

Assessing and Managing a Multi-Sectoral Multi-Objective Ocean *Challenges of Integration and Participation*



Anthony Charles

Saint Mary's University

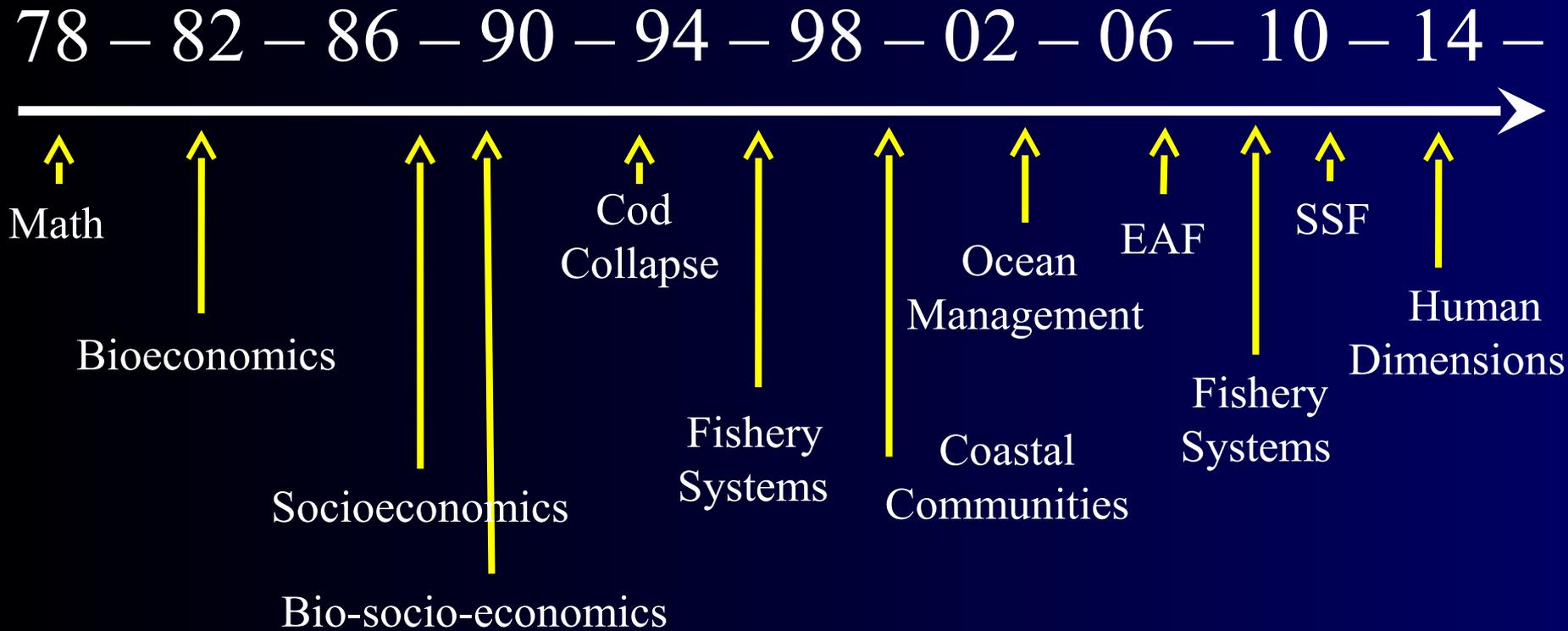
AnthonyCharles.ca

*“Understanding marine socio-ecological systems: including the human dimension
in Integrated Ecosystem Assessments”, 30 May - 3 June 2016, Brest, France*

First, a celebration!!

Transdisciplina rity

A Personal Time-Line



Some Realities

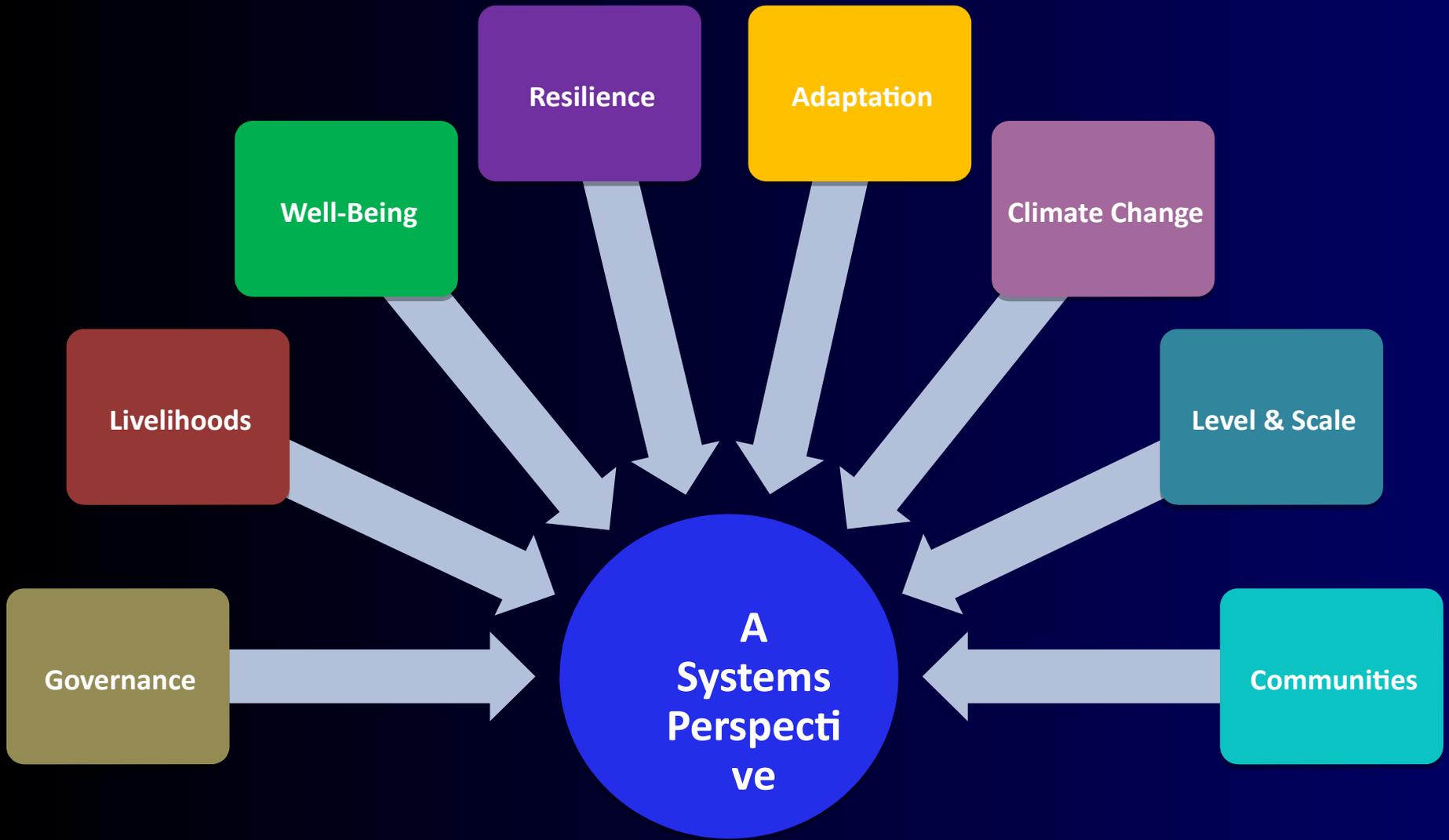
1. Everyone must know their expertise & what they don't know!
2. Expertise in social, economic and management analysis takes years to develop, as for biological and oceanographic studies.
3. So social and economic information cannot suddenly 'appear', but nor is there time to study fishing communities for decades.
4. Given a longstanding lack of attention to using human-focused research in fishery management, some 'catching up' is needed
5. A reminder of topics needing more attention (Eddie Allison):
 - **Power, Ethnicity & Gender, Ethics, Institutions**
 - **And don't forget History!**
6. The challenge of having a career with inter/transdisciplinarity.

Contrasting Views on Integration

1. Avoid human dimensions (Limit to scientific analysis of impacts of ocean users on ecosystems, and vice versa)
2. Limit human dimensions to ‘people processes’ in governance
3. Human goals and human components fully incorporated into analysis and decision making on marine systems...

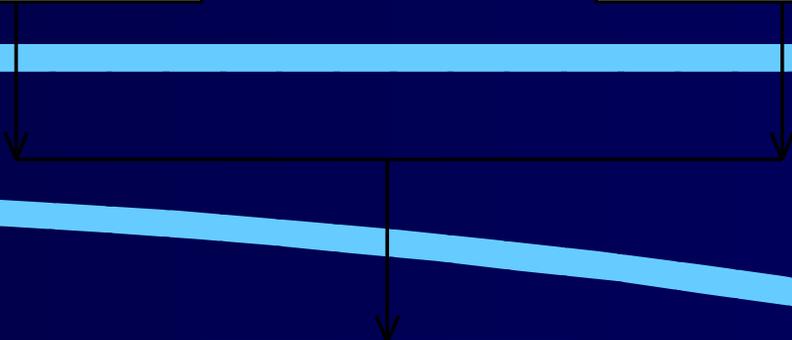


Systems



Resource

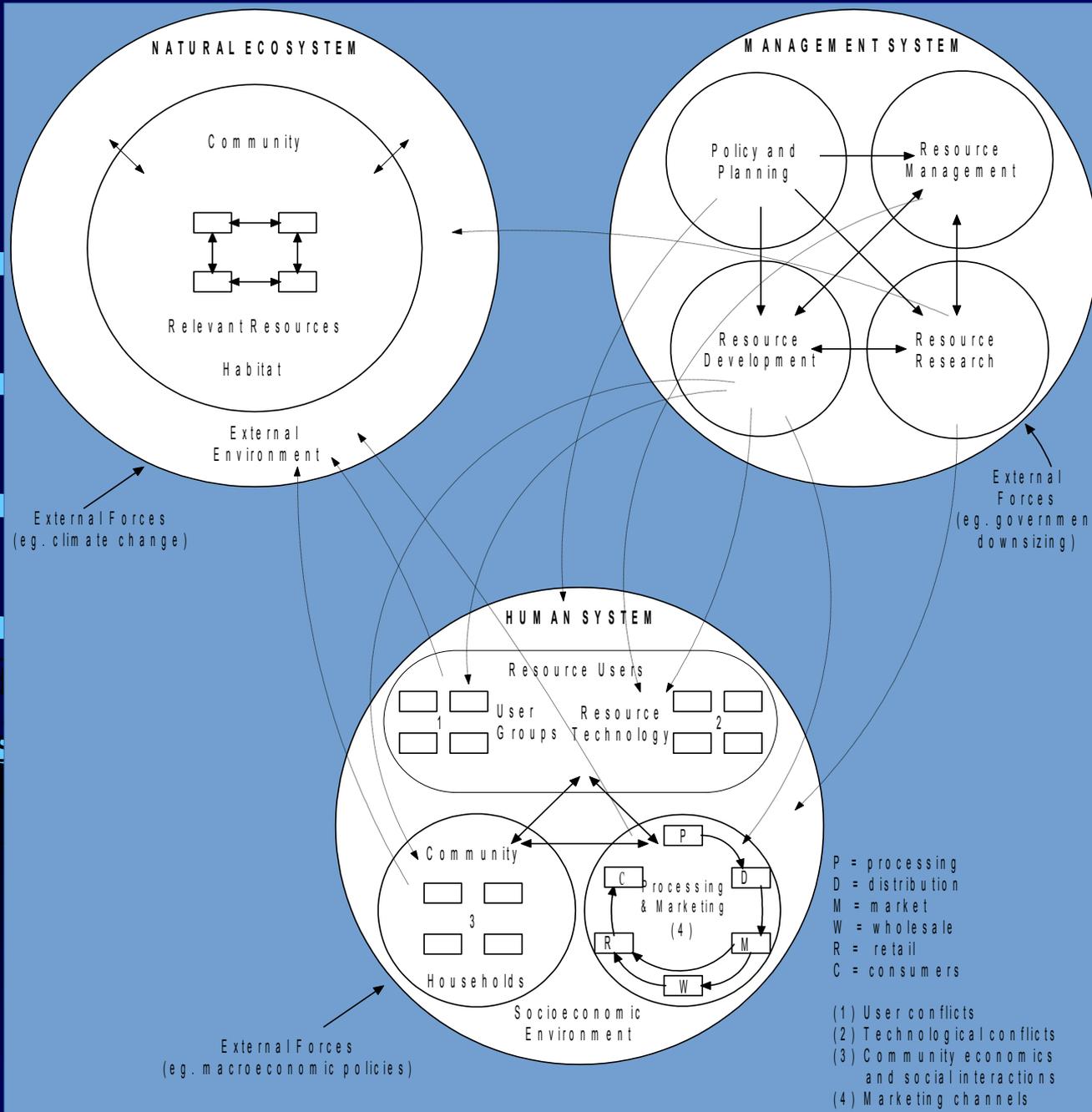
Technology



Resource
Extraction

Market





Adapted
 Charles, S
 Fishery S
 Oxford U



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Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Fishery systems and linkages: Implications for science and governance[☆]

