Environmental research: Necessary, not sufficient, and somewhat different…

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Content: a bird's-eye view on…

- Why we need environmental research
- What environmental research is about (relates to characteristics of environmental issues)
- Why we do environmental research
- What environmental policy needs
- How those needs call for quality environmental research
- What 'quality' means in this context
- The case for science-policy interfaces

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Premise

There is a crisis out there…
… or is it just one crisis?

- Financial /Economic
- Social/Demographic
- Energy
- Climate change
- Biodiversity and ecosystems
- Water
- Contamination (chemical and radioactive)
- New forms of contamination (GMOs, nanotechs?...)
- …

Global environmental crisis

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COMMON FEATURES	FINANCIAL CRISIS	CLIMATE CRISIS	BIODIVERSITY CRISIS
CAPITAL DESTROYED			
Financial	YES	YES	YES
Human	YES	YES	YES
Natural	YES	YES	YES
Social	YES	YES	YES
RISKS/ DEBTS PASSED ON TO CURRENT AND FUTURE 'OTHERS'?	YES	YES	YES

Adapted from Jacqueline McGlade

COMMON FEATURES	FINANCIAL CRISIS	CLIMATE CRISIS	BIODIVERSITY CRISIS
MARKET PRICES: Cover All costs?	NO	NO	NO
Reflect real risks?	NO	NO	NO
TRANSPARENT TRANSACTIONS?	NO	NO	NO
ACCOUNTING FOR WHAT MATTERS?	NO	NO	NO
EARLY WARNINGS HEEDED?	NO	NO	NO
ROBUST AND SUSTAINABLE SYSTEMS?	**NO**	**NO**	**NO**

IRREVERSIBILITY

Adapted from Jacqueline McGlade

Environmental science deals with:

- Complex far-from equilibrium socio-ecological systems ⇒
  - **emergence**
  - **non-linear internal causalities**
  - **irreducible uncertainties, ignorance, indeterminacy**
  - **irreversibility**
- Multiple drivers operating across scales from the local to the global, multiple causalities and complex feed-back processes
- Large temporal and spatial scales
- A societal issue: the environmental crisis

Precautionary Principle

But… is environmental research useful?

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Environmental research to…

- enhance our **knowledge** about the environment (explain, predict), including **drivers** of change;
- identify and assess **threats** to the environment and human well-being (including early warnings);
- understand the role of the environment as irreplaceable **life support system** for humans;
- contribute to **monitoring** the state and evolution of the environment;
- develop **solutions** to address socio-ecological problems;
- provide knowledge to **support policies** and **management** strategies;
- **assess and adapt** our policies and strategies
- raise **awareness** and **willingness to act**;
- make people **dream**…

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Uncertainty and Ignorance

'All scientific work is liable to be upset or modified by advancing knowledge. That does not confer on us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time'.

