**Department of Environment and Resource Studies, University of Waterloo**

# ERS 680 Sustainability Foundations

Fall 2012

Meetings: Wednesdays 1:30-4:30, EV2 room 2006

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**Special organizational note**

This course will be delivered in part jointly with ERS 701, the roughly parallel core introductory course for ERS doctoral students. This approach is new and untested. Some experimentation with joint and separate components, etc., will be involved. All participants will be encouraged to suggest desirable adjustments as we go along.

**Purpose**

As a core offering in the ERS masters programme, this course is intended to help its participants establish a reasonable working base from which to explore different fields of interest within environment and resource studies. The course focuses on the theme of creating and maintaining a sustainable society in a world of complex socio-ecological systems and interactions.

The main tasks of ERS 680 are

- to introduce the participants to the main contextual areas and issues related to the underpinnings, design and establishment of a sustainable society;
- to explore generally how insights from a variety of different fields can contribute to the pursuit of a sustainable society in a complex world; and in so doing
- to help the participants develop a defensible basic framework in which to prepare a thesis, to carry out other graduate work, and to engage in a host of other potential applications.

The course will give special attention to three core questions:

- can the main objectives and key considerations of sustainability efforts in a complex and uncertain world be at least roughly specified as basic guides for decisions and decision making processes for very different issues and contexts?
- can we overcome, or at least accommodate, the various big apparent tensions – between global and local, immediate and long term, socio-economic and ecological, planning ahead and expecting surprise, highly complex and practically manageable, generally applicable and context specific, etc.? and
- if so, how?

The approach here rests on a small set of basic propositions. Five main ones are as follows:

• sustainability, which in our usage is little more than a shorthand for attractive long term viability, involves a combination of ecological (biophysical) and human (physical, social, psychological, cultural, political, economic, institutional, etc.) considerations;
• these considerations are inevitably linked over time and space;
• the relationships involved (historically, currently and desirably in the future) are interactions of and in complex socio-ecological systems that are diverse, multi-scalar, nested and intersecting, dynamic and surprise-filled;
• in all sustainability issues and decisions, the specifics of the case and context matter; and
• what we choose to do in pursuit of sustainability is ultimately a matter of ethics as well as understanding, and an appreciation of the relations among ethics, understanding and uncertainty is likely to be helpful.

Beyond these propositions, there is no proper framework to be taught or accepted. Critical exploration in these areas will lead different individuals to different conclusions, and subsequent study will provide new enlightenment and perhaps very different perspectives. At the same time, each participant will be encouraged to assemble his or her own framework for understanding and applying the concept of sustainability in complexity, most immediately for the purposes of setting the anticipated MES research in its larger context.

Assembling this framework will require development of
• a critical grasp of the assumptions and institutional practices that now prevail (your critique);
• a reasonably coherent view of the basic characteristics of alternative assumptions and institutions – or alternative combinations of assumptions and institutions – that are more in keeping with sustainability objectives in a complex world (your vision) and unavoidable circumstances; and
• a set of working propositions about the most desirable means of making the transformation (your conclusions about the appropriate strategies and tactics applying various tools, techniques, etc.).

Accordingly, ERS 680 examines why sustainability and complex systems thinking have arisen as a critique of and alternative to prevailing ideas, institutions and behaviour, what their essential foundations are, what different forms a sustainable society might take and what main considerations guide development of appropriate strategies for response. The course also addresses central implementation considerations, especially respect for complexity and uncertainty, understanding of the main theories of change and appreciation of the range of possible applications. It looks carefully at actions that can be taken to help meet essential requirements for sustainability in campaigns for positive change locally and globally, with attention to the problems to be faced and the barriers to be overcome as well as the opportunities available.

ERS 680 is meant to assist individual student work in practical applications, including designing a sound and valuable thesis. In ERS, each thesis must be explicitly located in a

larger context and include a rationale that shows how the specific work illuminates, or contributes otherwise to, steps towards sustainability in a complex world.

**Readings**
The weekly information below provides lists of readings, usually in two categories: core "readings" and supplementary "additional readings". The core readings are priorities, though most weeks there are many core readings so you will need to select among them. They have been listed in a rough and debatable order of potential importance, which you are free to ignore. Particular interests may lead you to look also in the additional readings. These readings will be supplemented as appropriate throughout the course. Further suggestions are welcome.

Most of core readings are available electronically on the ERS course website on D2L (Learn), at https://learn.uwaterloo.ca. In the weekly lists below, core and additional readings on D2L are marked with an asterisk (*).

Significant portions of two books are included in the core readings and will be generally useful:

Robert B. Gibson, *Sustainability Assessment: Criteria and Processes* (London: Earthscan, 2005)

Brian Walker and David Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* (Washington: Island, 2006).

Copies are available in the bookstore.

For those wishing to delve a little more deeply into complex systems and sustainability, the following book is recommended, but not required:

David Waltner-Toews, James J. Kay and Nina-Marie E. Lister, editors, *The Ecosystem Approach: complexity, uncertainty and managing for sustainability* (New York: Columbia University Press, 2008).

**Assignments**
As noted above, one role of the course is to help establish a strong contextual foundation for the anticipated research and thesis. In aid of this, at the beginning of the course, each participant is asked to prepare and submit a concise description of his or her intended area of research. A paragraph will do (and we recognize that what you can describe now may not be what you end up doing). But having a working topic to use when considering applications of the ideas presented in the course should be useful throughout the term, And as part of the final commentary paper (see below), you will be expected to use your chosen research area as a basic for discussing the implications of material from the course lectures, readings and discussions.

***(i) Reading journal***
The main purpose of the assignment is to encourage reading that will round out and deepen your general understanding of issues concerning sustainability and complexity and clarify the links among these issues. This is meant in part simply to strengthen your foundations for understanding and acting. But it is useful also to anticipate application in

your thesis or, if your thesis agenda is still fuzzy, application to the general thesis area with more particular attention to some reasonably specific issue or case that you know well enough.

Quite aside from this course's purposes, you should be keeping a journal of some sort (perhaps an annotated bibliography) where you record new ideas, data, arguments and other useful findings from your readings (and other sources) for future reference.

The journal format is flexible but should include
• proper bibliographic references to written materials, addresses or information from other media;
• brief summaries of the main contents or main relevant points made or questions raised in the readings covered;
• relevant points from the class lectures/discussions;
• considered comments on the significance and implications of these points or questions (particularly with regard to the larger sustainability and complexity issues being addressed in the week and through the term); and, as the journal progresses,
• increasing concentration on connections or conflicts among the ideas considered.

Normally, each weekly entry should cover at least two readings relevant to the week's discussion. You may choose to consider these readings jointly or as separate items. You may mix longer and shorter entries. You must use proper grammar but may include bullet point lists.

Incorporating ideas from the class lectures/discussions and from sources outside the course is also a good idea.

It is a good idea to prepare the journal entries weekly, as we go. This will not be an enforced requirement. However, to encourage keeping up, and to provide for feedback throughout the term, the journal is to be submitted in three parts:
• Part one, covering weeks 1 to 5 is due on October 19.
• Part two, covering weeks 6 to 10, is due on November 23.
• Part three, the final two entries (for weeks 11 and 12) can be submitted with the commentary paper, on December 6.

***(ii) Commentary paper***
The commentary paper can be thought of as the conclusion to the reading journal with special consideration of implications for your anticipated research.

With particular attention to your research area, the commentary paper should discuss what you consider to be the defensible essentials of a defensible approach to research and practical action (an ethical framework for decision making seeking to contribute to sustainability, recognizing complexity) including
• what (if any) principles should be applied generally in assessing past experience, in identifying and choosing among potential options for action, and in designing and applying processes for deliberation and decision; and

• how more specific principles or guides should be developed for application in your research area, perhaps with illustrative focus on ae more or less particular case and/or context.