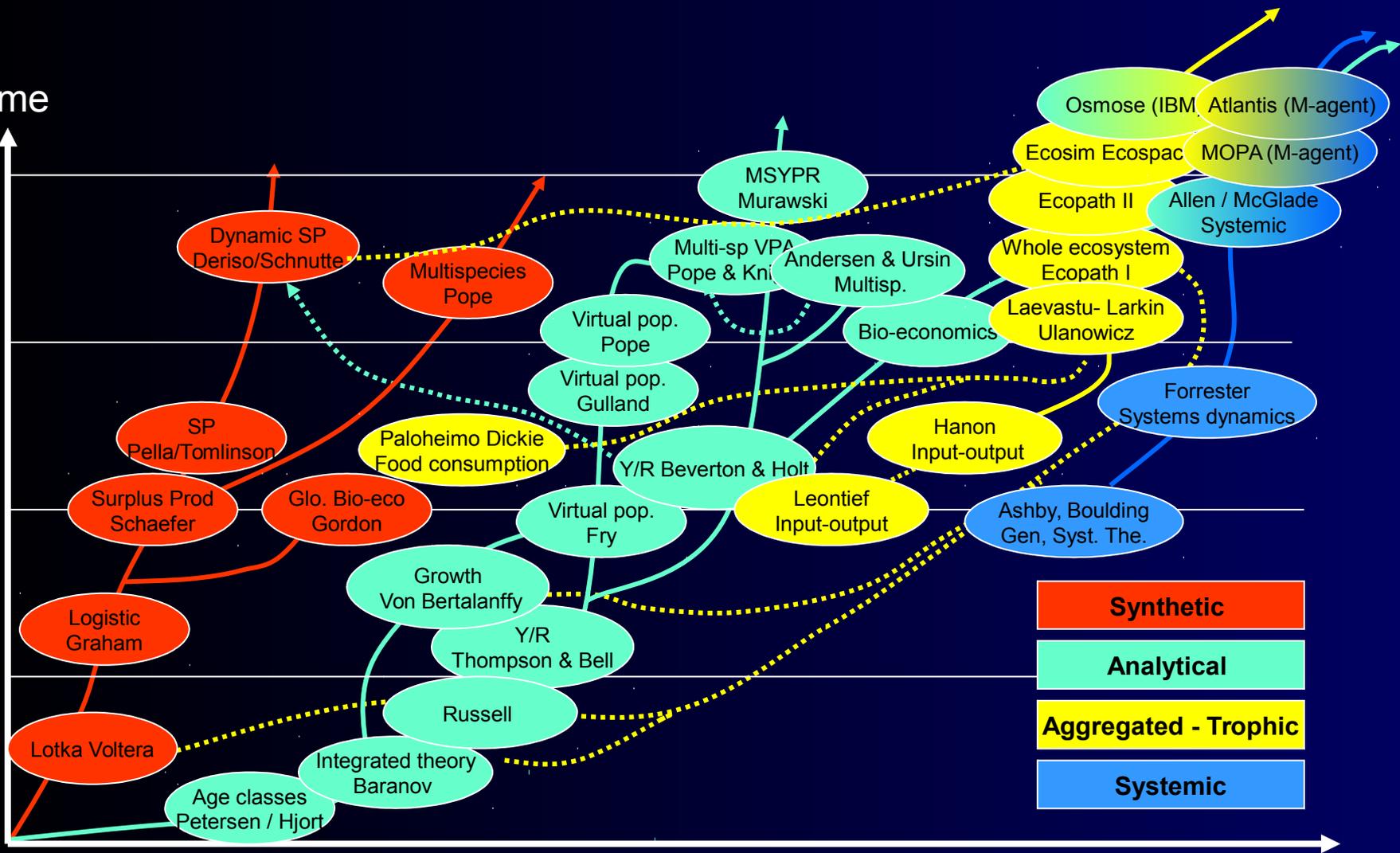
Serge M. Garcia^{a,*}, Anthony T. Charles^b

^a *FAO Fisheries and Aquaculture Management Division, Viale delle Terme di Caracalla, 00153 Rome, Italy*

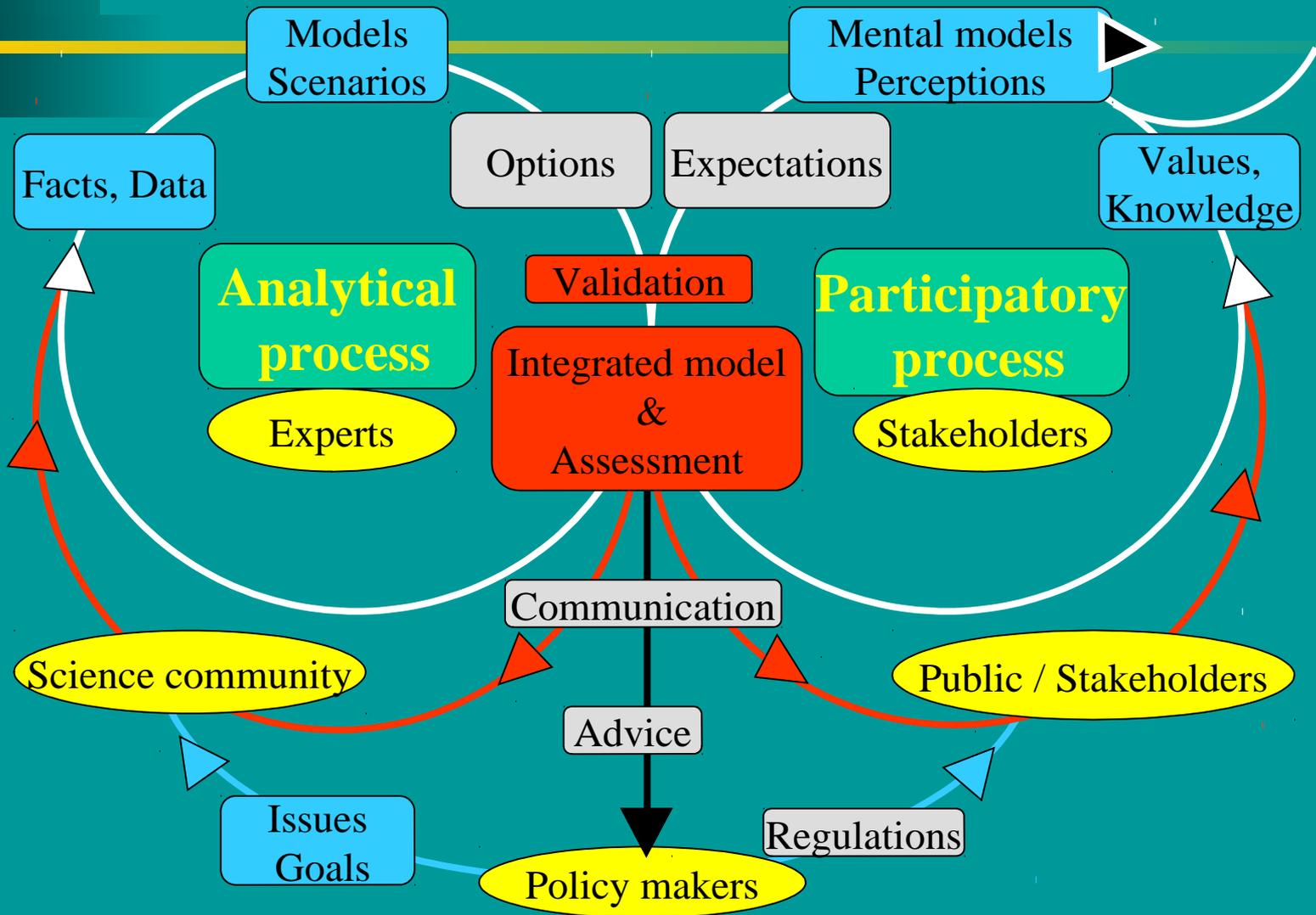
^b *Management Science/Environmental Studies, Saint Mary's University, Halifax, Nova Scotia B3H3C3, Canada*

Time

Complexity



by Serge Garcia



by Serge Garcia

System Drivers of Change

- Climate Change
- Demand Shifts
- Globalization of Markets
- Technological Change
- Urbanization
- Evolving Governance

Progress in Oceanography 87 (2010) 338–346

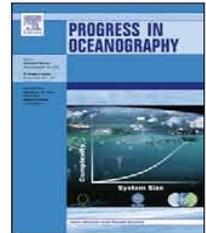


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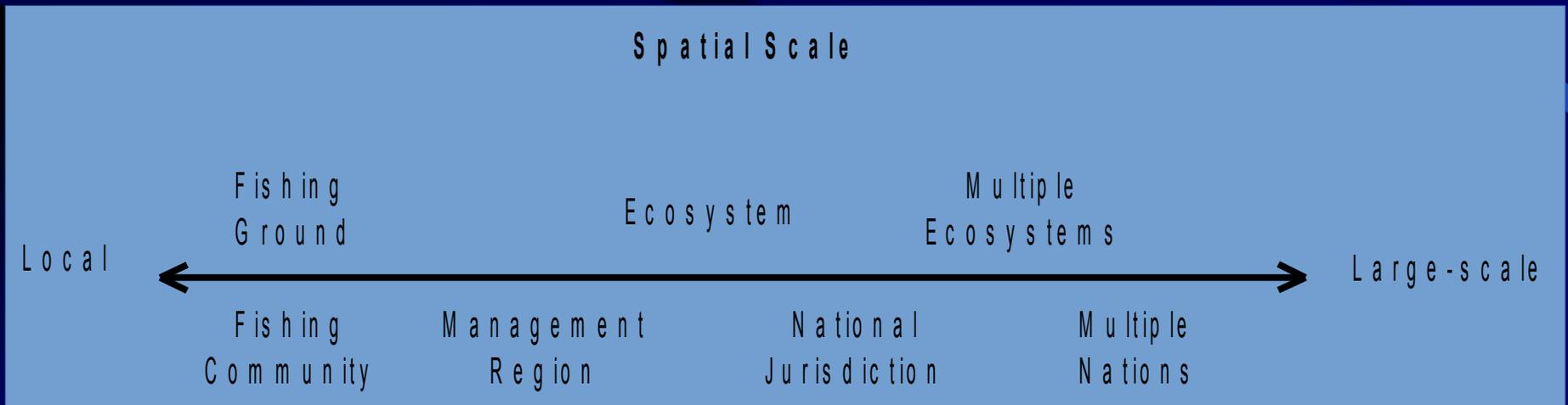
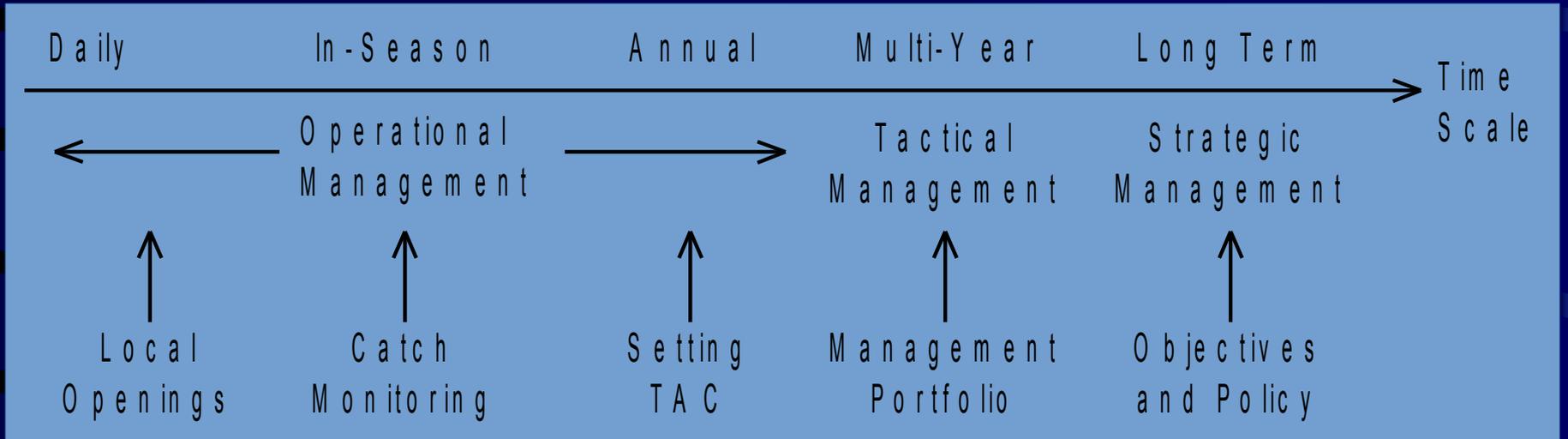


Climate change, uncertainty, and resilient fisheries: Institutional responses through integrative science