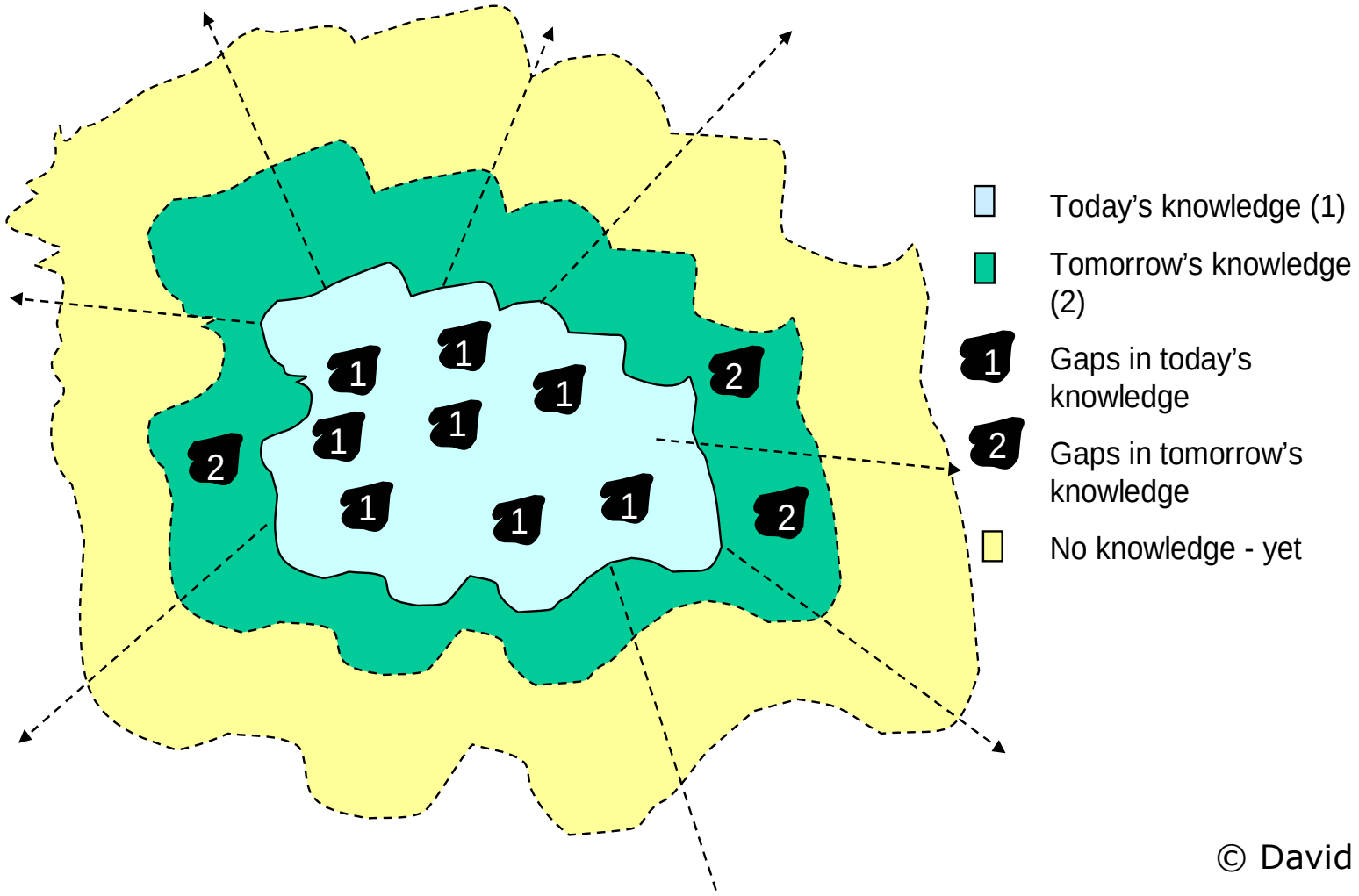
(B. Hill 1965, Environment and disease: association or causation?)

'Today's knowledge is often seen as static, with just a few troublesome gaps in knowledge that further research will remove. Such 'further research' can then become an excuse to postpone precautionary, or even preventative, actions.'

(Gee 2008, Establishing Evidence for Early Action)

