

Perceptions, Values, and Decisions

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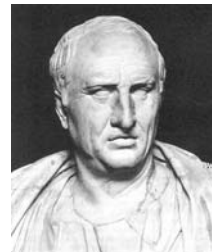
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Center



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“Probabilities direct the
conduct of the wise man”

Cicero, *De Natura Deorum*,
Book 1, chap. 5, sec. 12



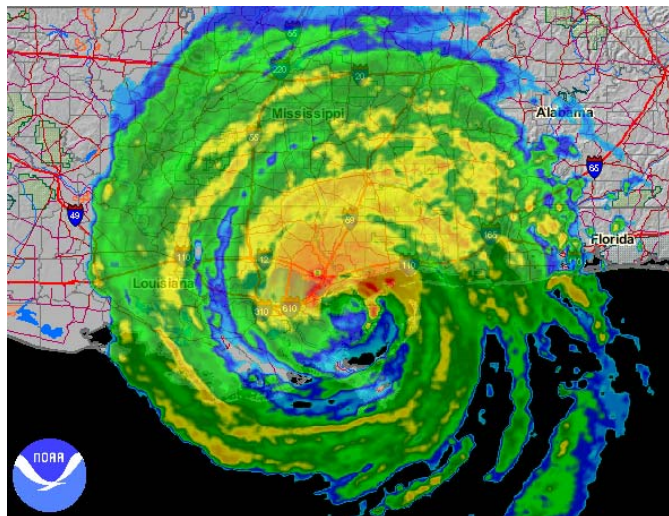
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Civil Works Context

- Diverse set of decision problems
 - Missions:
 - Flood risk management, water distribution, hydropower, navigation, environmental restoration, emergency operations
 - Participants:
 - Ranging from the individual to broad, public deliberations
- Risk attitudes, perceptions, and values
 - Determining how trade-offs are resolved
- Developing communication strategies and methods

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The Corps' Interest in Risk and Decision Making: A Tale of Katrina



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Katrina: A “Big” Event

- Landfall 0610, 29 August 2005
- Category 3
 - 125 mph sustained winds
 - 24-28 ft. max surge
- 1,836 deaths
- \$100B in damages
- 100 mcy of debris



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The Multidimensional Nature of Risk

- Two aspects
 - Diverse nature of the outcomes of interest
 - Could include: human health and safety, economics, environmental impacts, affects on social systems, etc.
 - Human dimensions
 - Human responses to risk are a function of human values, risk perceptions and risk attitudes
- Big questions:
 - How will people decide and respond?
 - How to approach informing decisions?

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Table 2. Estimates of risk from asbestos exposure in schools in comparison to other risks in U.S. society.

