

Creating Climate Resilient Fisheries

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Workshop on The Future of Fisheries in a Climate Changed World



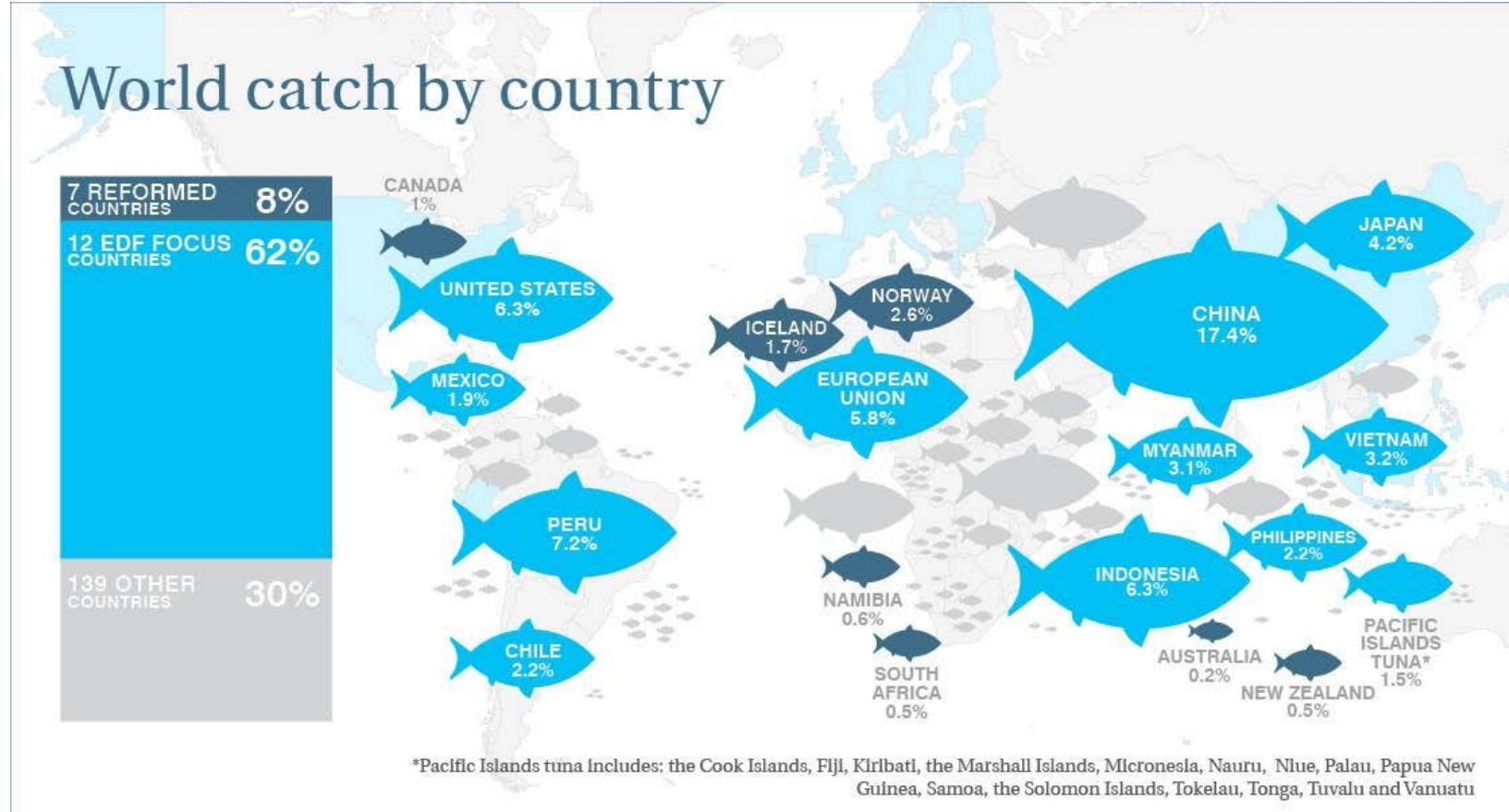
Outline

- Brief history of our fisheries work: sustainability and resilience
- Theory & practice: principles for climate resilient fisheries and examples of pathways for operationalizing resilience
- Building climate resilience in the Humboldt Current



EDF Ocean's sustainable fisheries approach

- Thousands of fisheries
- Unsustainable fishing practices threaten many fisheries
- EDF regions: greatest potential to catalyze sustainable reforms



EDF Oceans Program

Improving fisheries management in different socio-ecological and political contexts requires different kinds of scientific work



Food
+
Jobs
+
Revenue

Climate change has major impacts on fisheries

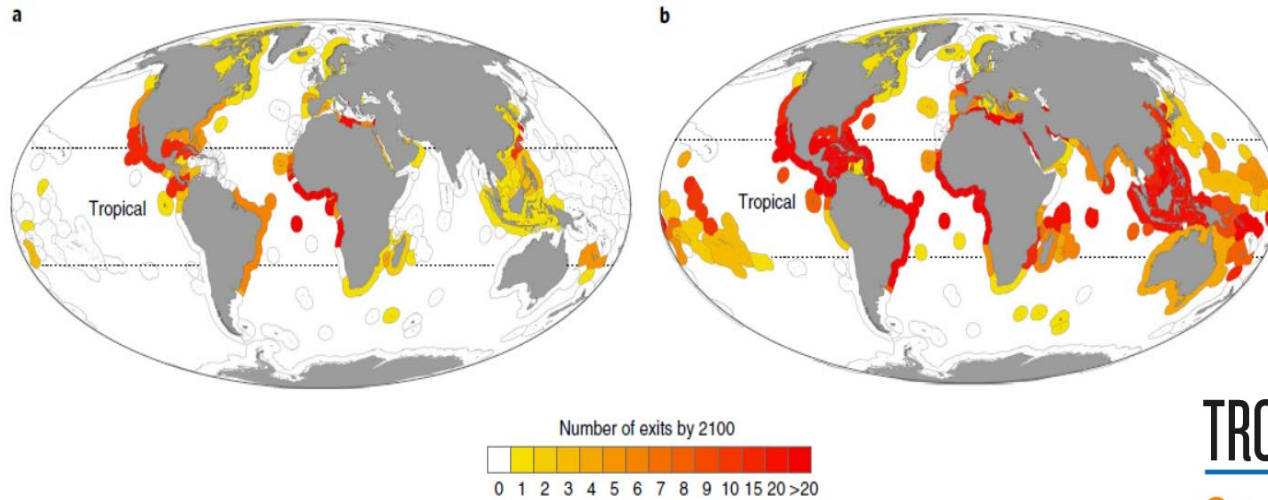


Fig. 1 | National loss of species. **a,b**, The number of species shifting out of each EEZ by 2100 under RCP 4.5 (**a**) and RCP 8.5 (**b**).

