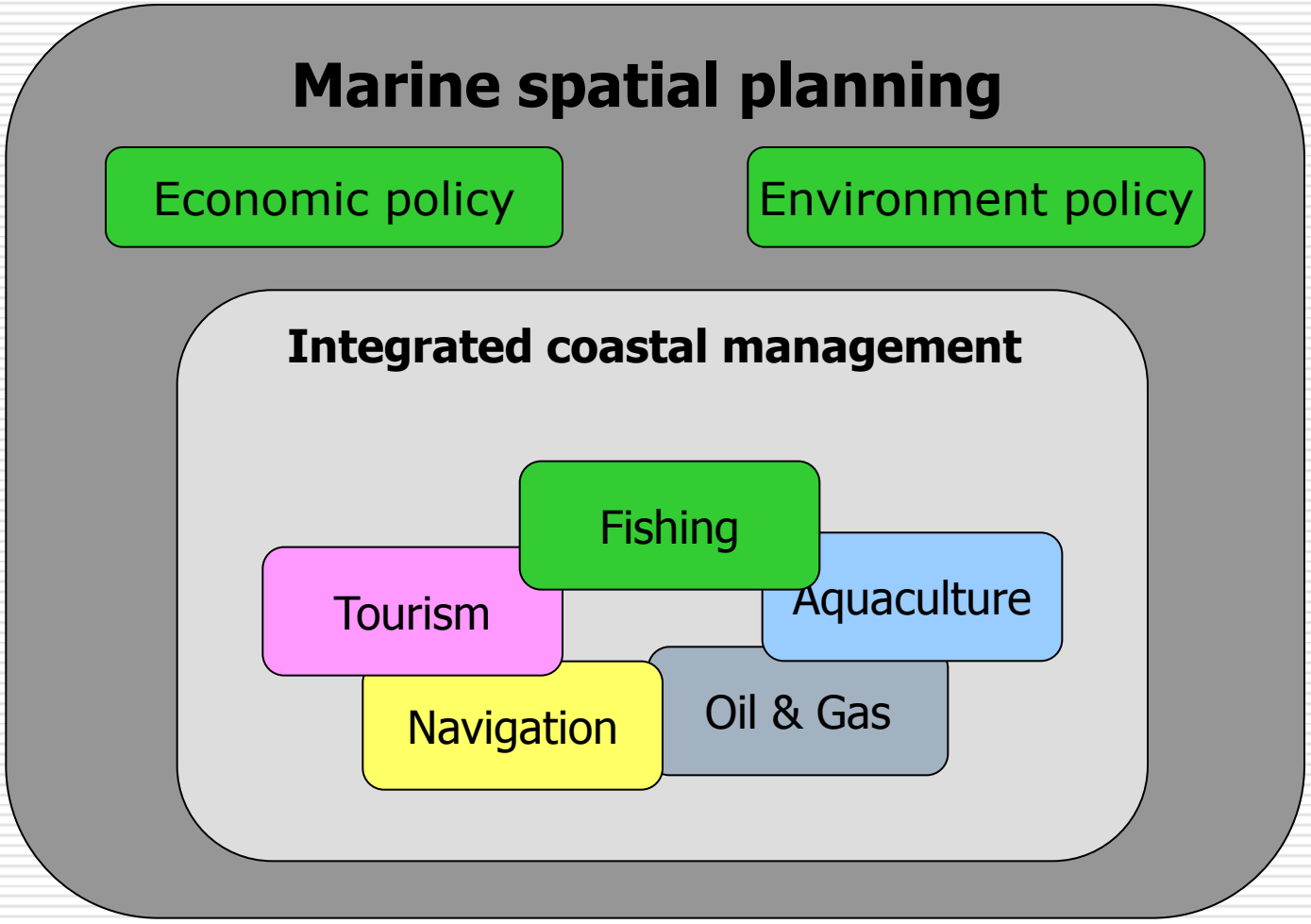
Source: Anonyme. 1989. Rapport du Groupe d' évaluation multi-espèces du CIEM.