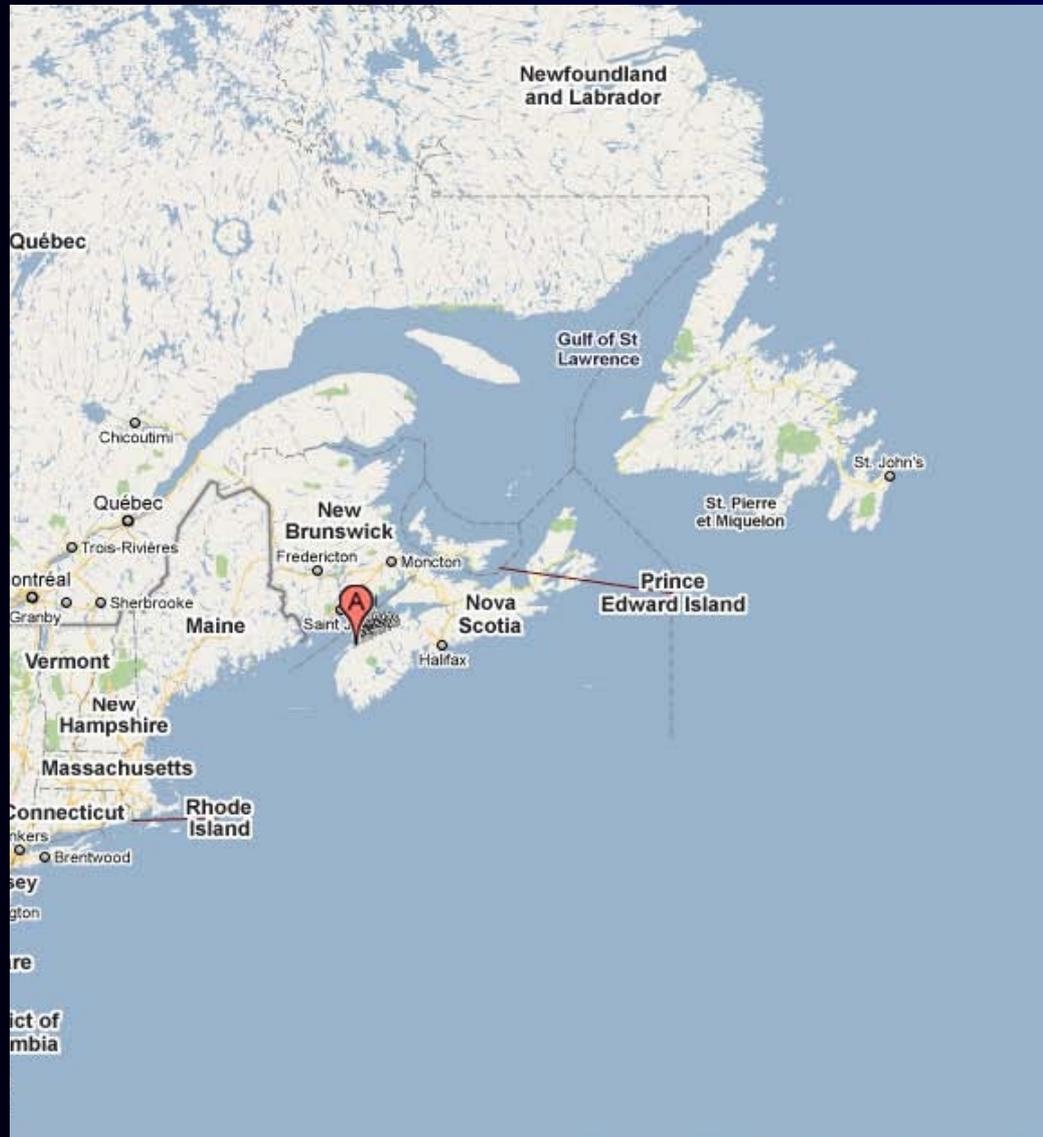
Kathleen Miller^{a,*}, Anthony Charles^{b,1}, Manuel Barange^c, Keith Brander^d, Vincent F. Gallucci^e, Maria A. Gasalla^f, Ahmed Khan^g, Gordon Munro^h, Raghu Murtuguddeⁱ, Rosemary E. Ommer^j, R. Ian Perry^k