Uncertainty and Ignorance

‘Knowing’ and not knowing: A dynamic expansion……

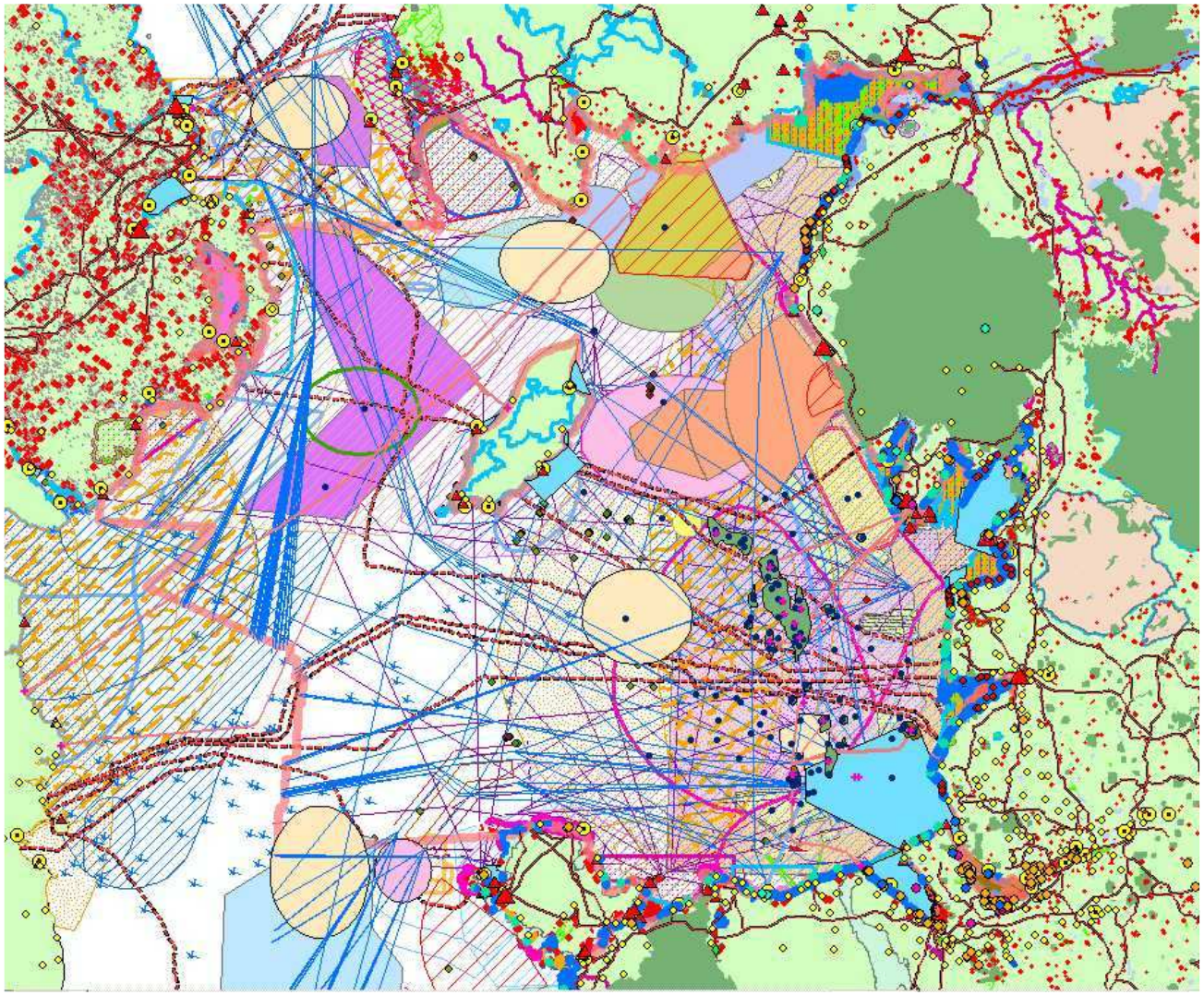


….and “complexity” increases.

European Environment Agency

Human activities in Irish Sea…

- Oil &Gas
- Mariculture
- Coastal Defence
- Ports & Navigation
- Military Activities
- Culture
- Conservation
- Dredging & Disposal
- Submarine Cables
- Fishing



- Renewable Energy
- Marine Recreation

Environmental policy needs:

- **Holistic approaches**, e.g. ecosystem approach, integrated management
- **Precautionary approaches**
- **Adaptive approaches**
  - dynamic processes of capacity-building, aiming at innovative, flexible and adjustable answers (not all eggs in one basket, leave options open, avoid lock-ins, learn as you go)
- **Re defining issues** (and options) as knowledge and societal priorities evolve
  - progressive integration of information as it becomes available, and of different value judgement and logics;
- **Policy relevant knowledge**
  - hence the need for quality environmental research

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Policy-relevant knowledge must

- often be highly **interdisciplinary**, including both natural and social sciences;
- bring together and acknowledge **diverse understandings**, perspectives, and values;
- often include detailed local, regional, indigenous, socio-political, moral and institutional knowledge;
- be transparent about **assumptions**, **choices** and **uncertainties**, and about the **limits** of (scientific) knowledge.

