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The 10-tenets relating to Non-indigenous species – natural and social sciences

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Management Questions:

- Where are the problems & What changes do they cause?
- What is the impact of these on ecosystem structure and functioning?
- What are the repercussions for ecosystem valuation based on economy-ecology interactions?
- What are the future environmental changes and economic futures?
- What governance framework is there, what do stakeholders need?
- What can we do about the problems?
- Where are the risks and how to address them now and in the future?
- What are the governance successes, failures and implications?
- How 'good' is the decision-making?
- What are the bottlenecks, showstoppers and train-wrecks?



Hazard leading to Risk (depending on assets)	Relevance to NIS
A) Surface hydrological hazards	✓
B) Surface physiographic removal by natural processes - chronic/long-term	
C) Surface physiographic removal by human actions - chronic/long-term	
D) Surface physiographic removal - acute/short-term	
E) Climatological hazards - acute/short term	✓
F) Climatological hazards - chronic/long term	✓
G) Tectonic hazards - acute/short term	
H) Tectonic hazards - chronic/ long term	
I) Anthropogenic microbial biohazards	✓
J) Anthropogenic macrobial biohazards	✓
K) Anthropogenic introduced technological hazards	✓
L) Anthropogenic extractive technological hazards	✓
M) Anthropogenic acute chemical hazards	
N) Anthropogenic chronic chemical hazards	
O) Anthropogenic acute geopolitical hazards	
P) Anthropogenic chronic geopolitical hazards	

Chapter 1

A Synthesis: What Is the Future for Coasts, Estuaries, Deltas and Other Transitional Habitats in 2050 and Beyond?

Michael Elliott¹, John W. Day², Ramesh Ramachandran³, Eric Wolanski⁴

Challenges for management (RA&RM; OA&OM):

Risk Assessment:

- Where are the problems and what changes do they cause? (ExUP & EnMP)
- What is their impact on ecosystem structure and functioning?
- What are the repercussions for ecosystem valuation based on economy-ecology interactions?
- What are the future environmental changes and economic futures?

Risk Management:

- What governance framework is there, what do stakeholders need & what are successes & failures?
- What can we do about the problems, hazards & risks and how to address them now and in the future?
- How 'good' is the decision-making?

And the corollary: Opportunity Assessment and Management

(Elliott, 2014 Mar. Poll. Bull.; Cormier et al 2019 OCMA, and others)

The 10 tenets:

**To be successful,
management measures or
responses to changes
resulting from human
activities should be:**

- Ecologically sustainable
- Technologically feasible
- Economically viable
- Socially desirable/tolerable
- Legally permissible
- Administratively achievable
- Politically expedient
- Ethically defensible
(morally correct)
- Culturally inclusive
- Effectively communicable

(cf. PESTLE)



Editorial

Marine science and management means tackling exogenic unmanaged pressures and endogenic managed pressures – A numbered guide



Editorial

The 10-tenets for integrated, successful and sustainable marine management



The 10-tenets of adaptive management and sustainability: An holistic framework for understanding and managing the socio-ecological system



Steve Barnard^{*}, Michael Elliott

The 10-tenets: For understanding and managing the problem - to be successful, management measures or responses to changes resulting from human activities should be:

Attribute/ Management requirement	Relevance to NIS/Research areas
Ecology/ Ecologically sustainable	Traits analysis (same attributes-different label?); changes to ecosystem; displacement of species; differences at biological levels (cell, individual, population, community, ecosystem); structure and functioning, ecological functioning leading to services; technologies for monitoring at all levels; adaptation to changing systems; natural changes? (but for spatial and temporal scales); ephemeral systems?; 'artificial science concern?'

**Techniques/
Technologically
feasible**

Mechanisms for control, ballast water, port activities; cleaning once detected; techniques for already existing problem; technologies for data and monitoring and for determining the problem; technologies for cleaning; deficient science technologies (less on taxonomy)?

**Economics/
Economically
viable**

Cost of control (close the Suez Canal?), increased navigation costs; port costs; opportunities for consuming NIS; costs and effects on Ecosystem Services and Societal Goods and benefits; economic costs and benefits; cost-benefit analysis of leaving or removing; costs of damage (e.g. power plants); costs of monitoring; employment possibilities - changed fisheries or aquaculture target species – threats and opportunities (e.g. CERES)

**Society/Socially
desirable/
tolerable**

Societal concerns for health and well-being (real or imagined effects on people); consumer patterns and opportunities; changes of attitude; citizen science; assumed concerns - awareness or not bothered?

**Law/Legally
permissible**

force majeure?; biosecurity and habitat legislation (HSD); health and safety protection law; national, EU, international (RSC) and global (e.g. IMO) instruments; vertical and horizontal governance; conundrum regarding fishing bylaws (control vs. exploitation) (e.g. Poole Bay Manila clam); MSFD implementation and infraction (e.g. Suez Canal); agreements (SDG14, CITES, G7, UNDOS, UN-DER)

<p>Statutory bodies/ Administratively achievable</p>	<p>Different bodies with control (ministries and agencies for environment, fisheries, transport, energy, etc); competent authorities; competing competencies</p>
<p>Politics/ Politically expedient</p>	<p>Political pros and cons, balancing positives and negatives; NIMTOO?; public awareness, 'sexy topics', 'knee-jerk politics'</p>
<p>Ethics (Morals) / Ethically defensible (morally correct)</p>	<p>Acceptance of changes to system; ethics and morals of species control (fish vs. seal?); costs of control passed to future generations; how we regard naturalised species; philosophy of way to regard a species in an area ('once an alien, always an alien?'); what is 'natural'?</p>

**Culture/
Culturally
inclusive**

Did indigenous/poor peoples worry about NIS or just eat what was available?; cultural response to the term 'alien species'; what is 'ours' - xenophobic attitudes; welfare concerns; societal response to science; change of diet; adaptation to climate change

**Communication/
Effectively
communicable**

Software for cataloguing/prediction; stakeholder consultation; who cares - league table of concerns?; dissemination diamond, high public awareness?; information exchange; databases for all disciplines; role of ICT in science and management

Final Messages:

Catalogue the activities and pressures in an area, and the effects on the natural and human systems – ‘What if?’ and ‘So what?’ (*Are aliens a problem for nature or for people?*)

Determine the natural and anthropogenic hazards and risks in an area

Using the 10-tenets determine the solutions to reduce or tolerate these

Determine the opportunities of benefit to nature and/or society

Using the 10-tenets indicate the way of achieving or maximising the opportunities

Consider future scenarios & managing moving baselines - monitoring/modelling/management - adaptive systems - interdisciplinary – natural and social sciences;

Future – more information, better and more adaptable management, more comprehensive management

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Thanks for the invitation and for listening!


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