PICES FUTURE Workshop 2

Bridging the divide between models and decision-making: The role of uncertainty in the uptake of forecasts by decision makers

City of Toronto Archives, Fonds 1257, f1257_s1057_it9074

- How can uncertainty (in input data, model structure, parameterization) be articulated and presented?
- Consider the credibility of model results, articulate assumptions, and expose uncertainties.

How can FUTURE products be more effectively communicated to a variety of audiences

FUTURE

(Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems)

a) Ecosystem resilience and vulnerability
b) Ecosystem response to natural and anthropogenic forcing
c) Forecast future ecosystem change
d) Interactions between human societies & coastal ecosystems

Engage *human societies by providing* ***useful products*** *on ecosystem change*

From observations to decision-making: what we know, what we assume, what matters

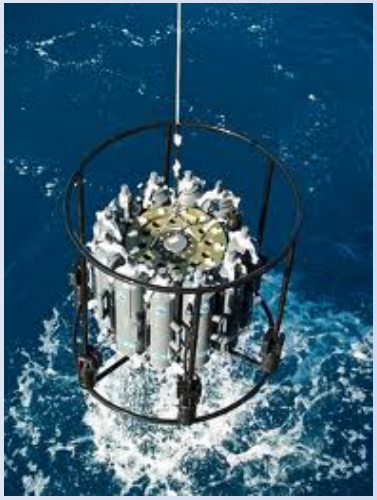
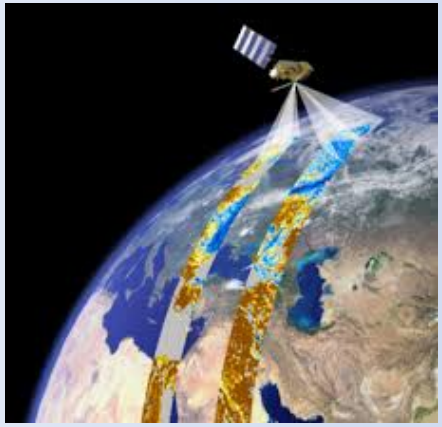


Photo : Carolyn Shield



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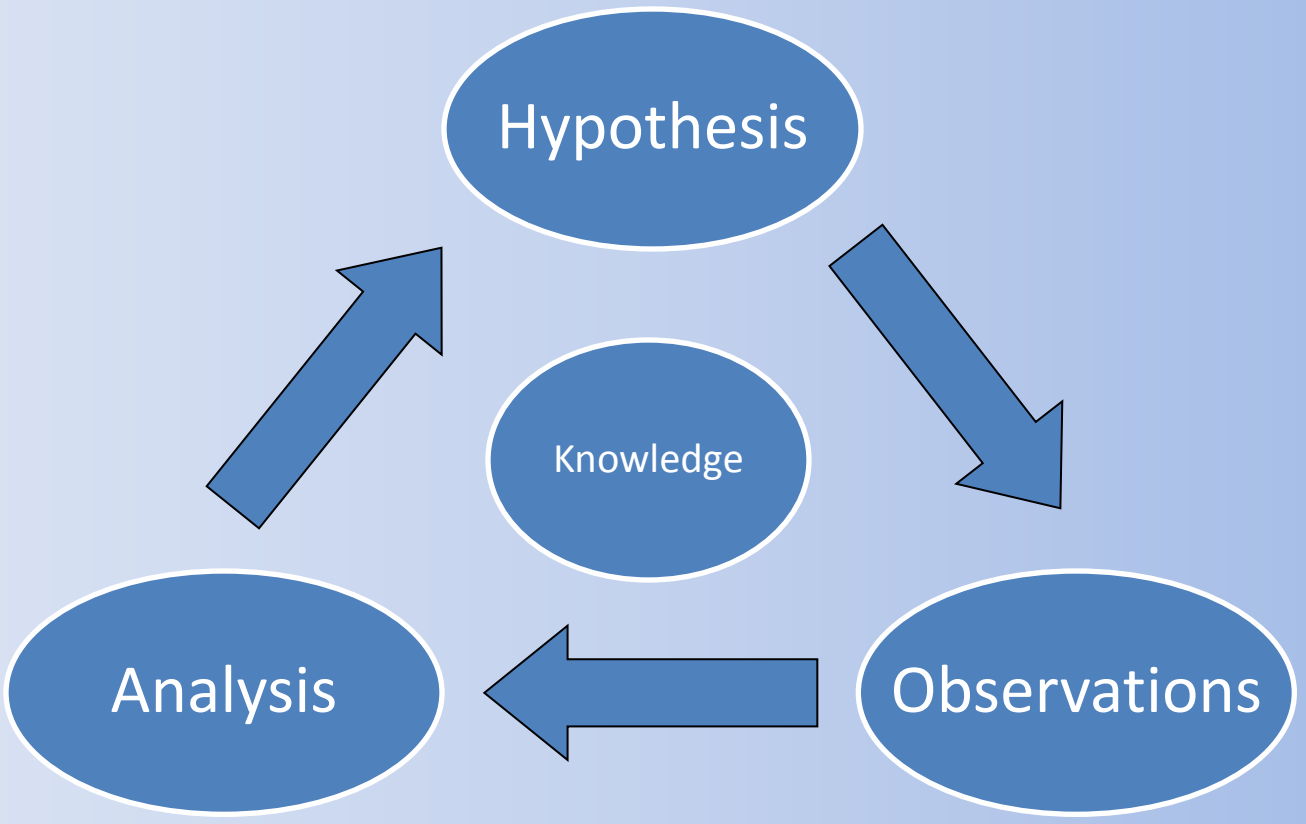
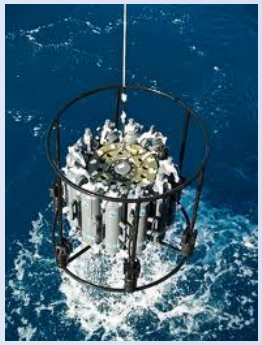
BRITE