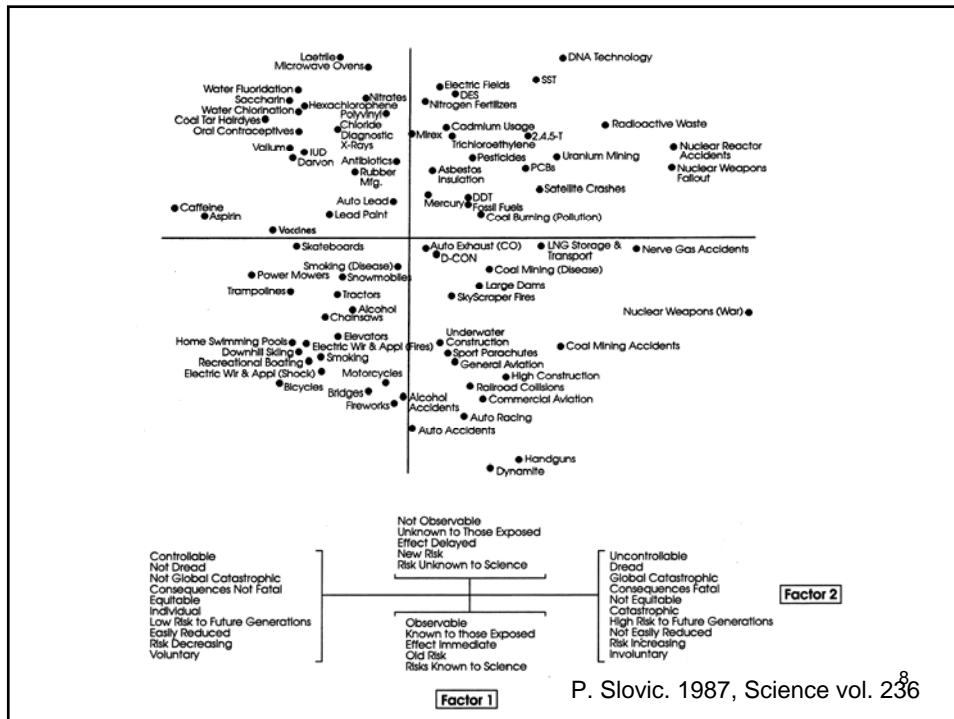
Cause	Annual rate (deaths per million)
Asbestos exposure in schools	0.005–0.093
Whooping cough vaccination (1970–1980)	1–6
Aircraft accidents (1979)	6
High school football (1970–1980)	10
Drowning (ages 5–14)	27
Motor vehicle accident, pedestrian (ages 5–14)	32
Home accidents (ages 1–14)	60
Long-term smoking	1200

Source: Mossman, et al., "Asbestos: Scientific Developments and Implications for Public Policy," 247 *Science* 294, 299 (1990) © AAAS.

Note: Data from six published risk estimates in which total deaths (lung cancer and mesotheliomas) attributable to asbestos exposure over a lifetime were estimated per 1 million students exposed to 0.00024 fibers per cubic centimeter air (the mean airborne concentration in schools) for five school years, beginning at age 10. Estimates indicate that the annual rate is 0.005 to 0.0093 deaths per million students for an average life expectancy of 75 years.

Breyer, S. 1993. *Breaking the Vicious Circle: Toward Effective Risk Regulation*. Harvard University Press, 127 pp.

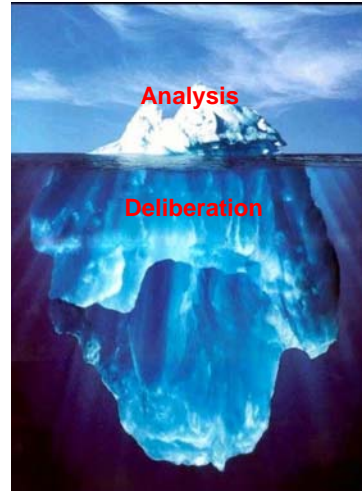
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P. Slovic. 1987, *Science* vol. 236

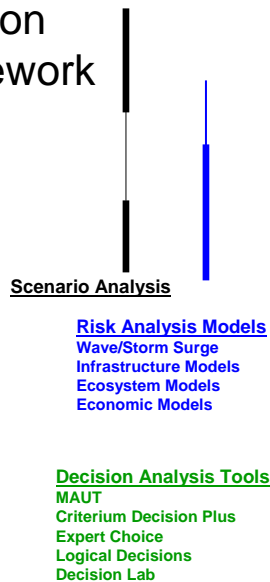
An Analytic-Deliberative Process

- Risk analysis produces technical information
- Deliberation is used to develop understanding to support decisions
 - Deliberation will determine:
 - How the problem is conceptualized
 - How the problem is analyzed
 - What constitutes a successful solution

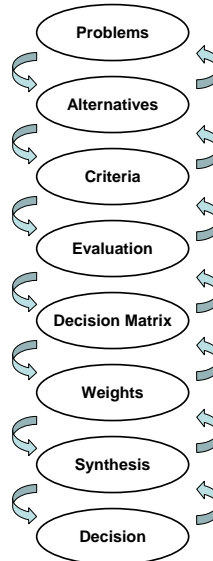


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Risk-Informed Decision Framework

