

Precautionary Principle, Burden and Level of Proof

Paris, 4. December 2002

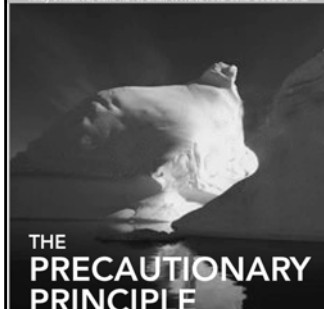
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'Late lessons from early warnings the precautionary principle 1896-2000'



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THE
PRECAUTIONARY
PRINCIPLE
in the 20th Century

A book = report
has been
published by
"Earthscan",
cost: 17 or 45 £

The report from
EEA is out of print

The report can be
found on web-site:

http://reports.eea.eu.int/environmental_issue_report_2001_22/en

Late Lessons from Early Warnings

Case studies:

- Antibiotic as growth promoters
- Asbestos and cancer
- Benzene and cancer
- BSE, Mad Cow Disease
- Hormones in fertility treatment
- Hormones as growth promoters
- Over-fishing
- Spectrum of persistent pollutants
- CFCs and ozone layer
- PCBs
- Radiation
- MTBE
- TBT
- Acid rain and SO₂

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Late Lessons from early warnings

- Ignorance and uncertainty
- Long term monitoring
- Look for "blind spots"
- Interdisciplinary obstacles
- Real world conditions
- Scrutinise benefits as well as risks
- Analyse alternative options
- Listen to "lay" and local knowledge
- Full account of stakeholder values
- Regulatory independence
- Institutional obstacles
- Avoid paralysis by analysis

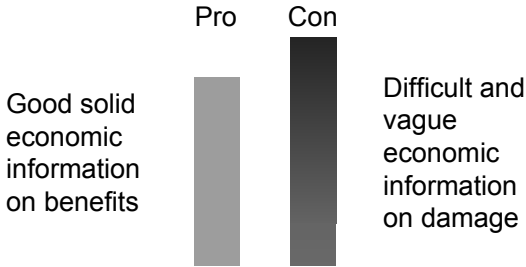
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Three levels of interpretation

- Normative rules
- Stance on proof
- Pro-et-con analysis and participatory approaches

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Imbalance of arguments



Assessment Reality vs. experiments

Reality, idealistically

| | | |
|--------------|----------------|----------------|
| - (harmless) | true | false negative |
| + (harmful) | false positive | true |

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Western positivism

- “Western world has been built on the concept of liberty”
- “Any act is permissible unless it is shown to cause unacceptable harm”

Bergkamp, L. “Understanding the Precautionary Principle”, Hunton & Williams, 25.01. 2002

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Assessment

A hypothesis: Assumed harmless, until proven harmful:

Incorrectly accepted = Result: **Harm**
false negative

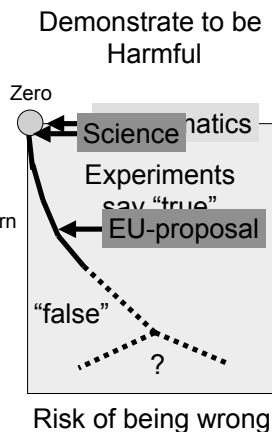
Incorrectly rejected = Result: **Lost benefits**
false positive

Who is to bear the risk of a wrong decision?

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Level of proof

- Proof
- Beyond all reasonable doubt
- Circumstantial evidence
- Reasonable grounds for concern
- Scientific basis for suspicion
- Balance of risk
- Guess
- Bias



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Who has burden of proof?

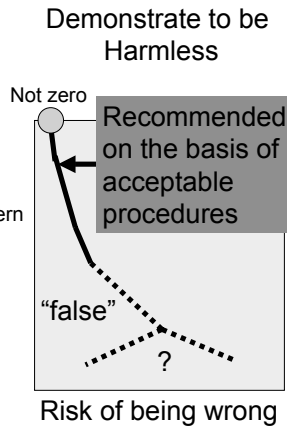
| Economic Activity | Producer | Authorities |
|---------------------------------|-----------------------|-------------|
| Medicines | ✓ | |
| Pesticides | ✓ | |
| Food Additives | ✓ | |
| Power Stations | ✓ | |
| “New” Industrial Chemicals | ✓ | |
| “Existing” Industrial Chemicals | | ← ✓ |
| Fishing | | ✓ |
| Many new technologies | | ✓ |
| | GMOs, ED, ETC? | |

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Acceptable risk of wrong decision

- False positive = type I error = $\alpha < X$
 - Proposers risk:
- False negative = type II error = $\beta < N * X$
 - Health and environment risk: $N \text{ always} > 1$

Why?

It is an established judicial, ethical concept that we prefer to acquit the guilty rather than convict the innocent

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Choice of level and burden of proof is not natural science.

It is an ethical issue:

Who shall suffer the risk of harm and who shall gain from the benefit of chance?

It is a question of moral and equity in regulatory practice.

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Risk Assessment

My observation is that there is utter confusion in the risk assessment community about:

- what are natural science arguments
- what are ethical issues

Popper: No decision can be made on facts alone. There has to be an ethical basis.

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Recent history of approaches to environmental engineering

- Command and control (laws, directives, codes, standards, rules)
- Economic instruments (prices, taxes, levies, subsidies, incentives)
- Consensual approach (hearings, stakeholders meetings, consensus conf.)
- Ethical approaches (morale, attitudes, behaviour)

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Overriding ethical principles

- **Motivation ethics**
 - Awareness, education
- **Behaviour ethics**
 - Command and control
 - Ban, prod. standards, labelling
- **Consequence ethics**
 - "Ends" ethics
 - Env. quality standards
 - Utility
 - Pro-et Con analysis
 - Cost-benefit analysis

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Interpretation of PP

The Precautionary Principle is a framework of thinking that governs the use of foresight and demands an ethical stance in situations characterised by uncertainty and ignorance and where there are potentially large pros and cons of both regulatory action and inaction.

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MAIN CONCLUSION:

Expand IEA, Integrated Environmental Assessment

Does include:

- Integration between disciplines
- Integration between media
- Alternatives
- Science/engineering - policy interface

Expand to include:

- Uncertainty
 - All available information and all values
 - Early involvement
 - "pro et con" analysis
- Action:
- Decision on the basis of level of suspicion, risk of being wrong, "pro et con", rights and equity
 - Choose a diversity of robust and adaptable solutions

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International Symposium



Uncertainty and Precaution in Environmental Management

***Copenhagen, June 7-9, 2004
Technical University of Denmark***

EFIEA

SETAC

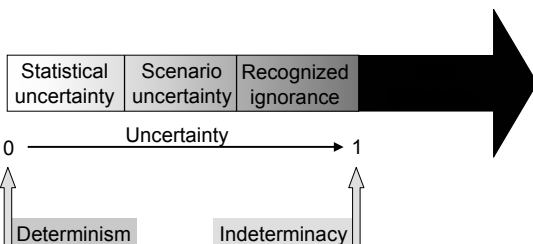
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Categories of no-know

- Determinism
- Statistical uncertainty (risk)
- Scenario uncertainty
- Ignorance
- Indeterminacy

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Level of uncertainty



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Tool box for uncertainty and precaution

- **Fixed models**
 - Uncertainty matrix
- **Decision making**
 - Robust optimization
 - OC-curves, power analysis
 - Bayesian networks, filtering
 - Stakeholder participation
- **Monitoring and model up-date**
 - Grey-box models
- **Real time control**
 - Dynamic strategic planning, real options

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**Wisdom is to know,
that you do not know**

Thank you for your attention

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