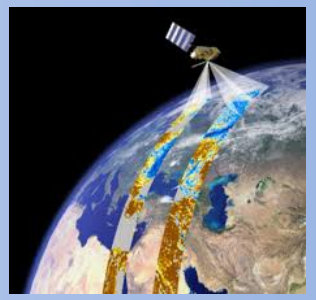
What we know

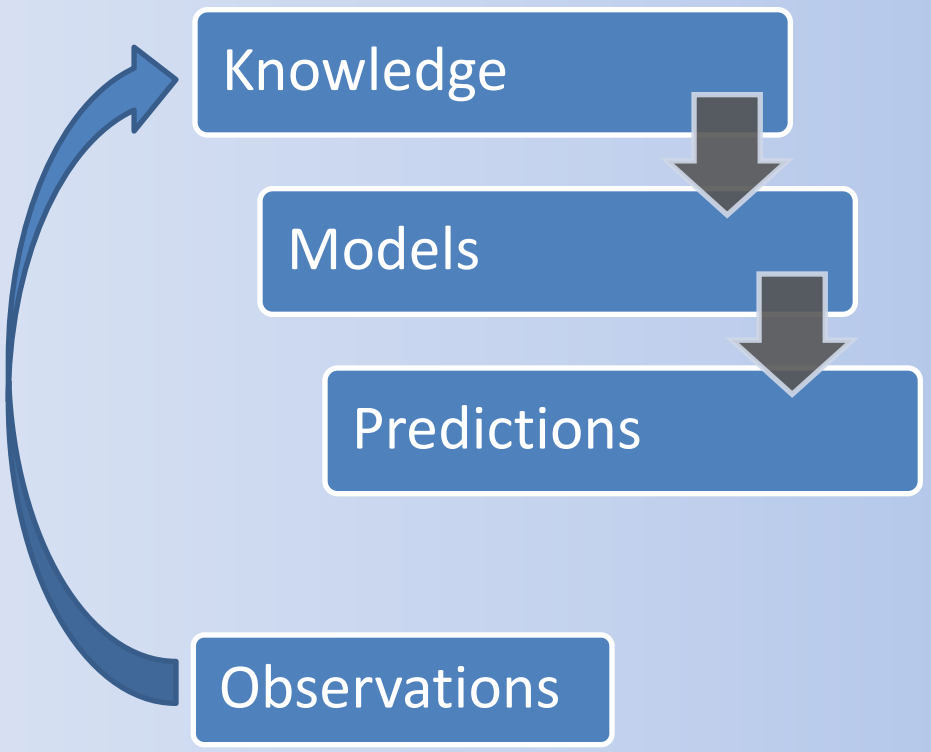




What we know

Ecosystem models





Assumptions
Data
Scope Structure
Process

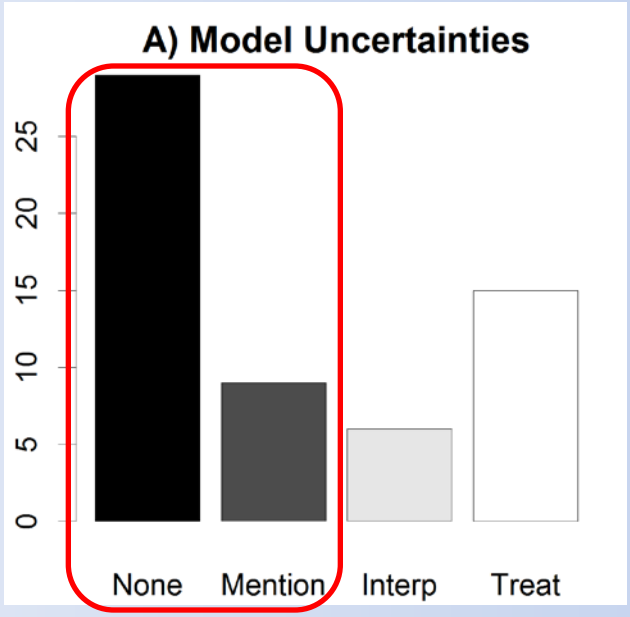
What we assume

- Assumptions are central to model design
- Used mainly to manage uncertainty

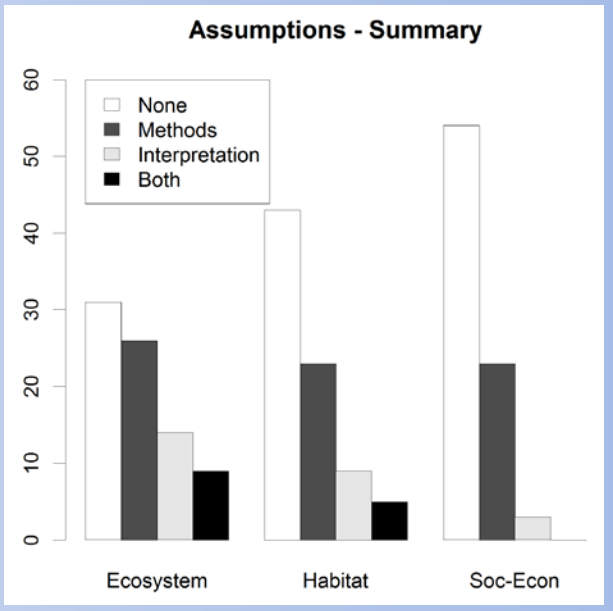
Assumption class	Uncertainty
Data	Observational
Scope Structure	Design uncertainty
Process	Parameter estimation Natural variation Inherent randomness

What we assume

Is largely implicit:



(n=60)



(n=4x20 per class)

Includes:
Extents
Resolution
Process
Data

- Over half largely ignored uncertainty
- Model design assumptions were mostly implicit