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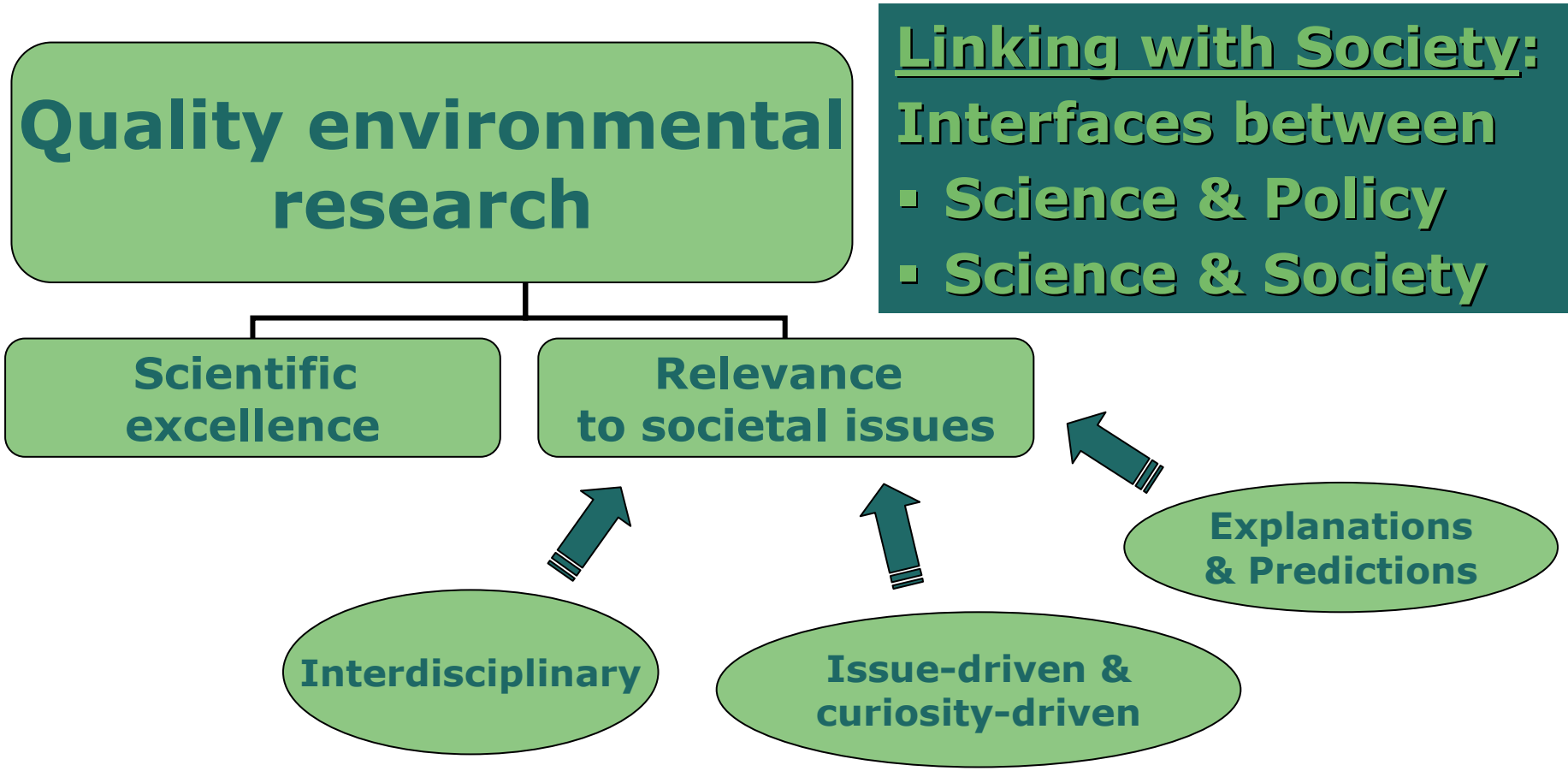
Quality environmental research?