You are free to challenge any of the underlying premises here, so long as the challenge is supported by good argument.

The paper should be properly referenced and not more than 2500 words. While this is not obligatory, you are likely to find it useful to illustrate your key points with examples or applications in your anticipated thesis or research paper topic area. Please feel free to do so. This paper is due on December 3.

***(iii) Discussions and presentations***

Each participant will be expected and encouraged to contribute to the weekly discussions. All of the weekly sessions will be structured to include some opportunities for discussion. Many sessions, especially from weeks 6 through 11, will be in three parts: an initial lecture (loosely defined), followed by small group discussions on issues raised, in turn followed by a concluding integration. Responsibility for reporting back on small group discussions to the whole group will circulate.

**Evaluation**

| | |
|---|---|
| journal part 1, weeks 1 to 5 | 25% |
| journal part 2, weeks 6 to 10 | 25% |
| journal part 3, weeks 11 and 12 | 10% |
| commentary paper | 20% |
| contributions to discussions | 20% |

**Schedule**

| | |
|---|---|
| 1. September 12 | Introduction |
| 2. September 19 | Indicators |
| 3. September 26 | Sustainability |
| 4. October 3 | Complex systems |
| 5. October 10 | History |
| 6. October 17 | Integrity, resilience and precaution |
| 7. October 24 | Efficiency |
| 8. October 31 | Equity, sufficiency, opportunity, civility and democracy |
| 9. November 7 | Integration and trade-offs |
| 10. November 14 | Application |
| 11. November 21 | Governance |
| 12. November 28 | Global and local action |

**University of Waterloo policies on key course related matters**

***Academic Integrity*:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trustworthiness, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

***Grievance:*** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please contact the department's administrative assistant who will provide further assistance.

***Discipline:*** A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

***Appeals:*** A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals), www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

***Disabilities:*** The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

***Religious Observances:*** A student needs to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

**Weekly agenda and readings**

***1. September 12 Introduction to the course***

*agenda*
introductions, backgrounds, areas of interest
context and criteria for MES work; links between core studies and particular thesis research
sustainability at the core: an integrating concept across areas of expertise and concern (social, economic, ecological) and across responses (critique, vision, strategy, tactics)
complexity and resilience as key considerations
fundamentals of an ethical framework
varieties of application

identification of applications topic areas for the class small group discussions

*task:*
For application discussions, we should choose about five cases to examine throughout the term as particular examples of issues and places with understandable broader contexts that we can use to see how various ideas discussed in the course do or could apply. The cases should
• be reasonably familiar or have basic character and context that is easily explainable to the course participants;
• involve biophysical and social factors, concerns and opportunities, options and decision making;
• preferably be at least broadly related to two or more participants' anticipated research areas;
• cover a range of different subjects;
• be intriguing enough to merit discussion stretching over many weeks (though we can switch to new ones if the first set wears out.

*readings*
Bill Adams, "Thinking like a human: social science and the two cultures problem," *Oryx* 41:3 (2007), pp.275-276.*
Richard B. Norgaard, "Finding hope in the Millennium Ecosystem Assessment, *Conservation Biology* 22:4 (2008) pp.862-869.*
David W. Orr, "The problem of disciplines and the discipline of problems," *Earth in Mind* (Washington: Island, 1994), pp.94-98.*

*for your curiosity*
Andreas Vesalius, "To the Divine Charles V, the Mightiest and Most Unvanquished Emperor," *De Humani Corporis Fabrica* (1543), Vesalius' preface to his books On the Fabric of the Human Body, http://vesalius.northwestern.edu.*

*additional readings*
Alphabet City, "Food connects us all," open letter September 2007.*
Moti Nissan, "Ten cheers for interdisciplinarity," *The Social Science Journal* 32:2 (1997), pp.201-216; http://www.is.wayne.edu/mnissani/pagepub/10cheers.htm.*
George Francis, "Towards a sustainable society: a bibliographic introduction," and "On the scope and fields for environmental studies: a bibliographic introduction," (ERS, 1992).*
Paul Ekins, "Environmental regeneration," in *A New World Order: Grassroots Movements for Global Change* (London: Routledge, 1992), pp.139-165.
Joseph Z.Z. Matowanyika, "Cast out of Eden: peasants versus wildlife policy in savanna Africa," *Alternatives* 16:1 (1989), pp.30-39.
Edward A. Page and John Proops, "An introduction to environmental thought," in Page and Proops, eds., *Environmental Thought* (Cheltenham, UK: Edward Elgar, 2003), pp.1-12.

## *2. September 19 From indicators to actions: critiques, visions, strategies, tactics*

*agenda*

evident problems and deeper problems: indicators and roots, critiques and basic assumptions
what the indicators now indicate: states and trends
indicator issues: selective evidence, problems of measurement, problems of interpretation, links between trends and drivers
responses to the indications: visions of alternatives (competing options, utopias and distopias, scenarios and backcasting, shades of green)
theories of change, strategies and tactics, motives, options, tools
sustainability ends and means, principles and processes

*exercise*

1. Each participant

(i) picks one major topic of concern that is relevant to sustainability and about which formal indicators have been identified and tracked (topics include global or other scales of armed conflict, biodiversity, child health, climate change, competitiveness, consumption, contaminant emissions, corporate responsibility, cultural diversity, democracy, development, ecological footprint, ecological integrity, fisheries, food production, food security, GDP, green performance, happiness, health, human rights, inequity, international trade, investment, major "natural" disasters, population, poverty, progress, security, water quality, water supply, weapons, wellbeing/quality of life, and various combinations (ecosystem and human wellbeing, health and equity, footprints and biodiversity, etc.)

(ii) finds one recent, credible report on the topic (see the list of sources on indicators on the ERS 680 D2L site);

(iii) is prepared to report, briefly, to the group, on what is revealed by the report.

Please pay particular attention to what indicators (criteria) are considered important and which ones are overlooked.

2. Each participant finds one additional indicator, quantitative or qualitative, on any factor that might in its small way be revealing of something larger – from any perspective, at any scale from the neighbourhood to the planet – to report on, very briefly, to the group. Extra glory for items that are especially bizarre and/or comical as well as illuminating.

*readings (etc.)*

"Miscellaneous sources on and of Indicators"*

Hans Rosling, "Stats that reshape your worldview," TED Talks (2006), http://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html

United Nations Environment Programme, "The great acceleration after the Second World War," *Global Environmental Outlook 5* (UNEP, 2012), p.22, http://www.unep.org/geo/geo5.asp.*

Jared Diamond, "The world as a polder," in *Collapse: how societies choose to fail or succeed* (New York: Viking 2005), pp.486-499.*

Donella Meadows, "Indicators and Information Systems for Sustainable Development," (Hartland, Vermont: The Sustainability Institute, 1998), esp. pp. viii-xii; http://www.nssd.net/references/SDInd/Donella.html.*
Anonymous, "Environmental Scares: plenty of gloom," *The Economist*, 20 December 1997, pp.19-21; http://home.hiwaay.net/~craigg/g4c/economist-Doom.htm.*
Anonymous, "Welcome to the Anthropocene: Humans have changed the way the world works. Now they have to change the way they think about it, too," *The Economist* 26 May 2011; http://www.economist.com/node/18744401.*
Will Steffen, Johan Rockström and Robert Costanza, "How defining planetary boundaries can transform our approach to growth," *Solutions: for a sustainable and desirable future* 2:3 (May 2011), http://www.thesolutionsjournal.com/node/935.*
George Monbiot, "What is Progress?" in *the Guardian,* 4 December 2007; http://www.monbiot.com/archives/2007/12/04/what-is-progress/.*
Fred Pearce, "Peak planet: are we starting to consume less?' *New Scientist* 20 June 2012, http://www.newscientist.com/article/dn21886-peak-planet-are-we-starting-to-consume-less.html?full=true&print=true.*
David Quammen, "The weeds shall inherit the Earth," *The Independent* (London), 22 November 1998, pp. 30-39; www.well.com/user/davidu/weeds.html.*
Robert Gibson, "Peril and possibility," *Alternatives* 33.2/3 (2007), p.31; http://www.alternativesjournal.ca/magazines/measuring-progress-and-building-heritage-332-3.*

*some key indicator documents*

United Nations Environment Programme, *Global Environment Outlook 5,* 2012, 550 pp.), http://www.unep.org/geo/geo5.asp.*
United Nations Development Programme, *Human Development Report 2011: Sustainability and Equity – A Better Future for All,* summary (26 pp.) and full report (185 pp.), http://hdr.undp.org/en/reports/global/hdr2011/download/.**

*sources on indicators*

There are many different presentations and assessments of current trends, including the worrisome ones; a selection is provided on the ERS 680 D2L site.