Gregr and Chan, in review

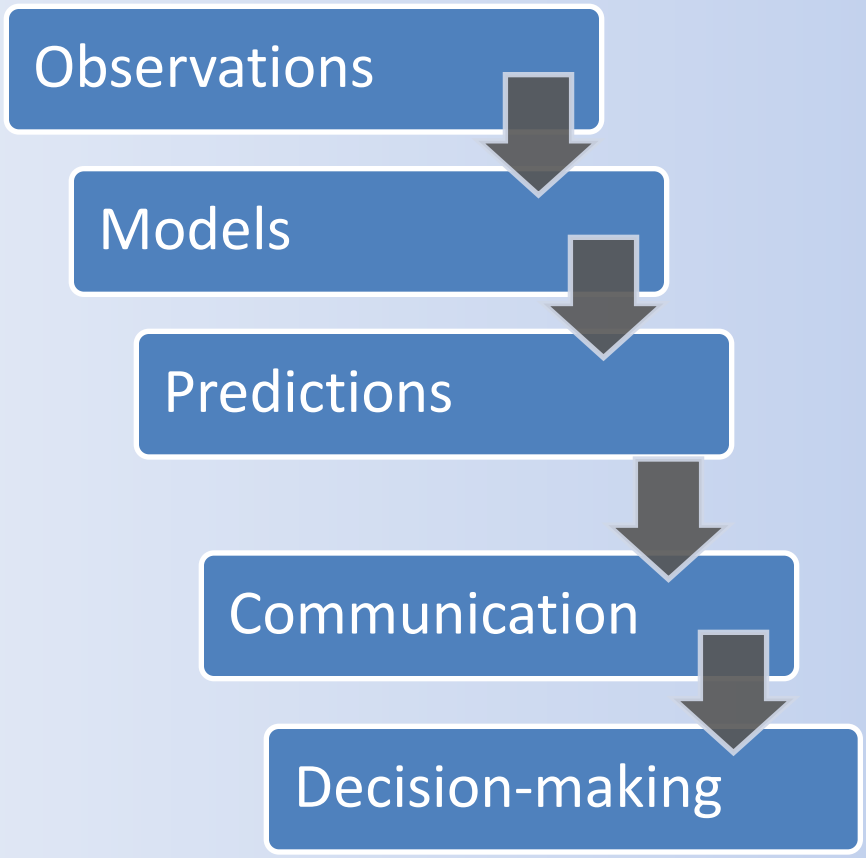
Implications

Not addressing assumptions & uncertainties:

- Can lead to misunderstandings
- Cripples the building of coupled-models
- Compromises uptake of results

- Good work on uncertainty being done, but papers are not being read
  Fawcett and Higginson 2012 (PNAS)

From models to decision making



Assumption class	Uncertainty
Data	Observational
Scope Structure	Design uncertainty
Process	Parameter estimation Natural variation Inherent randomness
Language	Ambiguity Under-specification Vagueness
Relevance	Context dependence Relativism

Regan et al. 2002, Colyvan 2008

What to do?

Be Explicit

For understanding

- Research question
- Data
- Scope
- Structure
- Process

For decision-making

- Language
- Relevance

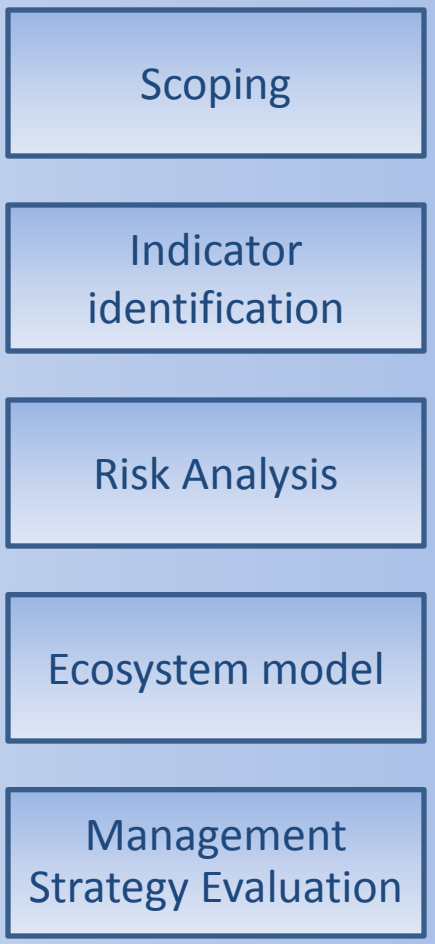
What matters – management context

SDM

- Define problem
- Define objectives
- End objectives and attributes
- Indicators and thresholds
- Define management alternatives
- Estimate consequences
- Evaluate trade-offs; select an alternative

(Bardach 1996)

IEA



(Levin et al. 2009)

Assumptions about what matters

- Define problem
- Define objectives

- End objectives and attributes
- Indicators and thresholds

- Define management alternatives

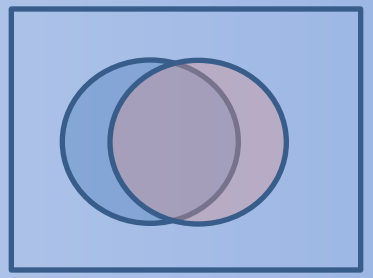
- Estimate consequences

- Evaluate trade-offs; select an alternative

Communicating FUTURE

Engaging humans

- Articulate problems that resonate
- Share critical context assumptions



Useful products

- Articulate design assumptions
- Demonstrate robustness

Conclusions

- Effective communication requires an interested, engaged audience
- Interest, engagement comes from relevance, shared assumptions
- Explicit assumptions & uncertainties needed for inter- and trans-disciplinary engagement
- Conflating models for understanding with models for decision-making is a recipe for bad decisions.

Questions?

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