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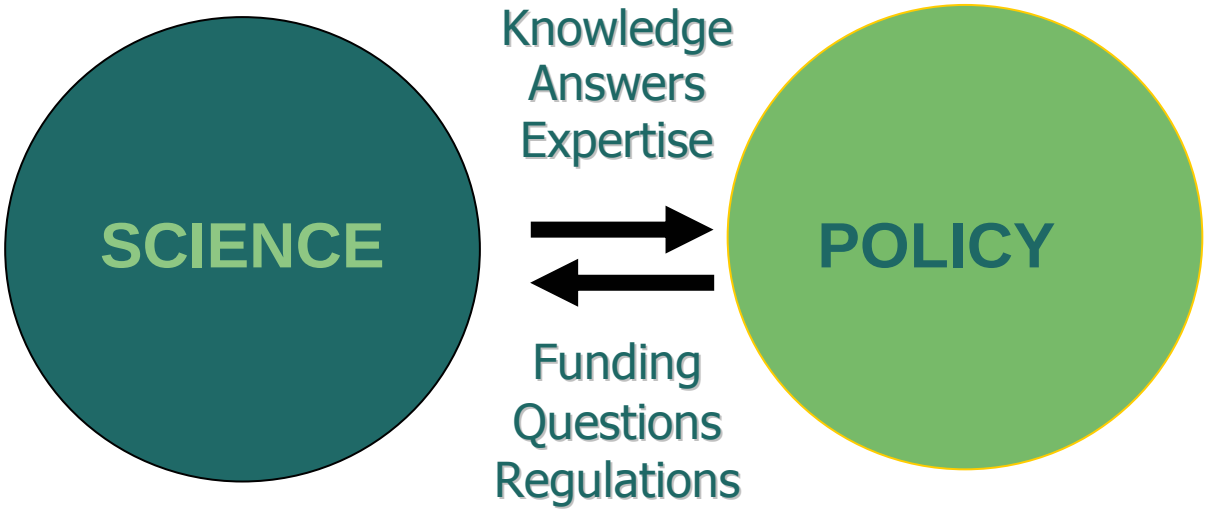
Science-Policy Interfaces

Going from a naïve vision…



- Mutually exclusive and hermetic categories
- Science as an isolated and deterministic system providing value free 'truths'.
- Two independent monologues which intermittently exchange products

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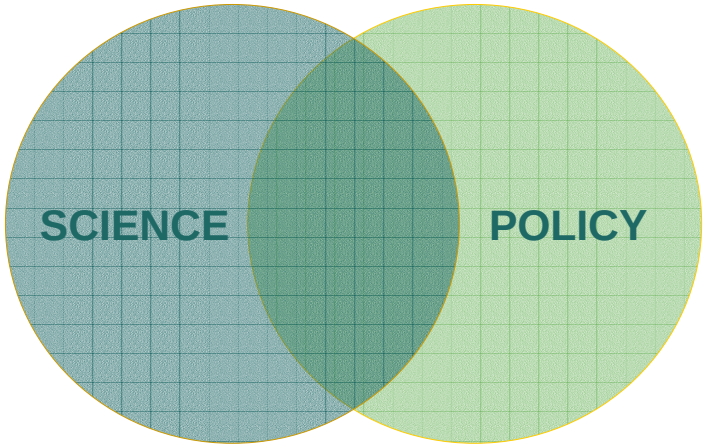
To a vision of co-evolution

- Science and policy as intersecting and coevolving domains of human activity:



- To manage the intersection between science and policy, some processes are implemented – spontaneously or not – which happen precisely at the intersection: ***science-policy interfaces***

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Science-Policy interfaces…

- Allow for exchange and co-evolution of scientific and policy knowledge in support of sustainability (dynamic world);
- Facilitate timely translation of research into policy advice;
- Facilitate early use of results in practice;
- Ensure strategic orientation of research to address societal issues and in support of policies;
- Ensure appropriate funding of research

