



## Science in the 21st century

- Increasingly seen as a tool of national development and is placed in a more utilitarian framing by Governments
- The need for science in the policy process is being increasingly understood
- The explosion of knowledge and the pace of innovation is both an opportunity for society and a challenge for society and governments
- The issues of achieving social license for science and technology is growing
- Increasingly science is embedded within society rather than standing apart from it
- And the nature of science itself is changing

## Changing nature of science

- From linear to non-linear
- Accepting complexity
- From reductionist to systems based  
(and the changed place of the hypothesis)
- From certainty to probabilistic
- From normal to post-normal...

## Post-normal science

- The application of science in situations where:
  - The science is complex
  - Facts uncertain
  - There is much which is unknown
  - Stakes are high
  - Decision making is urgent
  - There is a high values component and values are in dispute

*(Funtowicz and Ravetz, 1991)*

- *And these situations are the core of policy making !!!!*

## Post-normal science

- Much science applied or needed in the policy space is inevitably 'post-normal'
- Science advisory systems must be cognizant of these characteristics to be effective
- It is these characteristics and the failure of science to recognize these that can make policy makers and politicians skeptical about the role and utility of science if the cultural translation is poor

## Skepticism about science

- Post-normal science by its very nature must engage with disputed values
- There is evidence that science alone will not over-ride cognitive biases and core beliefs
- Skepticism on many issues (e.g. climate change , GMOs, WiFi) will persist for many reasons
- Science generally cannot resolve different world views

## The sources of knowledge

- There are different sources of knowledge and different types of evidence
  - Belief, religion and dogma
  - Tradition and traditional knowledge
  - Anecdote and observation
  - Science
- Science is a set of processes designed to develop (relatively) reliable knowledge about the world around and within us. It is an iterative set of processes subject to revision and testing.
- The positioning of values is different for science than for other sources of knowledge

# Why should science have privilege in the policy process?

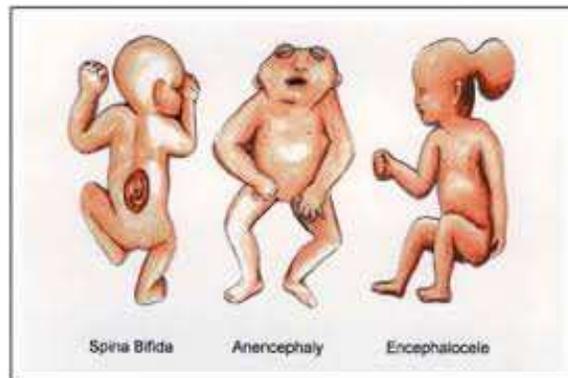
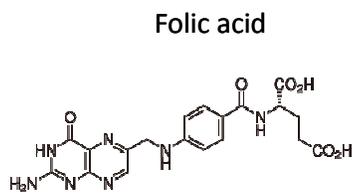
- How does it differ from other epistemologies?
- How science is undertaken and presented will impact on whether it is trusted
- Trust and legitimacy is essential to any claim of privilege.

## Science and values

- Science is not values-free: scientists make values-based decisions all the time: what to study; what methodology; what is considered sufficient evidence for conclusions...
- But the scientific method is designed to limit (or identify and mitigate) the influence of human values on the collection and analysis of data
- How science is *used* by society is intimately and inherently values-rich
- And policy is inherently values-rich
- Post-normal science engages and confronts values constantly

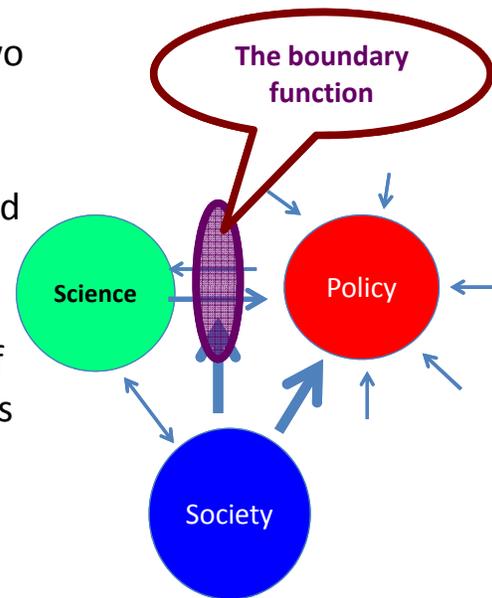
# Science and policy making

- Policy is rarely *determined* by evidence but policy can be and should be informed by evidence
- Inputs into policy
  - The science
    - Evidence of need, possible solutions, impact
  - Public opinion
  - Political ideology
  - Electoral contract
  - Fiscal objectives and obligations
  - Diplomatic issues and any international obligations