*sources on indicator selection and application issues*

Alternative Survey Group, *Alternative economic survey, India: 2005-2006: Disempowering masses* (Delhi: Daanish Books, 2006).
Atkinson Charitable Foundation, *Canadian Index of Wellbeing: Measuring what Matters* (March 2007), www.atkinsonfoundation.ca/ciw/CIW_Brief_March_2007_MEDIA.pdf
Peter Bartelmus, Amy Richmond and Surender Kumar "Green accounting," *Encyclopedia of Earth*; http://www.eoearth.org/article/Green_accounting
Ronald Coleman, "Measuring real progress," *Journal of Innovative Management* Fall 2001, http://www.gpiatlantic.org/pdf/general/realprog.pdf
Alan Fricker, "Measuring up to sustainability," *Futures* 30:4 (1998), pp.367-375; http://www.metafuture.org/articlesbycolleagues/AlanFricker/Measuring up to Sustainability.htm.*

Global Reporting Initiative, *Sustainability Reporting Guidelines (version 3)* *http://www.globalreporting.org/ReportingFramework/G3Online/*

Donella Meadows, "Indicators and Information Systems for Sustainable Development," (Hartland, Vermont: The Sustainability Institute, 1998), http://www.sustainabilityinstitute.org/pubs/Indicators&Information.pdf.*

Richard Shillington and John Stapleton, "Challenge the 'evidence'," *Cutting Through the Fog: why is it so hard to make sense of poverty measures?* (Toronto: Metcalf Foundation, May 2010), pp.3-5.*

Tamarack, "Approaches to measuring more vibrant communities," (Waterloo: Tamarack, 2010) http://tamarackcommunity.ca/downloads/vc/Measuring_More_Vibrant_Communities.pdf.*

Mathis Wackernagel and William Rees, *Our Ecological Footprint: Reducing Human Impact on the Earth* (Gabriola Island, BC: New Society Publishers, 1996) and for a response see Stephen Bocking, "Put Your Foot in It: It's time to review the usefulness of the 'ecological footprint' concept" ["Political Science" column], *Alternatives Journal,* 30:2 (2004), pp.32-33.

UNEP, *Environmental Indicators for North America* (2006) http://www.na.unep.net/reports.php - Indicators

*recent sources on the planetary boundaries debate*

Joseph R. Burger et al, "The macroecology of sustainability, *PLOS Biology* 10:6 (2012).*

Ted Nordhaus, Michael Shellenberger and Linus Blomqvist, *The Planetary Boundaries Hypothesis: a review of the evidence* (Breakthrough Institute, June 2012).*

John H. Matthews and Frederick Boltz, "The shifting boundaries of sustainability sciences: are we doomed yet?" *PLOS Biology* 10:6 (2012).*

Georgina M. Mace, "The limits to sustainability science: ecological constraints or endless innovation?" *PLOS Biology* 10:6 (2012).*

## ***3. September 26 The history and character of the sustainable society idea***

*agenda*

why, from what roots and in what different forms the sustainable society idea arose

underlying critiques of prevailing approaches to society, economy and nature

sustainability to support existing power (e.g. as a new civilizing mission) or to challenge and redistribute power

sustainability and complexity

different approaches to sustainability (e.g. local vs global, individual vs institutional, economic vs cultural, anticipatory vs adaptive, authoritative vs participative, balance vs integration); associated alternative assumptions, values and objectives

sustainability in context: specifying key issues, objectives, criteria

*exercise*

In the small groups, we will examine the applications cases chosen in week one. Each group will

(i) identify three significant sustainability-related problems and/or opportunities in the case/place that have in the past and now still do merit careful attention;
(ii) consider whether and if so how the three problems and/or opportunities and potentially successful efforts to address them are or should be linked.

*readings*

Robert B. Gibson et al., "Sustainability," in *Sustainability Assessment* (London: Earthscan, 2005), chapters 3 and 4.

International Institute for Sustainable Development, "The sustainable development timeline," (Winnipeg: IISD, 2012), www.iisd.org/pdf/2012/sd_**timeline**_2012.pdf.*

Peter Hay, "All hail sustainable development," in *Main Currents in Western Environmental Thought* (Sydney: University of New South Wales Press, 2002), pp.212-219.*

John Robinson, George Francis, Russel Legge and Sally Lerner, "Defining a sustainable society: values, principles and definitions," *Alternatives* 17:2 (1990), pp.36-46.*

David Runnalls, "Our common inaction: meeting the call for institutional change," *Environment* 50:6 (2008), pp.19-28, www.iisd.org/pdf/2008/Our_Common_Inaction_low_res.pdf.*

B.D. Sharma, "On sustainability," in Michael Tobias and Georgianne Cowan, eds., *The Soul of Nature* (New York: Continuum, 1994), pp. 271-278.*

Chris Sneddon, Richard B. Howarth and Richard B. Norgaard, "Sustainable development in a post-Brundtland world," *Ecological Economics* (May 2006), 57 (2), pp. 253-268.

World Business Council for Sustainable Development, *Changing pace: public policy options to scale and accelerate business action towards Vision 2050* (Geneva: WBCSD, 2012), esp. pp.1-10, http://www.wbcsd.org/changingpace.aspx.*

United Nations Environment Program, "Integrating environment and development: 1972-2002," in *Global Environmental Outlook 3* (London: Earthscan, 2002), pp.1-27, http://www.unep.org/geo/geo3/ (chapter 1).*

World Commission on Environment and Development, Gro Harlem Brundtland, chair, "From One Earth to One World: An Overview," from *Our Common Future* (Oxford/New York: Oxford University Press, 1987), pp. 1-23.*

*selected additional readings*

Peter Dauvergne, "Introduction," in Dauvergne, *Historical Dictionary of Environmentalism* (Lanham, Maryland: Scarecrow Press, 2009), pp.xli-lviii; http://www.politics.ubc.ca/index.php?id=2450.*

Paul Ekins, "Sustainable development," in Edward A. Page and John Proops, eds., *Environmental Thought* (Cheltenham, UK: Edward Elgar, 2003), pp.144-172.

George Francis, "Towards a Sustainable Society: a bibliographic introduction," esp. section 1, "Sustainable societies," and "On the Scope and Fields for Environmental Studies: a bibliographic introduction" (ERS, 1992).*

Robert Goodland, "The concept of environmental sustainability," *Annual Review of Ecological Systems* 26 (1995), pp.1-24.