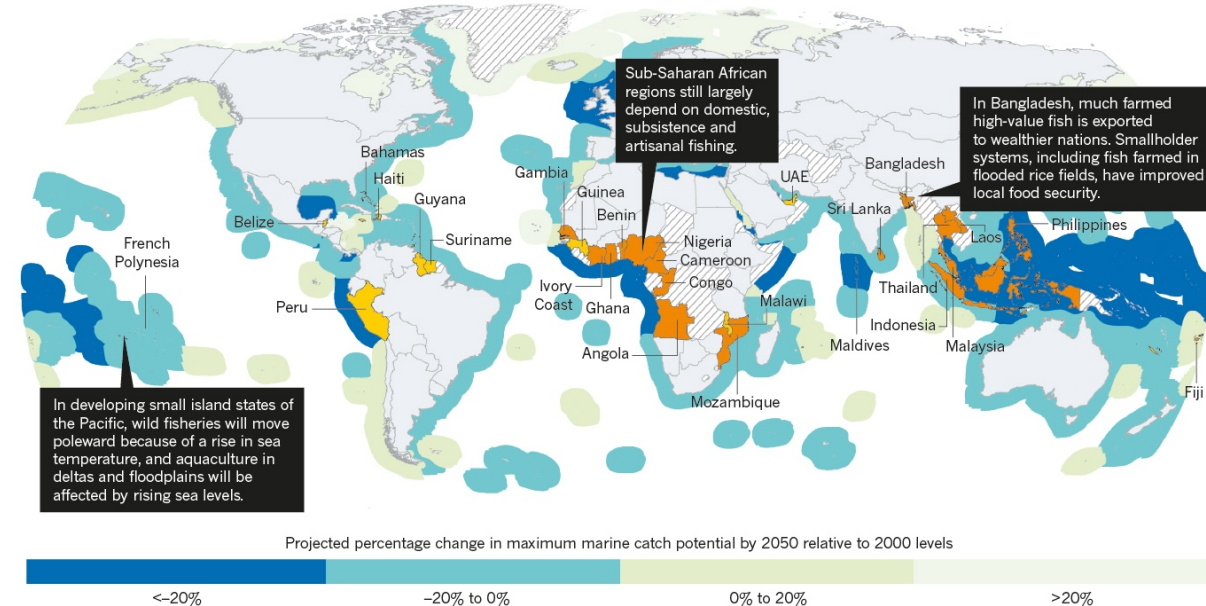
Oremus et al., 2020

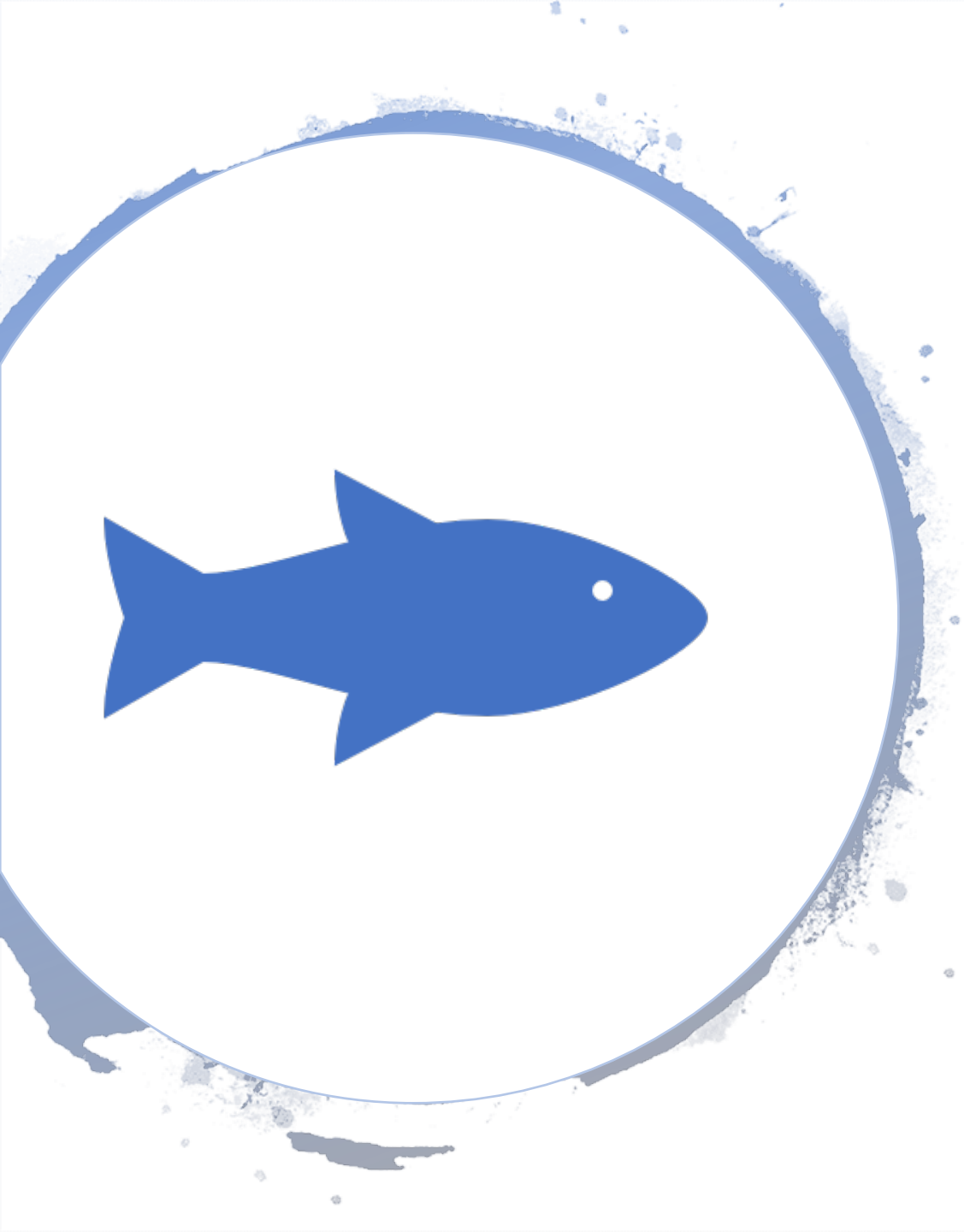
Golden et al., 2016

TROUBLED WATERS

In the low-latitude developing nations, human nutrition is most dependent on wild fish, and fisheries are most at risk from illegal fishing, weak governance, poor knowledge of stock status, population pressures and climate change. These countries urgently need effective strategies for marine conservation and fisheries management to rebuild stocks for nutritional security.

- Most reliant on fish and most vulnerable to micronutrient malnutrition
- Reliant on fish and vulnerable to micronutrient malnutrition
- Less reliant and less vulnerable
- No data





Development of climate pathways

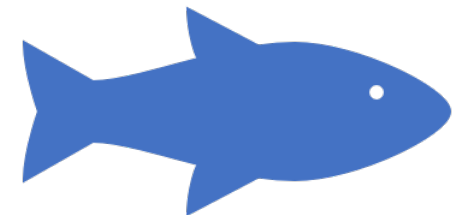
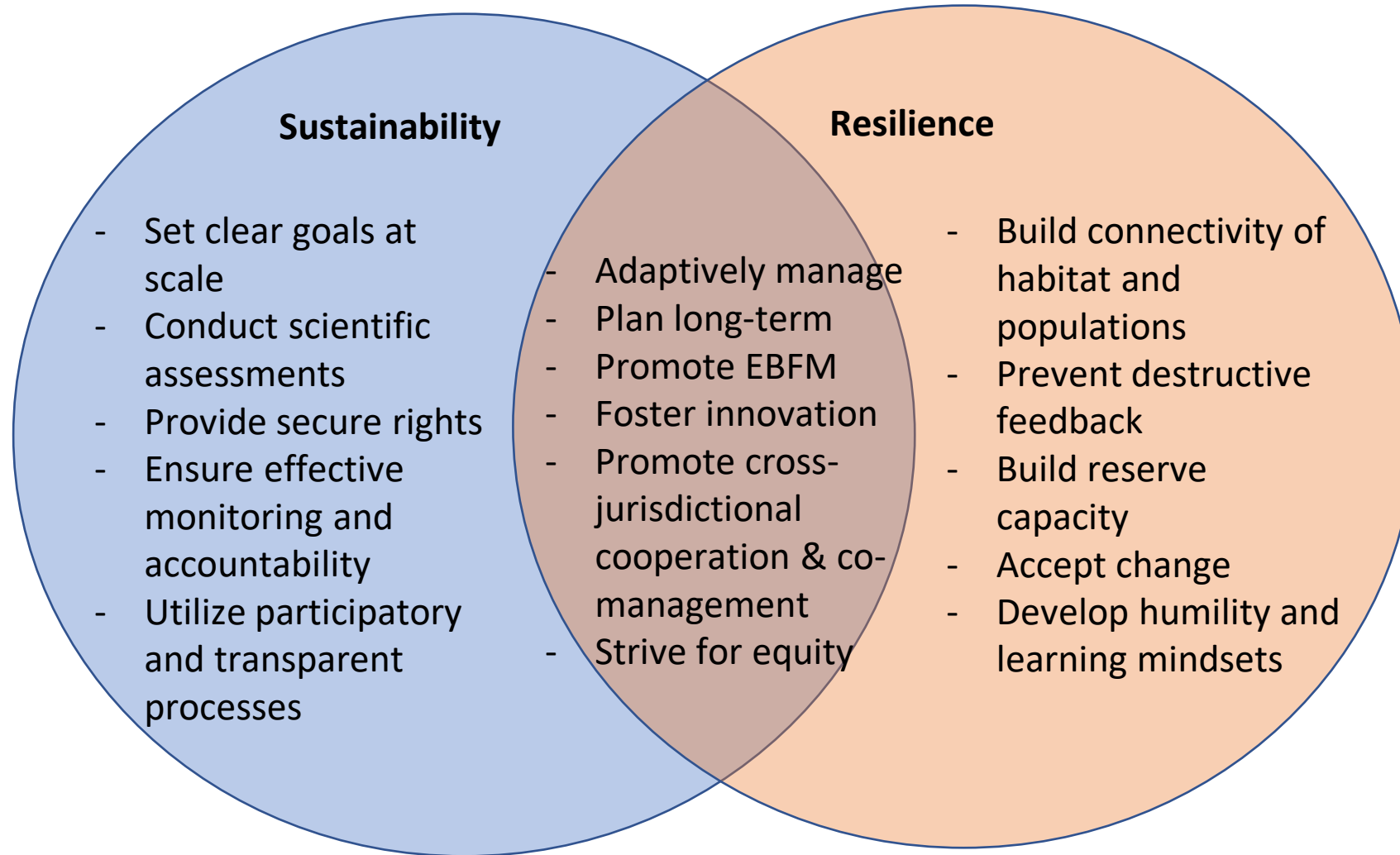
To achieve our global fishery
sustainability goals, we must
augment sustainability practice
with resilience