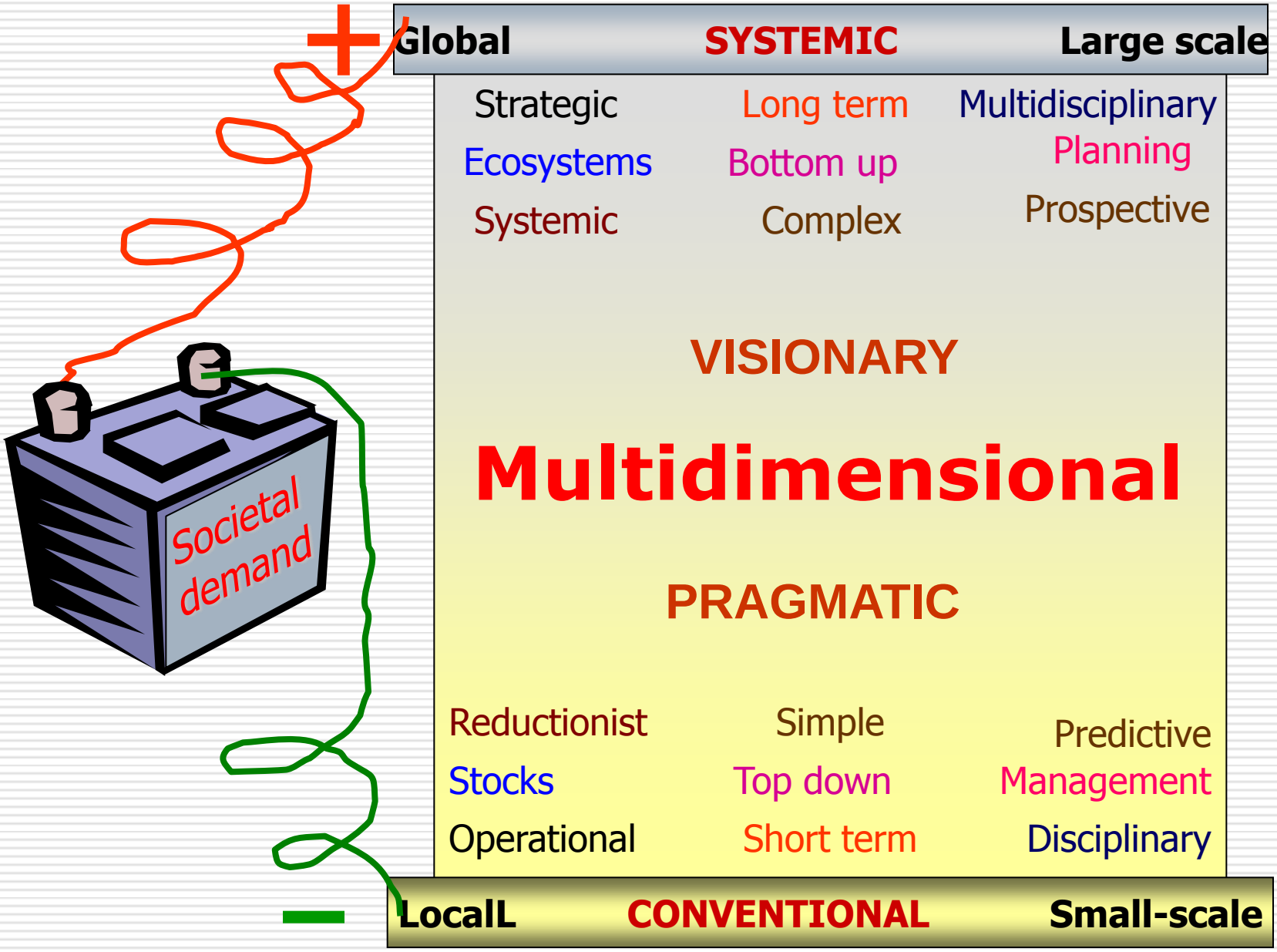


Management Swiss knife

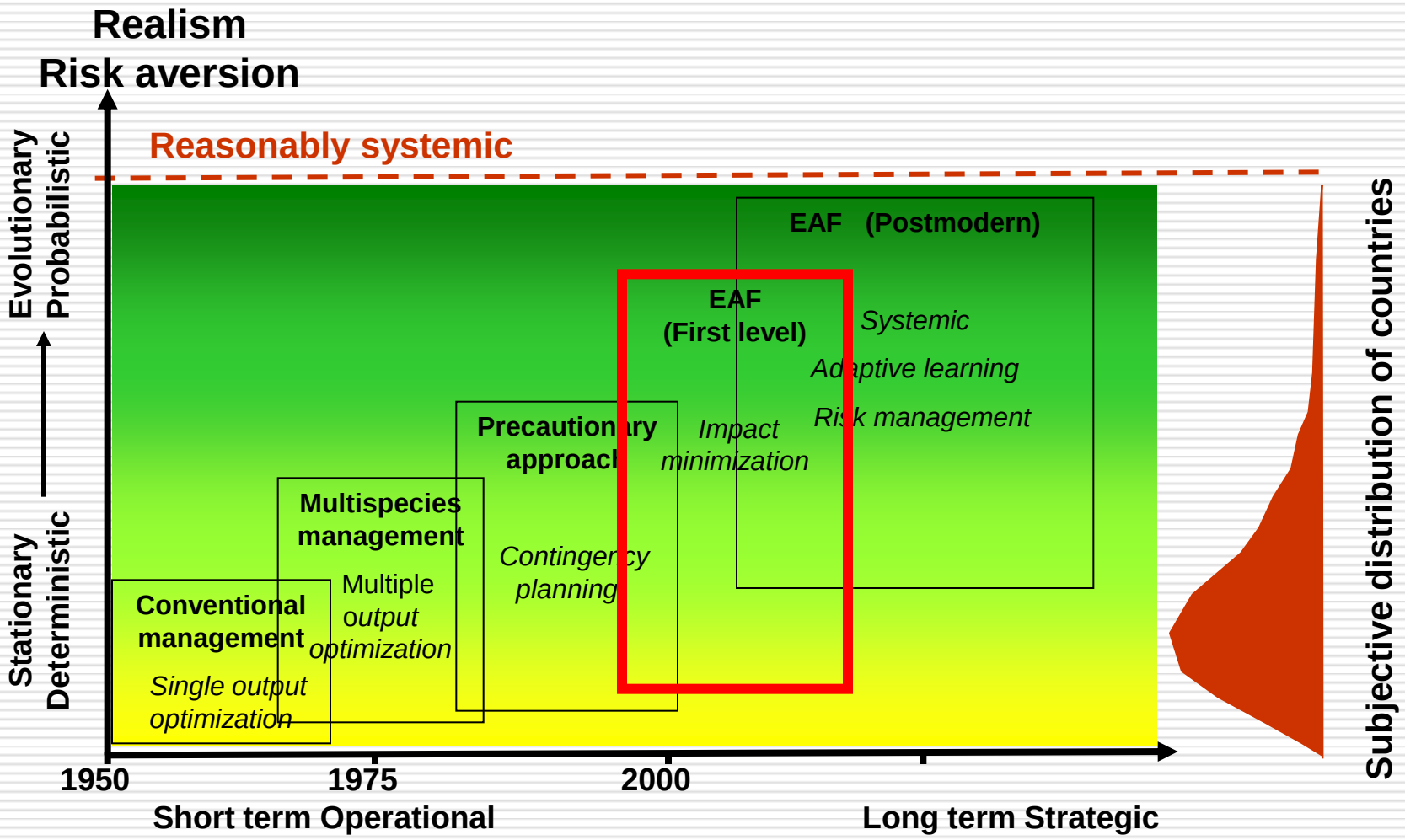


Policy integration