Scale

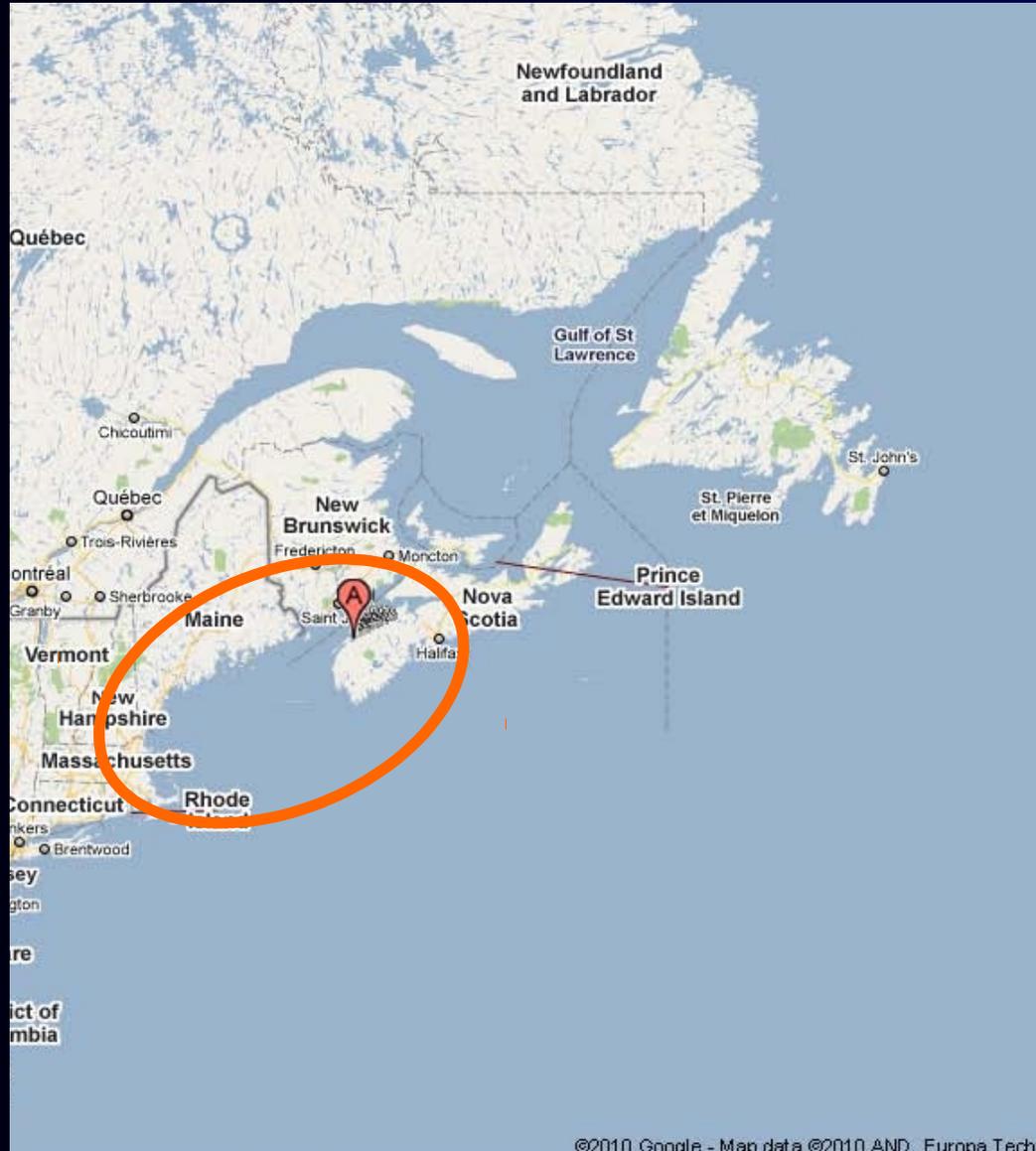
Scale



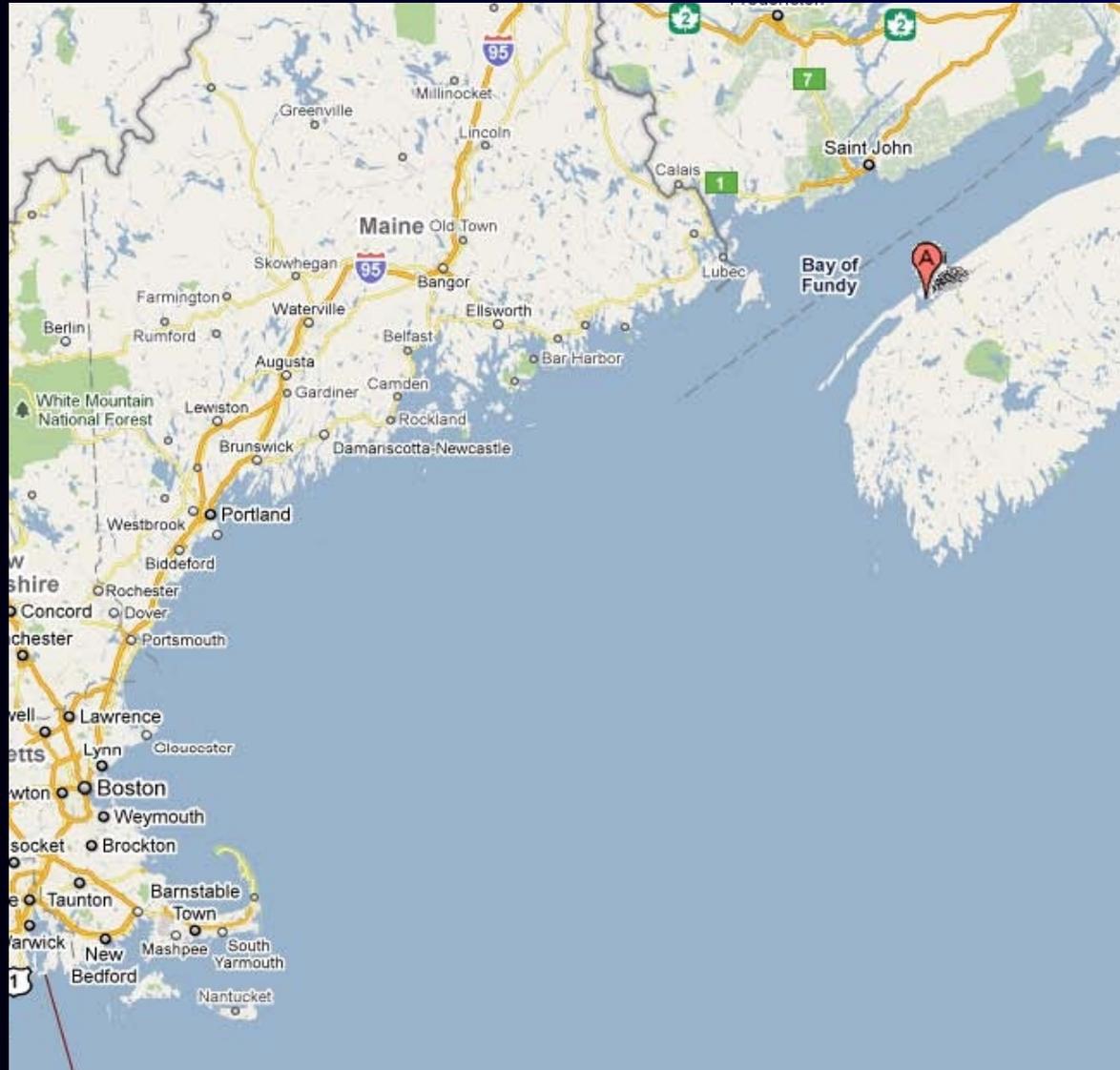
Northwest Atlantic



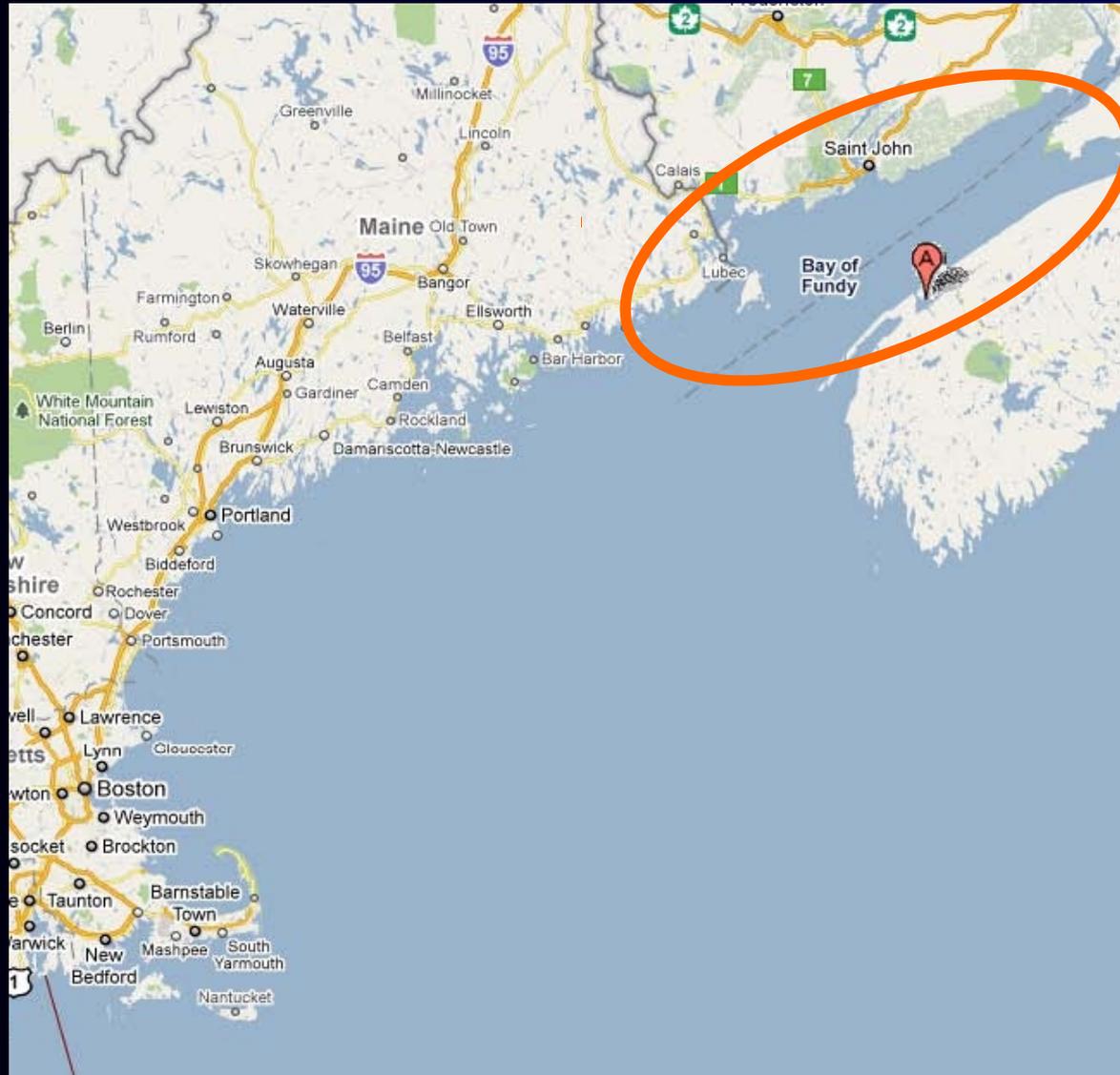
Northwest Atlantic



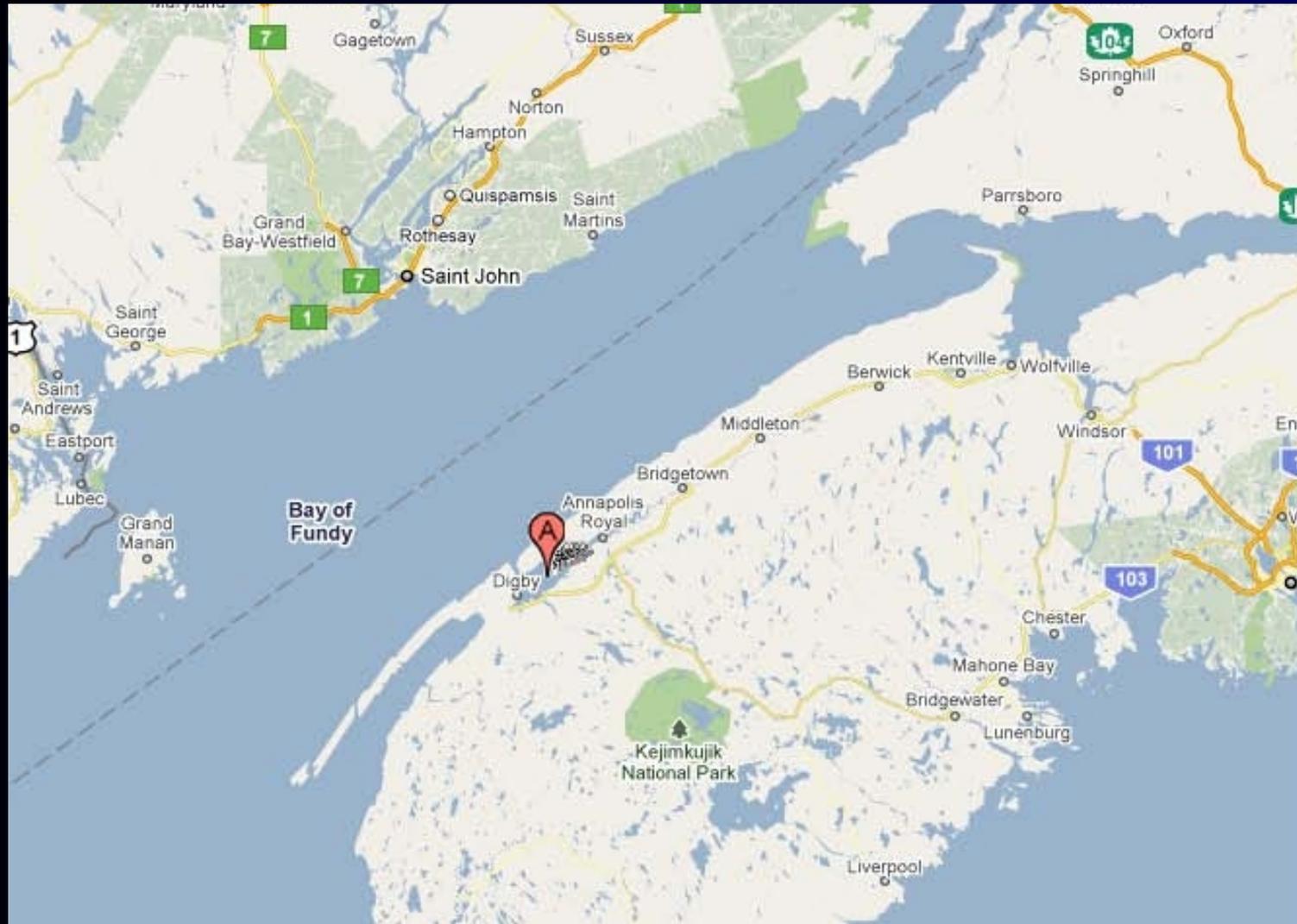
Gulf of Maine



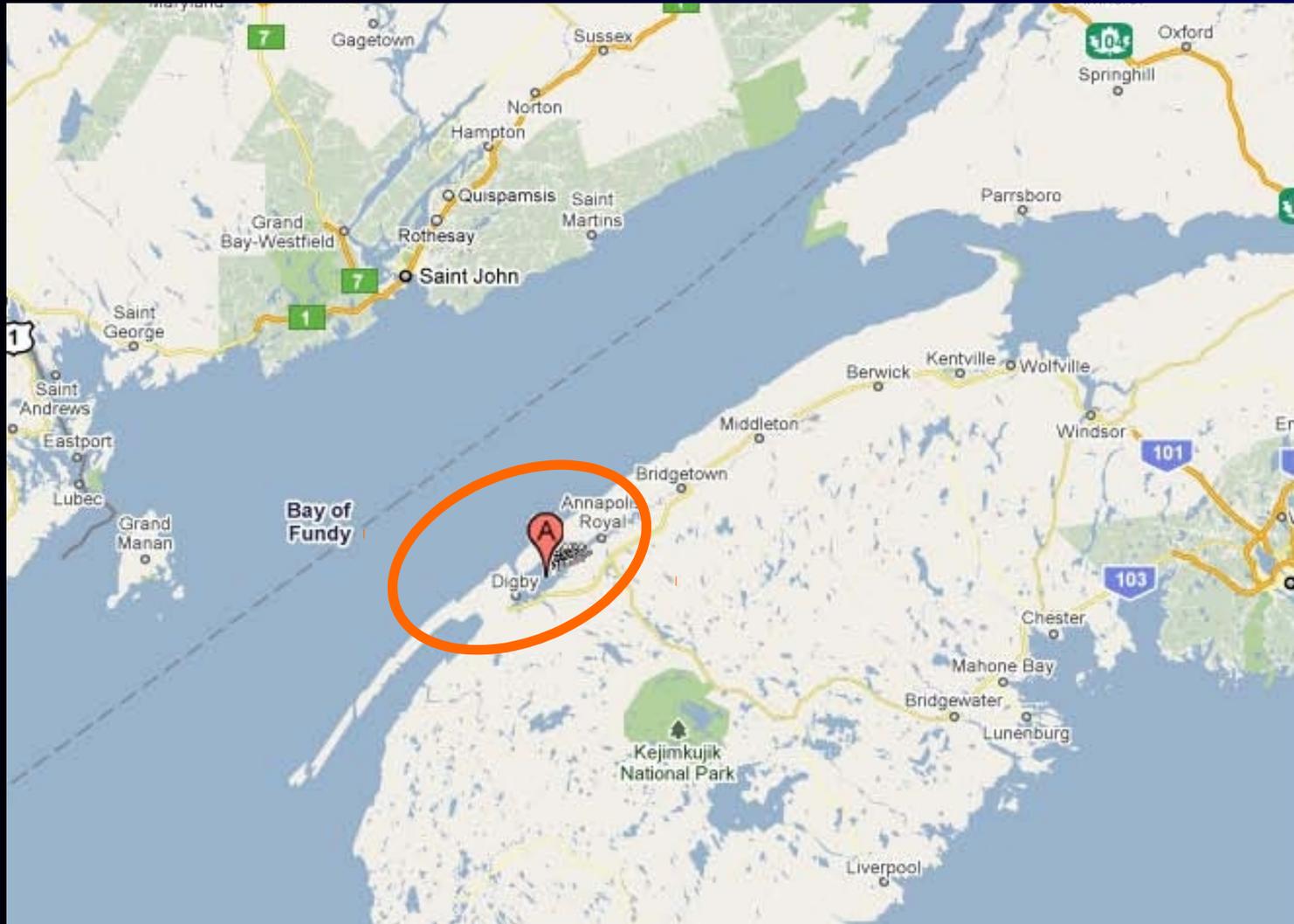
Gulf of Maine



Bay of Fundy



Bay of Fundy



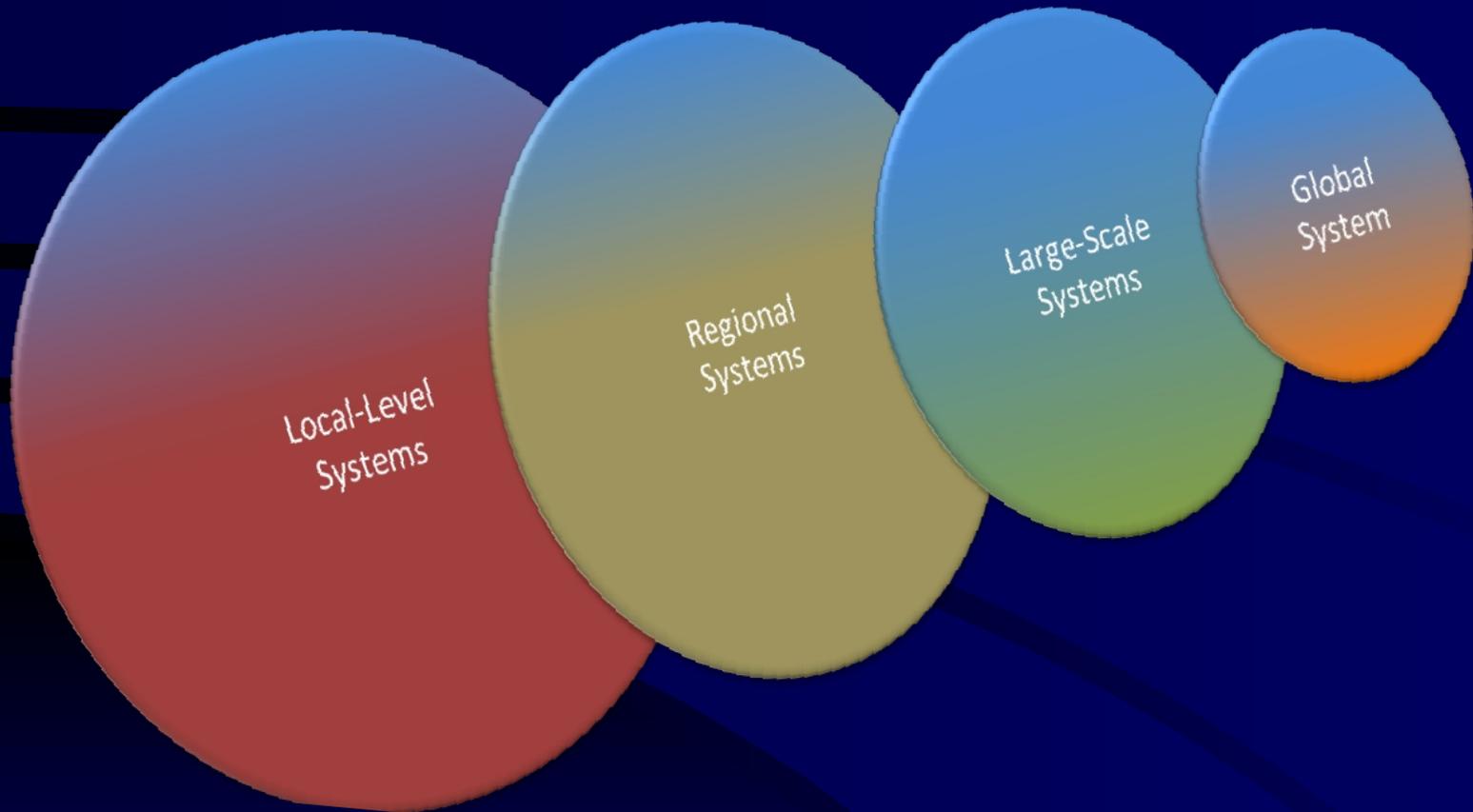
Annapolis Basin, Nova Scotia



Annapolis Basin, Nova Scotia



Organizational Scales



Governance

Values

Values

Intergenerational respect

Importance of place

Valuing community

Building consensus

Food security

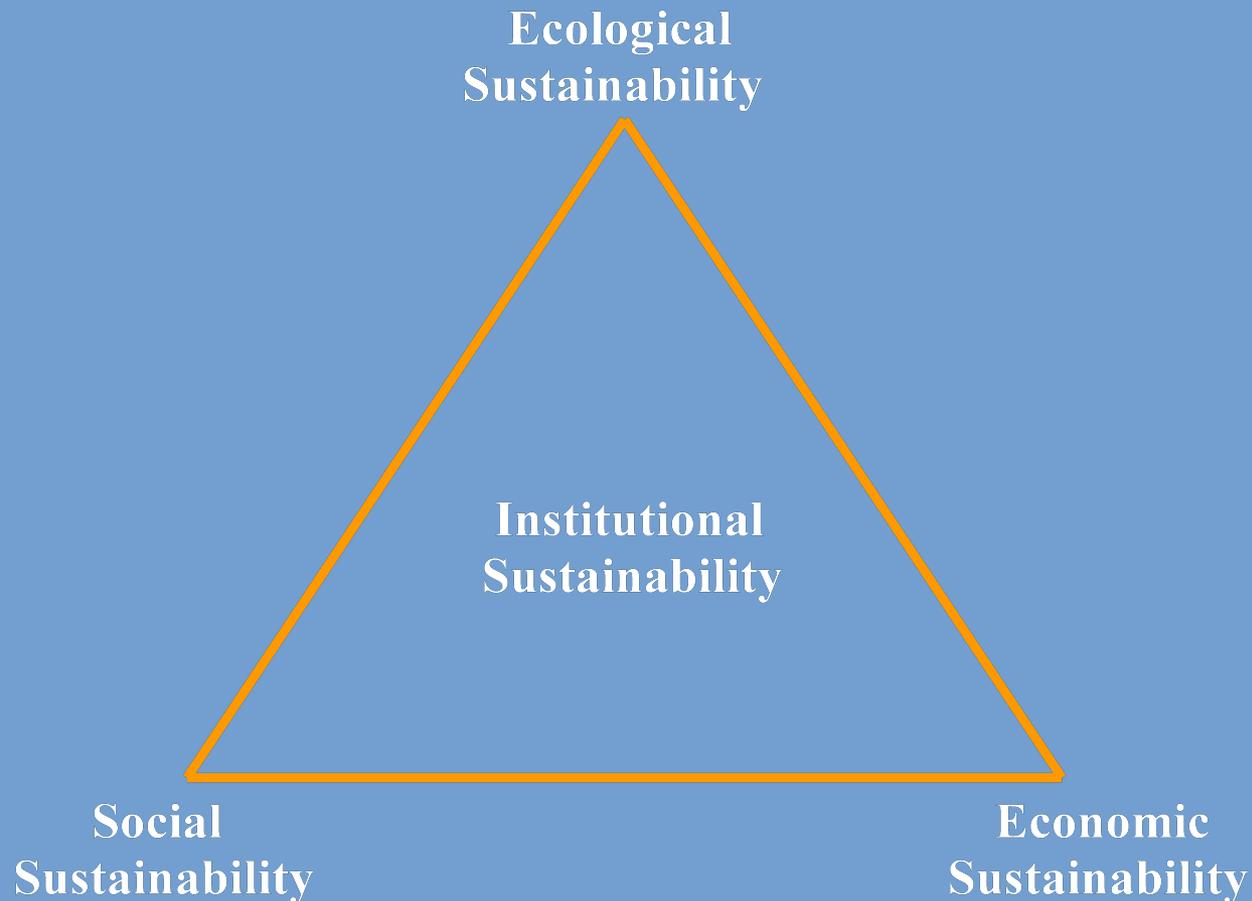
Respect for human rights

Healthy & safe ecosystems and communities

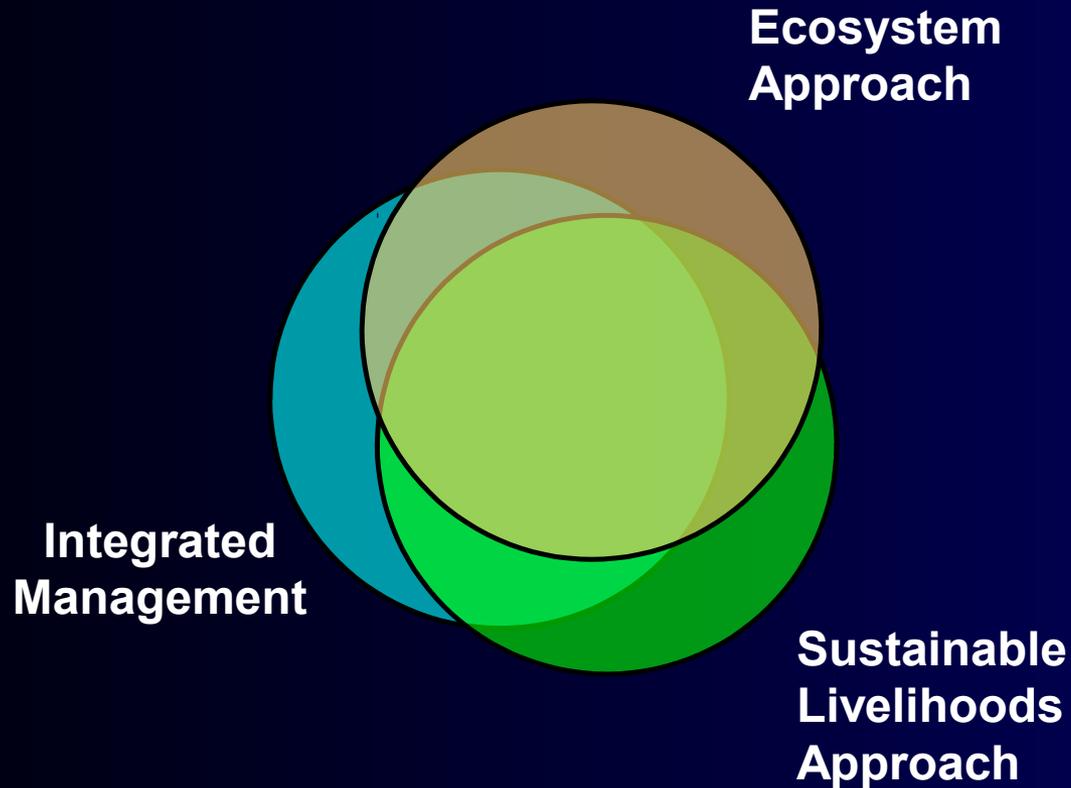
