Risk, Resilience and Decision Making

PA 5741

Spring 2018

University of Minnesota

Room: Humphrey School 184

Time: Tu/Th 9.45AM – 11AM

Syllabus

Instructor: Peter Calow

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Office Hours: By appointment

Course Description

Risk is a (possibly THE) concept for our time.

Every advance that we make through science and technology brings its own problems for human health and environment.

Anticipating and managing these technological risks is a major role for governments.

Assessing risks involves an understanding of the technology (and its wastes) and the science behind impacts on humans and environment.

Managing risks combines an understanding of impacts and their causes with an understanding of public preferences and values.

This course embraces how risk assessment informs policy development and decision-making in a cross-disciplinary way by addressing the core natural and social science issues. In tune with the basic philosophy of the Science, Technology & Environmental Policy (STEP) program it therefore makes connections between science/technology and policy by integrating understanding across the sciences.

The focus will be on chemicals – contamination and pollution - and their effects on human health and the environment. But students will be encouraged to consider how the principles can be broadly applicable to other risk agents and their effects on the socio-economic system.

Learning Objectives

Through this course students are expected to:

- Understand the core principles and practices of risk assessment. For example, students will be able to define and distinguish hazard, risk and uncertainty – and understand the basic principles behind exposure and effects assessments for humans and ecosystems.

- Appreciate differences between human health and ecological risk assessments; and be able to recognize how vulnerability and resilience should be taken into account.
- Understand how risk assessment informs, and is informed by, risk management issues. This will entail learning how public preferences can be captured through cost-benefit and public value mapping and how all relate to structured decision making.
- Appreciate how the concepts of risk assessment and management can be broadly applied
- Synthesize the elements of risk assessment and management by evaluating prominent risk laws.

Grading

One essay (Assignment 3 is a practice and Assignment 5 is the one that will be graded) – worth 25%.

Quiz session 7 worth 25%.

Risk law policy assessments (Assignment 8) worth 30% (10% for presentations and 20% for written policy assessment).

Overall attendance and involvement worth 20%.

You are expected to attend all classes. You are expected to record your own attendance via the Moodle site. Your grade for attendance will be reduced proportionately to your absences as recorded on Moodle. If you are ill or there are exceptional circumstances that prevent you from attending you should notify me in advance by email.

You are expected to submit assignments on time as specified on the Moodle site. Submission after a deadline will incur a penalty – being reduced by up to one grade point (e.g. A to B) depending on circumstances; failure to submit at all before the end of the course will lead to zero grade. If you are ill or there are exceptional circumstances that prevent you from submitting the work you should notify me in advance by email.

Grading levels are as follows

- A   >93%

- A-   92 -90%

- B+   89-87%

- B   86-83%

- B-   82-80%

- C+   79-77%

- C   76-73%

- C-   72-70%

- D   <69%

- F <59%

Percentages between grade borders (i.e. equal to or greater than: 92.5%, 89.5%, 86.5%, 82.5%, 79.5%, 76.5%, 72.5%, 69.5% and 59.5%) will be rounded up to the next highest grade.

Humphrey School grade definitions are:

- A = superior

- B = satisfactory graduate-level work

- C = below Graduate School standards, but worthy of graduate credit

- D = unsatisfactory work; no graduate credit

- F = fail/ no credit given

- S = satisfactory (grade of S must level of C- or above)

- N = non-satisfactory/ no credit given

Please note University policy on grading and student conduct at the following website: *policy.umn.edu/education/syllabusrequirements-appa*

Session #	Date of class session	Topic	Planned class activity	Homework – see Moodle for full details	Graded activities due
1	20 Mar	Risk society and the need for risk assessment and management	After introductions PC lecture on the topic	Assignment 1 – for session 2 from the web clarify definitions of hazard, risk, uncertainty and vulnerability.	
2	22 Mar	Technical aspects of risk	PC lecture but will be	Assignment 2 – write notes	

			interactive on the basis of assignment 1	comparing and contrasting human health endpoints in effects assessment; does it matter which is used? This will provide a basis for session 4. See Robinson (2007) and USEPA (2014).	
3	27 Mar	Exposure assessment	PC lecture		
4	29 Mar	Effects assessment 1- human health	PC lecture – but this will be an interactive session based on Assignment 2. Also PC will give advice on essays.	Assignment 3 – write a practice essay (no more than 1000 words) on: What are we trying to protect in ecological systems. Readings are Calow & Forbes (2003) and Forbes & Calow (2012). Bring the essay along to the next class, Session 5, as a basis for discussion and to swap with colleagues for comment.	
5	3 Apr	Effects assessment 2 - ecosystems	Interactive on the basis of assignment 3 – swap practice essays with colleagues for feedback	Assignment 4 – Write notes on resilience and consider if/how it should be taken into account in assessing risk. Readings are	Practice essay will be submitted in class today.

