Use and Politicization of Science in Environmental Policy Development

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Phases of Environmental Policy Development

• Discovery (scientific or otherwise) of a problem of concern to the general public or a key constituency

• Political debate simultaneous with ongoing scientific validation/refutation through peer-reviewed literature and/or commissioned reports

• Litigation aimed at forcing regulation and pointing to selective scientific evidence

• Legislation and/or international treaty development and enactment, often pointing to government-sanctioned comprehensive scientific assessments (e.g., National Academies reports; IPCC reports)

• Attempts to regulate accompanied by counter-litigation often questioning the quality or relevance of the science

• Court decisions shape regulation
Examples

International

• Montreal Protocol on Substances that Deplete the Ozone Layer
• UNFCCC/Kyoto Protocol

U.S. Domestic

• Toxic Substances Control Act (TSCA)
• Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), aka “Superfund”
• Clean Water act
• Clean Air Act
GHG regulation under the Clean Air Act

- 1997: Kyoto Protocol is adopted into the UNFCCC; United States does not ratify
- 1999: Several advocacy groups petition EPA to regulate GHGs as pollutants under the Clean Air Act
- 2003: EPA denies the petition, stating that it lacked authority to regulate GHGs under the Clean Air Act and would not choose to do so even if it had authority
- 2005: Several states and other parties sue EPA for violating Clean Air Act requirements. The DC Appellate Court finds in EPA’s favor; the plaintiffs appeal to the Supreme Court.
- 2007: U.S. Supreme Court rules that GHGs are pollutants under the Clean Air Act and compels EPA to issue endangerment and cause or contribute findings.
GHG regulation under the Clean Air Act

- 2009: EPA finds that six GHGs emitted from new vehicles cause or contribute to pollution that endangers public health and welfare, requiring regulation under the Clean Air Act.

- 2009: Unauthorized release of emails stored on a server at University of East Anglia’s Climatic Research Unit (UEA-CRU) leads to “climategate” scandal.

- 2010: AL, TX, VA and other parties petition EPA to reconsider its findings, arguing the UEA-CRU emails show that the IPCC process was corrupt. EPA denies the petition; petitioners sue.

- 2011: EPA begins regulating GHG emissions from new mobile sources.

- 2012: DC Appellate Court upholds EPA’s findings.

- 2013-14: EPA prepares new regulations for GHG emissions from power plants.
EPA’s Endangerment and Cause or Contribute Findings

Endangerment Finding: “The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases — CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆ in the atmosphere threaten the public health and welfare of current and future generations.”

Cause or Contribute Finding: “The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.”
EPA’s Technical Support Document (TSD)
The Science Behind EPA's GHG Endangerment and Cause or Contribute Findings under the Clean Air Act

Technical Support Document for

Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act
EPA’s Technical Support Document (TSD)

- TSD provides technical analysis of the potential risks of GHGs for human health and welfare and contribution of human activities to rising GHG concentrations
- 31 EPA staff contributed to TSD
- 15 federal expert reviewers from 8 agencies (1 from EPA)
- 120-day public comment period in 2009
- 60-day public comment period in 2010
- 580,000 public comments received; large fraction directed at TSD
- Final report: 198 pages & 171 references
Underlying Scientific Assessments

1. NAS (2001) Climate Change Science: Analysis of Some Key Questions
2. NAS (2005) Radiative Forcing of Climate Change
3. NAS (2006) Surface Temperature Reconstructions for the Last 2,000 Years
7. CCSP (2009) SAP 1.2: Past Climate Variability and Change in the Arctic and at High Latitudes
8. CCSP (2008) SAP 1.3: Re-analyses of Historical Climate Data
10. CCSP (2009) SAP 2.3: Aerosol Properties and their Impacts on Climate
11. CCSP (2008) SAP 2.4: Trends in Ozone-Depleting Substances
12. CCSP (2008) SAP 3.1: Climate Change Models
13. CCSP (2008) SAP 3.2: Climate Projections
15. CCSP (2008) SAP 3.4: Abrupt Climate Change
17. CCSP (2009) SAP 4.2: Thresholds of Change in Ecosystems
21. CCSP (2008) SAP 4.7: Impacts of Climate Change and Variability on Transportation Systems
22. GCRP (2009) Global Climate Change Impacts in the United States
Some Conclusions from the Assessments


  “It is highly likely (greater than 90 percent probability of occurrence) that intense precipitation events will continue to become more frequent in widespread areas of the United States.”