Working definition:

“Resilience is the capacity of socio-ecological systems to recover, adapt, or transform constructively to support human and natural well-being as climate change and other stressors interact unpredictably over time.”



Sustainable management + Resilience = Climate readiness





Combination of sustainability and resilience principles led to 5 climate pathways that we strive for with fisheries reforms

Climate Resilience Pathways

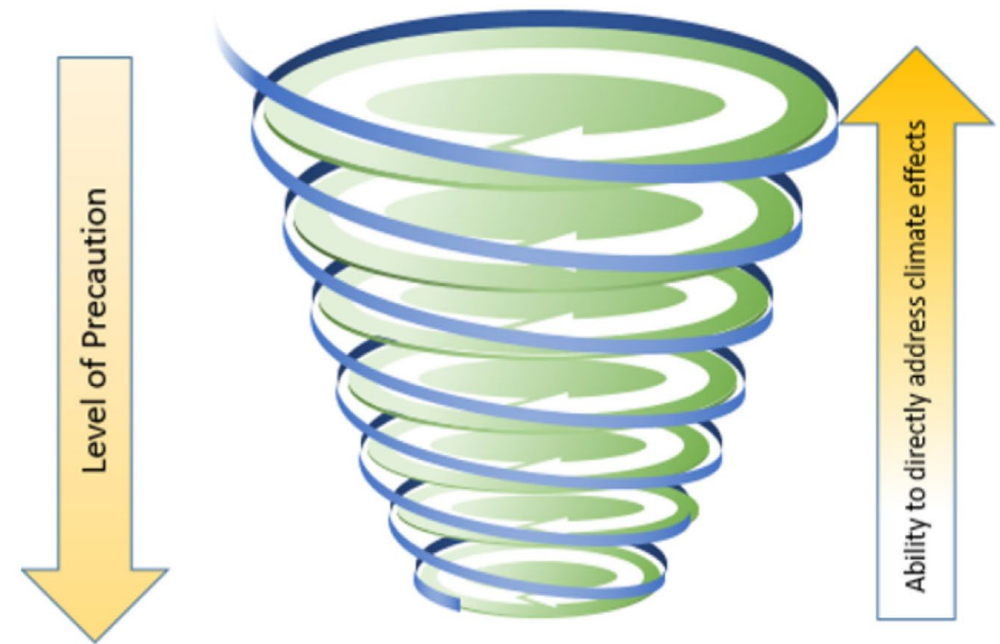
1. Establish & promote effective management and governance
1. Plan ahead for change
1. Enhance cooperation across borders
1. Improve ecosystem & institutional health
1. Uphold principles of fairness and equity

Principle 1: Establish & promote effective management & governance

- Effective governance at appropriate scale
- Adaptive, science-based management
- Participatory approaches that include marginalized groups
- Transparency and accountability
- Established rights

Higher complexity:

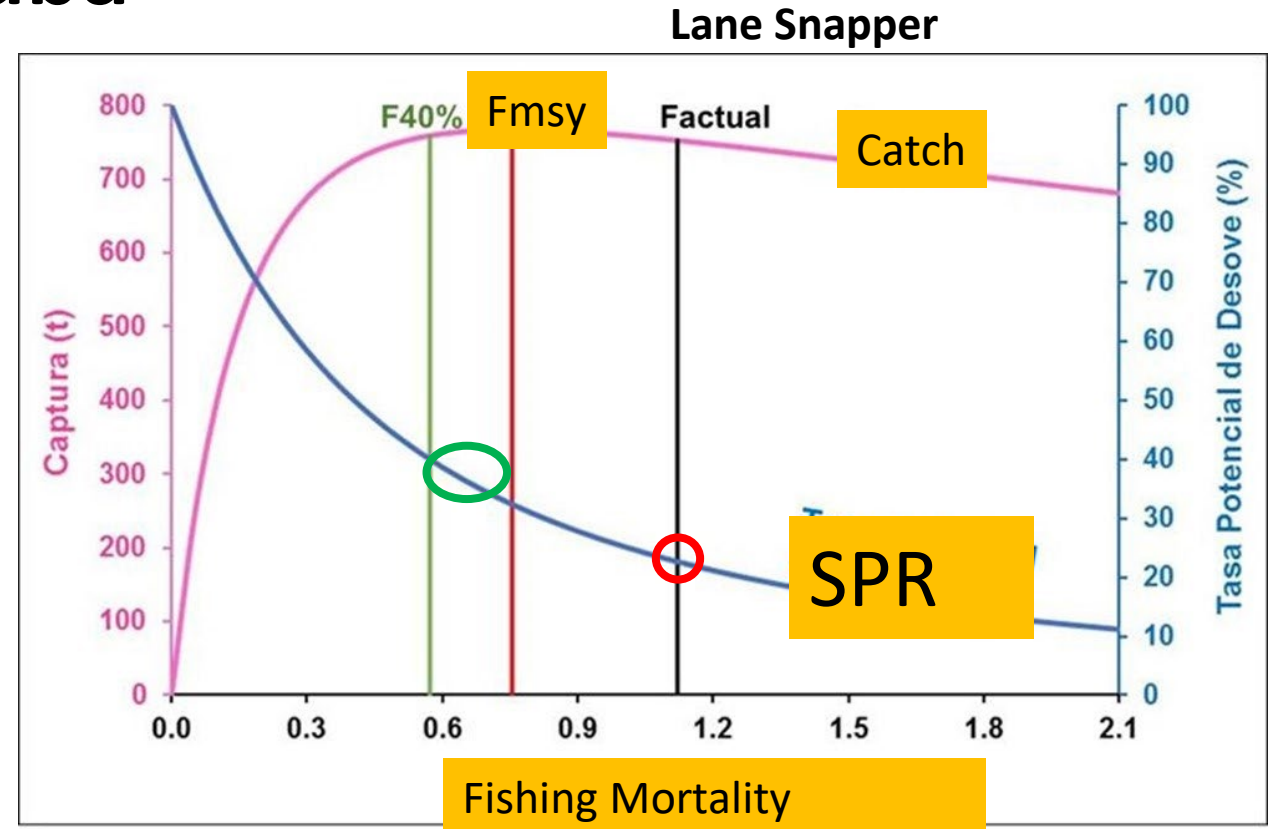
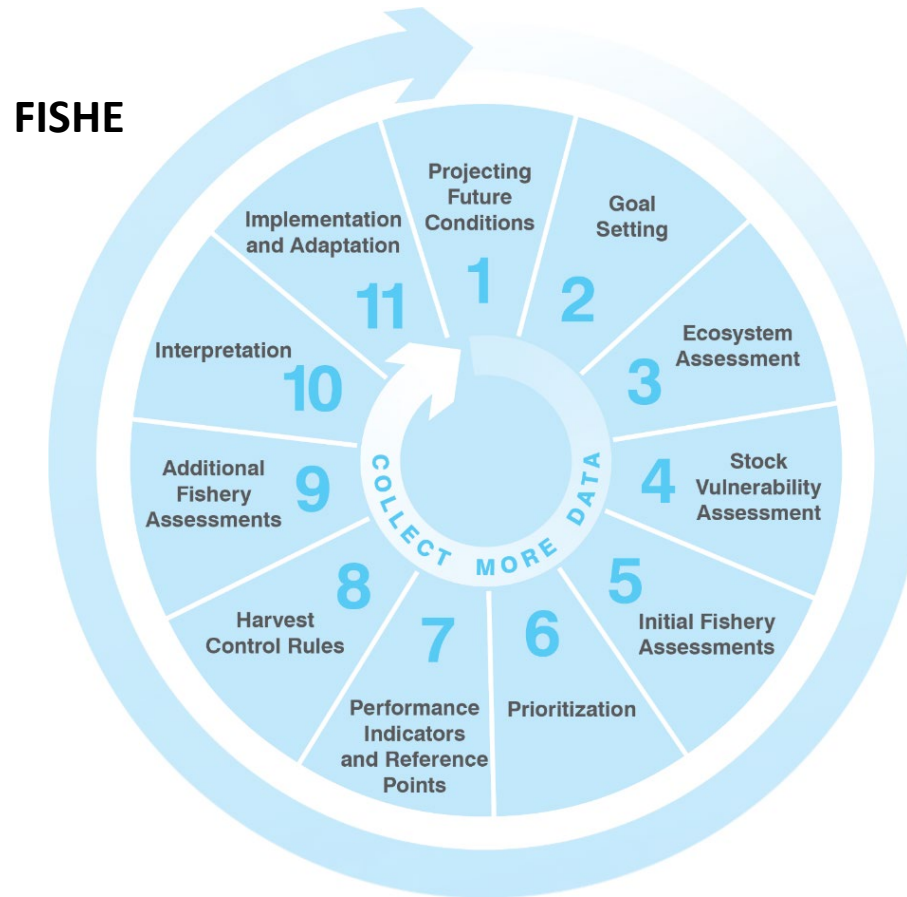
Fully developed system with many management steps. Higher number of measures, controls and information available.