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A multiplicity of processes:

- at local, national, EU and international levels;
- can be closer to the policy or to the scientific processes;
- can be formal and institutionalised, or informal and more flexible;
- many of them are intertwined or embedded in one another;
- operate at different stages of the policy process (early warning, issue identification, policy design, implementation, assessment, review)

⇒ **Not end-of-pipe engagement!**

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Science-Society interfaces

- Raise **public awareness** of contribution of the environment to quality of life, economy, society;
- Raise **willingness to act** and to support policy amongst the public and stakeholders;
- Ensure rapid **uptake** of research results by stakeholders;
- Stimulate **vocations** in environmental sciences to ensure a highly qualified next generation of scientists and practitioners.

⇒**Dissemination, outreach, education, training…**

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Conclusion - Environmental research is:

- **Necessary:**
  - We are confronting multiple and intertwined crises
- **Not sufficient:**
  - Complex systems, high uncertainties, ignorance, high risks and irreversibility impose precautionary approaches
- **Somewhat different**, entails:
  - Interdisciplinarity
  - Combination of issue-driven and curiosity driven science
  - Plurality
  - Transparency
  - Interfaces between science, policy and society
  - Humility
- **Thrilling**

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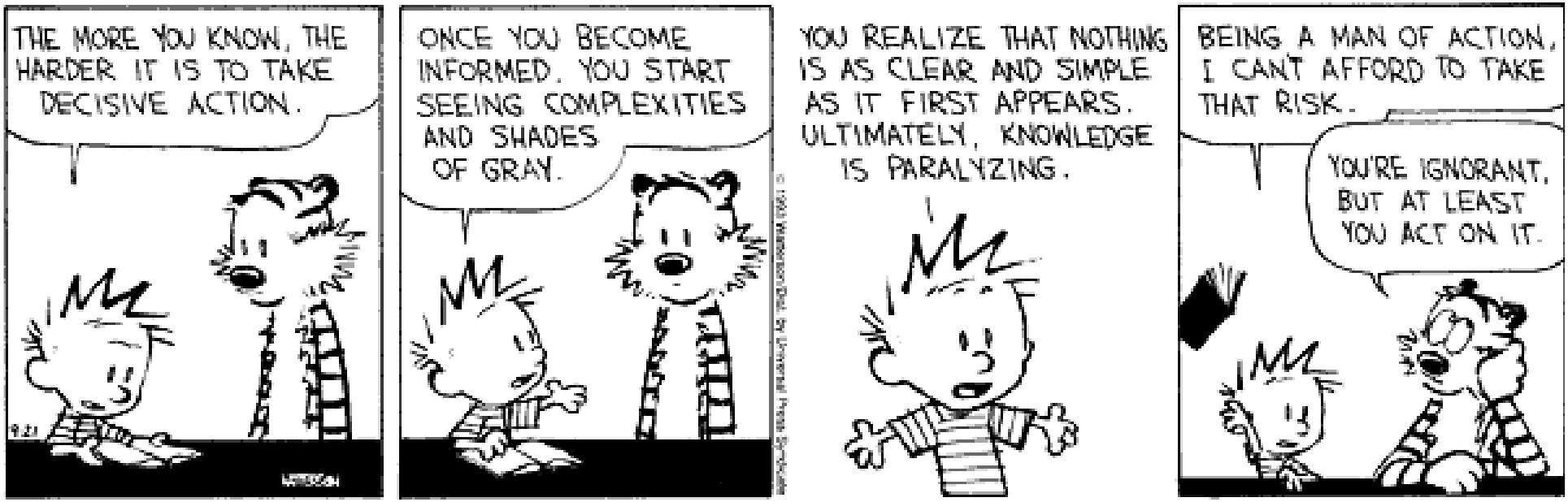
Thank you!



Also for slides and inspiration from Jacquie McGlade, David Gee, Andy Stirling, Silvio Funtowicz, Jerry Ravetz, Brian Wynne, DEFRA, Calvin & Hobbes, and many others…

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