

Climate Change, Science, and Mariculture Management in the United States and Brazil



Dr. Tom Safford - University of New Hampshire, U.S.A

Ms. Megan Henly – University of New Hampshire, U.S.A.

Ms. Michelle Renk – Universidade Estadual de Campinas, Brazil



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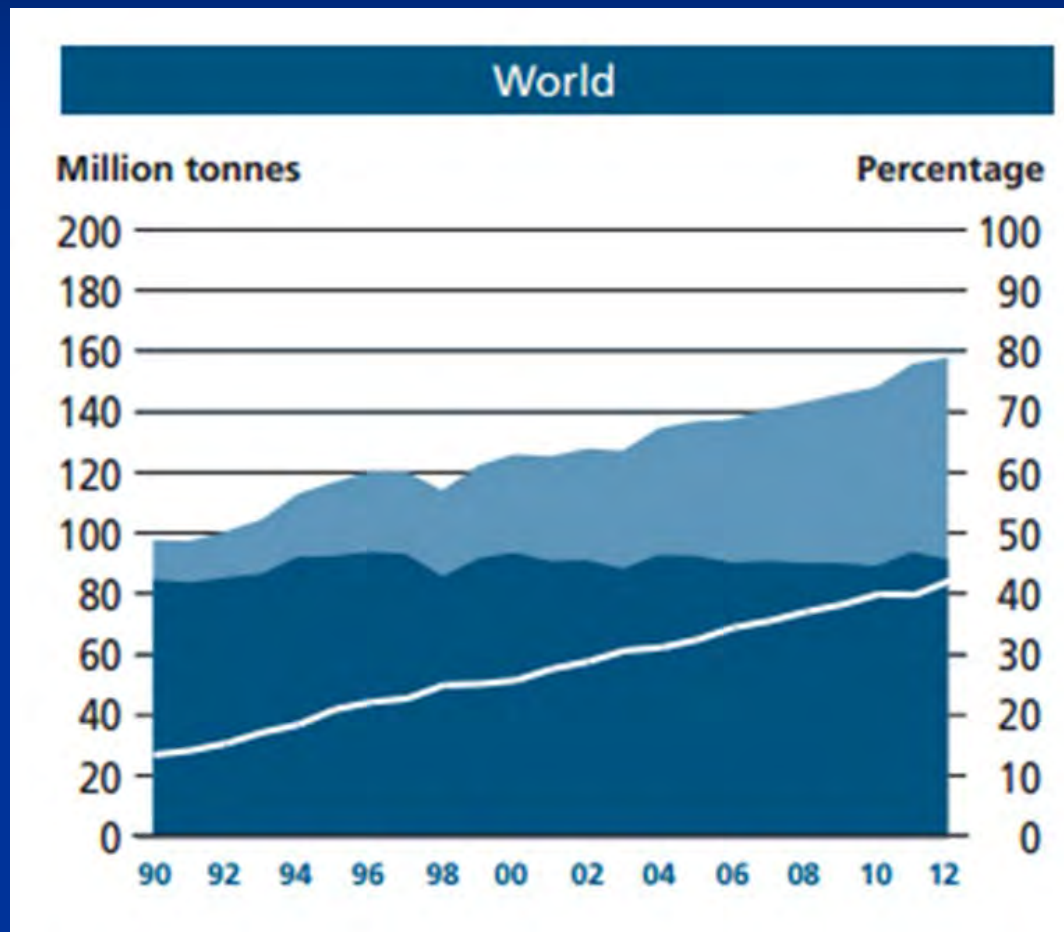


Overview

- Global aquaculture / mariculture management
 - Implications of climate change
- Climate science and mariculture in New England, USA
 - New England Sustainability Consortium
- Climate science and mariculture in Santa Catarina, Brazil
- Questions and discussion