  “The impacts of higher temperatures in urban areas and likely associated increases in tropospheric ozone concentrations can contribute to or exacerbate cardiovascular and pulmonary illness if current regulatory standards are not attained.”
EPA’s Technical Support Document (TSD)

Sections of the TSD

1. Introduction and Background
2. Greenhouse Gas Emissions and Concentrations
3. Direct Effects of Elevated Greenhouse Gas Concentrations
4. Radiative Forcing and Observed Climate Change
5. Attribution of Observed Climate Change to Anthropogenic Greenhouse Gas Emissions at
6. Projected Future Greenhouse Gas Concentrations and Climate Change
7. Human Health
8. Air Quality
9. Food Production and Agriculture
10. Forestry
11. Water Resources
12. Sea Level Rise and Coastal Areas
14. Ecosystems and Wildlife
15. U.S. Regional Climate Change Impacts
16. Impacts in Other World Regions

Appendix A.  Brief Overview of Adaptation
Appendix B.  Greenhouse Gas Emissions From Section 202(a) Source Categories
Appendix C.  Direct Effects of GHGs on Human Health
Some Key Conclusions of the TSD

- GHG concentrations have risen far above natural background levels.
- Warming of the climate system is unequivocal.
- Most warming since mid-20th century is very likely due to the increase in anthropogenic GHG emissions.
- U.S. temperatures warmed during the 20th and into the 21st century.
- Climate change is currently affecting U.S. physical and biological systems.
- The United States is very likely to warm during this century; most U.S. areas likely to warm by more than the global average.
- Severe heat waves projected to intensify in the U.S., with potential increases in mortality and morbidity.
- Many health effects likely to fall disproportionately on the poor, elderly, disabled, and uninsured.
Some Key Conclusions of the TSD

- Increased ozone pollution expected due to higher temperatures and weaker circulation in the United States.
- Climate change very likely increased the size and number of forest fires, insect outbreaks, and tree mortality in the western U.S.
- Coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution.
- Climate change likely to affect U.S. energy use and production and infrastructures.
- Climate change impacts may exacerbate humanitarian, trade, and national security issues of interest to the United States.

“These Findings are based on careful consideration of the full weight of scientific evidence and a thorough review of numerous public comments received...”
2010 Petition to Reconsider hinged on the Credibility of the Underlying Science

- 10 Petitioners:
  - States: Texas, Virginia
  - Energy interests: Ohio Coal Association; Peabody Energy Company, Arthur Randol
  - Free-market policy/legal groups: Competitive Enterprise Institute, Pacific Legal Foundation, Southeastern Legal Foundation
  - Business advocacy groups: Chamber of Commerce, Coalition for Responsible Regulation

- Citing the UAE-CRU “climategate” emails, "The petitioners allege that the e-mails show that the peer-review and report development processes employed by the IPCC are ‘fundamentally corrupt,’ lack scientific integrity, are policy prescriptive, and do not yield ‘true’ consensus conclusions regarding the state of the science.”

- EPA denied the petitions on July 29, 2010: “EPA finds that the evidence and arguments provided by petitioners do not support their conclusion that the peer review and assessment report processes employed by the IPCC were “fundamentally corrupt” and policy prescriptive.”
UAE-CRU Email Controversy

“In mid-November 2009, emails were removed without authorization from a University of East Anglia server and posted to the internet; within 24 h an international scandal was born—alleging fraud by leading climate scientists—which almost immediately became known as climategate.”

Maibach et al., 2012

While noting some undesirable behaviors by individual scientists, eight (8) investigations cleared “Climategate” scientists of wrongdoing

- March 2010: House of Commons Science and Technology Committee
- Feb 2010, June 2010: Pennsylvania State University (two reviews)
- July 2010: Independent Climate Change Email Review (Russell Report)
- July 2010: USEPA denial of petition to reconsider Endangerment Finding
- Feb 2011: Inspector General of the U.S. Department of Commerce OIG
- Aug 2011: National Science Foundation OIG
The purpose of this painstaking documentation was to demonstrate that the findings were based on credible science. Adequate science and accurate documentation of the science provides political and legal cover for the regulator.
Politicization of Science in the Policy Arena

• Most science-based policy issues are non-controversial: e.g., municipal water treatment, toxic chemicals, childhood vaccination for measles, mumps & rubella

• Why do some science-based issues become controversial?
Cultural Cognition Worldviews

Hierarchy

- **Hierarchical individualists** (e.g., Conservative Republicans)
- **Egalitarian communitarians** (e.g., Liberal Democrats)

Risk Perception Key
- Low Risk
- High Risk

Individualism → Communitarianism

- Climate Change, Nuclear Power
- Guns/Gun Control

Egalitarianism

- Climate Change; Nuclear Power
- Guns/Gun Control
Public Perception of Expert Credibility