# Science and policy making

- Science and policy making are two very distinct cultures
- The nature of the interaction is influenced by context, culture and history *and by the relationship between science and society*
- There is increasing recognition of the importance of boundary roles and structures in linking these cultures
- The nature of these boundary entities is variable and still evolving; there will not be a one-size-fits-all model



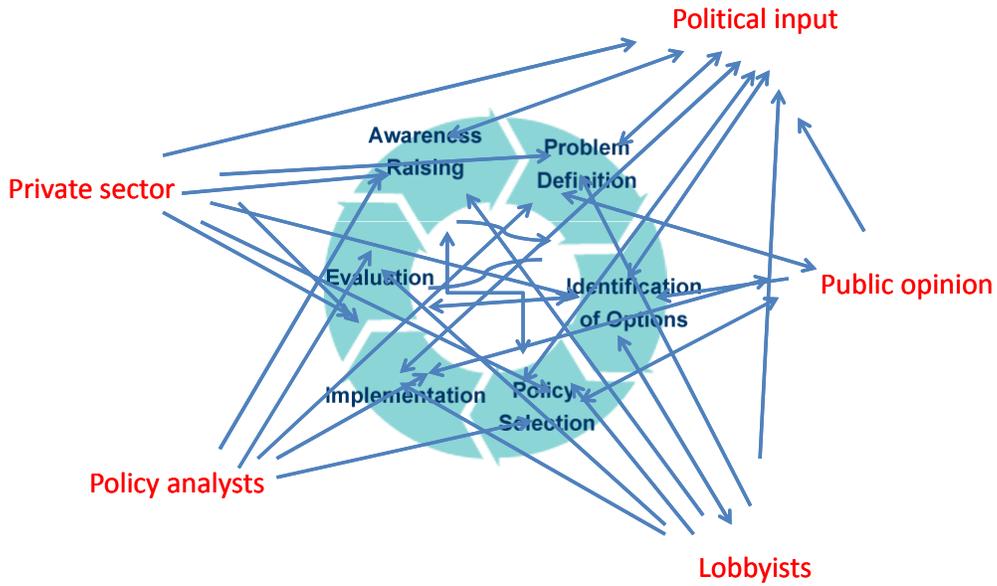
# The policy process

- The policy process is rarely as described in textbooks

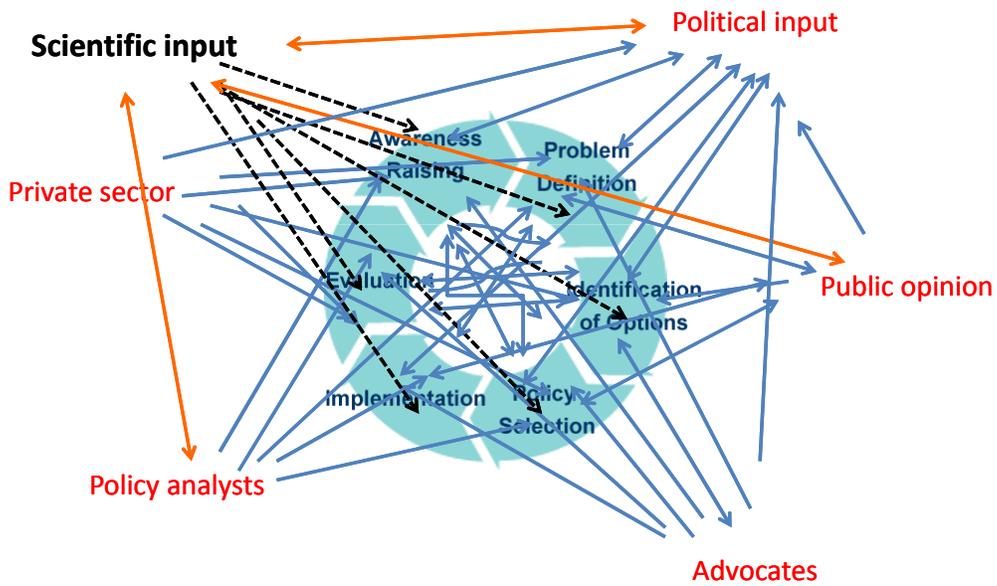


- The policy cycle is an idealized view of a much more complex and iterative process

# The policy process



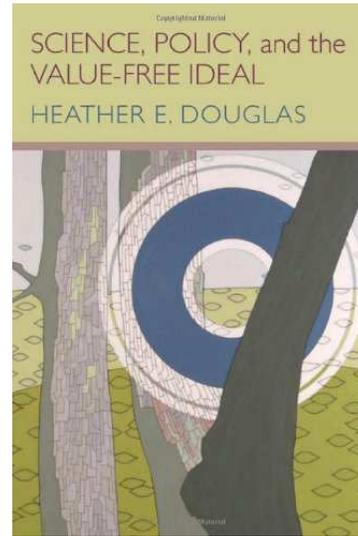
# The policy process



The challenges of single point and iterative inputs

# The inferential gap

- A big challenge for scientific advice is the “inferential gap”
- This is the gap between what is not known and what is concluded by the advisory process.
- What are the consequences of getting it wrong?
- These issues are magnified by post-normal science



*Heather Douglas (2009)  
Science, Policy and the Value Free Ideal*

# The understanding of risk

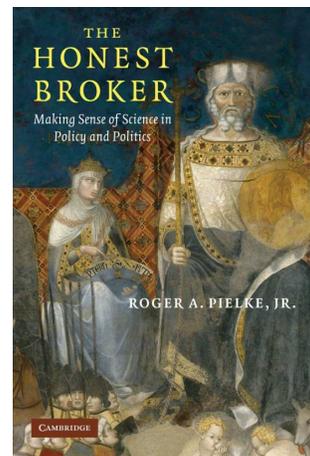
- Actuarial/probabilistic
- Perceptual
  - The role of cognitive biases
    - Availability
    - Representational
    - Confirmational
    - Anchoring
    - Asymmetry
  - Perception of gains and losses, benefits and burdens
- Reputational and **political**
- The misuse of the precautionary principle

# The challenge of science being used as a proxy for values debates

- Values discussions are difficult
- Science has frequently been misused as a proxy for what are primarily values debates:
  - Climate change
  - GMOs
  - Reproductive technologies
  - Stem cells
  - Water fluoridation
- Science cannot usually resolve irreconcilable worldviews

## Advocacy versus brokerage

- **The Issue Advocate** is the scientist who collects and presents data with a view to servicing a cause.