Ecological sustainability

Resilience & diversity

Pillars of Sustainability

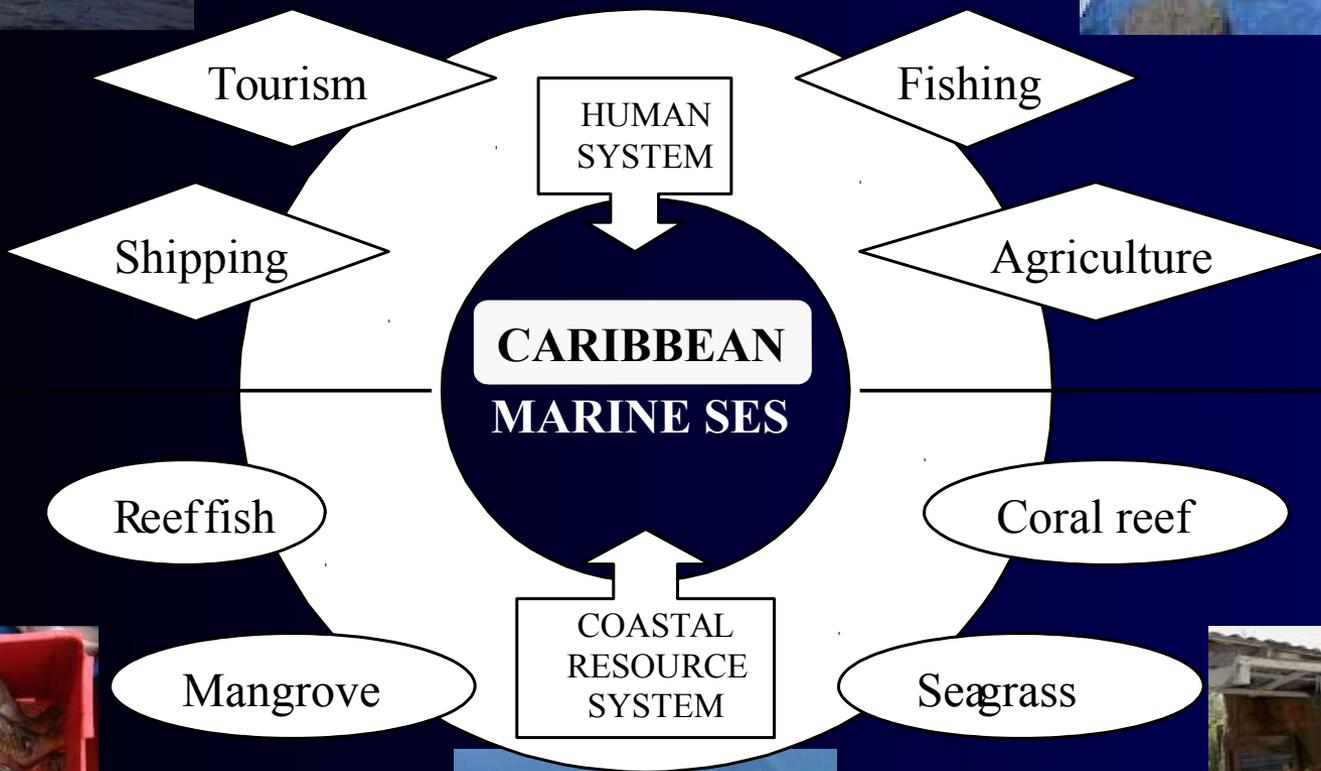


Integrative Frameworks



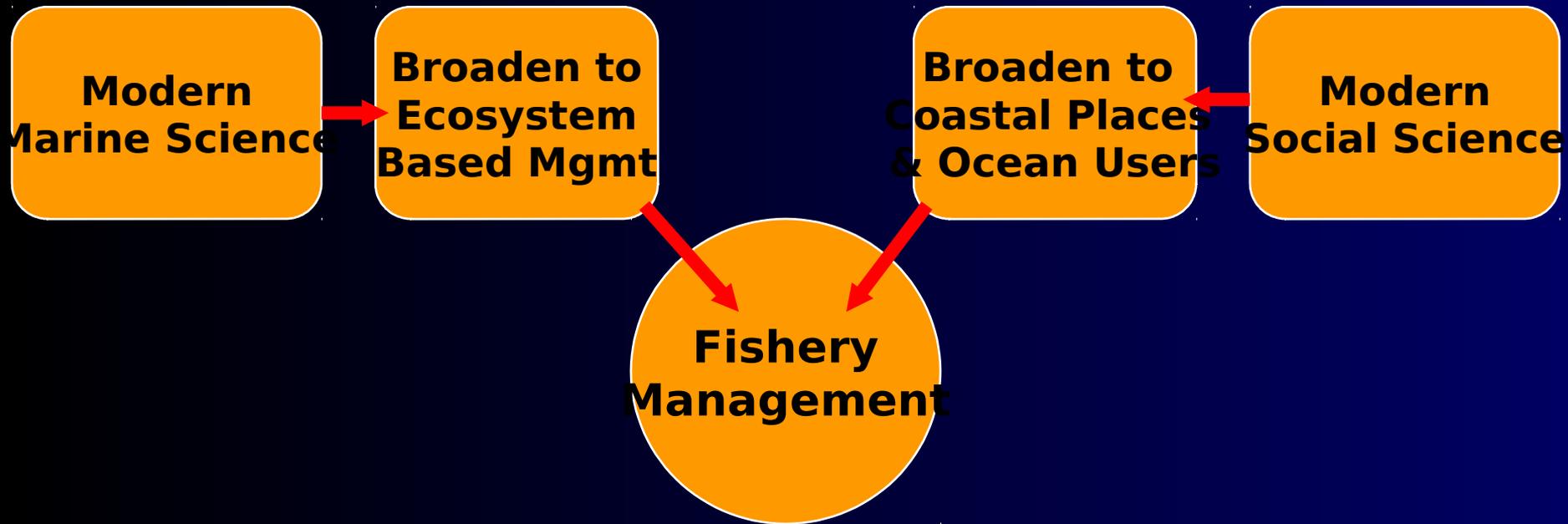


Multi-Sectoral Governance

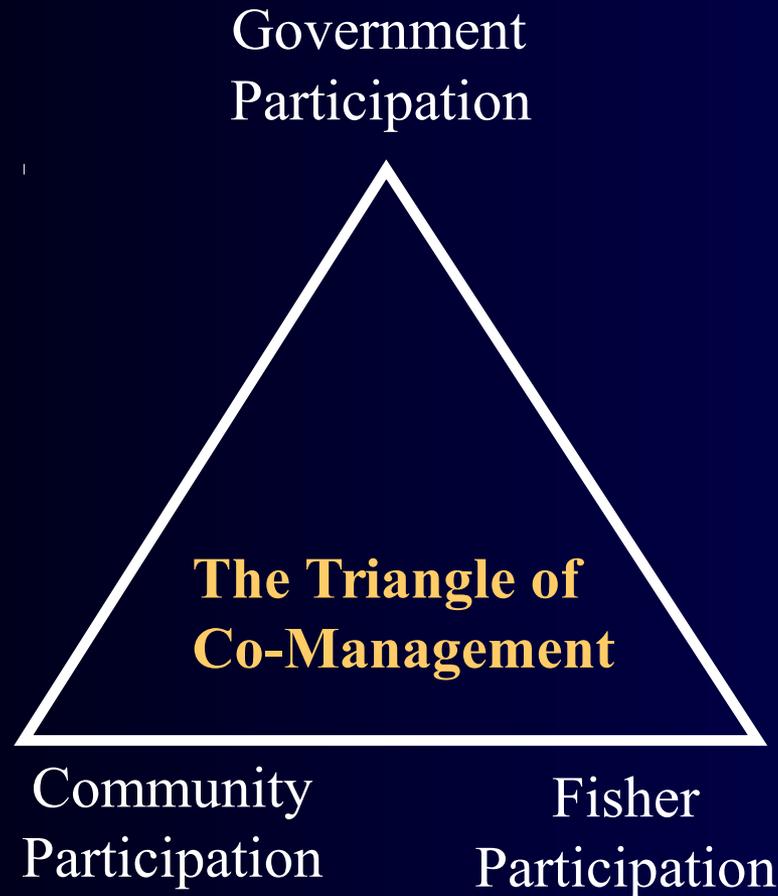


(with P. McConney, UWI Barbados)

Integration



Participation



Community Participation

Community Fisheries Management Handbook



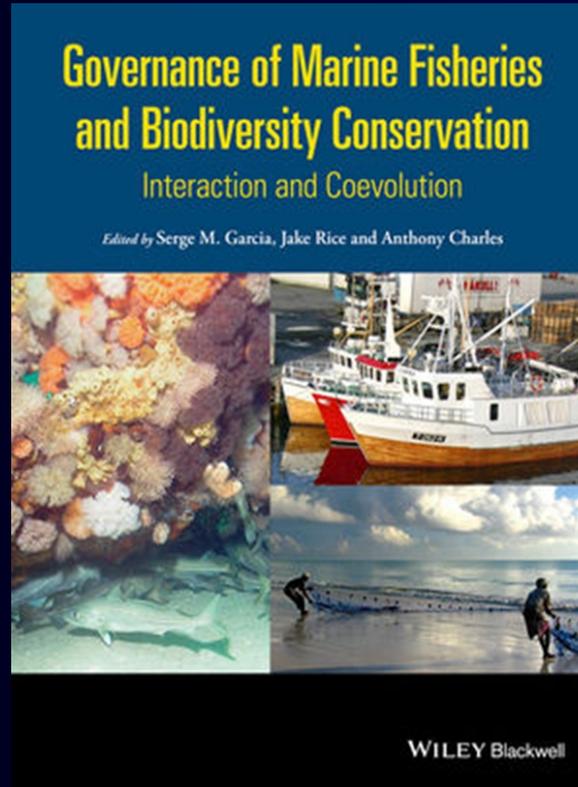
By Jennifer Graham with Anthony Charles and Arthur Bull

Streams of Governance



Fisheries
(management)

...FAO, fishery depts,
fisher organizations



Biodiversity
conservation
...CBD, environment
ministries & ENGOs



How do the streams of governance deal with
the three pillars of sustainable development?