Peter Hardi and Terence Zdan, *Assessing Sustainable Development: principles in practice* (Winnipeg: International Institute for Sustainable Development, 1997),

includes the "Bellagio principles," (November 1996), http://www.iisd.org/measure/principles/1.htm
W.M. Lafferty and O. Langhelle, *Towards Sustainable Development: on the goals of development and the conditions of sustainability* (London: Macmillan, 1999).
Geoffrey Lamberton, "Sustainable sufficiency – an internally consistent version of sustainability," *Sustainable Development* 13 (2005), pp.53-68.
Hunter Lovins and Walter Link, Rocky Mountain Institute and Global Academy, "Insurmountable Opportunities? Steps and Barriers to Implementing Sustainable Development," comments to the UN Regional Roundtable for Europe and North America, Vail, Colorado, 6–9 June 2001, http://www.rmi.org/sitepages/pid178.php - B01-18.*
Donella H. Meadows, Dennis L. Meadows and Jørgen Randers, "Preface," in *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future* (Post Hills, Vermont: Chelsea Green Publishing, 1992), pp.xii-xvii.
D. Mebratu, "Sustainability and sustainable development: historical and conceptual review," *Environmental Impact Assessment Review* 18 (1998), pp.493-520.
Keith Pezzoli, "Sustainable development: a transdisciplinary overview of the literature," *Journal of Environmental Planning and Management* 40:5 (1997), pp.549-574.
D. Scott Slocombe et al., "Design criteria for a sustainable Canadian society, " in John B. Robinson, *Life in 2030: exploring a sustainable future for Canada* (Vancouver: UBC Press, 1996), pp.53-82.
United Nations Conference on Environment and Development, "The Rio declaration on environment and development," (Rio de Janeiro, June 1992), http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163.
Wolfgang Sachs, "Environment and development: the story of a dangerous liaison," *Planet Dialectics: explorations in environment and development* (London: Zed, 1999), excerpt, pp. 56-61.
World Business Council for Sustainable Development, *The business case for sustainable development: making a difference toward the Johannesburg Summit 2002 and beyond* (Geneva: WBCSD, 202), 16 pp.*

## ***4. October 3 The history and character of the complex systems idea***

*agenda*
sustainability as an agenda requiring understanding of its ecological and human context
sustainability as a concept resting on particular assumptions about ecological systems, humans and change
a history of complex systems thinking
key concepts:
- systems as dynamic, open, holarchic, nested and overlapping, more or less self-organising, minimally predictable, etc.
- the concepts of system health, integrity and self-organizing capacity

the complex nature of ecological systems
the complex nature of human beings and their ideas, institutions and interrelations:

- human nature, motives, capabilities, potential and limitations (basic needs vs desires; economic vs non-economic drives, consumption vs exertion, individuals as autonomous minds vs individuals as social beings, understanding vs behaviour, etc.);
- roles of society, culture, community;

interrelations between human systems and ecosystems:

- defining integrity and resilience needs
- respecting thresholds
- embracing uncertainty
- integrating anticipatory understanding and conscious choice
- broad implications for decision making

*exercise*

In the small groups, we will again examine the applications cases chosen in week one. Each group will

(i) identify again three significant sustainability-related problems and/or opportunities in the case/place that have in the past and now still do merit careful attention (they do not have to be the some ones identified in week 3);

(ii) sketch a one page a systems depiction, identifying the key influencing factors, considering at least one scale larger and one scale smaller as well as overlapping influences at the same scale;

(iii) identify where there are most likely to be points of system stress – where the system might be near a threshold for significant change; and if there is sufficient time

(iv) consider the major implications for selection and design of the response efforts.

*recommendation*

As a complement to your journal entry for the week, develop for your own research area (or, better, for an illustrative case example within it) a system depiction as in (ii) above, relying on what background information you have on hand, supplemented by a quickly gathered set of up to 20 news articles on the place/case.

*readings – theory*

Brian Walker and David Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* (Washington: Island, 2006), esp. pp.1-14.

James J. Kay and Eric Schneider, "Embracing complexity: the challenge of the ecosystem approach," *Alternatives* 20:3 (1994), pp.32-39.*

George Francis, *Overview of Concepts and Insights From Complex Systems.* Working paper #1, September 2005, 29pp. http://www.env.uwaterloo.ca/research/biosphere/WorkingPapers.htm.*

George Francis, "'Models' for sustainability emerge in an open systems context," *The Integrated Assessment Journal* 6:4 (2006), pp.59-77.* [journal version of the working paper #1, above]

George Francis, *Insights and Applications from International Studies of Earth Systems Science*, working paper #2, September 2005, 33pp. http://www.env.uwaterloo.ca/research/biosphere/WorkingPapers.htm.*

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C.S. Holling, "The resilience of terrestrial ecosystems: local surprise and global change," in W.C. Clark and R.E. Munn, *Sustainable Development of the Biosphere* (Cambridge: Cambridge University Press, 1986), pp.292-320.

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Naresh Singh, "Community adaptation and sustainable livelihoods: basic issues and principles," (Winnipeg: IISD, March 1996), http://www.sustainable-livelihoods.com/pdf/SL_basic_issues_principles1.pdf

Mary E. Clark, *Ariadne's Thread: the search for new modes of thinking* (London: Macmillan, 1989), pp.213-226.

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Ursula M. Franklin, "The second scientist," *Canadian Forum* (Dec.1985), pp.S3-S4.

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Millennium Ecosystem Assessment project, various reports; http://www.millenniumassessment.org/en/index.aspx

J.B. Callicott, "A review of some problems with the concept of ecosystem health," *Ecosystem Health* 1 (1995), pp.101-112.

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Silvio Funtowicz and Jerome Ravetz, "Post-normal science," in International Society for Ecological Economics, *Internet Encyclopaedia of Ecological Economics* (Feb 2003).*

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Mario Giampietro, *Multi-scale integrated analysis of agroecosystems* (London: CRC Press, 2003).

C.S. Holling, "Understanding the complexity of economic, ecological and social systems," in *Ecosystems* 4 (2001), pp.390-405, http://www.tsa.gov/assets/pdf/PanarchyorComplexity.pdf.*

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## *5. October 10 The longer background to sustainability in complexity: old sustainability, progress, critiques and the context for new sustainability*

*agenda*
roles of ideas, institutions and surprises in the history of change
pre-modern versions of sustainability
the nature and roots of the conventional modern idea of progress and its underlying assumptions about nature and humanity and their proper interrelations
alternative views of nature and humanity (pre-modern, anti-modern, post-modern)
debates about the human record: a history of resilience and collapse
how changes happened: the role of nature, ideas, institutions and surprise
traditional critiques of conventional modern ideology and application of scientific, technological and economic progress
green critiques and sustainability
- nineteenth and twentieth century environmentalists and other critics
- various greens (appropriate technologists, environmental economists, social ecologists, deep ecologists, ecofeminists, bioregionalists, etc.)
- integration of ecology and equity
- role of uncertainty and complexity
- assumptions underlying the various alternatives

comparison of recent and historical critiques/assumptions

*exercise*
Each participant adopts and presents the basic aims or concerns of

(i) one old advocate or critic of (or one individual whose work was a substantial influence on) the idea and practical pursuit of progress – candidates include Francis Bacon, Queen Elizabeth I, Christopher Columbus, Thomas Hobbes, René Descartes, Galileo Galilei, Isaac Newton, Karl von Linné (Linnaeus), Mary Wollestonecraft, Samuel Taylor Coleridge, Mary Shelley, TR Malthus, Adam Smith, Charles Dickens, Charles Darwin, Karl Marx, Louis Riel, Peter Kropotkin, Cecil Rhodes, Emiliano Zapata, Frederick Taylor, Henry Ford, VI Uylanov (Lenin), JJR Tolkien, Lewis Mumford, Aldous Huxley, Karl Polanyi, Albert Einstein, and Mohandas K Gandhi; and

(ii) one green or sustainability-oriented advocate (or representative of an advocacy organization) – candidates include Henry Thoreau, Henry Salt, John Muir, Gifford Pinchott, Aldo Leopold, Rachel Carson, EF Schumacher, Sunderlal Bahuguna (Chipko activist), Jacques Cousteau, Petra Kelly, Gro Harlem Brundtland, Stephen Schmidheiny (World Business Council for Sustainable Development), James Lovelock, Dr. Suess, Paul Watson, Arne Naess, Thomas Berger, Jane Jacobs, Herman Daly, Elizabeth May, David Suzuki, Nelson Mandela, Amory Lovins, Fritjof Capra, Karl Henrik Robert, Jonathan Porritt, Sheila Watt-Cloutier, Carolyn Merchant, Paul Hawken, Chico Mendez, Marilyn Waring, Wangari Maathai, William McDonough, Jane Goodall, Sunita Narain, Mathis Wackernagel, Al Gore, Jamie Oliver, Langdon Winner, and Vandana Shiva.