Lower complexity:

Underdeveloped system making initial inroads into management. Few measures, controls and limited data available.

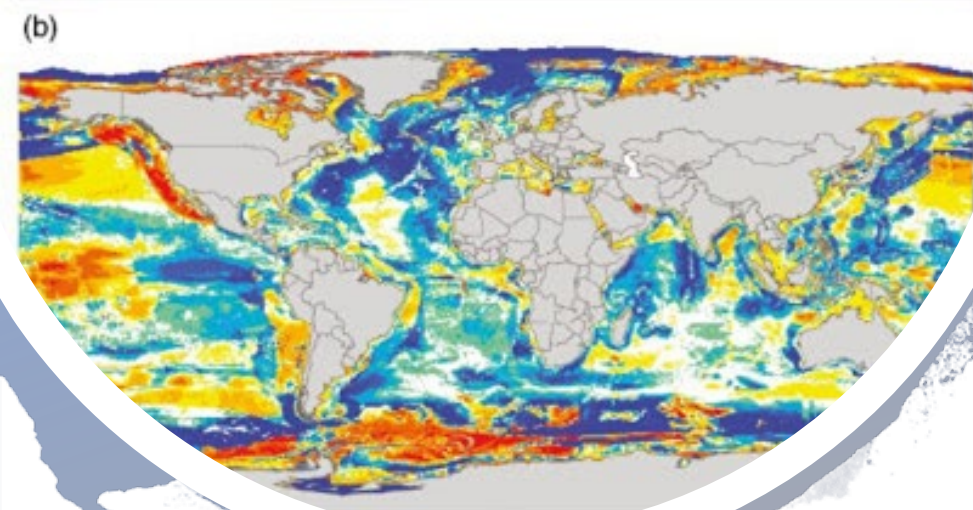
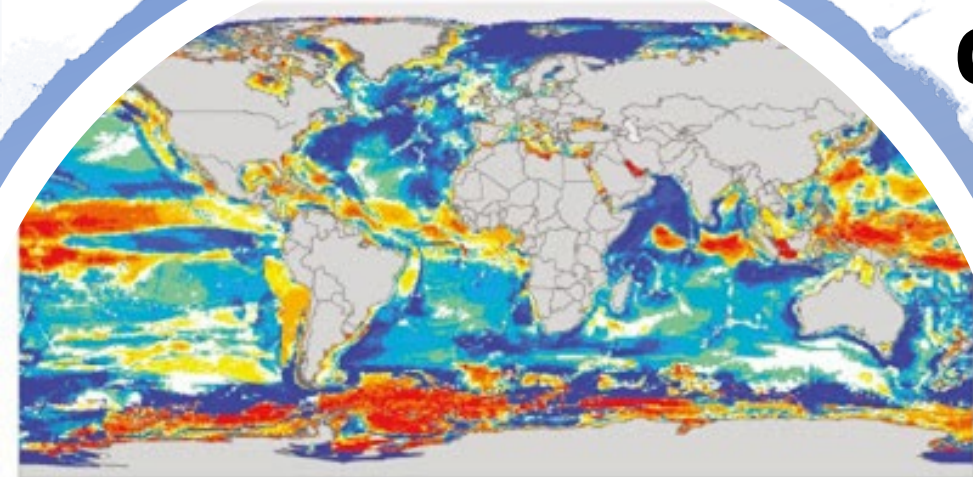
Adaptive management: Cuba



- Banned set nets and bottom trawls
- Closed season in main spawning areas
- Catch limits during spawning season.

Principle 1: Establish & promote effective management & governance

Principle 2: Plan ahead for change

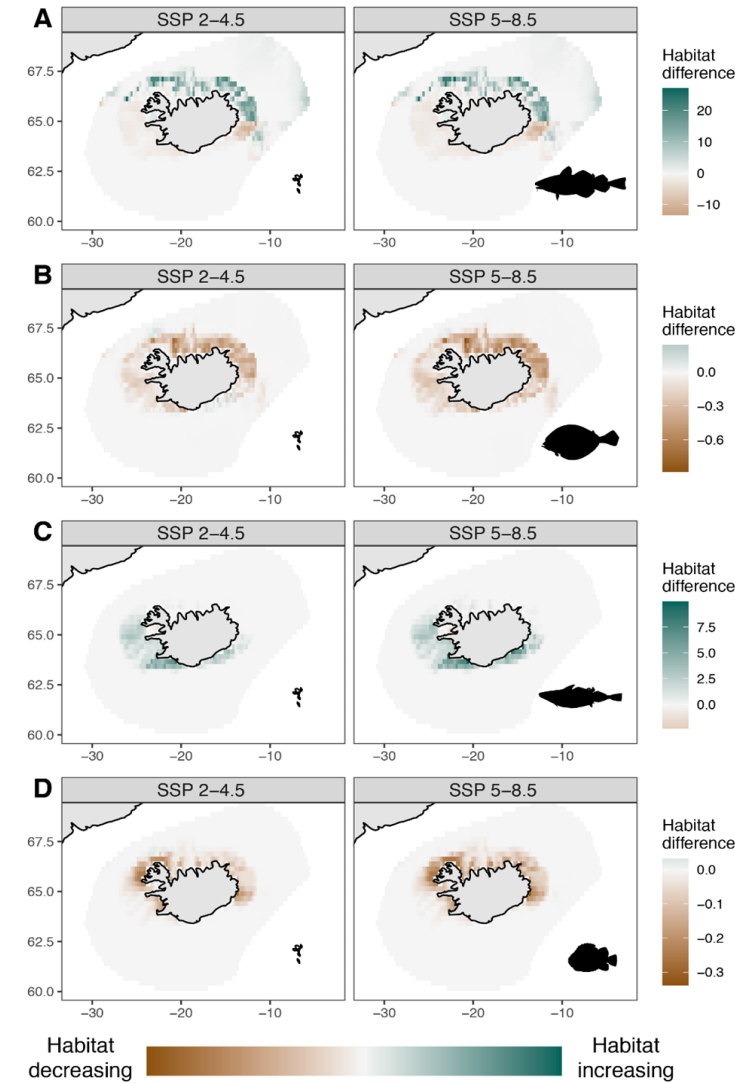


- Adequate understanding of future changes can help managers plan and prepare
- This will help with adaptive management and will require:
 - **Data collection at appropriate scales**
 - **Research and models**