Aquaculture as a Global Concern

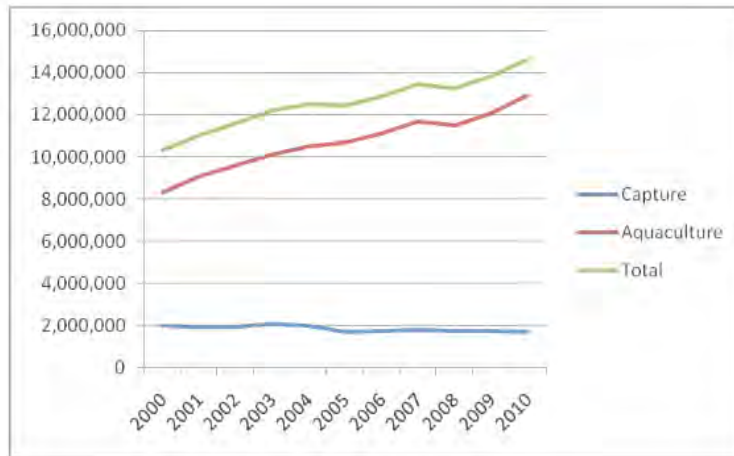
Global harvest of aquatic organisms in million tonnes



(FAO 2012)

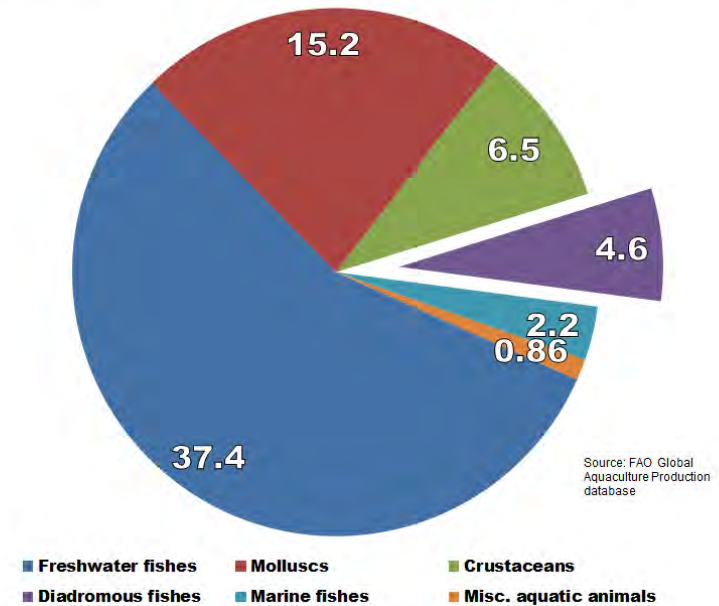
Mollusk Mariculture

Global bivalve production 2000 - 2010



World Aquaculture Production in 2012

(Million tonnes)



(FAO 2012)

Climate and Mollusk Mariculture Management

- Environmental, social, economic, and health implications
 - Issues of changing ocean temperatures and salinity
- ❖ **Production issues:** Ocean acidification; Spread of shellfish diseases (e.g. MSX and Dermo)
- ❖ **Impact issues:** Pathogenic bacteria; (e.g. *Vibrios*); Marine biotoxins (e.g. Harmful algal blooms)
- Management challenges
 - Issues with siting and use of marine commons
 - Seed harvesting and mollusk productivity
 - Water quality
 - Sanitary controls and distribution
- ❖ Overarching challenges related to regulatory vs. resource management roles

Investigating climate and mariculture science

■ Central research question:

■ How do social and institutional factors affect..

- 1) the development of different types of science related to mariculture
- 2) the use of science by managers and industry
- 3) perceptions of scientific validity, reliability, and certainty.

❖ Compare “production” science to “impact” science

❖ Data gathered from in-depth interviews with scientific community, managers, seafood industry, and growers

