

**Value-added Science:
Increasing the utility of
science for environmental
management**

**Lucia M. Fanning
Marine Affairs Program, Dalhousie University
Halifax, Nova Scotia, Canada**

Format

1. What is meant by ‘value-added science’
2. Why the urgent need for value-added science
3. What is the role of science and is this role still appropriate given accepted global change?
4. What are we doing about it

“Scientists today are privileged to be able to indulge their passions for science and simultaneously to provide something useful to society. With these privileges, of course, comes serious responsibility.”

Lubchenco, Science 1998, p. 491

Value-added Science

Two linked components:

Knowledge that is useful

-  potential functionality and desirability for a wide variety of uses

Knowledge that is usable

-  Well-suited to a particular application

Production of 'useful' information



Delivering 'usable' scientific knowledge

Urgent need for Value-added Science - The Anthropocene: the age of man

(i) Transformation of the land and sea

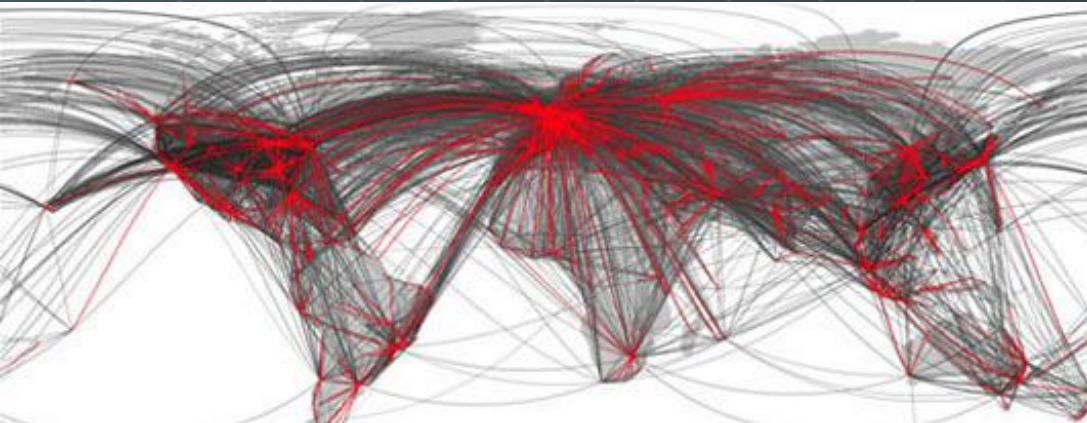
(ii) Alteration of the major biogeochemical cycles

(iii) Addition and/or removal of species and genetically distinct populations



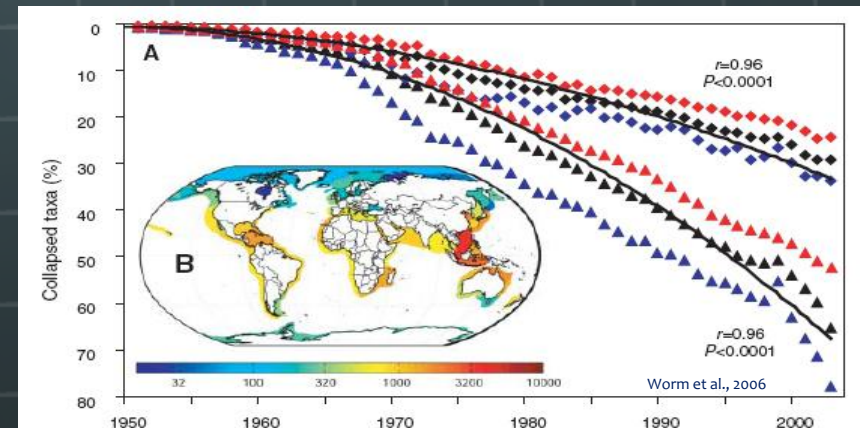
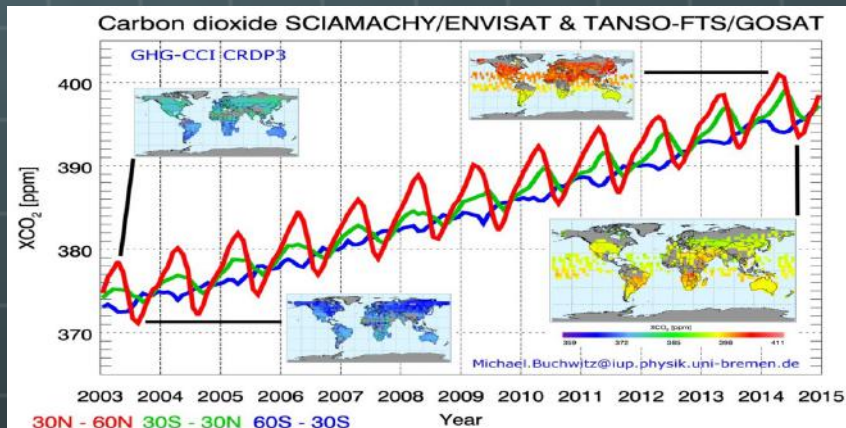
Global change -The Anthropocene: the age of man