Research & models: species shifts around Iceland

Data-rich system:

- Modeling shifts in distribution and abundance
- Stakeholders provide feedback and assess readiness for potential changes
- Allow managers and industry to plan ahead



Principle 3: Enhance Cooperation Across Borders



Manage transboundary stocks:

- Characterize species shifts across borders
- Anticipate consequences of shifts
- Cooperate to reduce risks of overfishing and inequitable outcomes

Manage transboundary stocks: The EU

EU's catch allocation is static, but fish stocks have shifted drastically

- 2017 EDF-ICES workshop to consider implications of species shifts on fisheries management

ECOGRAPHY

Research

Changing fish distributions challenge the effective management of European fisheries

Alan Ronan Baudron, Thomas Brunel, Marie-Anne Blanchet, Manuel Hidalgo, Guillem Chust, Elliot John Brown, Kristin M. Kleisner, Colin Millar, Brian R. MacKenzie, Nikolaos Nikolioudakis, Jose A. Fernandes and Paul G. Fernandes



Principle 4: Improve Ecosystem & Institutional Health

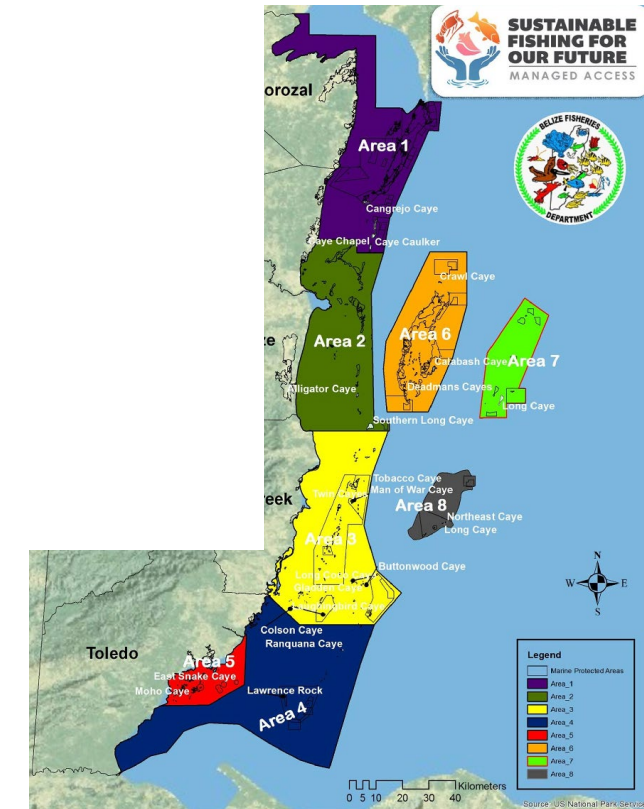
Consider wider socio-economic and ecosystem components:

- Healthy ecosystems and human institutions are more resilient



Considering ecosystem components in Belize

- Area-based cooperative pilots
- Expansion of Managed Access
- Data-limited multispecies management
- Enhancement of National fisheries policy
- Recognition of inter-connectedness of reef health and fisheries

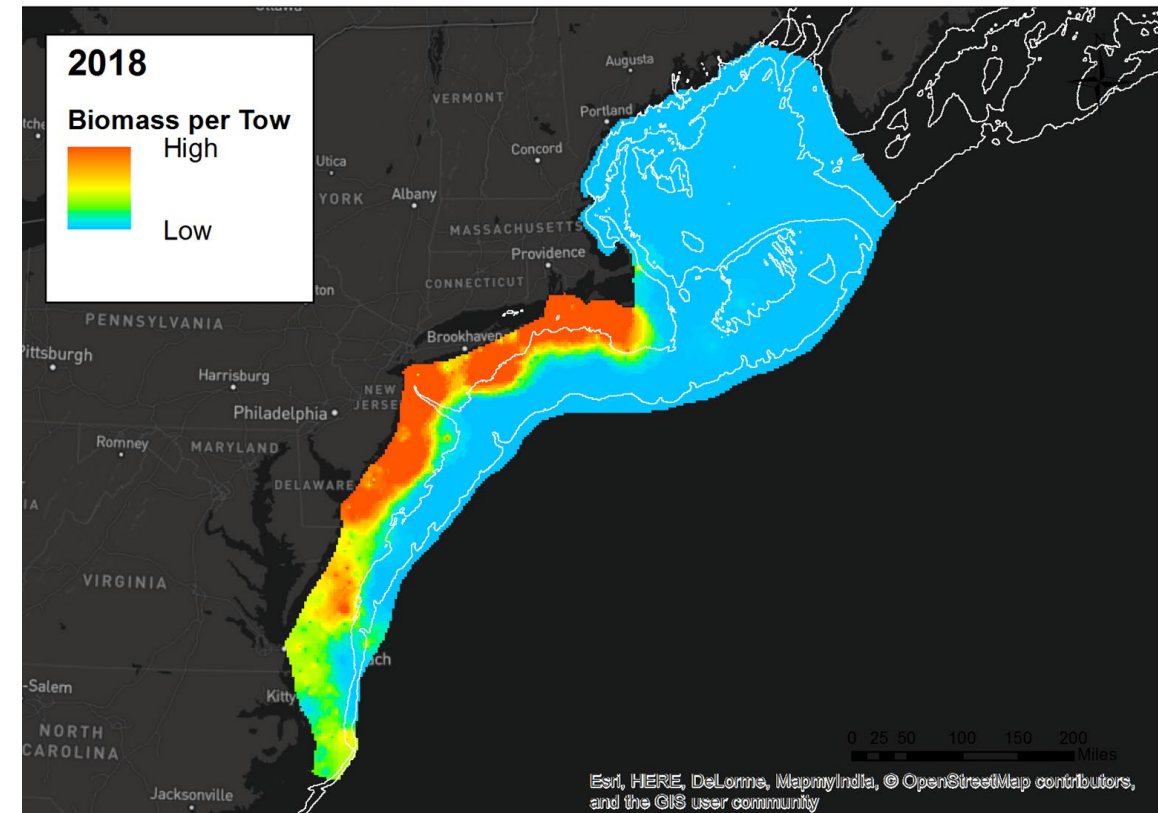
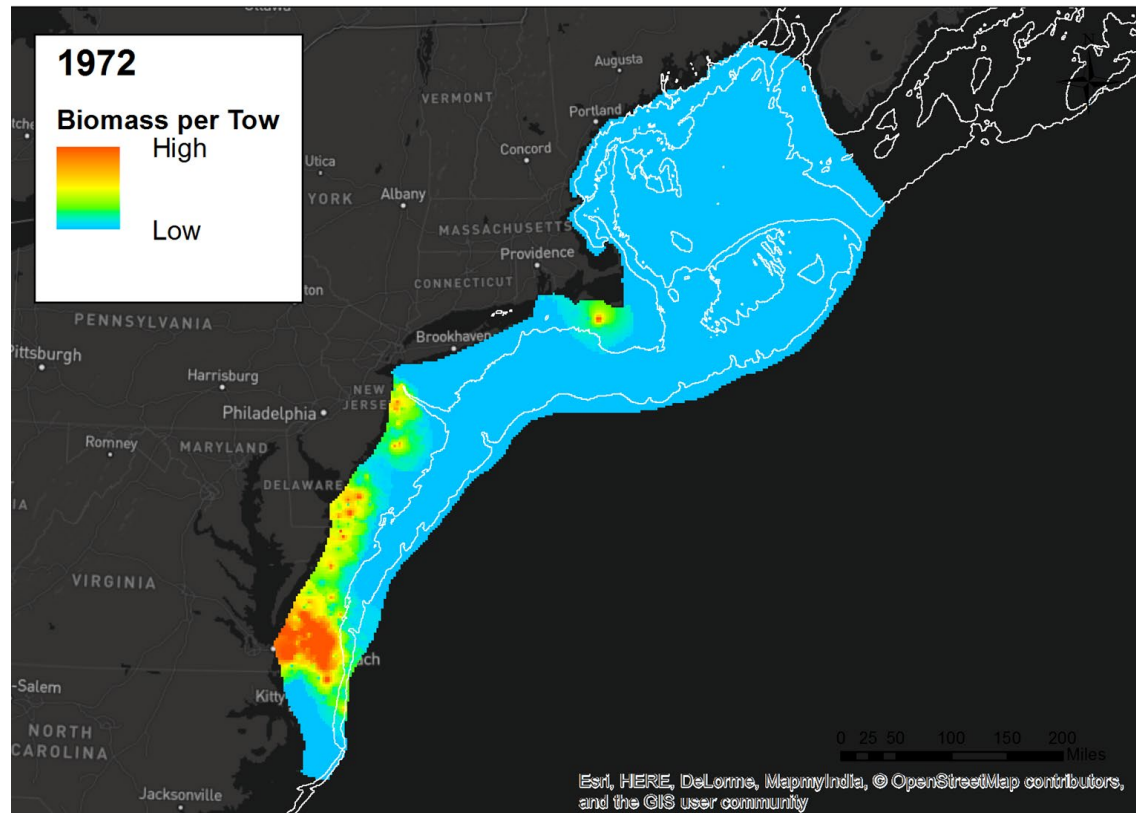