'People Factors' of Successful Management

1. Find Suitable 'Entry Points'
2. Effective Governance is Critical
3. Get the Rights Right
4. Make Participation Meaningful
5. Costs Matter as much as Benefits
6. Support Local Communities
7. Deal with Displacement
8. Shift Underlying Attitudes
9. See MPAs in the Bigger Picture
10. Knowledge has a 'People Side'

Charles, A. and L. Wilson (2009) Human dimensions of Marine Protected Areas. ICES

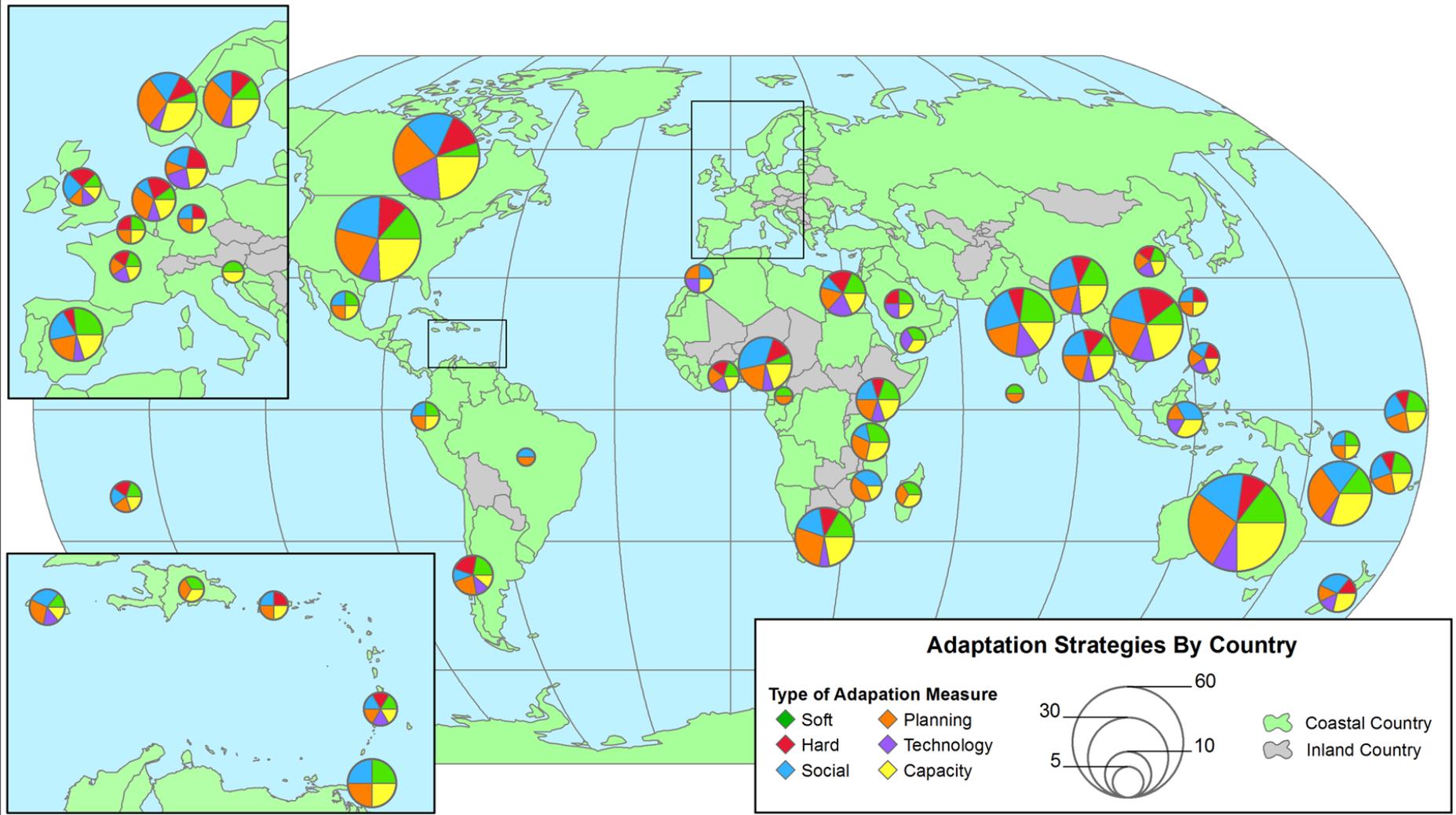
Governance Challenges

- Conflict over boundaries (ecological + human)
- Connecting with policy, legal and institutional realities
- Creating appropriate incentives and rights
- Fitting to the right scale of the system
- Making governance participatory and adaptive.



Managing Climate Adaptation

(Ahmed Khan, Derek Armitage, Anthony Charles)



Ecosystem- Based Management

Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods



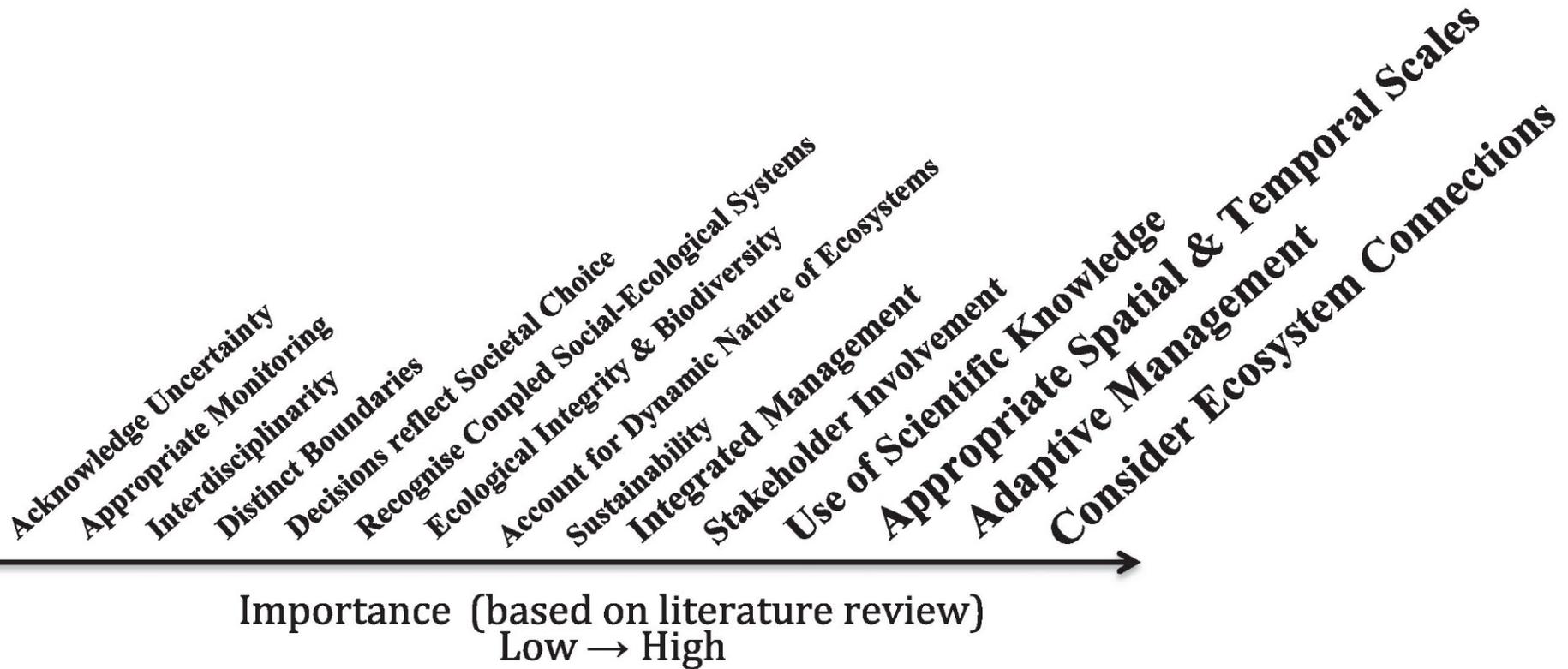
Key Principles of EBM

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

(Long et al., Marine Policy 2015)

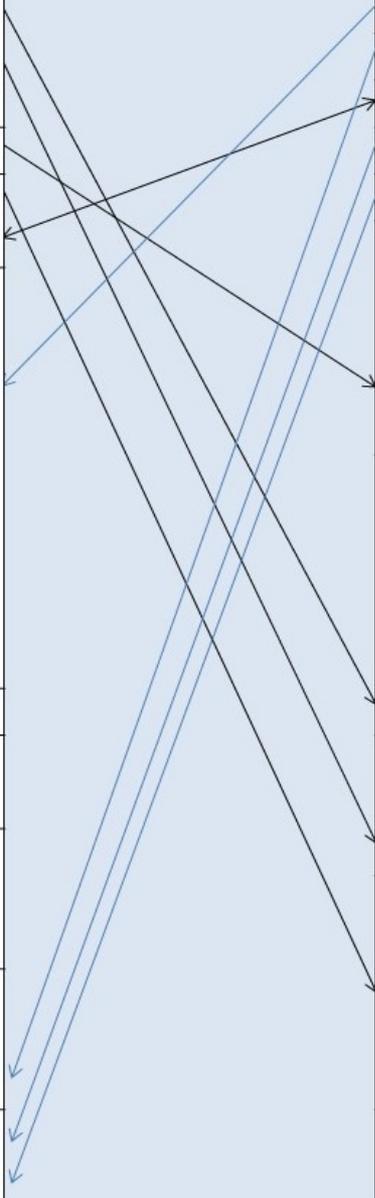
Priorities among EBM Principles

R.D. Long et al. / Marine Policy 57 (2015) 53–60



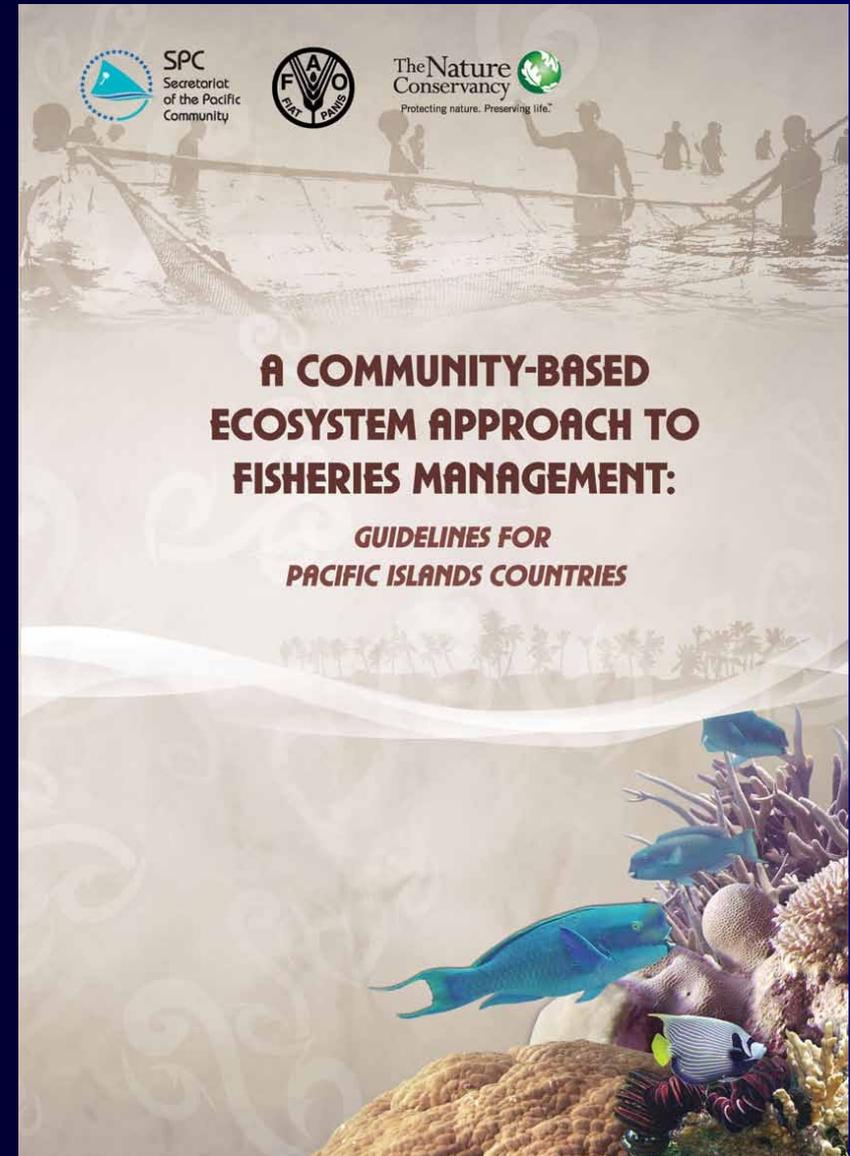
Rank	EBM Theory Publications	Frequency
1	Ecosystem Connections	11
	Appropriate Temporal Scales	11
	Adaptive Management	11
2	Use of Scientific Knowledge	10
3	Integrated Management	9
	Stakeholder involvement	9
4	Dynamic Nature of Ecosystems	8
	Ecological Integrity and Biodiversity	8
	Sustainability	8
	Coupled Socio-ecological systems	8
	Decisions reflect societal choice	8
	Distinct Boundaries	8
	Interdisciplinary	8
	Monitoring	8
	Uncertainty	8
5	Ecosystem Resilience	5
6	Economic context	4
	Precautionary Approach	4
7	Cumulative Impacts	3
	Organizational Change	3
	Trade-offs	3
8	Effects on adjacent ecosystems	2
	Principles of Equity	2
	Long term objectives	2
9	All forms of knowledge	1
	Use of Incentives	1

Rank	Industry top 5 EBM Priorities	Frequency
1	Sustainability	19
2	Long term objectives	17
3	Stakeholder involvement	11
4	Use of all forms of knowledge	9
5	Use of incentives	5
6	Economic Context	4
	Uncertainty	4
	Monitoring	4
	Use of Scientific Knowledge	4
	Ecological Integrity and Biodiversity	4
7	Precautionary Approach	3
	Adaptive Management	3
	Coupled Socio-ecological systems	3
	Effects on Adjacent ecosystems	3
	Ecosystem Resilience	3
8	Ecosystem Connections	3
	Organizational Change	2
	Decisions reflect societal choice	2
9	Appropriate Temporal Scales	2
	Trade-offs	1
	Interdisciplinary	1
	Integrated Management	1
	Principles of Equity	1
10	Dynamic Nature of Ecosystems	1
	Cumulative Impacts	0
	Distinct Boundaries	0



Local-Level EBM

- EBM applicable at a variety of scales
- Most attention has gone to large scale (e.g. LME)
- Balancing better across scales could improve management/governance
- Need to know how to ‘scale up’ & ‘scale down’ across multiple scales.