- **The Honest Broker** tries to identify and overcome biases to present what is known, what is not known, what is the scientific consensus, what are the implications for policy and action and the tradeoffs of various options.
- Scientists often switch between these roles but when giving advice, clarity as to role is important. Science advisory systems are best when clear as acting as brokers.



*Roger Pielke, Jr (2009)  
The Honest Broker*

# A useful guideline

*Researchers should limit professional comments to their recognized expertise when engaged in public discussions about the application and importance of research findings and clearly distinguish professional comments from opinions based on personal views*

From the Singapore Statement on Scientific Integrity (2010)

## **PART 2**

### **The Practice of Scientific Advice**

## Science and policy making

- There are few areas of government policy in which evidence, knowledge and science cannot assist;
  - Infrastructure (energy, transport etc)
  - Primary production
  - Manufacturing
  - Resource management
  - Environmental protection
  - Social issues
  - Health, education, justice
  - Security and defense
  - Diplomacy and trade

## Policy for science vs science for policy

- Policy for the science system is a distinct set of considerations/practices from science to inform broad public policy (science for policy)
- There are some overlaps
  - The same people may be involved
- There is a risk that being perceived as having a primary role as an advocate for the public research system can undermine the reception of science advice for broader policy

## The practice of scientific advice

- What is known, what is the expert consensus  
(need, impact, alternatives, monitoring etc.)
- What is not known
- Other caveats
- The inferential gap, risk management
- How it relates to other considerations, alertness to social implications
- Options and tradeoffs

Science does not make policy, it informs policy by elucidating options.