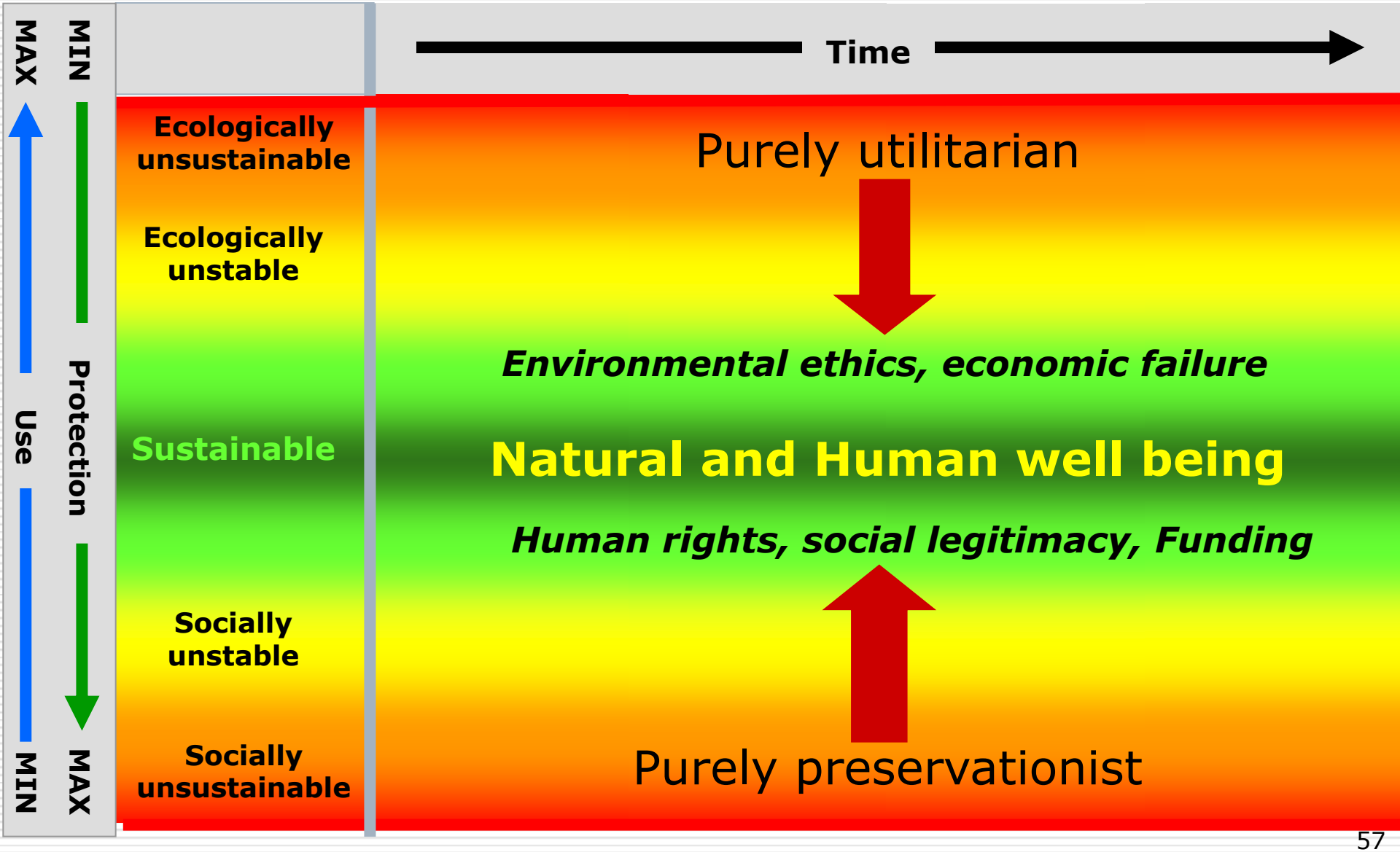



Global
SYSTEMIC
Large scale
Strategic
Long term
Multidisciplinary
Ecosystems
Bottom up
Planning