Robert Linden

Position: Professor of Meteorology, Massachusetts Institute of Technology
Education: Ph.D., Harvard University
Memberships:
• American Meteorological Society
• National Academy of Sciences

Global Warming

Oliver Roberts

Position: Professor of Nuclear Engineering, University of California, Berkeley
Education: Ph.D., Princeton University
Memberships:
• American Association of Physics
• National Academy of Sciences

Nuclear Power

James Williams

Position: Professor of Criminology, Stanford University
Education: Ph.D., Yale University
Memberships:
• American Society of Criminologists
• National Academy of Sciences

Gun Control

Climate Change Expert (Fictional)

POSITION A (HIGH RISK)

“It is now beyond reasonable scientific dispute that human activity is causing ‘global warming’ and other dangerous forms of climate change.... Scientific authorities at all major universities agree that the source of this increase is human industrial activity.... This change is resulting in a host of negative consequences: ..., ..., ...”

POSITION B (LOW RISK)

“Judged by conventional scientific standards, it is premature to conclude that human CO₂ emissions ... cause global warming.... Scientists who predict global warming despite these facts are relying entirely on computer models. ... The idea that those same models will accurately predict temperature ... is based on unproven assumptions, not scientific evidence. ...”

Public Perception of Expert Credibility

**Featured scientist is a knowledgeable and credible expert on ...**

*Difference in Likelihood of Agreeing Scientist is “Expert”*

<table>
<thead>
<tr>
<th></th>
<th>Low Risk</th>
<th>High Risk</th>
</tr>
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<tbody>
<tr>
<td>Climate Change</td>
<td>72%</td>
<td>54%</td>
</tr>
<tr>
<td>Nuclear Power</td>
<td>31%</td>
<td>22%</td>
</tr>
<tr>
<td>Concealed Carry</td>
<td>61%</td>
<td>58%</td>
</tr>
</tbody>
</table>

Liberal more likely to agree
Conservative more likely to agree

*N = 1,500. Derived from ordered-logit regression analysis, controlling for demographic and political affiliation/ideology variables. Culture variables set 1 SD from mean on culture scales. CIs reflect 0.95 level of confidence.*

**Scientific Literacy vs. Political Ideology**

- Rated scientific literacy and political worldviews of survey respondents
- Asked, “How much risk do you believe climate change poses to human health, safety, or prosperity?”

U.S. general population survey, $N = 1,500$. Scale 0 (“no risk at all”) to 10 (“extreme risk”), $M = 5.7$, $SD = 3.4$. CIs reflect 0.95 level of confidence.

Demonstrating Political Polarization over Scientific Risk Information

Non-controversial:
Skin cream

<table>
<thead>
<tr>
<th>Result</th>
<th>Rash Got Worse</th>
<th>Rash Got Better</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients who did use</td>
<td>223</td>
<td>75</td>
</tr>
<tr>
<td>the new skin cream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients who did not</td>
<td>107</td>
<td>21</td>
</tr>
<tr>
<td>use the new skin cream</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(A) Rash Decreases

Yale Law School, Public Law Working Paper No. 307
“How much risk do you believe climate change poses to human health, safety, or prosperity?”

**Interaction of Scientific Literacy and Culture**

**Greater**

**Liberals**

**Lesser**

**Polarization INCREASES with scientific literacy**

U.S. general population survey, $N = 1,500$. Scale 0 (“no risk at all”) to 10 (“extreme risk”), $M = 5.7$, $SD = 3.4$. CIs reflect 0.95 level of confidence.

Effect of Numeracy and Political Ideology on Interpretation of Politically Non-controversial Data: Face Cream Results

Liberal Ideology / Conservative Ideology
- Cream increased rashes
- Cream decreased rashes
Effect of Numeracy and Political Ideology on Interpretation of Politically Controversial Data: Gun Control Results

Liberal Ideology / Conservative Ideology

- - - - - Gun control decreased crime
- - - - - Gun control increased crime

Numeracy score
**Politicization of Science in the Policy Arena**

- Most science-based policy issues are non-controversial: e.g., municipal water treatment, toxic chemicals, childhood vaccination for measles, mumps & rubella

- Why do some science-based issues become controversial?
  - When topics collide with strongly held values that differ across ideological worldviews (e.g., premarital sex, “big government”)
  - When scientists become perceived as an interest group supporting a particular side of a debate (Note: works in both ideological directions)

- When these things happen, science and scientists are no longer viewed as an objective arbiters of “fact” or “truth”

- Dan Kahan (Yale Law) and colleagues have found that when public perception of science becomes politicized, people look to validators whose politics they agree with rather than to technical experts on the topic in dispute.