- Inequity within and among all nations has increased;
- New infectious diseases have emerged;
- Dramatically more democratic governments;
- Technology, communication, and information systems have undergone revolutionary changes;
- Markets have become global;
- The cultural worlds are becoming homogenized;
- The rate of transport of people, goods, drugs, and organisms has increased around the globe, along with increasingly porous borders;
- Multinational corporations have emerged and nongovernmental organizations have increased



The “Century of the Environment”

- Disruptions to the global climate
- Depletion of stratospheric ozone
- Irreversible losses of biological diversity
- Changes in the structure and functioning of ecosystems around the world



Redefining what is meant by “the environment”

National security

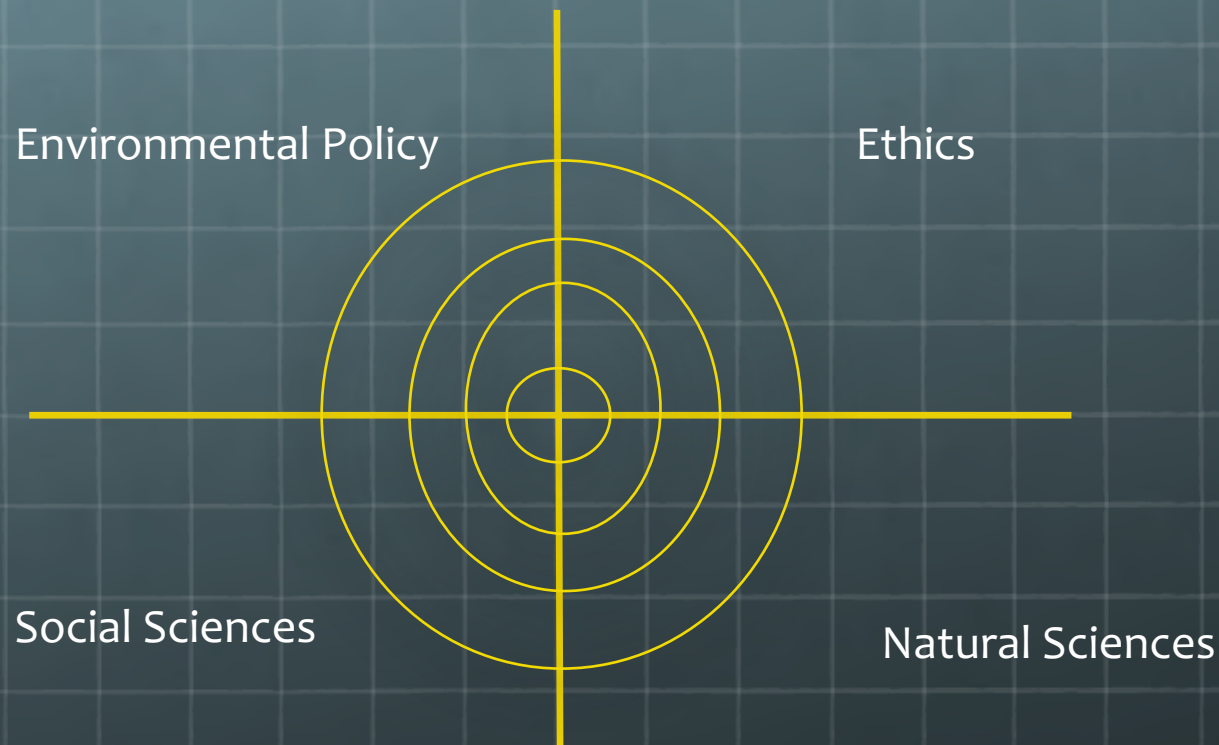
Social justice

Economy

Human Health

Is the traditional role of science able to respond to these integrated challenges?

Conceptual understanding of environmental problems



“... global change science can strengthen its social robustness... when ethical... dilemmas... are... addressed...”

Klenk et al. Science, 2015, p. 743

A changing role of science?

The roles of science—to discover, communicate, and use knowledge and train the next generation of scientists—have not changed, but the needs of society have been altered dramatically.

 **Society currently expects two outcomes from its investment in science.**

 the production of the best possible science regardless

Usable Knowledge to inform decisions has emerged as one of the critical unmet needs of society

important

 Direct benefits to the economy, human health, etc.

