Tales from the field





Using case examples and case studies to enhance learning Mary A. Fox, PhD, MPH Health Policy and Management Risk Sciences and Public Policy Institute Teaching Toolkit Presentation

Disclosures and acknowledgements

- Not the case study research method
- Drawn from the 4 core courses of the Risk Sciences and Public Policy Certificate program
 - Risk faculty colleagues: Tom Burke and Keeve Nachman

n Risk Sciences and Public Policy Institute

Risk Sciences Certificate?

- Training in risk assessment, risk management and risk communication
- Risk assessment procedures underlie health-based decision making on many topics
 - Air, water, hazardous waste clean-up, Superfund
 - Food safety (ingredients, adulterants, additives, food contact substances)
 - Consumer products
 - Drugs and devices
- Translation of scientific data for policy making

Risk Assessment?

➢ Problem Formulation

Qualitative

➢Hazard Identification

Qualitative

Dose-response Assessment

Quantitative

Exposure Assessment

Quantitative

➢ Risk Characterization

Quantitative and qualitative

Management and communication



NRC 2009 Science and Decisions: Advancing Risk Assessment

Example case study topics developed from practice activities

- Spring Valley, DC: WWI chemical weapons hazardous waste site
- Pesticide mixtures in food
- Arsenic in food, soil, chicken production
- Coal ash and drinking water contamination
- Gold King mine spill
- Perchlorate (rocket fuel) in water
- Perfluorinated compounds





Using case examples and case studies

• As lectures

- Small features with other content
- Full class session
- Class modules, multiple lectures covering policy context, methods pieces, outcomes, new directions
- Blended/discussion-based (new for next term)
- As assignments
 - Qualitative and quantitative
 - Full-term or several in a term

Assignment types

- Multi-part with Q & A components, calculations, interpretation
- Written and spoken policy testimony to agency or Congress
- Conventional read and respond assignments
- Peer review and public comment on a current government document

From faculty experience to case study/case example: coal combustion waste

- Technical assistance to county health officer
 - County sampled and analyzed water from 82 wells (83 homes)
 - Mixtures of As, Al, Mn, Tl over drinking water standards in several wells



What's in CCW?

- "Clean" coal may mean clean air but not clean water
- Coal combustion waste comes from combining solid waste outputs of coal-fired power production
 - Boiler ash
 - Flue-gas scrubber sludge

- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Chromium (III)
- Chromium (VI)
- Cobalt
- Copper
- Fluorine
- Iron

- Lead
- Manganese
- Mercury
- Molybdenum
- Nickel
- Potassium
- Selenium
- Silver
- Strontium
- Sulfate
- Thallium
- Vanadium
- Zinc



From faculty experience to case study/case example: coal combustion waste, cont.



- Technical assistance to county health officer
 - Risk assessment for families on private wells
- Participation in policy development
 - Congressional briefings (2009)
 - Congressional and agency hearings (2010 and 2018)
- Course products:
 - Lecture in the policy course
 - In-class exercise in introductory course

Building a case-study assignment

- Considerations
 - Skills to include
 - Resources to produce, implement
 - Maintenance/update
 - Can it be modular some data can be easily replaced or updated
 - Level of student effort, time requirements
 - Grading approach

Quantitative case-study assignment

- Pesticide mixtures in food
- Skills
 - Selecting data and distributions to represent an exposure process
 - Calculate mixture exposure and risk metrics
 - Interpret a distribution of exposure and risk
 - Preparing a mini risk assessment report
- Other aspects
 - Learning a new software add-in
 - Demonstrating software functions (that students are not required to use)





Quantitative case study - pesticide mixtures

- Components:
 - Scale down of original assessment
 - Developed my own software tutorial
 - Extracted data sets
 - Time in computer lab

- Lessons learned
 - Refined over time to enhance
 - Student time to consider
 - data quality/relevance (rather than find data)
 - the process
 - the results
 - Challenges
 - Time intensive: 3-weeks of term
 - Had to be simplified for online

Qualitative case-study assignment

- Written and 5-minute spoken hearing testimony on a policy change
- Students choose topic
- Graduated assignment builds over the term
- Skills
 - Use data to support a policy-change argument
 - Writing
 - Timed public speaking (mock-hearing environment)
- Resources
 - Detailed assignment instructions for each part of the assignment
 - Reserve class session(s) for the mock hearing

Overall lessons learned

- Case-based learning is critical to our field
- Relatively easy to find new topics
- Case-based assignments can be time/resource intensive
- Some case studies can be used long-term but beware inertia

Student experiences



Risk Certificate Class of 2015

- Methods carried forward into PhD research
- Students sought out the Risk program for science-policy translation training
- Value in job search
 - At interview student was asked details of case study analysis
 - Students now on faculty, in federal and state government, NGOs, consulting
- Direct translation to practice (testimony presented in agency hearing)

Group discussion

- Other experiences?
- Case study ideas to develop?