## Audiences for science advice

- National level
  - Executive
  - Legislative (parliamentary)
- Regional
- Local - particularly vulnerable – often with little access, but great power (resource consent; planning; ecosystem stewardship etc.)
- International
  - Bilateral, plurilateral
  - Formal organisations

*Each level will have different requirements and variable access to quality science/translation*

## Types of science inputs with policy relevance

- Technical
- Regulatory
  
- Deliberative or formal
- Informal
  
- Advice in emergencies

## Technical/science advice and scientific advice

- Science advice
  - Technical advice on specific questions
  - Scientists generally want sufficient (if not complete) data before attempting to draw conclusions

But often policy- and decision-makers do not have that luxury

- Scientific advice bridges this gap
  - Policy-makers need to know what is known, what is not known and the assumptions
  - Decision-makers need the to understand the implications of options the science suggests

## Deliberative mechanisms of scientific advice

- Much depends how the question is framed and by whom (supply side or demand side)
- Agenda can be compromised by committee dynamics and interests
- Can usually only input at a single point in policy process (not sufficiently supple and iterative)
- Hard to be timely or responsive
- Offers key opportunity for inclusiveness and legitimacy = trust
- Usefully combined with other forms of advice

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### Slide 29

KA4

A bit too obviously negative in description of deliberative! Need to also show some of the up side and its utility to support legitimacy (esp in the eyes o of the public = trust and social license). I added a couple of the 'pros'

Kristiann Allen, 25/02/2016

## Informal mechanisms of scientific advice

- Is a key need of leaders and governments
- Brain storming
- Critical challenge to the policy maker
- Instant and responsive
- Can impact very early in policy cycle and repeatedly
- Requires a high level of integrity and trust
- Relies on individuals
- But is not unaccountable
- Is a conduit to deliberative science advice

## Scientific advice in emergencies

- Advisors become intimately associated with decision making
- Has become a big focus of UNISDR, APEC, GSF etc
- Require an integrated and multidisciplinary approach
  - Siloed responses are concerning
  - Natural, social and behavioural sciences
- Urgent conduit to informed experts and other jurisdictions

## Structures of science advice

- Individual advisors
  - Single
  - Department-based
- Academies
- Advisory Councils
- Formal panels
  - Standing
  - ad hoc, task-oriented
  
- A complete advisory system needs multiple elements to integrate the external and internal inputs

## Academies

- Well placed to give deliberative advice
- Not always sensitive to the needs of policy makers
- Can forget it is not a purely academic exercise
- Delicate balance: defense of independence can sometimes limit the value and respect for their advice , but that independence is important for public trust and legitimacy
- If academy initiated may not align with policy needs
- **A core challenge is to DISTINGUISH between advocacy for science and brokered advice of value to teh policy maker**

## Individual advisors

- CSAs (Council chairs, Academy heads etc)
- CSAs can only take on the boundary role – not the advocacy role
- CSAs are well placed to provide informal advice throughout the policy cycle
- CSAs are intermediaries to obtain and translate deliberative advice
- CSAs provide a means to ensure scientific advice across the policy process and *across ministries using a joined-up lens*
- **The core challenge is TRUST**

## Science and policy making- some key points

- The challenge of scientific and policy hubris
- “Evidence informed” rather than “evidence based” policy
- Scientific engagement with the policy process can occur from within and without the policy system
  - Different responsibilities, roles and opportunities
- There are many challenges in ensuring demand for advice at the appropriate stages in policy development
- There are challenges in ensuring the privilege of evidence in the policy process

# Core principles

- Trust
- Independence
- Report to the top
- Distinguish *science for policy* from *policy for science*
- Understand science informs and does not make policy
- Protect the privilege of science
- Avoid hubris
- Recognize the limits of science
- Brokerage not advocacy
- Engage the science community
- Engage the policy community

## The art of science advice to government

Peter Gluckman, New Zealand's chief science adviser, offers his ten principles for building trust, influence, engagement and independence.