Systemic
Complex
Prospective
VISIONARY
Multidimensional
PRAGMATIC
Reductionist
Simple
Predictive
Stocks
Top down
Management
Operational
Short term
Disciplinary
LocalL
CONVENTIONAL
Small-scale
Societal demand

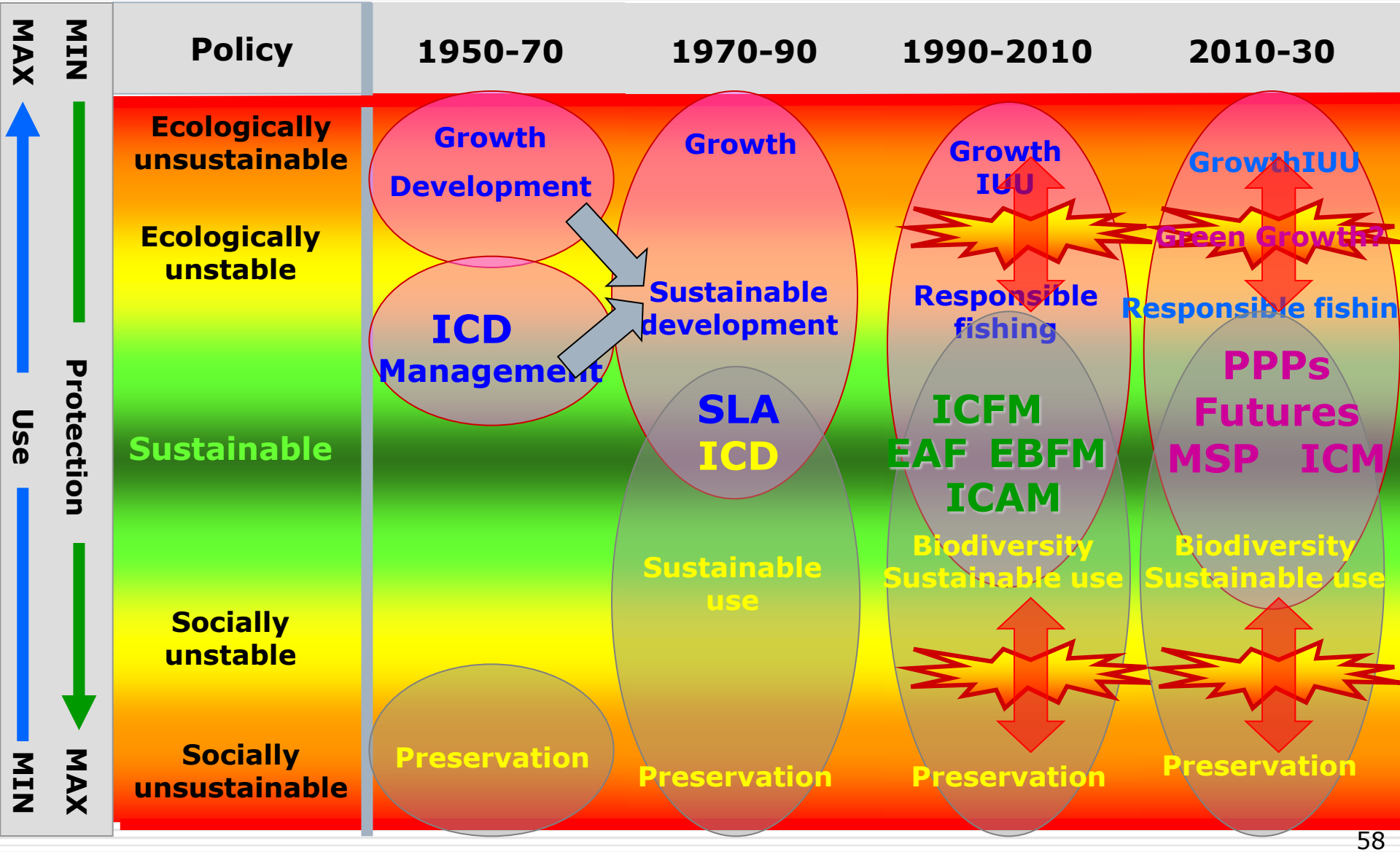
Where do we stand ?