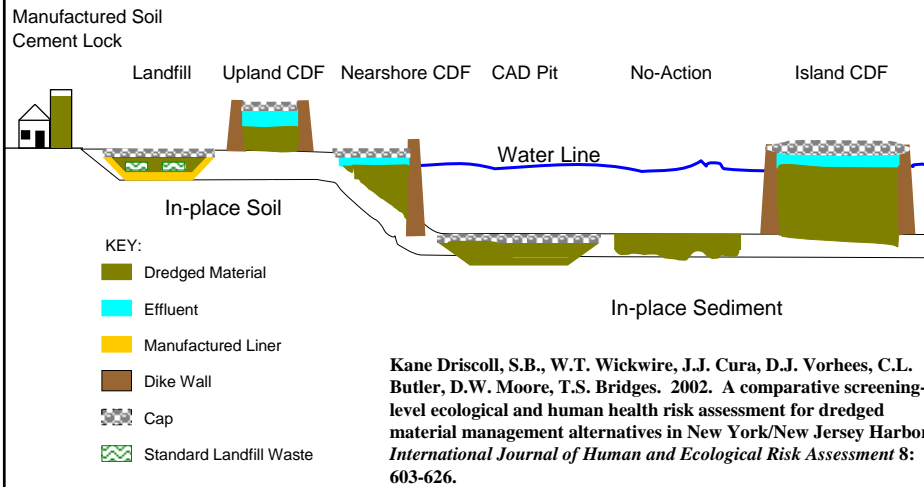


Risk and Decision Analysis Framework



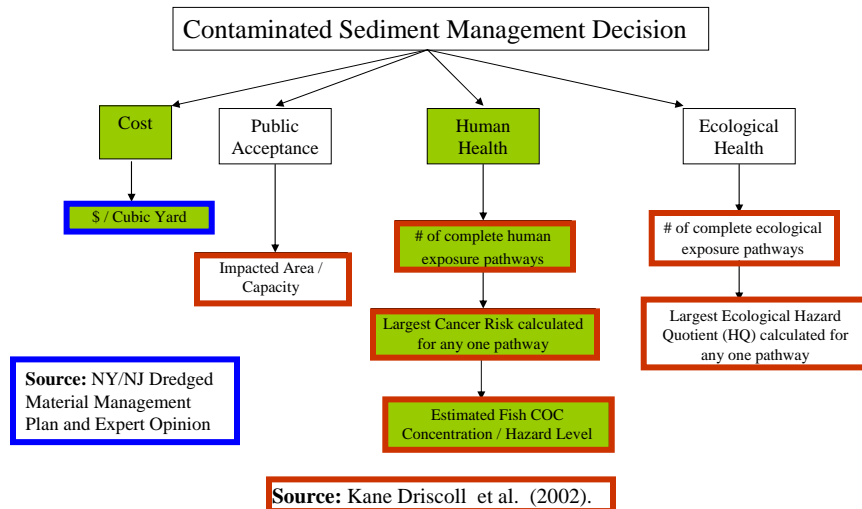
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Conceptual Illustration of Disposal Alternatives



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Decision Criteria: NY/NJ Harbor