The focus should be on identifying the differences in basic assumptions about the nature of a good and viable life on Earth – assumptions that in turn rest on deeper views about the essential character of human beings and nature of biophysical systems and proper relations between humans and the rest of the environment.

*readings*

J.R. McNeill and William H. McNeill, *The Human Web: a bird's-eye view of world history,* excerpt (New York: Norton, 2003), pp.3-8.*

Robert Constanza, Lisa J. Graumlich and Will Steffen, "Sustainability or collapse: lessons from integrating the history of humans and the rest of nature," in Robert Constanza, Lisa J. Graumlich, and Will Steffen, eds., *Sustainability or Collapse: An integrated history and future of people on Earth* (Cambridge, MIT Press, 2007), pp.3-17.*

Carolyn Merchant, "Science and worldviews," in *Radical Ecology: the search for a livable world* (New York: Routledge, 1992), pp.41-60.*

Adam Smith, *The Wealth of Nations,* (originally published, 1776), Book I, chapter 2.*

Karl Polanyi, "Societies and economic systems," in *the Great Transformation: the political and economic origins of our time* (Boston: Beacon, 1957), pp.43-47.*

Libby Robin, "The big here and the long now: agendas for history and sustainability," presentation to the conference on *History and Sustainability*, University of Cambridge, 7 September 2007, [longer version is Libby Robin and Will Steffen, "History for the Anthropocene," *History Compass,* 5:5 (August 2007), pp.1694-1719].*

Vandana Shiva, *Monocultures of the Mind* (London: Zed, 1993), pp.12-15, 19-21.*

Frank Birkin and Thomas Polosie, "The best of times, " in *Intrinsic Sustainable Development: epistemes, science, business and sustainability* (Singapore: World Scientific, 2012), pp.39-45.*

Ronald Wright, *A Short History of Progress* (Toronto: Anansi, 2004), pp.109-115.*

Gifford Pinchot, "The fight for conservation," from D. Worster, ed., *American Environmentalism* (NY: Wiley, 1973/originally published 1910), pp. 84-95.*

Wolfgang Sachs, "The archaeology of the development idea," *Planet Dialectics: explorations in environment and development* (London: Zed, 1999), pp. 3-23.*

Aldo Leopold, "The land ethic"; http://www.luminary.us/leopold/land_ethic.html.*

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Morris Berman, *The Reenchantment of the World* (NY: Bantam Books, 1984), pp. 37-55.

Hugh Kearney, *Science and Change 1500-1700* (Toronto: McGraw-Hill, 1971), pp.17-76.

Langdon Winner, "The political philosophy of alternative technology: historical roots and present prospects," *Technology in Society* 1 (1979), pp.75-86.*

William Leiss, "Francis Bacon," in *The Domination of Nature* (New York: Braziller, 1973), pp.45-71.

Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper and Row, 1980), esp. pp.164-180 and 227-235.

Robert L. Heilbroner, *The Worldly Philosophers,* fourth edition (New York: Simon and Schuster, 1972), pp. 16-39.

Thomas Hobbes, "Of the Naturall Condition of Mankind as Concerning their Felicity, and Misery," in *Leviathan*, R. Tuck, ed. (Cambridge: Cambridge University Press, 1991/original edition, 1651), pp. 86-90.

Keith Thomas, *Man and the Natural World: changing attitudes in England 1500-1800* (Harmondsworth: Penguin, 1984), pp.17-50.

Andrew Skinner, "Introduction," (part), in Adam Smith, *The Wealth of Nations,* Skinner, ed. (Harmondsworth: Penguin, 1970/originally published, 1776), pp.11-17.

Mary Wollstonecraft, *A Vindication of the Rights of Woman* (1792), excerpts from chapters 1, 2 and 8; from http://www.bartleby.com/144/.*

E. J. Hobsbawm, "The human results of the industrial revolution," *Industry and Empire* (Harmondsworth: Penguin, 1969), pp.79-95.

Theodore Roszak, "Romantic perversity," in *Where the Wasteland Ends* (Garden City, NY: Doubleday, 1973), pp.255-271.

Karl Marx, "Estranged labour," (part) *Economic and Philosophic Manuscripts of 1844* (New York: International Publishers, 1964), pp.106-119.

Petr Kropotkin, *Mutual Aid* (New York: Garland Publications, 1972).

Aldous Huxley, *Brave New World* (Harmondsworth: Penguin, 1955/ orig. pub.1932).

Stephanie Lahar, "Roots: rejoining natural and social history (excerpt)," from Kent Peacock, ed., *Living with the Earth: An Introduction to Environmental Philosophy* (Toronto: Harcourt Brace, 1996), pp. 313-316.

Clive Ponting, "Creating the Third World," in *A Green History of the World* (London: Sinclair-Stevenson, 1991), pp. 194-223.

Thomas R. Dunlap, "Creation and destruction in landscapes of empire," in Jeffry M Diefendorf and Kurk Dorsey, eds., *City, Country, Empire: Landscapes in Environmental History* (Pittsburgh: University of Pittsburgh Press, 2005), pp.207-225.

*selected additional readings (greens and new sustainability)*

John Bellamy Foster, "Expansion and conservation," in *The Vulnerable Planet: a short economic history of the environment* (New York: MR Press, 1994), pp.69-84.

John Muir, "Wild wool" and "The Yosemite," from D. Worster, ed., *American Environmentalism* (NY: Wiley, 1973), pp. 185-197.

Roderick Nash, "Hetch Hetchy" from *Wilderness and the American Mind,* 3rd Edition (New Haven, Conn.: Yale University Press, 1982), pp. 161-181.

Lewis Mumford, "The organic outlook (1936)," from Derek Wall, *Green History: a reader in environmental literature, philosophy and politics* (London: Routledge, 1994), pp. 100-101.

Aldo Leopold, "The land ethic," in *A Sand County Almanac* (New York: Ballantine, 1970) pp. 237-263.

Gino J. Marco, "Summary of *Silent Spring,*" excerpt from *Silent Spring Revisited*, Online Ethics Center for Engineering and Science, Case Western Reserve University; http://www.onlineethics.org/CMS/profpractice/exempindex/carsonindex/SSsummary.aspx.