In 2009, I was appointed as the first science adviser to the Prime Minister of New Zealand. The week was appointed coincided with the government announcement that the New Zealand food industry would not be required to add folate to flour-based products to help to prevent neural-tube defects in newborns, despite an earlier agreement to do so. As it happens, this is an area of my own scientific expertise and, before my appointment, I had advised the government that folate supplementation should occur. But no-one would have had any considerable public concern on the matter, about health risks and about medicating the food supply.

Thus, in my first media interview as science adviser I was asked how I felt about my advice not being heeded. I pointed out that despite strong scientific evidence to support folate supplementation, a democratic government could not easily ignore overwhelming public concerns about the food supply. The failure here was not public callousness; it was the lack of sustained and effective public engagement by the medical-science community on the role of folate in the diet. As a result, the intervention did not get the social licence necessary to proceed. Five years on, I am still in the post. I have come to understand that the primary functions and greatest challenges for a

science adviser are providing advice not on straightforward scientific matters, but instead on issues that have the hallmarks of what has been called 'post-normal science'. These issues are urgent and of high public and political concern; the people involved hold strong positions based on their values; and the science is complex, incomplete and uncertain. Diverse meanings and understandings of risks and trade-offs dominate. Examples include the eradication of exotic pests in New Zealand's unique ecosystems; offshore oil prospecting; application of recreational psychology; drugs, voice quality, family violence, obesity, teenage morbidity and suicide; the ageing. ▶

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OFFICE OF THE PRIME MINISTER'S CHIEF SCIENCE ADVISOR

*Nature*, 13 March 2014

## Trust

Simultaneously earning and maintaining the trust of stakeholders who can be in deeply opposing positions, which can influence their view of 'objective science'

- Politician
- Policy maker
- Media and public
- The science community



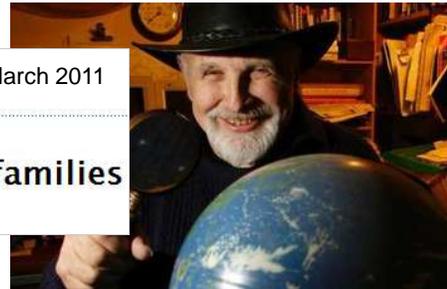
OFFICE OF THE PRIME MINISTER'S CHIEF SCIENCE ADVISOR



[nzherald.co.nz](http://nzherald.co.nz)

19 March 2011

## Christchurch earthquake: Ring's tip sends families fleeing



## Ken Ring's Christchurch earthquake claims 'terrifying' people

**stuff.co.nz**

### Ken Ring's Earthquake Warning For 20 March 2011 In NZ

Saturday, 12 March 2011, 6:40 pm  
Press Release: Uncensored Magazine

### Ken Ring: 'I predicted the Christchurch quake'

28-Feb 16:03



Ken Ring watches the moon and the tides. He is a fishing commentator for radio, but after predicting the date of last week's quake his opinions are being followed by thousands.

He says another will strike on March 20th.

Campbell Live is covering this story because so many viewers emailed and phoned.

We feel it is our job to cover the issue but in no way do we believe it or are we asking you to believe it.

What we do know is being in Christchurch and experiencing the after shocks has left us all vulnerable and on edge.

We have not found a single scientist, geologist or seismologist which believes in Ken Rings theories.

We have though found members of the public who say they joined his site and knew the earthquake last week was coming.

Mihingarangi Forbes talked to three families who are hooked on ring's opinions.

Watch the video.





- INGSA was founded in 2014 under the aegis of ICSU
- Partnership with UNESCO
- All levels of government
- Roles
  - Forum, resources, networking
  - Capacity building workshops
  - Principles of science advice (ICSU, UNESCO, WSF 2017)
  - Second international meeting, Brussels 29-30<sup>th</sup> September 2016
- This week INGSA Africa was formed as a chapter of INGSA
- Membership is free: academics, practitioners, policy makers

[www.ingsa.org](http://www.ingsa.org)