Principle 5: Uphold Principles of Fairness and Equity



- Inequity → conflict and lack of compliance → resource depletion and loss of resilience
- To promote resilience we need:
 - Participatory processes
 - Designs consider equitable outcomes

Designs that consider equitable outcomes: US East Coast



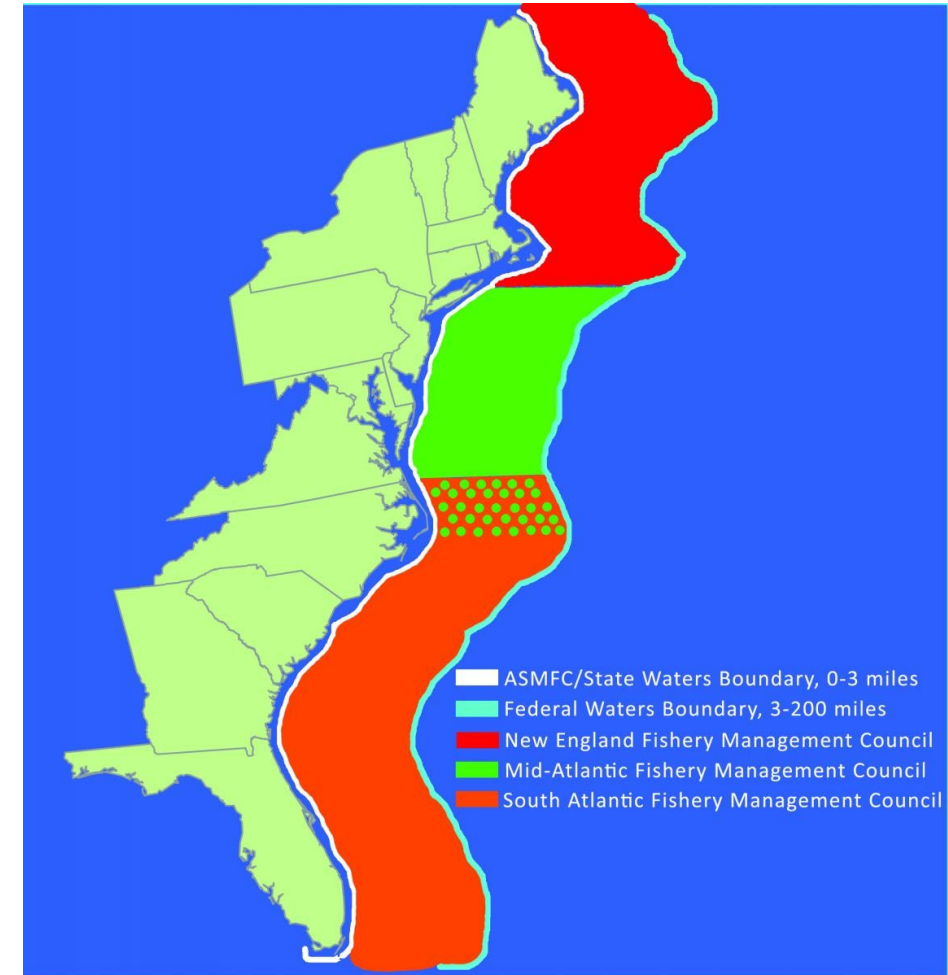
Black sea bass range shifting northward.

Changing allocations to account for fish movements could reduce costs and increase fairness.

Designs that consider equitable outcomes: US east coast

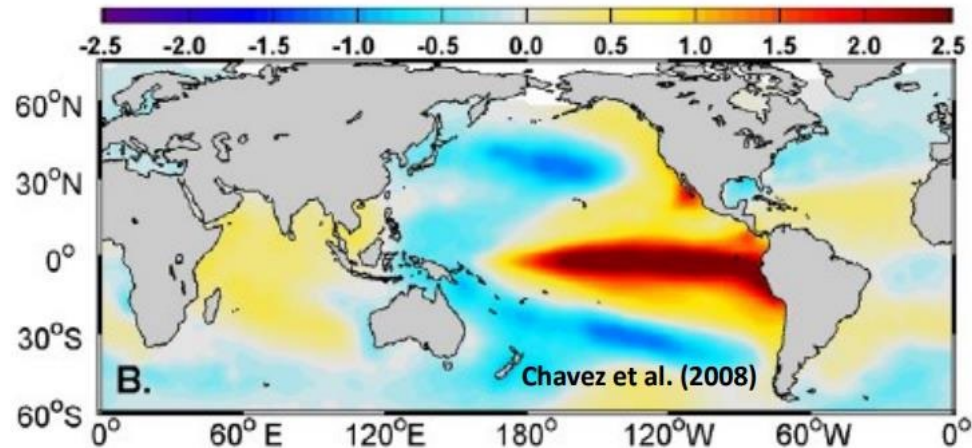
Lenfest Shifting Stocks project:

- Retrospective analysis of allocation policies
- Assessing socio-economic benefits and tradeoffs



Most efforts will be a combination of these pathways: Humboldt Current

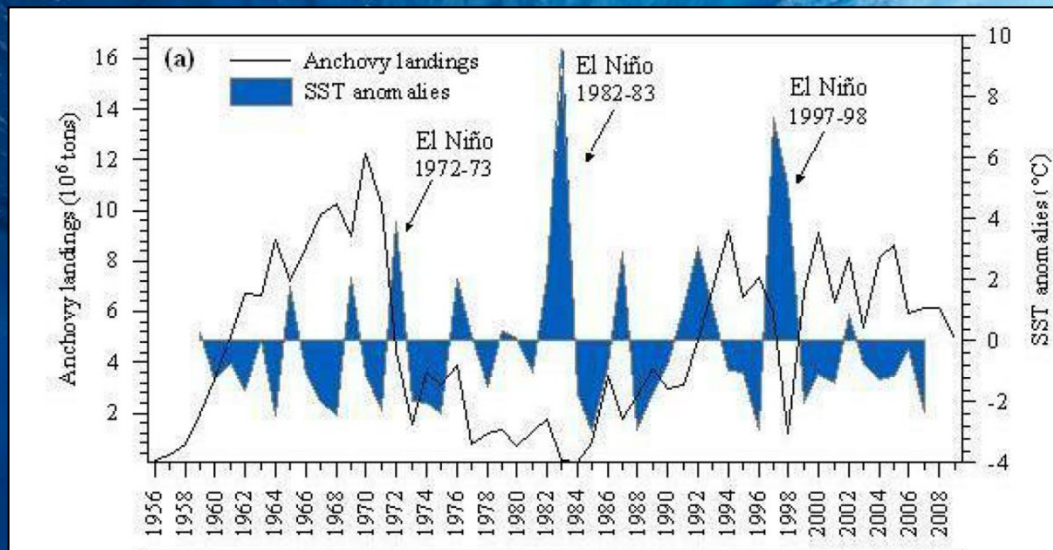
*Achieving climate resilient fisheries through the development of a comprehensive system for ocean observation, prediction and early warning
"SAPO"*