Gary Kroll, Rachel Carson's *Silent Spring:* a brief history of ecology as a subversive subject," Online Ethics Center for Engineering and Science, Case Western Reserve University; http://onlineethics.org/moral/carson/kroll.html

Jane Jacobs, *The Death and Life of Great American Cities* (New York: Vintage, 1961), pp.443-448.
David Orfald and Robert Gibson, "The conserver society idea: a history with questions," *Alternatives* 12:3/4 (1985), pp.37-45.
Robert C. Paehlke, "Conservation, ecology and pollution," in *Environmentalism and the Future of Progressive Politics* (New Haven, Yale U Press, 1982), pp.13-40.
Petra Kelly, "The system is bankrupt," in *Fighting for Hope* (Boston: South End, 1984), pp.11-14.
Anita Anand, "Women in development: a critique of mainstream models," *Alternatives* 12:3/4 (1985), pp.8-12.
Arne Naess, "Identification as a source of deep ecological attitudes," in Michael Tobias, ed., *Deep Ecology* (San Diego: Avant Books, 1985), pp. 256-270.
George Sessions, "The deep ecology movement: a review," *Environmental Ethics* 9 (1987), pp.105-125.
Jonathon Porritt and David Winner, "Green divides," from *The Coming of the Greens* (London: Fontana/Collins, 1988), pp.29-34.
Fritjof Capra and Charlene Spretnak, *Green Politics* (New York: Dutton, 1984), "Who are the Greens (excerpt)," pp.3-5, and "Principles of a new politics," pp.29-56.
Melody Hessing, "Women and sustainability," *Alternatives* 19:2 (1992), pp.14-21.
Vandana Shiva, "Development, ecology and women," in Donald VanDeVeer and Christine Pierce, eds., *The Environmental Ethics and Policy Book: Philosophy, Ecology, Economics* (Belmont, California: Wadsworth Publishing, 1994), pp.281-288.
Vandana Shiva, *Monocultures of the Mind* (London: Zed, 1993), pp. 9-22, 59-62.
Ramachandra Guha and Juan Martinez-Alier, *Varieties of Environmentalism: essays north and south* (London: Earthscan 1997).
Ramachandra Guha, "The Earth Summit and north-south conflicts: unity and division among the environmental movement," in *Environmentalism: a global history* (New York: Longman, 2000), pp.138-145.
David Pepper, "Modern Environmentalism," from *The Roots of Modern Environmentalism* (London: Croom Helm, 1984) pp. 13-36.

## ***6. October 17 Sustainability requirements: integrity, resilience and precaution***

*agenda*
building sustainability in the context of complex socio-ecological systems
implications of the history of socio-ecological change
the nature of complex ecological and socio-ecological systems [review of week 4]:
- dynamic, open, holarchic, nested and overlapping, self-organising, minimally predictable, etc.
- the concepts of system health, integrity and self-organizing capacity
- thresholds, peaks and boundaries
- general implications for sustainability (non-linear problem solving, scenario building and adaptation vs modelling and forecasting; management of people versus management of ecosystems, participation and choice, precaution, etc.)

implications for resource and protected area management

- managing human interactions with resources, protected areas, …
- choices and implications for participation

broader implications for design and operation of socio-ecological systems (including urban ones)
- taking into account complexities of human nature, motives, capabilities, potential, limitations (basic needs vs desires; economic vs non-economic drives, consumption vs exertion, individuals as autonomous minds vs individuals as social beings, etc.);
- roles of ideas, institutions (including customs), society, culture, community
- respect for uncertainty and surprise
- competing definitions of wellbeing; universal rights/values versus cultural diversity
- defining socio-ecological integrity and resilience
- implications for horizontal and vertical links, appropriate scale, human/nature relations, precaution, etc.
- decision making (identifying ecological imperatives and ecological choices; determining what is good for ecosystems or at least what is required for maintenance of ecological integrity, determining what is good for human systems, etc.)

available approaches
- ecosystem goods and services
- Millennium Ecosystem Assessment
- Resilience Alliance approach: resilience analysis

implications for ecological ethics and anthropocentric ethics

*exercise*

Small groups take the applications topics from weeks 3 and 4, recalling the major sustainability-related problems and/or opportunities and the depiction of the place/case as a complex system, and consider

(i) the focal system's desirable characteristics, threats to these characteristics and possible ways to reduce the stresses and build system resilience to maintain these characteristics;

(ii) the focal system's undesirable characteristics, the nature (including evident resilience) of the institutions and other factors the perpetuate these characteristics, and possible ways to encourage a transition (overcome undesirable resilience).

(iii) two examples of desirable links between actions identified in (i) and (ii).

*readings*

Brian Walker and David Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* (Washington: Island, 2006).

R.B. Gibson, *Sustainability Assessment,* chapter 5, pp.95-98.

B. Walker, C.S. Holling, S.R. Carpenter and A. Kinzig, "Resilience, adaptability and transformability in socio-ecological systems," *Ecology and Society* 9:2 (2004), article 5, http://www.ecologyandsociety.org/vol9/iss2/art5/.*

Melissa Leach, et al., "Transforming innovation for sustainability," *Ecology and Society* 17(2):11, 6pp.; www.ecologyandsociety.org › Vol. 17, No. 2.*

Paul Nadasdy, "Adaptive co-management and the gospel of resilience," in Derek Armitage, Fikret Berkes and Nancy Doubleday, eds., *Adaptive Co-management: collaboration, learning and multi-level governance* (Vancouver: UBC Press, 2008), pp.208-227.*

Will Steffen, Johan Rockström, Robert Costanza, "How defining planetary boundaries can transform our approach to growth," *Solutions: for a sustainable and desirable future*, 2:3 (20 May 2011); http://www.thesolutionsjournal.com/node/935, on course D2L site (but the online version is better). *

Stephen Cork, "Resilience of ecosystems and social-ecological systems," in S. Cork, ed., *Brighter Prospects: enhancing the resilience of Australia* (Australia 21: 2009), pp.63-66.*

Jan Sendzimir et al., "Assessing the resilience of a river management regime: informal learning in a shadow network in the Tisza River Basin," *Ecology and Society* 13:1 (2008): 11, http://www.ecologyandsociety.org/vol13/iss1/art11/.*

Naresh Singh, "Community adaptation and sustainable livelihoods: basic issues and principles," (Winnipeg: IISD, March 1996), http://www.sustainable-livelihoods.com/pdf/SL_basic_issues_principles1.pdf.*

Peter Montague, "The precautionary principle," *Rachel's Environment and Health Weekly,* 19 February 1998, http://www.ratical.org/co-globalize/REHW586.html.*

Fridolin Simon Brand and Kurt Jax, "Focusing the meanings(s) of resilience: resilience as a descriptive concept and a boundary object," *Ecology and Society* 12:1:23 (2007), www.ecologyandsociety.org/vol12/iss1/art23/.*

Resilience Alliance, *Assessing and managing resilience in social-ecological systems: a practitioners workbook*, version 2.0 (June 2010), http://www.resalliance.org/index.php/resilience_assessment.*

Resilience Alliance, *Assessing resilience in social-ecological systems: a workbook for scientists*, version 1.1 (June 2007), http://www.resalliance.org/index.php/resilience_assessment.*

*also highly recommended*

*Alternatives Journal* 36:2 (2010), special issue on resilience, see http://www.alternativesjournal.ca/magazines/362-building-resilience

*selected additional readings*

W. Neil Adger, "Ecological and social resilience," in Giles Atkinson, Simon Dietz and Eric Neumayer, eds., *Handbook of Sustainable Development* (Cheltenham: Edward Elgar, 2007), pp.78-90.

Philip Angell, et al., *World Resources 2008: Roots of Resilience – growing the wealth of the poor* (Washington: WRI, 2008).*

Arizona Health Futures, *Resilience: health in a new key* (Fall 2003); http://www.slhi.org/publications/issue_briefs/pdfs/ib-03fall.pdf

Dean Bavington, "A sea swarming with fish," chapter 1 of *Managed Annihilation: an unnatural history of the Newfoundland cod collaps*e (Vancouver: UBC Press, 2010), pp.1-12.*

Fikret Berkes and Carl Folke, eds., *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience* (Cambridge, UK: Cambridge University Press, 1998); see especially chapters 1 and 16 for framework, chapter 12 for cod fishery collapse analysis.

Stephen Bocking, "Visions of nature and society," in *Alternatives* 20:3 (1994), pp. 12-18.