Port Mouton Bay

An SES analysis of fishery-aquaculture interactions...

www.communityconservation.net/resources/port-mouton-bay



Wikimedia Commons



Geology.com



Sonya Lee

Loss of Ecosystem Services

Loss of access to safe haven and productive habitat	% response perceiving the loss	Loss of provision of seafood	% response observing the loss	Economic loss to ocean-based livelihood	% response experiencing the loss
<i>lobster catch</i>	63	<i>lobster</i>	63	<i>fouled gear</i>	24
<i>bait fishery</i>	53	<i>scallops</i>	35	<i>gear loss</i>	8
<i>safe passage</i>	51	<i>clams</i>	35	<i>increase bait cost</i>	29
<i>safe haven</i>	63	<i>bait fish</i>	27	<i>increase fuel costs</i>	35
<i>mackerel fishing</i>	51	<i>Irish moss</i>	41		
<i>Scalloping</i>	22	<i>whelks</i>	10		
<i>Irish moss harvest</i>	39	<i>mussels</i>	49		

Integrated Ocean Management

Integrated Ocean Management

- Based on 2011 study for OECD Fisheries Unit
- Multi-sectoral, multi-objective
- Ecosystem-based management with human, non-human aspects
- Spatial allocation, conflict resolution, governance structures
- Diverse tool-kit of approaches to govern human activities at sea



IOM & EBM

- IOM and EBM both focus on specific well-defined ocean areas
- Both seek ‘integrated’ holistic approach to management of human uses
- IOM = organizational approach focused on processes, institutions
- EBM = ‘systems’ approach focused on interactions
- Note: EBM as EAF operates solely within the fishery sector



IOM Instruments & Institutions

(a) Ocean Zoning / Marine Spatial Planning

Spatial distribution of ocean uses, implemented at various scales

(b) Governance institutions and rights-based approaches

- Ecosystem-oriented, precautionary policy
- Stakeholder involvement in management
- Ocean use rights & Management rights
- Marine protected areas.



Linking Fisheries and IOM

Fishery Benefits:

- Multi-sectoral mechanism to deal with fishery-related goals & with externalities of other sectors
- Economic efficiency (conflict resolution, spatial planning/zoning)

Fishery Costs:

- Higher management costs, lost resources for fishery management
- Compromise with other economic sectors or conservation sector (over rights to spaces or resources).



Two Win-Win Illustrations

(1) Eastport, Newfoundland - Charles and Wilson (2009)

- Fishers drove first a fishery closed areas, then a formal MPA

(2) Shiretoko World Heritage Site (Hokkaido, Japan) - Makino et al. (2009)

- Multiple Use Integrated Marine Management Plan
- “a system for coordination among the wide range of sectors involved”



Integrated Management: Conclusions

- Must determine how to link integrated management and single-sector management, institutionally and in terms of instruments.
- Must determine changes needed in governance to ensure efficiency in IOM, fisheries management, and ocean management.
- Multiple scales (community to LME), levels (municipal to regional).
- IOM, like fisheries management, is crucially people-oriented!



Integrated Assessments

Integrated Assessments for Ocean Management: A Survey

Approaches to Social, Economic and Cultural analysis...

- Methodologies, Frameworks, Cases studies
- e.g., Global International Waters Assessment
- e.g., Socioeconomic Manual for Coral Reef Management

Report available from: Department of Fisheries and Oceans
(Ottawa Canada).

Case Studies

LOMA Scale

Medium-Scale

Cod Grounds

Port Stephens

Channel Islands

Large-Scale

South-East
Marine Region

Russian Arctic

Great Barrier
Reef

Scottish Coast

Beaufort Sea

Gulf of St.
Lawrence

Northwest
Forest Plan

Large-Scale (Multi-Country)

Baltic Sea

Benguela
Current LME

Greater North
Sea

Small-Scale (Local)

San Salvador

Tortugas

Montego Bay

U.S. Virgin
Islands

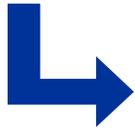
Vaavu Atoll

Results: Commonly Used Variables

Small-Scale (local)	DATA TYPE	VARIABLE	SUB-VARIABLE (if any)
	SOCIAL	Demography	Population Urbanization Rate Population Density
		Education & Training	<i>(no commonalities)</i>
		Health & Community Services	Poverty/Quality of Life
	ECONOMIC	Macro-Indicators	GDP per capita
		Employment	Unemployment Rate
		Industry Profiles	Production Rates
			Value to Economy
	CULTURAL	-	-
	GOVERNANCE	Structure	Applicable Legislation
Institutions			
Enforcement & Security		Military	

Results: Attribute Analysis

Attribute



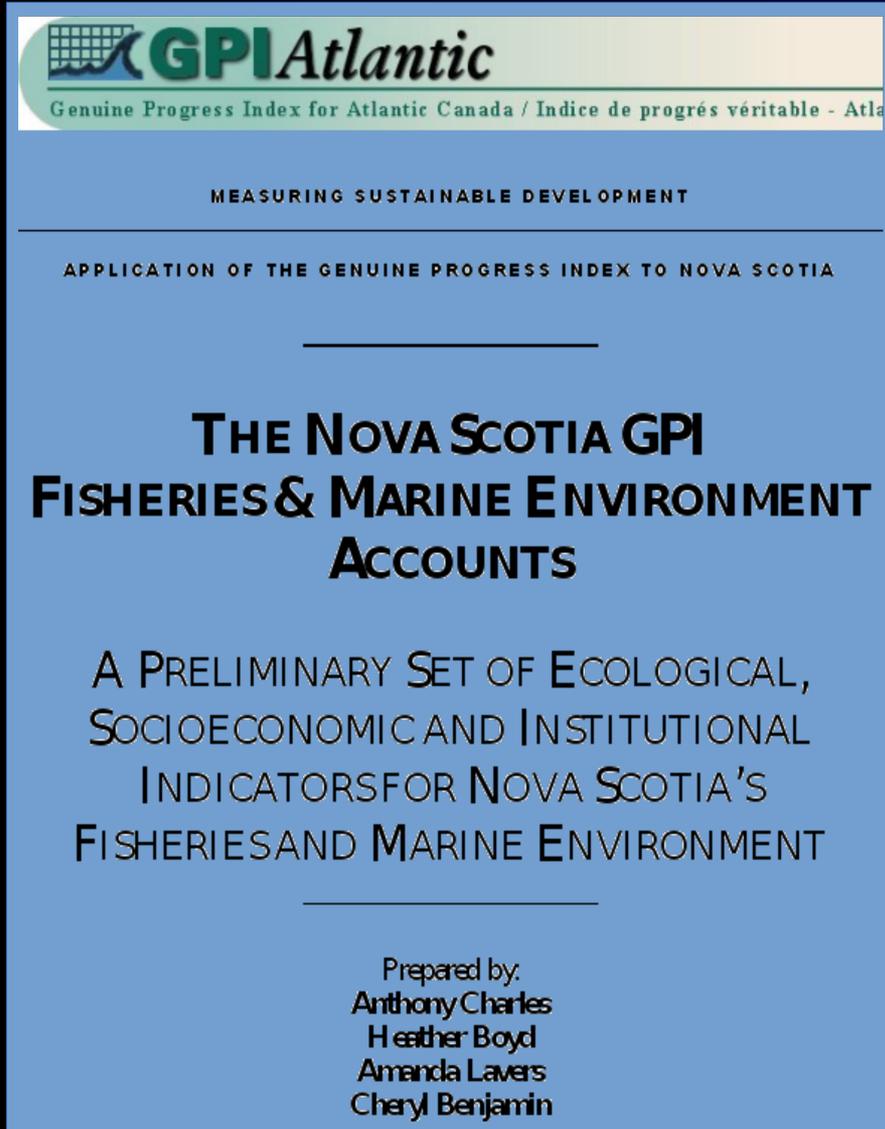
	Process						Content							Data Form							
	Participatory	Product-Oriented	Process-Oriented	Follows a Set Framework	Part of a Planning Process	One-Off Study	Data Analysis	Sector-Focused	Social Data	Economic Data	Cultural Data	Governance Data	Considers User Conflicts	Considers Human Health	Discussion of Threats	Detailed Data	Quantitative	Qualitative	Primary Data	Macro-Indicators	Micro-Indicators
Beaufort Sea LOMA		Green			Green			Green	Green	Green	Green		Green		Green	Red				Red	Red
Gulf of St. Lawrence		Green			Green			Green	Green		Green				Green	Red				Red	Red
Scotland		Green			Green			Green	Green	Green				Green	Green	Red	Red			Red	Red
South-east Marine Region	Green	Green			Green			Green	Green	Green	Green	Green			Green		Red	Red	Red	Red	Red
Russian Arctic		Green		Green			Green	Green	Green	Green	Green		Green		Green	Red				Red	Red

Integrated Assessments for Ocean Management: Conclusions

- Key roles of local conditions, capacity, budgets, time, goals
- Scales from large (government) to small (community, NGO)
- Socio-economic assessments have been mostly economic
- Cultural assessments mostly local
- Governance aspects are crucial (e.g. ocean policies, MPAs)
- Best approaches have an evaluation phase built in early...

Indicators

Integrated Indicator Frameworks



GPI Atlantic
Genuine Progress Index for Atlantic Canada / Indice de progrès véritable - Atlantique

MEASURING SUSTAINABLE DEVELOPMENT

APPLICATION OF THE GENUINE PROGRESS INDEX TO NOVA SCOTIA

**THE NOVA SCOTIA GPI
FISHERIES & MARINE ENVIRONMENT
ACCOUNTS**

A PRELIMINARY SET OF ECOLOGICAL,
SOCIOECONOMIC AND INSTITUTIONAL
INDICATORS FOR NOVA SCOTIA'S
FISHERIES AND MARINE ENVIRONMENT

Prepared by:
Anthony Charles
Heather Boyd
Amanda Lavers
Cheryl Benjamin

- Ecological Indicators
- Socioeconomic Indicators
- Community Indicators
- Institutional Indicators

Example Indicators

Economic

Total Landed Value

Total Processed Value

Fishery Gross Domestic Product

Value of Fishery Exports

Profit per Fisher

Return on Investment

Depreciation in Natural Capital

Value of Ecosystem Services

Diversity of Employment Sources

Economic Diversity

Debt Levels of Fishers

Social

Employment

Equity

Community well-being

Diversity of employment

Institutional

Acceptability of governance

Robustness of management

Management portfolio

Participation in decision-making

Effectiveness of incentives

Local-Level Fishery Indicators



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Ocean & Coastal Management 49 (2006) 237–258

www.elsevier.com/locate/ocecoaman

Ocean &
Coastal
Management

Creating community-based indicators to monitor sustainability of local fisheries

Heather Boyd^{a,*}, Anthony Charles^b

^a*Biological Sciences Department, University of Calgary, Calgary, Alberta, Canada T2N 1N4*

^b*Management Science/Environmental Studies, Saint Mary's University, Halifax, Nova Scotia, Canada B3H3C3*

Identify Participants



**Develop a Common
Vision**



**Develop Indicator Framework to
Reflect Vision**



**Identify Characteristics of
Sustainability**



Develop Indicators to Reflect Sust'y

Focus Group

act →

Literature Review



Consultations



Brainstorming



**Classify/Evaluate
Indicators**



**Select Indicators for
Community Use**

Proportion of indicators positively evaluated in relation to the 3 criteria of indicator quality