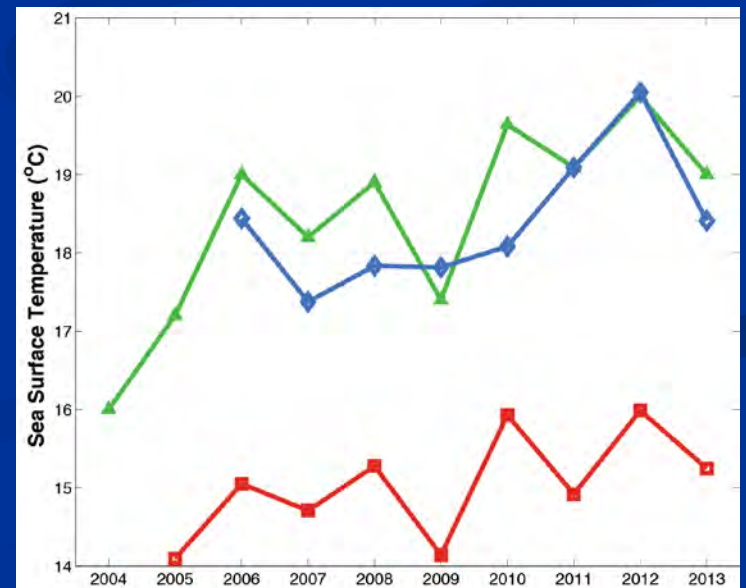
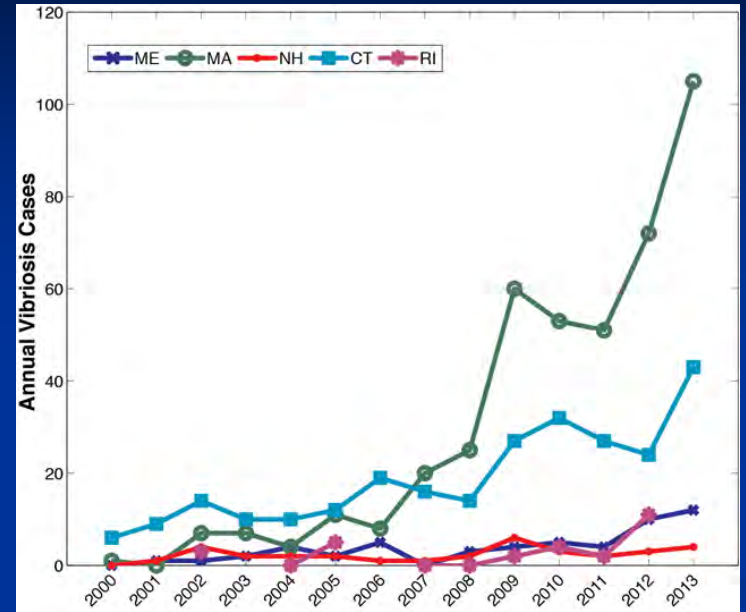