Fridolin Simon Brand and Kurt Jax, "Focusing the meanings(s) of resilience: resilience as a descriptive concept and a boundary object," *Ecology and Society* 12:1:23 (2007), www.ecologyandsociety.org/vol12/iss1/art23/.*

Jeb Brugmann, "Sustainable growth: a report from the Earth Summit +5," *Initiatives* 16 (July 1997), pp. 2-3.

Louise E. Buck, Jeffrey C. Milder, Thomas A. Gavin, Ishani Mukherjee, "Understanding ecoagriculture: a framework for measuring landscape performance," (Ithaca: Department of Natural Resources, Cornell University, September 2006)

Diana Carney, *Sustainable livelihoods approaches: progress and possibilities for change* (London: DFID, 2002), http://www.livelihoods.org/static/dcarney_NN156.html.*

Tim Clark and Ron Westrum, "Paradigms and ferrets," *Social Studies of Science* 17:1 (1987), pp.3-33.

European Environment Agency, "Late lessons from early warnings: the precautionary principle 1896–2000" (Copenhagen: EEA, May 2002) downloadable as pdf from http://themes.eea.eu.int/Actions_for_improvement/information/reports

Carl Folke, et al, "Resilience and sustainable development: building adaptive capacity in a world of transformations," *Ambio* 31:5 (2002), pp.437-440.*

Lance Gunderson, "Comparing ecological and human community resilience," *CARRI Research Report 5* (Oak Ridge: CARRI, January 2009).*

Parakh Hoon, Naresh Singh and Samir S. Wanmali, "Sustainable Livelihoods: concepts, principles and approaches to indicator development (draft discussion paper" [http://www.livelihoods.org/info/linksevents_sub/linksevents_nareshsingh.html]

Kevin Kelly, "The nine laws of God," chapter 24 in Kelly, *Out of Control: the new biology of machines, social systems and the economic world* (1994) http://www.kk.org/outofcontrol/ch24-a.html.*

Nina-Marie Lister and James J. Kay, "Celebrating diversity: adaptive planning and biodiversity conservation," in Stephen Bocking, ed., *Biodiversity in Canada: ecology, ideas and action* (Peterborough: Broadview Press, 2000), pp.189-218.*

Amory Lovins, "Energy Strategy: the Road Not Taken," *Foreign Affairs* (October 1976), [reprinted version from *Not Man Apart* http://www.rmi.org/rmi/Library/E77-01_EnergyStrategyRoadNotTaken].*

S.F. McCool, "Wildlife viewing, natural area protection, and community sustainability and resiliency," *Natural Areas Journal* 16 (1996), pp.147-151.

Millennium Ecosystem Assessment project, various reports; http://www.millenniumassessment.org/en/index.aspx

Arne Naess, "Identification as a source of deep ecological attitudes," in Michael Tobias, ed., *Deep Ecology* (San Diego: Avant Books, 1985), pp. 256-270.

B. Norton, "Ecological integrity and social values: at what scale?" *Ecosystem Health* 1 (1995), pp.228-241.

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Garry D. Peterson, Graeme S. Cumming and Stephen R. Carpenter, "Scenario planning: a tool for conservation in an uncertain world," *Conservation Biology* 17:2 (April 2003), pp.358-366.*

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Andrew Stirling, *On science and precaution in the management of technological risk* (SPRU: University of Sussex, May 1999).
W.D. Solecki, "Putting the biosphere reserve concept into practice: some evidence of impacts in rural communities in the United States," *Environmental Conservation* 21 (1994), pp.242-247.
Michael E. Soulé, "What is conservation biology?" *Bioscience* 35:11 (1985), pp.727-734.
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Bruce Stokes, *Local Responses to Global Problems: A key to meeting basic human needs* Worldwatch Paper 17 (February 1978).
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J. C. Weaver, "Indicator species and scale of observation," *Conservation Biology* 9 (1995), pp.939-942.
D.A. Wicklum and R. W. Davies, "Ecosystem health and integrity?" *Canadian Journal of Botany* 73 (1995), pp.997-1000.
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Donald Worster, "The ecology of order and chaos," *Environmental History Review* 14:1/2 (1991), pp.1-18.
Donald Worster, "The age of ecology: science and the fate of the Earth," in *Nature's Economy: A history of ecological ideas,* 2nd edition (Cambridge: Cambridge University Press, 1994), pp.339-433.

## ***7. October 24 Sustainability requirements: efficiency***

*agenda*
efficiencies for what?
- maintenance of ecological functions and protection of resource base

- maintenance of socio-ecological systems
- freeing capacity for ensure sufficiency for all

doing more with less (factor 4 and factor 10)
economic and technological aspects; social, political and ecological aspects
sustainability efficiencies vs market efficiencies
- conventional market assumptions
- the problem of public goods
- needs and wants vs consumer products/packages; advertising
- environmental economics and ecological economics
- full valuing of natural and social capital

limitations: what gets done with the gains (e.g. the rebound effect)? how does efficiency fit or conflict with resilience (e.g. need for redundancy)?
implications for application
- competing approaches (global vs local, market drive vs social direction/control, technological optimism vs risk avoidance)
- use of markets and market adjustment tools (internalizing costs, prices as indicators)
- use of non-market options (e.g. tools for decisions about common goods such as collective ownership, co-management, covenants; alternative indicators)
- hard path vs soft path
- responses to consumerism
- decoupling growth from resource use and ecological damage
- links to other objectives

*exercise*
Each small group identifies one area of evident need for greater material and/or energy efficiency related to the applications topic and considers
(i) the major approaches that have been or could be taken to enhance material and/or energy efficiency;
(ii) the most promising approach;
(iii) the main barriers to effective action and how they might be overcome;
(iv) the extent to which these efficiency initiatives might be sufficient from a sustainability perspective (or whether they might be deficient or problematic – e.g. because of conflicts with resilience objectives, or inequitable in their effects, or …).

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## ***8. October 31 Sustainability requirements: equity, sufficiency and opportunity, civility and democracy***

*agenda*
sufficiency, satisfaction and progress
material equity (sufficiency, growth vs redistribution, security)
political equity (individual vs collective rights, representation vs participation)
positive vs negative freedom
intergenerational equity
de-coupling additional opportunity from additional material growth (green growth?)
interdependence of community, security, and empowerment
social capital and socio-ecological capital: ecological and social civility (community and land ethic)
moral choice and customary behaviour
roles of education (educational theory, participative/liberatory education), community building, and involvement in nature
key considerations for applications:
- contextual differences (culture, ecology, capacities,
- institutional organisation and scale, etc.
- process implications: participative, educational, non-violent, community building, socio-ecological integration
- just transitions

tools for application:
- individual and collective mechanisms
- green livelihoods
- equity links (e.g. equity and health, equity and biodiversity)
- ethics and understanding

- generation and maintenance of traditional/local knowledge and broader (global) citizenship
- citizen engagement (e.g. citizen-based ecological monitoring, ecological restoration, policy monitoring)
- urban nature (daylighting streams, urban agriculture, watershed planning, green energy, etc.)
- role of media (print and broadcast, internet) and roles of popular culture (e.g. music, literature, film, sport)
- community-based social marketing

*exercise*

Each small group identifies what people in that area, individually and collectively, need for the essentials of lasting wellbeing (sufficiency, etc.) and considers
(i) what major deficiencies, vulnerabilities and opportunities seem most significant for those people in that place;
(ii) which of them appear to have been addressed in some way by recent or current initiatives;
(iii) what interests (present and future, human and non-human) have been influential in the relevant decision making and what interests have been neglected or suppressed;
(iv) what kinds of knowledge have been applied (scientific data, economic analysis, traditional understanding, political strategizing, etc.), and what kinds have been neglected or suppressed.
Consider also what could be done to correct or reduce the deficiencies in your case (e.g. different decision making processes, different legal or economic arrangements, different education, better data, …).