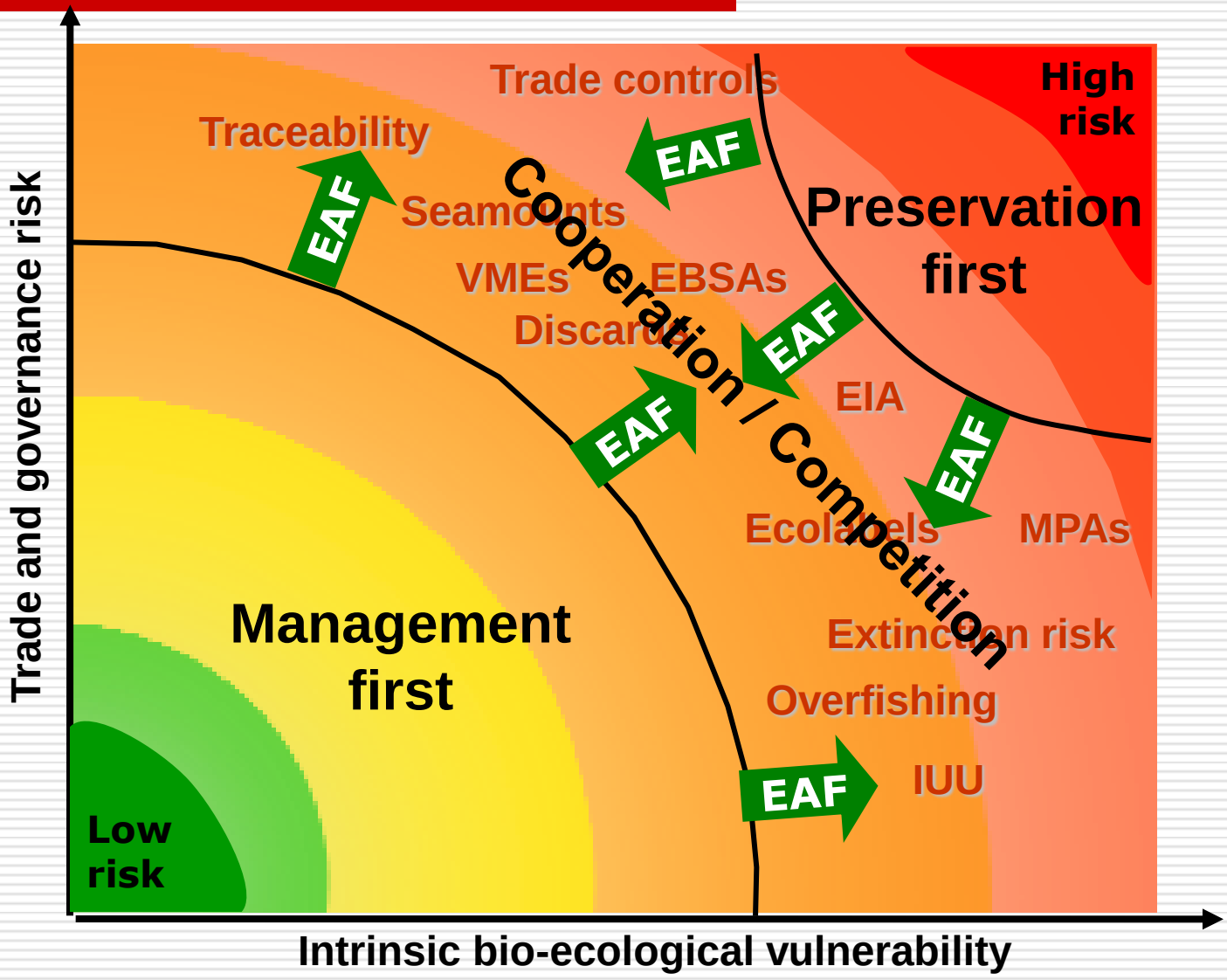
The evolutionary field