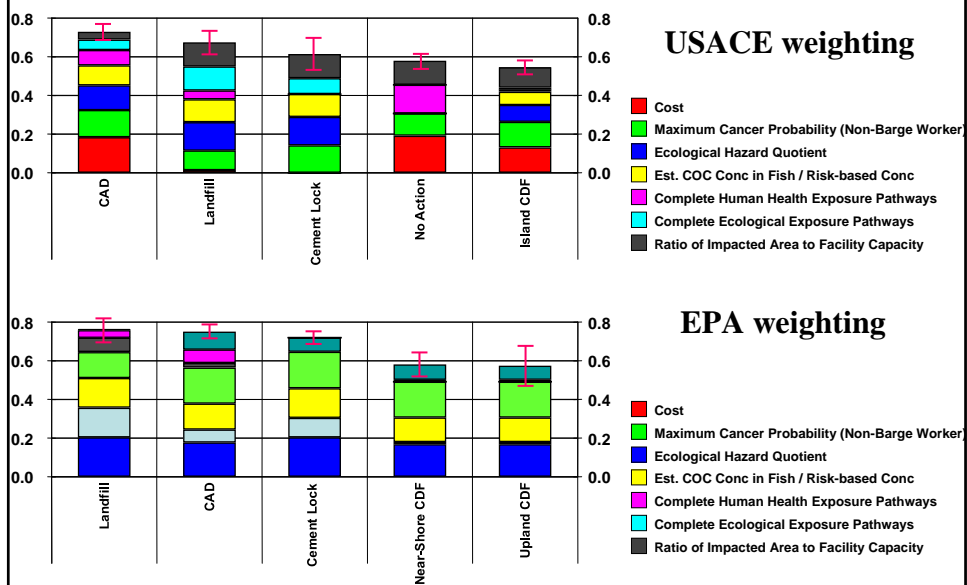
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USACE/EPA Survey Results: Criteria Weights (%)

	EPA	USACE
Public Acceptability	7.4	12.5
Ecological Health	35.6	27.1
Human Health	47.0	40.7
Cost	10.0	19.7

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Criteria Contributions to Decision Score



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LaCPR Objectives and Metrics

Planning Objectives

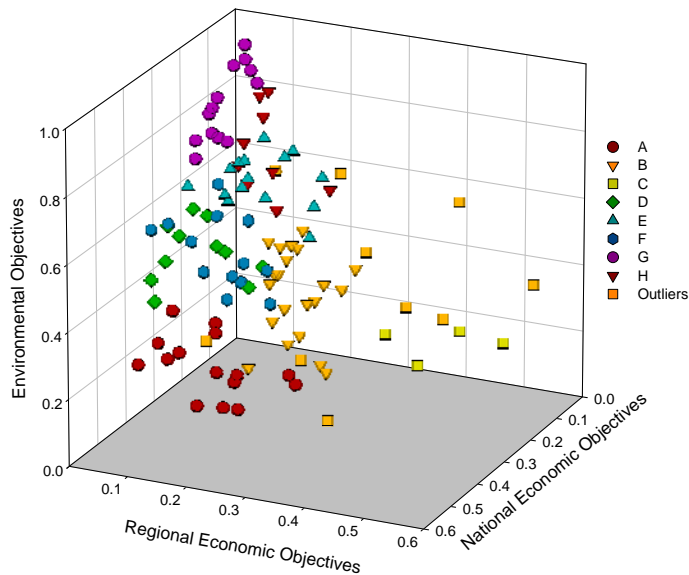
- Reduce risk to public safety from catastrophic storm inundation
- Reduce damages from catastrophic storm inundation
- Promote a sustainable ecosystem
- Restore and sustain diverse fish and wildlife habitats, and
- Sustain the unique heritage of coastal Louisiana by protecting historic sites and supporting traditional cultures

Performance Metrics

- National Economic Development
 - Residual damages
 - Life-cycle costs (Implementation, O&M)
 - Construction time
- Regional Economic Development
 - Regional Economic Development (jobs, income, regional output)
- Environmental Quality
 - Spatial integrity
 - Wetlands restored and/or protected
 - Direct impacts
 - Indirect impacts
 - Historical properties protected
 - Archeological properties protected
- Other Social Effects
 - Residual population impacted
 - Historical districts protected