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## ***9. November 7 Sustainability ethics: integration and trade-offs***

*agenda*

elements of a sustainability ethics: integrity, efficiency, sufficiency and opportunity, equity, democracy and civility, precaution and integration (economic opportunity, social justice, ecological responsibility, humility in the face of uncertainty), etc.
specifying criteria for particular contexts
appropriate indicators and other information
appropriate processes for deliberation, decision and implementation/action
appropriate attention to complexity and uncertainty
dealing with conflicts and trade-offs
practical differences between an ecological ethics and an enlightened human-centred ethics
common criteria, alternative visions, contextual applications
applications of sustainability ethics in different areas of interest

*exercise*

The set of sustainability requirements (as criteria for evaluations and decisions in assessment processes) in the *Sustainability Assessment* book, enriched by attention to complex systems realities and resilience considerations in the *Resilience Thinking* book, represents an ethical package of sorts. You may wish to consider whether it is justifiable, comprehensive, suitably focused on key matters, flexible enough, etc. But in any event, plenty of other ethics have been offered for practical application in decision making

related to sustainability initiatives in general and in particular areas (ecological restoration, wildlife management, development assistance projects, water management, community building, and so forth).

Your assignment for this week is to identify one of these other ethics (or set of criteria for planning or evaluation or management design, or …), preferably one that is particularly relevant to your anticipated thesis research area, and be prepared to discuss how it compares with, and/or differs from, the package that we have been discussing.

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## ***10. November 14 Application: the Mackenzie Panel's review***

*agenda*
specifying general insights for application in particular cases and places
integrating social, economic and cultural and biophysical considerations
evaluating alternatives
addressing uncertainties
considering legacies
relations between sustainability and resilience effects

*readings*
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*background*
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*exercise*
Each participant will
(i) pre-select an issue area of the Mackenzie report to examine, favouring topics related to their established expertise and anticipated research area (e.g. wildlife effects, climate change issues, community effects, governance capacities, future scenarios,…);
(ii) scan through the relevant chapter dealing with the substantive concerns, the relevant recommendations and their apparent impact on the Panel's overall conclusions
(iii) be prepared to report briefly on how well the Panel addressed sustainability and resilience factors in the examined aspects of its work.

## ***11. November 21 Implications and means for action: governance issues and options***

*agenda*
theories of change and roles of ideas, institutions, surprise, etc. (review)
individual choices/behaviour and collective decision making (governance)
resources: customs, rules (law, policy), economic self-interest and market mechanisms, understanding/reason/science/other knowledge, love/respect
institutions (governments, corporations, media, NGOs and other civil society organizations, etc.) and tools
- markets (ecological economics, green taxes, etc.)
- regulatory tools (hard and soft law, policy, programmes, etc.) and non-regulatory approaches, drivers, players
- participative processes, democracy and education, expertise and its limits, traditional knowledge
- civil society
- combinations and alliances

anticipating and pursuing the future
- forecasting and backcasting
- scenarios

general principles and contextual significance, coherence and diversity, purity and pragmatism

*exercise*
The small groups once again take the case/place/issue topic that you have used in several of the earlier exercises (or some new one with which you are familiar) and
(i) consider the basic characteristics of a more desirable future in that place or field of activity, the transformations needed to get there, and the particular changes that seem most likely to be successful in encouraging these transformations;
(ii) the main players and tools involved, and how they may be connected (players include government agencies at various levels, corporations, private sector associations at various levels, non-government public interest organizations at various scales, community

organizations, particular individuals, particular kinds of experts, religious or aboriginal bodies, etc.); and
(iii) what these main players apparently assume about how significant change is to be accomplished (e.g. by individuals or institutions; by better knowledge or more effective motives; by sudden major changes or by slow incremental steps).
We can discuss whether attention to the full suite of sustainability requirements and complex system features (multiple scale influences, thresholds, feedbacks, etc.) would lead to different assumptions and approaches.

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## ***12. November 28 Scales: global and local actions***

*agenda*
sustainability as a global challenge
- global problems (climate change, ozone layer depletion) local/regional problems now extending globally (fisheries depletion, persistent toxics, economic and political inequity, etc.)
- major responses (international organizations and initiatives, etc.)
- advantages and limitations of global initiatives

current economic globalization
- nature, objectives, underlying assumptions, areas of attention/neglect
- effects on national/local authority/options
- effects on integrity, efficiency, equity, etc.
- trade liberalisation options and approaches (cost internalization mechanisms, social and ecological protections in trade agreements versus in separate accords, closed and open negotiations, sustainability assessment of trade options)

other globalizations: communications, culture (homogeneity, awareness of diversity, etc.), solidarities and conflicts, etc.
role of governments, multilateral agencies, corporate interests, media and international civil society groups in addressing global sustainability challenges and in promoting, guiding, limiting and opposing economic globalization
global action tools: conventions and accords, product boycotts, standards and certification, internet alliances, complementary local actions, local alternatives
sustainability as a local responsibility
- local roots of global problems
- advantages and limitations of locally focused responses (e.g. communities and local skills/knowledge, ecosystems and local resources, linking individual and community, social and ecological concerns)

current local action and community-centred development
- nature, objectives, underlying assumptions, areas of attention/neglect
- effects on national/global authority/options
- effects on integrity, efficiency, equity, etc.

- role of governments, multilateral agencies, corporate interests, media and international civil society groups in promoting, guiding, limiting and frustrating local action

local action options, approaches (roles of experts and citizens, self-sufficiency versus self-reliance, entrepreneurial options, government and civil society initiatives municipal and regional initiatives, bioergionalism, efforts to promote local production and consumption, etc.)

local action tools: sustainability planning (scenarios to identify and compare alternative futures, growth management/smart growth plans, appropriate incentives and assets, ecosystem approach to land use planning and design, citizen-based planning and monitoring), industrial ecology, neighbourhood scale sustainability development, appropriate technology, energy (and water) soft path, community-centred poverty-reduction initiatives, microfinance, cooperatives and co-management, land trusts, community based social marketing

global/local links (global programmes, local applications)

- relations between local assets/knowledge/skills/involvement and outside experts/technology/funds
- community-centred international development aid (e,g, micro credit, sustainable livelihoods)
- cultural diversity and/versus basic rights and requirements for sustainability

implications for thesis and research paper work on various topics

- subject matter, methodologies, audience
- using sustainability considerations (ethics/objectives, theories of change) as a basis for developing thesis/research paper proposals

*exercise*

The small groups for one last time take the case areas,

(i) remember from last week the basic characteristics of a more desirable future in that place, the transformations needed to get there, and the particular changes that seem most likely to be successful in encouraging these transformations (you can think of these as a set of strategies for change);

(ii) using all that as a broad context, take the particular question of food and consider what approaches to food system design and related aspects of the socio-ecological systems involved would be most appropriate for your case area recognizing also its global context; and

(iii) consider how the food systems of your place might best be maintained and/or transformed for greater sustainability and resilience, paying particular attention to what aspects should be global or local or some combination.

*globalisation discussion questions*

For sustainability, what problems and opportunities need to be addressed at a global or at least multinational level?

What sustainability criteria are and are not being addressed/met in the predominant economic globalization initiatives centred on trade liberalization? Do the faults lie in the objectives and underlying assumptions or in the implementation efforts?

What matters are properly left largely for market management?

Where non-market mechanisms are needed, how can they be provided effectively, within the capabilities of actual communities, governments, civil society organizations, etc.?

*localisation discussion questions*

What are the key advantages and disadvantages of a community-centred approach to sustainability?

Where there are trade-offs to be made among local interests and between local and larger scale interests, how might this best be done?

What should be done where local culture appears to conflict with sustainability objectives?

On what matters is local self-reliance most crucial?

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