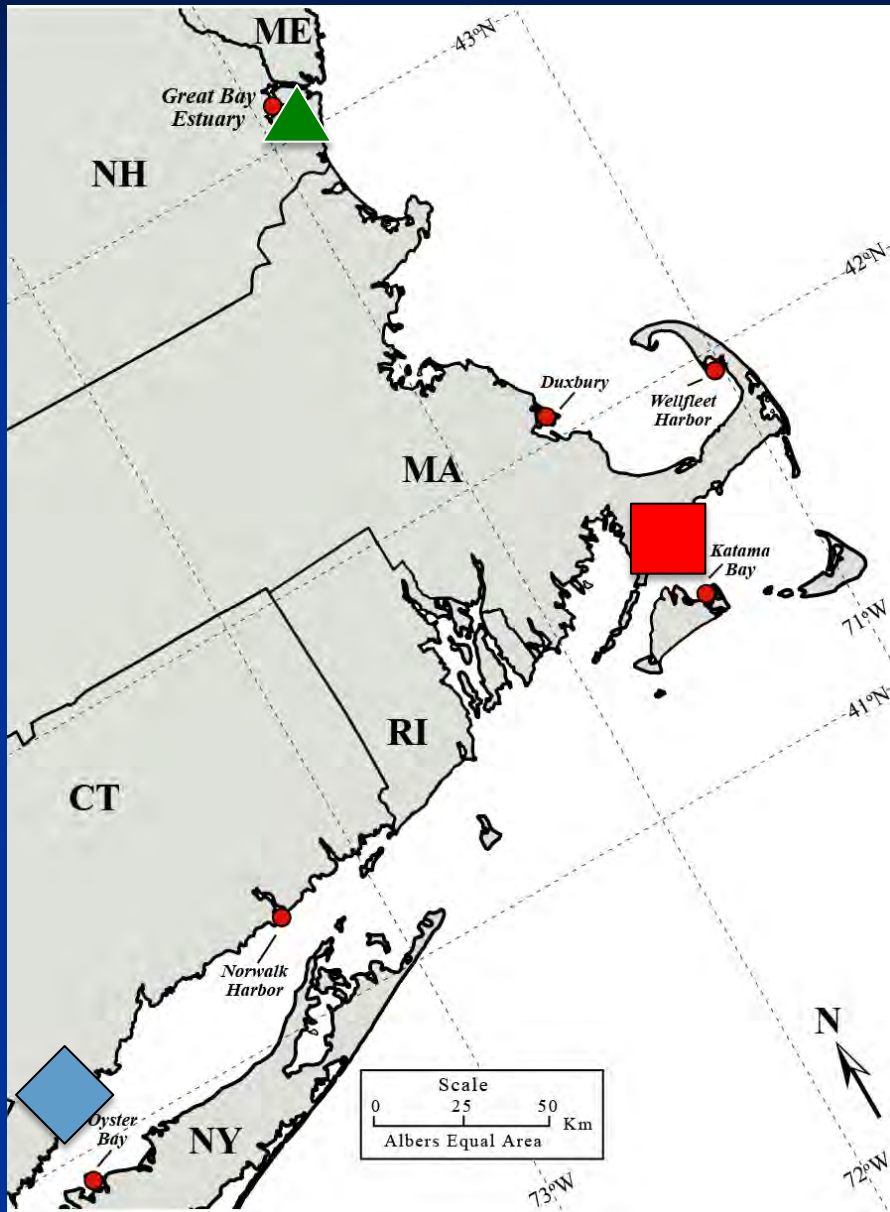
Mariculture Development and Management in New England