				Gibbs (2009) and Bundschuh et al (2017). The notes will provide a basis for discussion in session 6	
6	5 Apr	Taking into account resilience	Interactive session on the basis of assignment 4	Assignment 5 - write an essay (no more than 1000 words) that gives a critical account on: how/if risk assessment relates to structured decision making and how both relate to cost/benefit analysis and public value mapping. Readings: Gregory et al (2012) and Bozeman & Sarewitz (2011) Deadline for submission: 19 April at 5pm. Also prepare for quiz in next session 7.	
7	10 Apr	Qs and As and Quiz session	There will be an opportunity for Qs in first half. Then there will be quiz on previous sessions. There will then be opportunity for	

				anonymous feedback on the course.		
8	12 Apr	Risk assessment informs risk management 1 – the risk paradigms	PC Lecture	Assignment 6 - write notes on risk perception as basis for session 11. Reading: Slovic et al (2004)	
9	17 Apr	Risk assessment informs risk management 2 – connection to structured decision making, cost benefit analysis and public value mapping	Interactive on the basis of assignment 5 – and this will sharpen thinking for the essay Assignment 5	Assignment 7 – write notes on risk communication. Readings: Pidgeon & Fischoff (20110 and Stern et al (2016). This will provide a basis for session 12.	
10	19 Apr	Risk reduction laws	PC outlines some and how to carry out a policy assessment	Assignment 8 – class divides into teams. Each selects risk reduction law. Each carries out a policy assessment on how that law addresses the connection between risk assessment and risk management and if they are likely to deliver effective policy. This will provide a basis for sessions 13 and 14. Each team will produce a written policy assessment to be submitted	Deadline for Assignment 5 essay on structured decision making etc 5pm

				by 3 May at 5pm. Each team will make a presentation over a prescribed time (to be defined) either on 1 May or 3May	
11	24 Apr	Risk perceptions 1 why they often differ from technical risk assessment	PC lecture		
12	26 Apr	Risk perceptions 2	Interactive on the basis of assignment 7		
13	1 May*	Reports from assignment 8			
14	3 May*	Reports from assignment 8			Deadline for submission of policy assessment 5pm

*sessions will run together on same day subject to class agreement

References

There is no course text because currently there is no book that adequately covers both human health and environment, natural science and social science issues. Background references are suggested for consultation. All the rest will be provided on the class MOODLE.

Bozeman,B. & Sarewitz, D. (2011) Public value mapping and science policy evaluation. Minerva, 49, 1-23. [This is the introduction to a symposium collection. Students might like to read some of the other papers. They are available on line].

Bundschuh, M., Schulz, R., Schafer, R.B. AllenC.R. & Angeler C.R. (2017) Resilience in ecotoxicology: toward a multiple equilibrium concept. Environmental Toxicology & Chemistry, 36, 2574 – 2580.

Calow, P & Forbes, V.E. (2003) Does ecotoxicology inform ecological risk assessment? Environmental Science and Technology, 37, 146A-151A.

Forbes, V. & CALOW, P. (2012) Problems and promises for the new paradigm of risk assessment and an alternative approach involving predictive systems models. Environmental Toxicology & Chemistry' 31, 2663 – 2671.

Gibbs, M.T. (2009) Resilience: what is it and what does it mean for marine policymakers? Marine Policy, 33, 322-331.

Gregory, R., Failing L., Harstone, M., Long, G., McDaniels, T. & Ohlson, D. (2012) Structured Decision Making. A practical guide to environmental management choices. Wiley-Blackwell, Oxford. [Read sections: 1.2 Structured decision making; 2.2.1 Structured decision making compared with cost-benefit analysis; 2.2.4 Structured decision-making compared with risk assessment and management].

Greim, H. & Snyder, R. (2008) Toxicology and Risk Assessment: A Comprehensive Introduction. Wiley, NY. (Background reading – present in the library?)

Pidgeon, N. & Fischoff, B (2011) The role of social and decision science in communicating uncertain climate risk. Nature Climate Change, 1, 35-41.

Robinson, L.A. (2007) How the US government agencies value mortality risk reduction. Review of Environmental Economics and Policy, 1, issue 2, pp. 283–299. doi: 10.1093/reep/rem018

Slovic, P., Finucane,M.L., Peters, E & MacGregor, D.G. (2004). Risk as analysis and risk as feelings: some thoughts about affect, reason, risk and rationality. Risk Analysis 24, 311 – 322.

Stern, P.C., Perkins, J.H., Sparks, R.E. & Knox, R.A. (2016). The challenge of climate change neoskepticism. Science, 353, 653 – 654.

Sunstein, C.S. (2002) Risk and Reason. Cambridge University Press, Cambridge. (Background reading – present in the library?)

Suter, G. (2007) Ecological Risk Assessment, CRC Press, Boca Raton. (Background reading – present in the library?)

USEPA (2014) Framework for human health risk assessment to inform decision making. USEPA Archive Doc. [PC can supply if needed].

Other resources that will be supplied by tutor

1.   Description of Policy assessment

2.   Rubric for class presentations

3.   Rubric for team assignments

4.   PowerPoints will appear on the day of the session. Please note that these are property of the tutor and should only be used by students for the course, except by permission from the tutor.