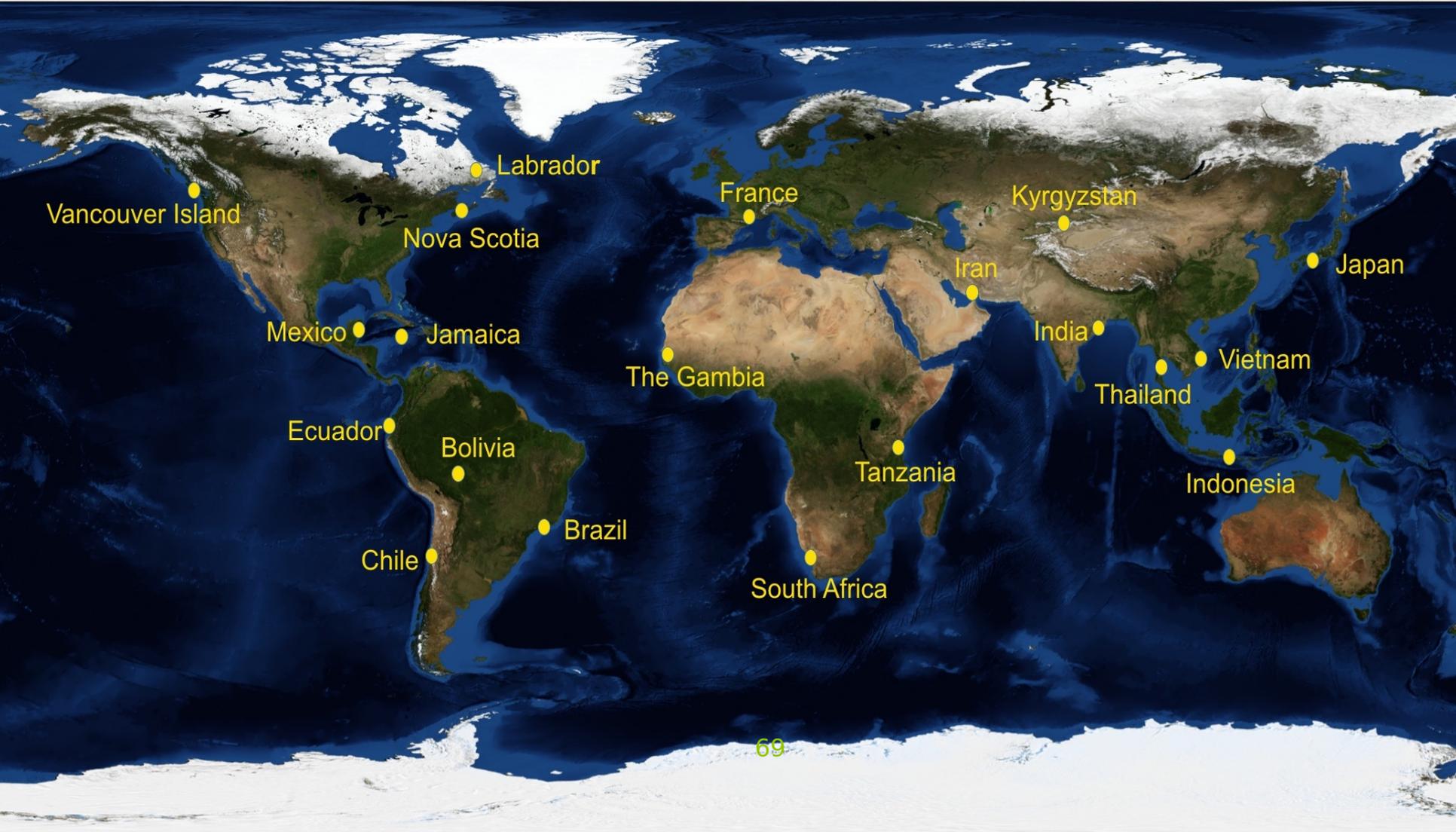
	Theoretical Appropriate	Practicality	Data Availability	Useable Indicators
<i>Community Sustainability</i>	17 / 18	16 / 18	5 / 18	4 / 18
<i>Ecological Sustainability</i>	11 / 25	8 / 25	15 / 25	4 / 25
<i>Institutional Sustainability</i>	12 / 17	11 / 17	2 / 17	1 / 17
<i>Socio-Econ Sustainability</i>	24 / 26	15 / 26	9 / 26	5 / 26
Total	64 / 86	51 / 86	30 / 86	14 / 86

**People in
Places:
Communities
Doing
Marine
Conservation**



Community Conservation Research Network

**Successful community environmental stewardship,
sustainable livelihoods, and government engagement.**





Key Messages from the CCRN

1. Community conservation essential to livelihoods & economies.
2. Involving local communities leads to better sustainability results.
3. Excluding communities leads to conflict and management failure.
4. Conservation efforts must properly use community knowledge.

www.CommunityConservation.net



Bay of Fundy, Canada

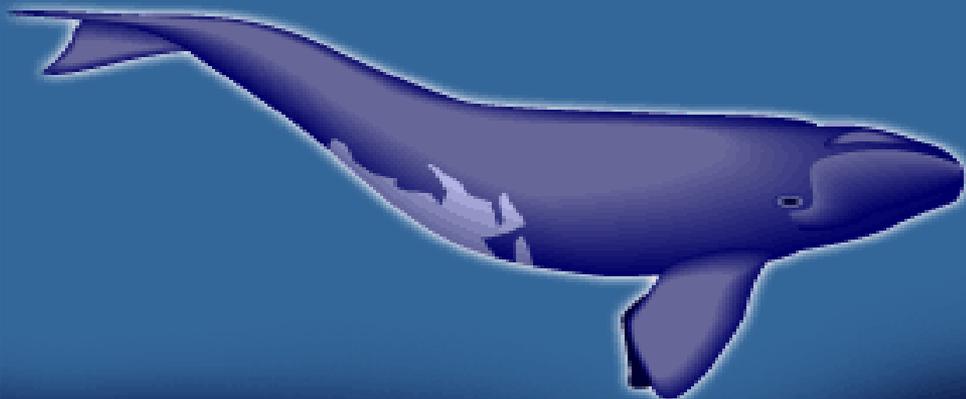
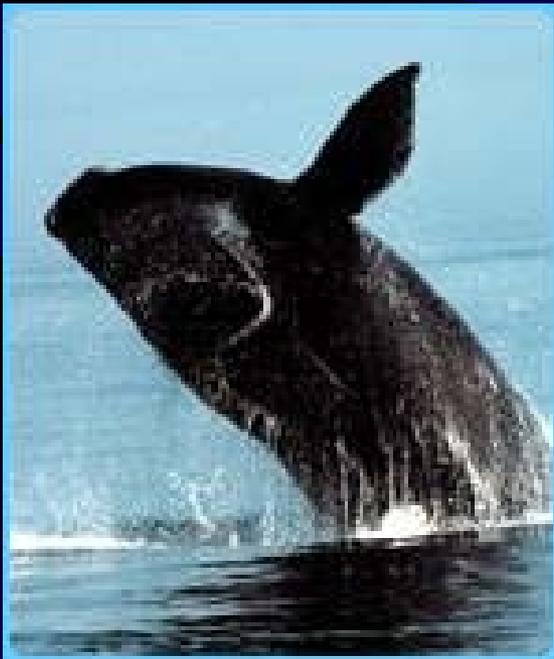




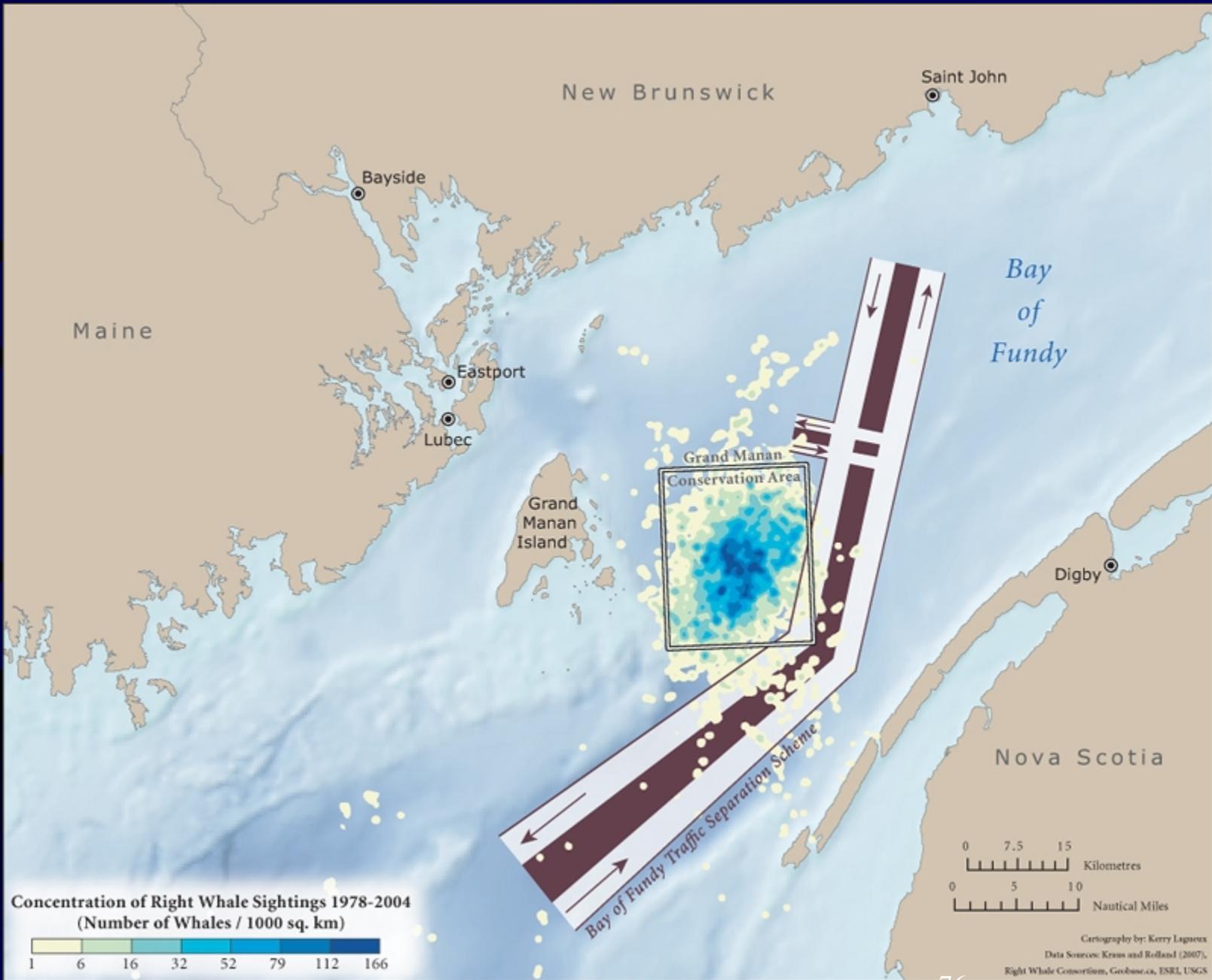




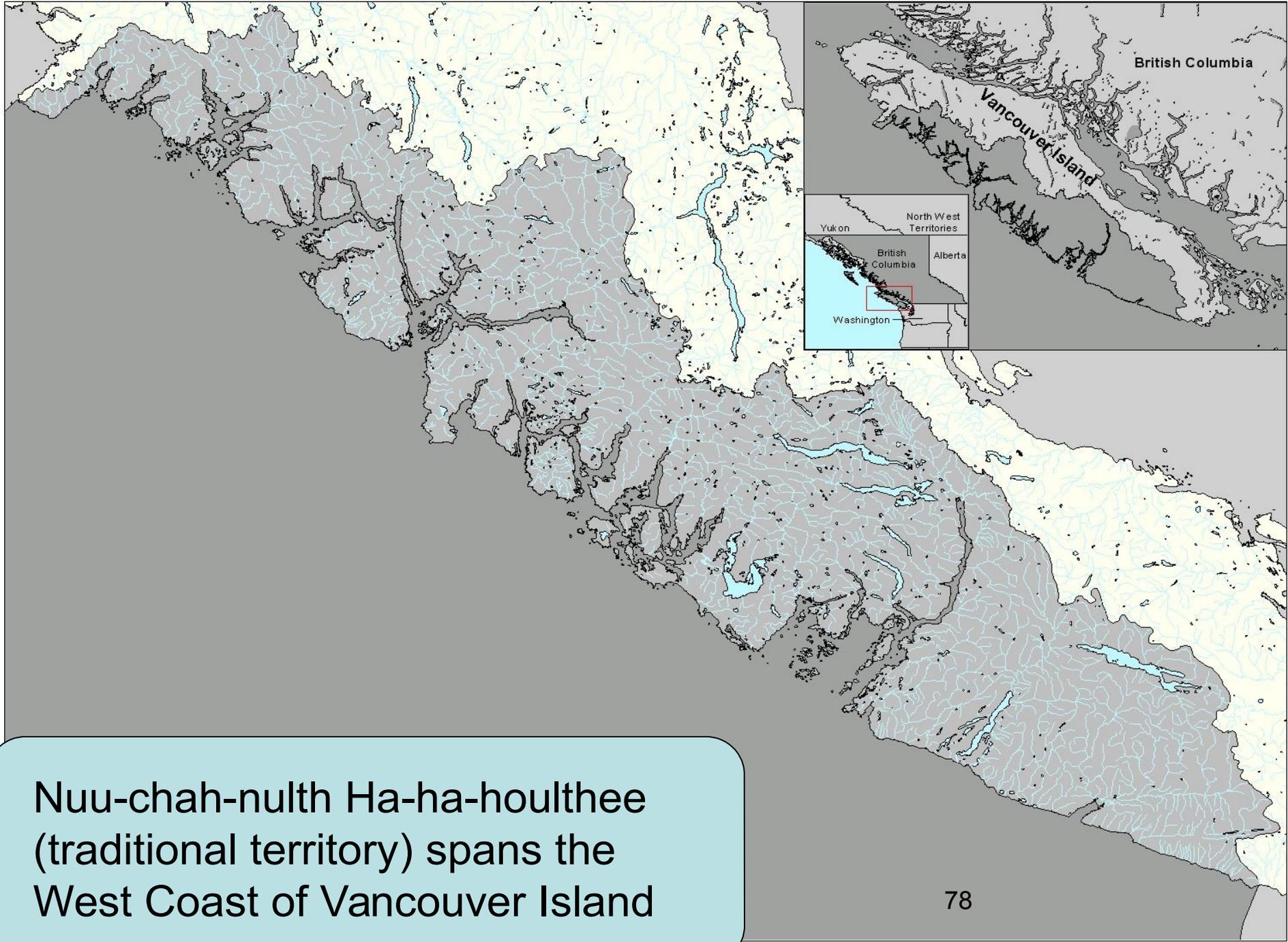
NORTHERN RIGHT WHALE



- Their scientific name is *Eubalaena glacialis*
- Called "right" because they were the right ones to catch
- Adult right whales are usually 12 to 16 metres in length
- With just 300 individuals left they may already be doomed



Nuu-chah-Nulth Territory, Canada



Nuu-chah-nulth Ha-ha-houlthee
(traditional territory) spans the
West Coast of Vancouver Island



Uu-a-thluk

TAKING CARE OF



Nuu-chah-nulth Principles

Hishukish ts'awalk

"everything is one, everything is connected"

lisaak

"respect" - caring for everyone and everything

Nuu-chah-nulth Principles

Hishukish ts'awalk

"everything is one, everything is connected"

lisaak

"respect" - caring for everyone and everything

Thank you!