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LaCPR Weightings Results



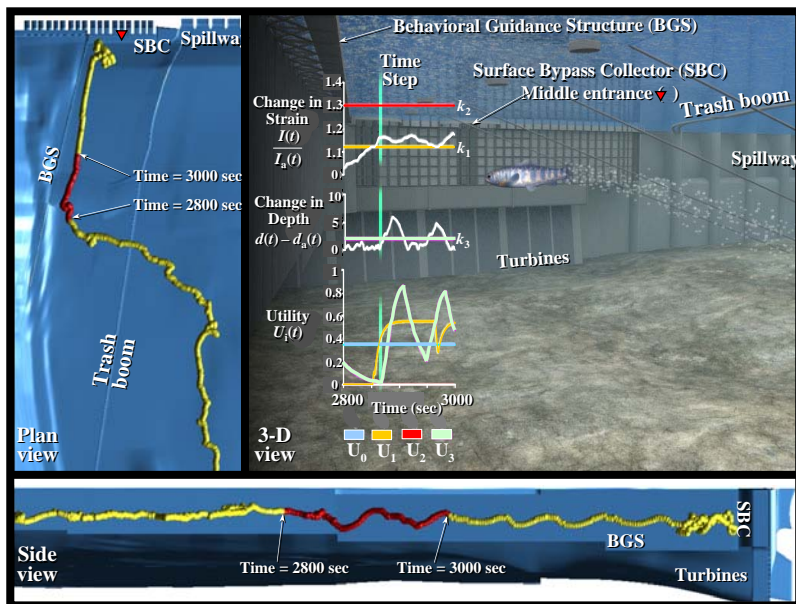
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Describing and Predicting Animal Behavior

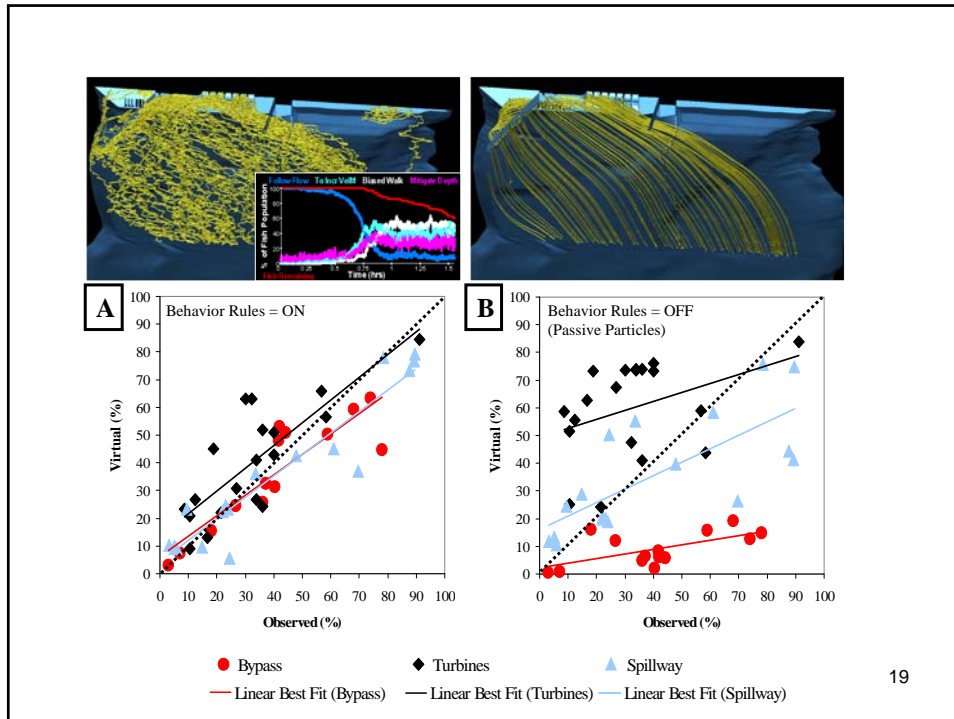
- Predator-prey interactions
 - Northern pike minnow preying on salmon smolts in dam tailraces
- How will birds respond to habitat restoration projects?
- How will fish and turtles respond to flow fields created by dredges?
- Perception and data processing
 - Spatiotemporal movements
 - Environmental / physical conditions



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Questions

- What short- and long-term research in cognitive science:
 - Will help us understand human responses to risk-decision problems?
 - Aid in developing internal and external communication strategies?
 - Help us make “better” decisions?
- What research on animals/humans can inform our understanding of cognition in humans/animals?

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