 Usable knowledge to inform policy and management decisions

Why is this?



Top 20 things scientists need to know about policy making.
#1 “Making policy is really difficult”
#19 “Policy makers care about research evidence in so far as it helps them make better decisions.”
Taylor, Guardian, 2 December, 2013



Twenty tips for interpreting scientific claims
#16 “Study relevance impact generalizations”
#18 “Dependencies change risk.”
Sutherland et al., Nature 2013



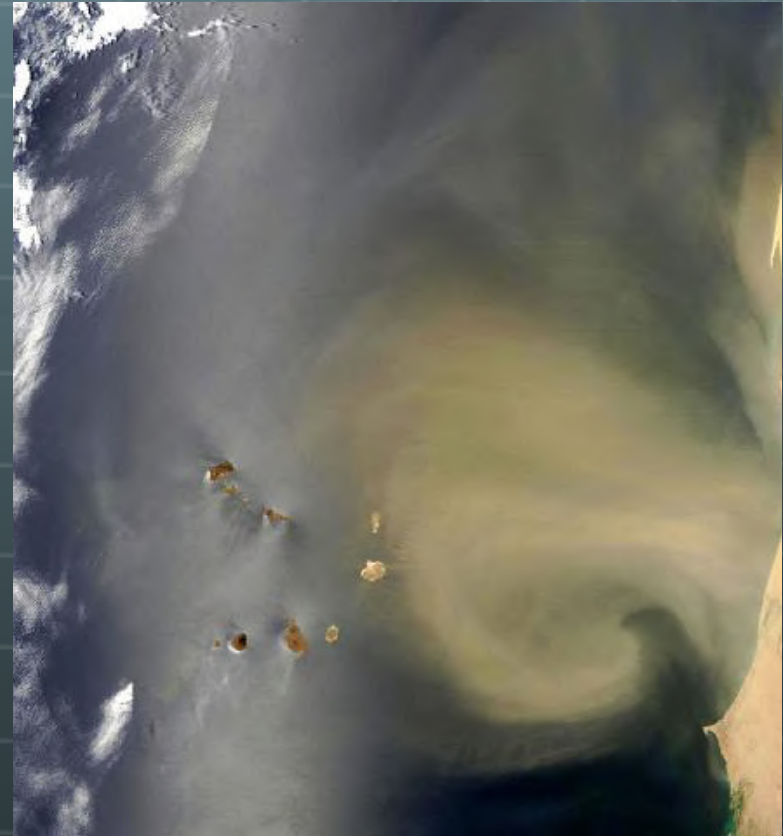
Recognize Science-Policy Challenges

“How policy pays attention to science is variable”

Watson-Wright, 2005, former Exec. Sec, IOC-UNESCO

Why is this?

- 🌐 Perception of ‘fit’ - **salience**
- 🌐 Interplay between new and existing knowledge - **credibility**
- 🌐 Interactions between knowledge holders and users - **legitimacy**



Dust storm approaching Cape Verde, Feb 2014
NASA Terra satellite

Value-added science



Figure 1. Decisionmakers at multiple scales of governance respond to many social, political, cultural, and economic factors in addition to scientific analyses. Global-scale studies may influence decisions at international scales but can only be effective at influencing finer-scale decisions if they are coupled with finer-scale analyses.

For scientists to only focus on providing knowledge on global-to-local biophysical limits at the expense of a focus on realistic scale-based solutions is insufficient and no longer meets society's expectations of science.

Policy Requirements

“Change from science “push” to policy “pull” ”

Watson-Wright, 2005

- 🌐 Benefits - science advice on actions to improve situation in short term
- 🌐 Credibility – science advice to support adoption and ongoing compliance by public



Value-added science – a new social contract

- 🌍 Recognize the extent of human domination as a “force of nature” on the planet
- 🌍 Commit to harness the full power of the scientific enterprise in discovering new knowledge that can be combined and informed by other branches of knowledge to address problems caused by human domination
- 🌍 Responsible for communicating existing and new understanding to the public and policy makers that meaningfully informs decision making
- 🌍 Help society make the informed choices that move towards a more sustainable biosphere

In summary....

- 🌐 Business as usual is not a viable option
- 🌐 The global changes and consequences associated with the Anthropocene epoch has led to new expectations by society for science
- 🌐 A new social contract requires science to still fulfill its traditional role of the pursuit, communication and application of new knowledge but adds on a new requirement of providing **value-added** science to inform 'local to global' decisions addressing societal priorities
- 🌐 The work of MareFramers clearly demonstrates its commitment to meet the terms and conditions of this new social contract



Thank you