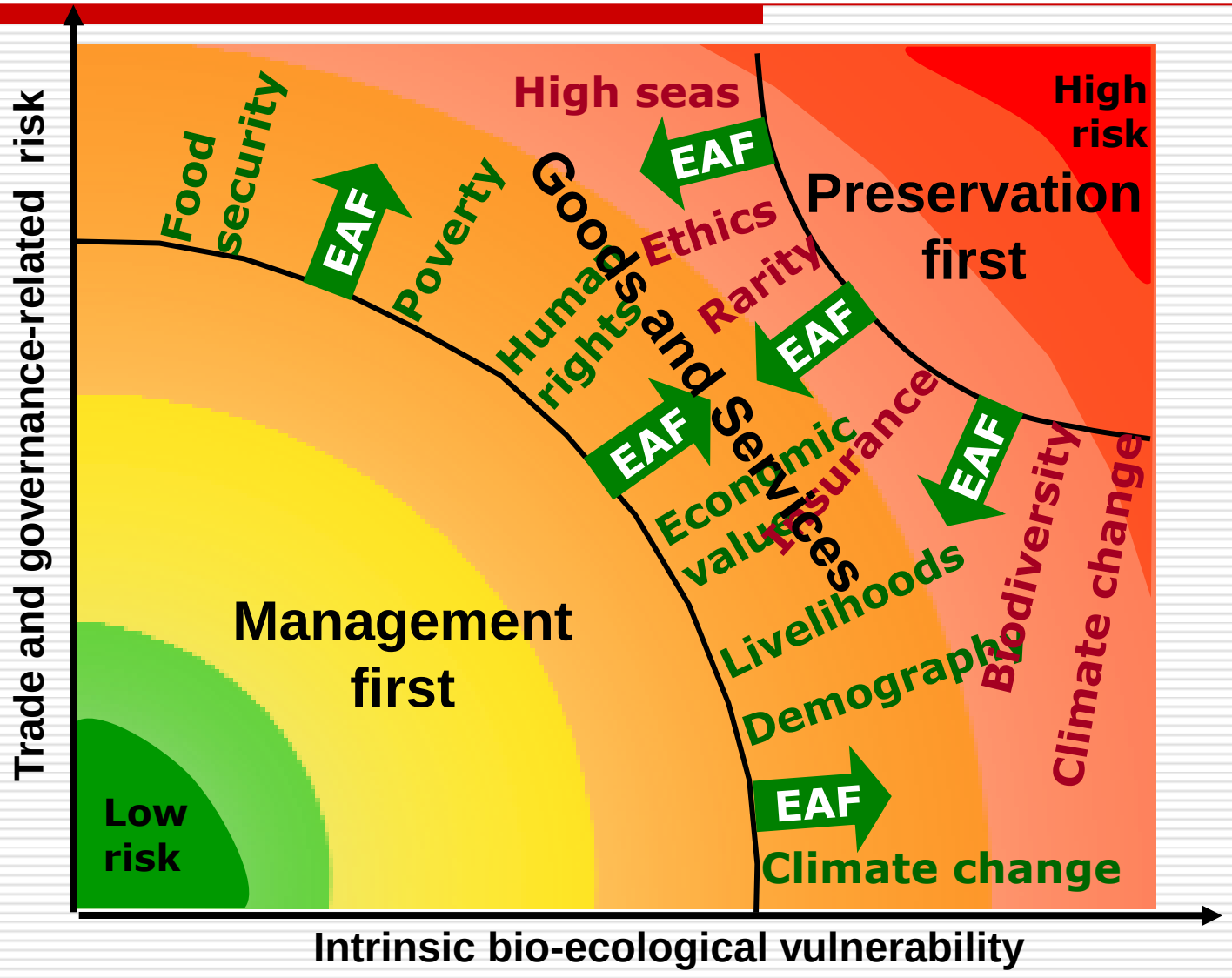
Converging evolutions

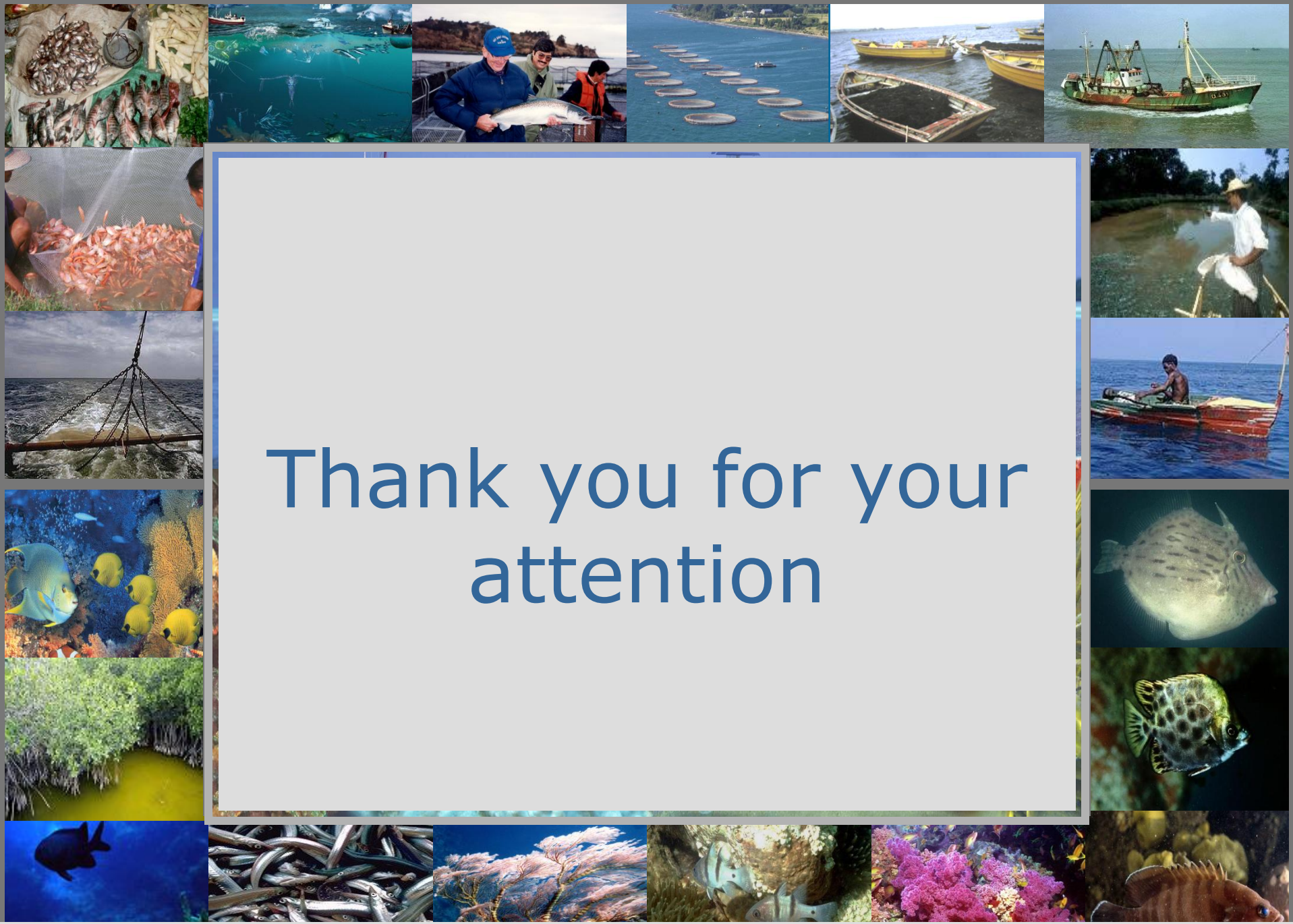


Institutional tensions



Institutional tensions-2





Thank you for your attention