Mariculture management in the U.S.

- Key factors affecting use of production and impact science
 - Different types of growers and levels of knowledge
 - Asymmetrical investment in production vs. impact science
 - Institutional and policy context
 - Regulatory: Federal (EPA vs. FDA)
 - Marine resource: federal, state and local



Climate and Vibriosis in New England



Climate science and *vibrio* management

- Regulatory regimes different for HABs and *vibrios*
 - Regulatory action – open / closed
- Uncertainty related bacterial growth in ocean and during transport
 - Scientific community hesitant to engage in mgmt.
 - Competing interests promoting mariculture development vs. public health limits
- Economic rationalism dominates
 - Comparison acidification vs. *vibrio*

Mariculture Development and Management in Santa Catarina

Brazil and Santa Catarina (SC)



(DEINFRA-SC 2013)

www.worldatlas.com

Mollusk production in SC 1990-2012

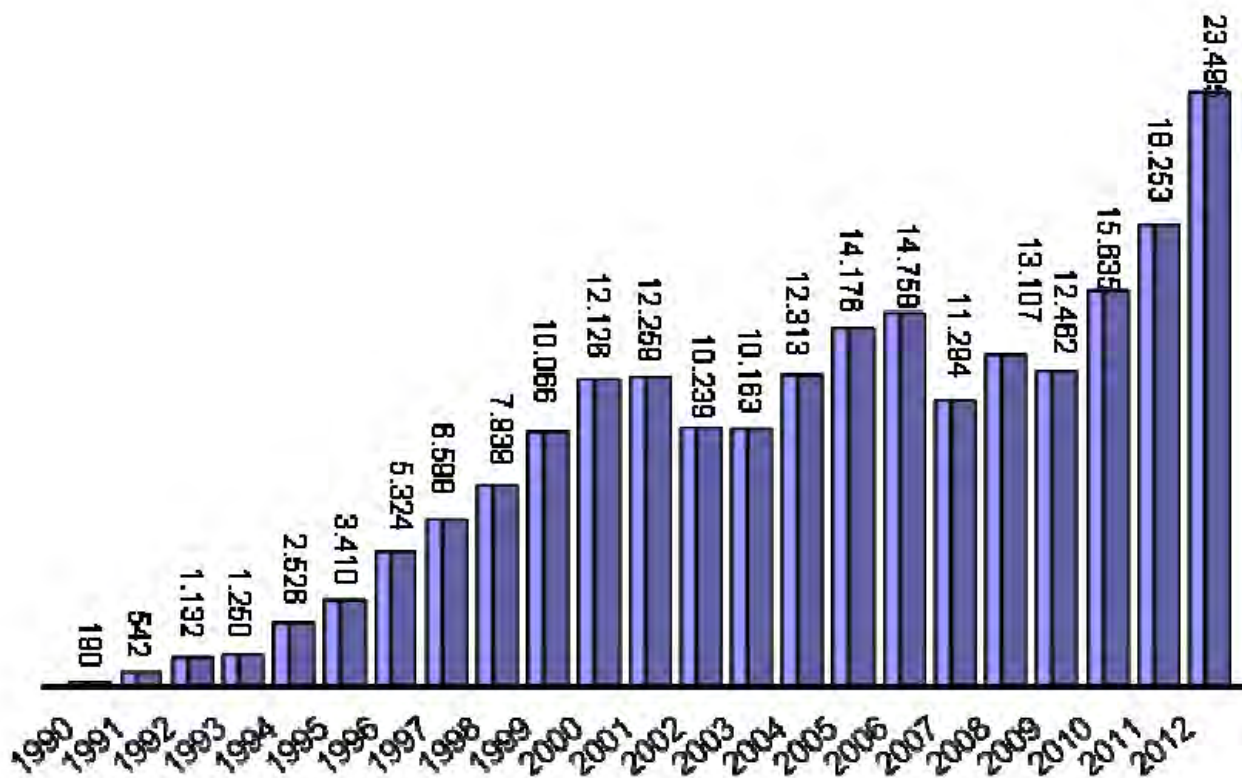


Figura 1. Evolução da produção de moluscos comercializados em Santa Catarina entre 1990 e 2012 (t)

(Epagri 2012)

Economic Implications

Tabela 1. Estimativa econômica da comercialização de moluscos na concha, com base nos preços médios praticados diretamente pelo produtor (sem recompra), nos 12 municípios produtores do litoral catarinense, em 2012

Estimativa econômica da maricultura de Santa Catarina		
Safra 2011		Quant./valor
Ostras	Quant. (dz)	2.468.000
	R\$ (dz)	5,55
	Total (R\$)	13.697.400,00
Mexilhões	Quant. (kg)	21.027.000
	R\$ (kg)	1,49
	Total (R\$)	31.330.230,00
Vieiras	Quant. (dz)	5.800
	R\$ (dz)	29,67
	Total (R\$)	172.086,00
Total (R\$)		45.199.716,00

(Epagri 2012)

Mariculture in Santa Catarina



Science, Technology and Mariculture



Controle Higiênico-sanitário de Moluscos Bivalves no Litoral de Santa Catarina

QUI, 04 DE MARÇO DE 2010 12:24



Mais **segurança** para quem consome ostras e mexilhões produzidos em Santa Catarina



(Epagri 2012)

Science, Technology, and Mariculture



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Science and Mariculture in SC

- Reliance on production science to launch and sustain industry
 - Strong connection to universities and extension
 - Social-economic rationale dominates
- Legal and institutional ambiguity creates uncertainty
- Lack of capacity with public health sector to consider climate-related concerns

Cross National Issues

- Institutional challenges related to the marine commons
- Willingness to apply *production science* with uncertainty
- Hesitance to apply *impact science* with uncertainty
- Key cultural differences within the scientific and management communities
 - Agronomy/mariculture vs. microbiology
 - Marine resource mgmt. vs. public health
 - Efforts to manage vs. regulate
- Heterogeneity among growers
 - Scale of operation, access to capital, technical training

Key Future Social Science Questions

- Role of climate science in vulnerability assessments and resilience
 - Continuing challenges with uncertainty and skepticism
- Values and beliefs of producers and consumers
 - Production vs. public health concerns
- Differences between economic, health, and environmental risks
- Role of science and technology in advancing development and production vs. identifying and mitigating risks
 - Cultural differences within the scientific community
- Institutional capacity – govt., industry, community groups

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<http://www.newenglandsustainabilityconsortium.org>
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