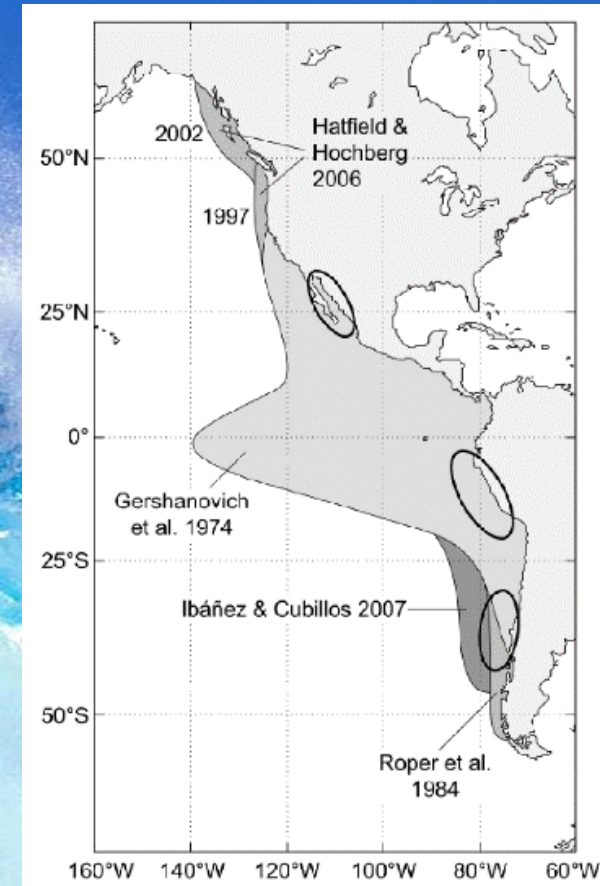
INSTITUTO DE
FOMENTO
PESQUERO



Humboldt Current System: high variability and high productivity



Schreiber et al, 2011

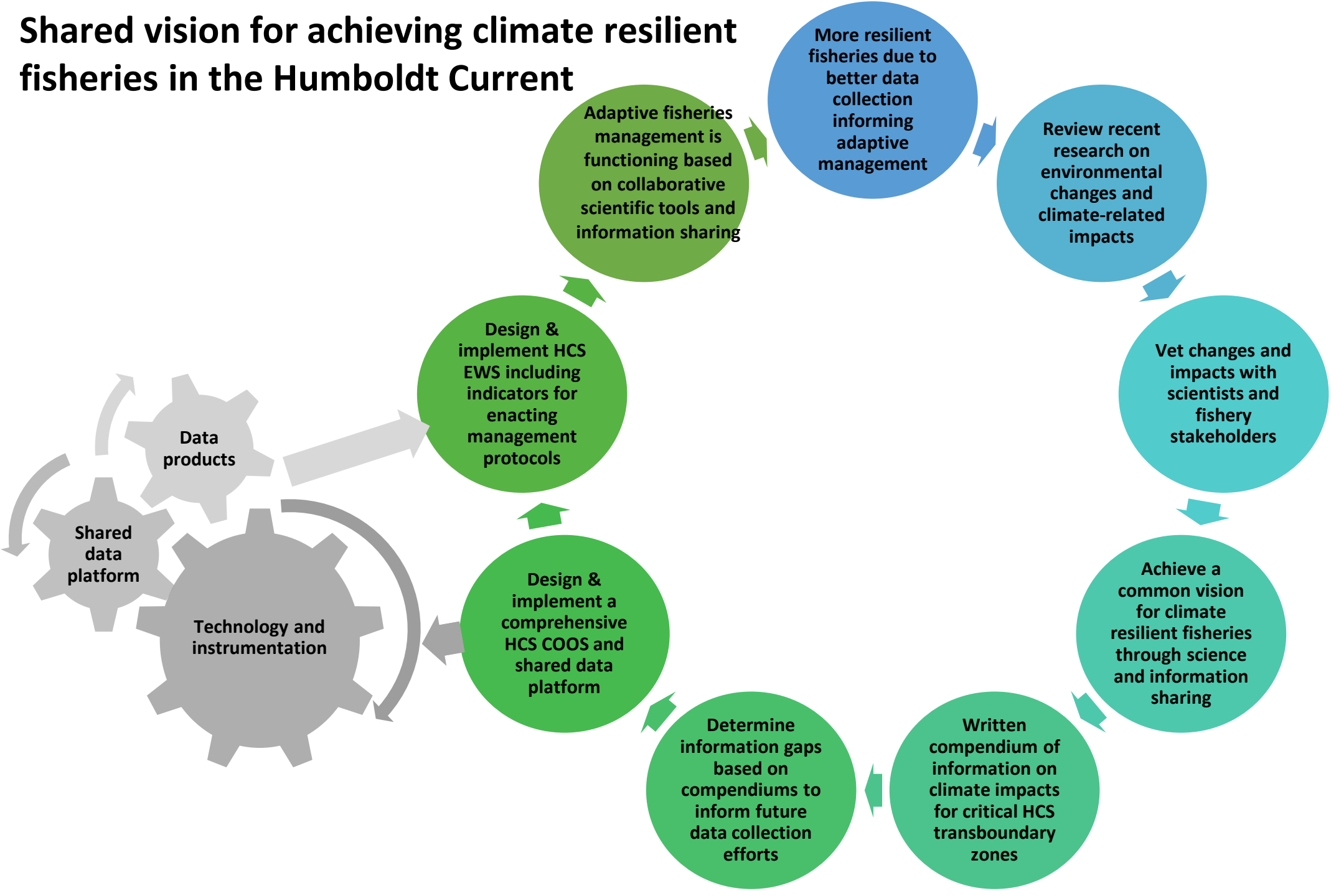


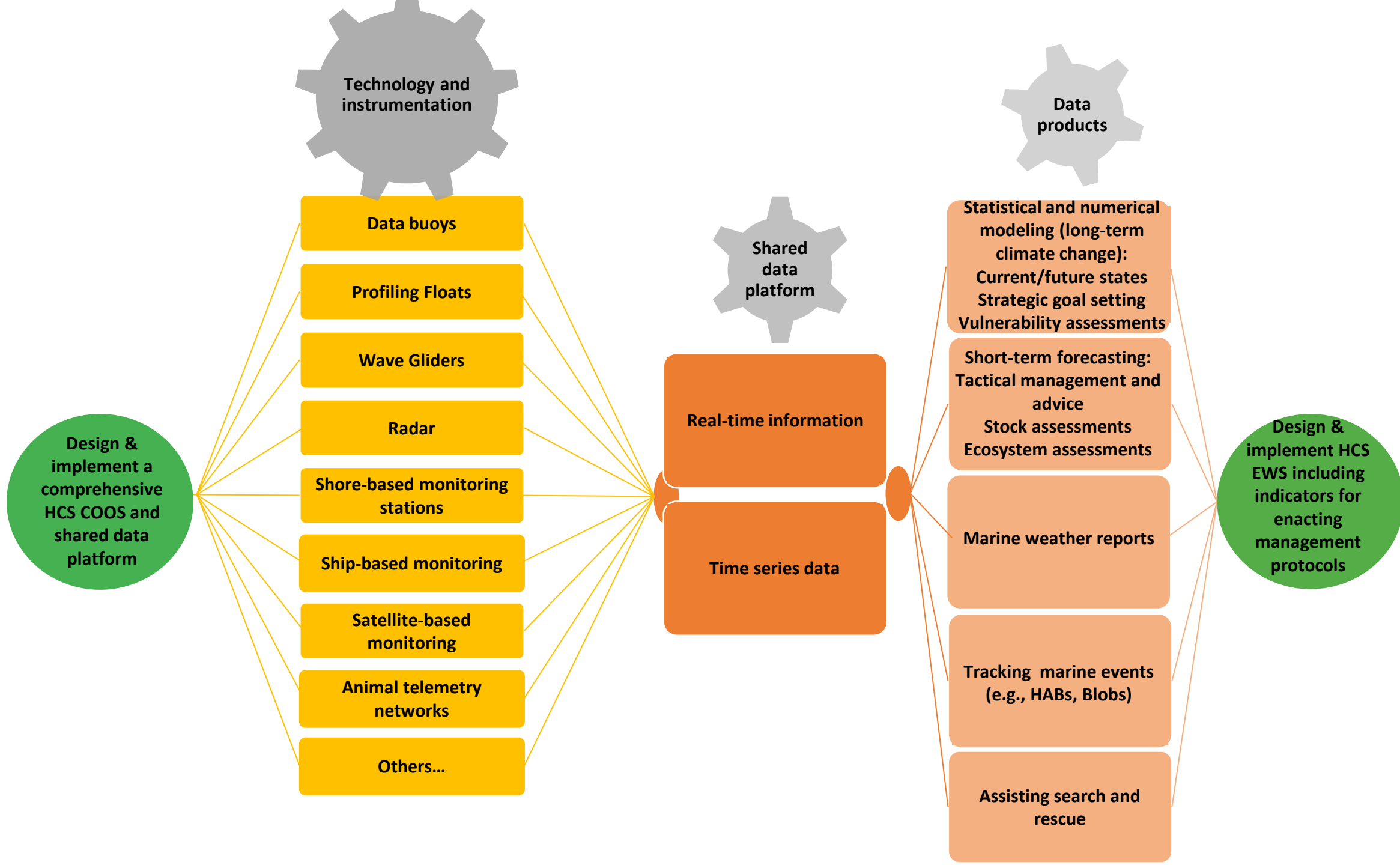
Keyl et al, 2008

Species distributions are changing

Variability is expected to increase

Shared vision for achieving climate resilient fisheries in the Humboldt Current

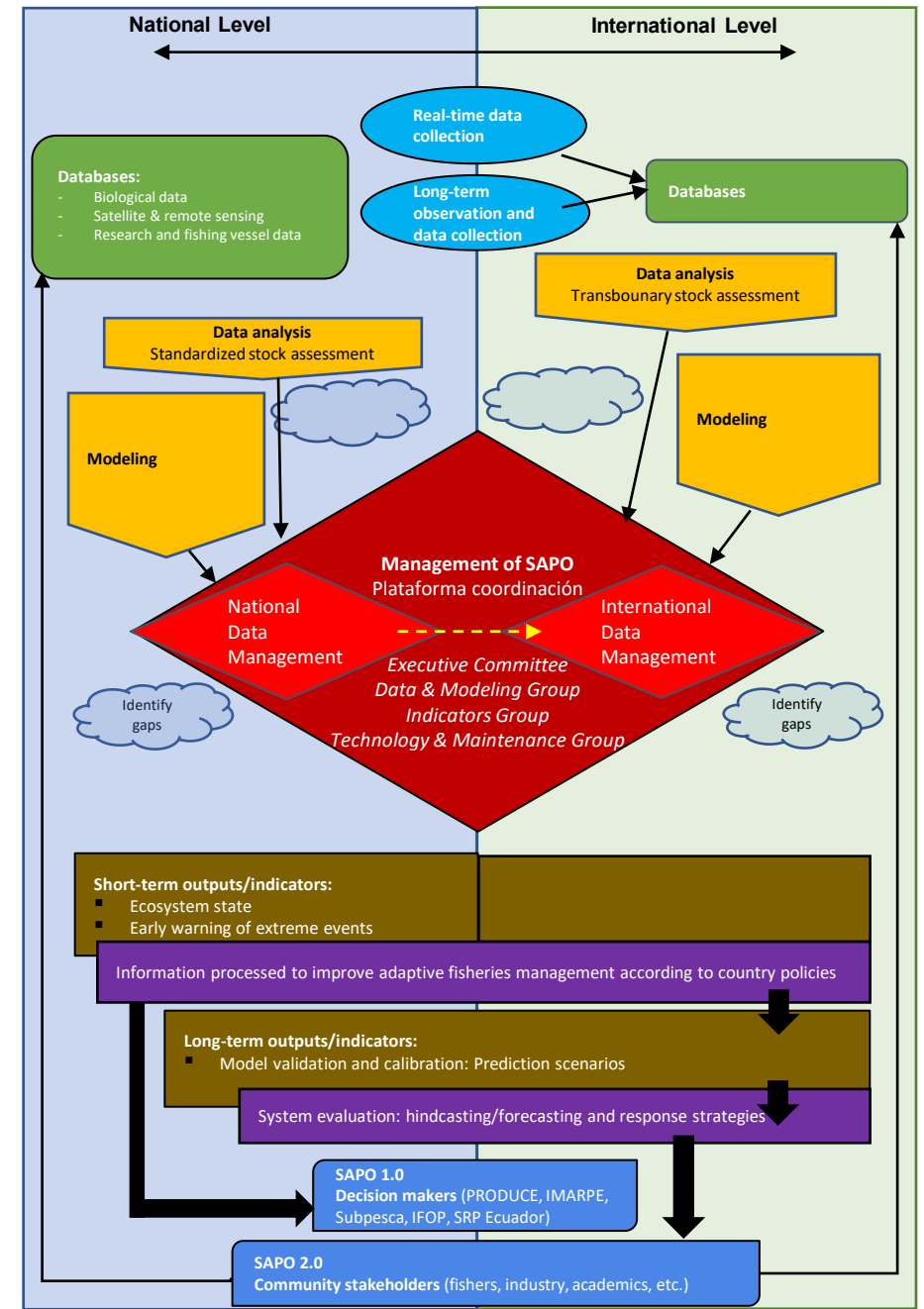
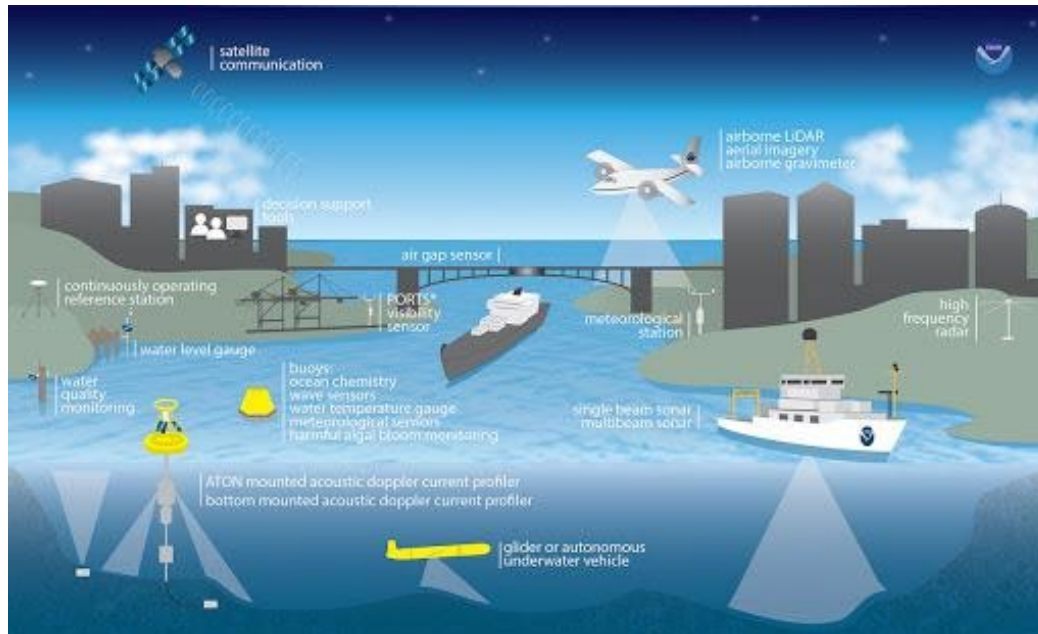




Data collection at appropriate scales:

Humboldt Current "SAPO"

- Data collected at appropriate scales to observe, predict, and provide advanced warning of impacts
- Tri-agency science collaboration: foundation for management at scale



A Climate Resilient Fishery

- 
- A tropical island with palm trees and a boat in the water. The island is lush with greenery, including many palm trees and dense bushes. A small boat with a white canopy is docked at the shore. The water is clear and greenish, reflecting the sky. The sky is blue with some light clouds.
- Science-based management
 - Plans for change
 - Enhanced cooperation across borders
 - Healthy ecosystems and institutions
 - Greater fairness and equity

Thank you!

Questions?

