

**Biosphere Reserves as Social-Ecological Systems**  
**ERS 475 & ERS 675**  
Course Outline – Winter 2013

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Email is the best way to contact me. I will normally check it once a day and I will try to reply to messages within 24 hours, except over weekends and holidays. Since my office is off-campus, we will hold a course information meeting on campus near the end of Fall Term.

LEARN will be used for course readings starting **07 January 2013**. One set of readings will be required each week for the six weeks leading up to the course. They will be accompanied by study questions for you to think about before getting into the field. A list of links and topics will be suggested to help students prepare for their final project. The week before the course, you will prepare a short project proposal, and the final project and essay will be due four weeks after the field component.

### **1. Course Overview**

ERS 475/675 will look at Parry Sound and the Georgian Bay Biosphere Reserve as a set of social-ecological systems. With almost 600 UNESCO biosphere reserves in the world and 16 in Canada, these sites provide an ideal setting to learn about sustainable community development, adaptive resource management, and social and ecological resilience. The main objective is to link practical experience “on the ground” with some of the theoretical concepts related to sustainability and complex systems. Case studies for this include: (1) the historic fisheries collapse, (2) the shift to sustainable forestry, and (3) reporting on ecosystem health.

**2. Course Location:** We will be based 20 minutes outside of the town of Parry Sound (250 km north of Toronto). From there we will explore the shore of Georgian Bay, various communities and areas of the French-Severn forest. Field activities may include: cross-country skiing, backcountry snowshoeing, guided hikes, quinzee-building.

### **3. Course Objectives:**

- i. To explore a UNESCO biosphere reserve as a model of sustainability;
- ii. To apply a systems perspective to practical challenges within one of Ontario’s landscapes;
- iii. To use the theoretical frameworks from the readings to analyze these experiences; and,
- iv. To build an understanding of the social-ecological system that is eastern Georgian Bay.

**4. \*To Be Confirmed\* Course Fee:** approximately \$350 for accommodations & rental equipment for 10 days (15-24 February) with \$100 deposit due to Patti Bester by end of Fall Term or UW Cashier (non-refundable unless a replacement is found). Balance is due to UW Cashier prior to course start or you will not be able to attend. Note: you are required to plan, purchase and cook meals at the camp with your classmates during your stay.

**5. Lectures on:**

- Complex social-ecological systems
- UNESCO Biosphere Reserves
- Ecosystem monitoring and reporting
- Sustainable forestry
- Fisheries history, ecology and management
- Natural history and winter ecology
- Resilience assessment frameworks

**6. Assignments and Evaluation for ERS 475 (ERS 675 students your readings are below & pg 9)**

10% Participation on LEARN:

Advanced readings are required on a scheduled basis. Students should prepare answers to the study questions for discussion during the course and link them to case studies and their project.

15% Participation in-class discussions and in the field:

Students should actively contribute to class discussions and small group workshops. They should engage with guest lectures and guided field trips with questions and comments.

15% Project Proposal: **Due Tuesday 12 February 2013**

Based on the readings and your own research about “communicating complex systems” provide us with a 2-page proposal for your final project. In single-space paragraphs and bullets, you will outline the project topic, rationale, background questions, key course concepts you will use with references, and the final presentation format you envision for your project (see section #9 below). In addition, you will attach a bibliography of references and that you have consulted. Please submit this digitally in Word format: rpollock@gbbr.ca

10% In-Class Assignments:

Assignments may include a rapid appraisal of community sustainability; quizzes on readings and lectures; and discussions on resilience analysis and complex systems.

10% Project Presentation:

Near the end of the course, you will have the opportunity to present a working draft of your project to see how well you “communicate complex systems” to a variety of target audiences. We will encourage class feedback to incorporate into your final project. Your final project will be due four weeks after the field course.

40% 475 Course Project: Communicating Complex Systems: ***Due Friday 22 March 2013***. Building from the course materials, students will work individually or in pairs to produce a tangible product and accompanying 15-25 page double-spaced written analysis about “communicating complex systems” related to the Georgian Bay Biosphere Reserve. This might be a poster or public presentation, display or powerpoint, webpage or brochure, etc. The project must be properly referenced. Individual contributions in team work will be evaluated accordingly. Please submit final projects to me digitally in Word format (where possible) rpollock@gbbr.ca

Note: Please have your assignments in on time. If you have problems, please contact your instructor. Extensions can be given for due cause (illness requires a doctor’s note); it is best to contact your instructor right away rather than wait until after the fact. Late penalties will be 5% of the value of the assignment per day.

Note: Standard University of Waterloo policy will apply regarding academic infractions, particularly for plagiarism.

### 7. Field Course Schedule 2013

- Six weeks of readings leading up to the course.
- A project proposal submitted before the course (**12 February 2013**).
- Generally, lectures in the morning and field activities in the afternoon.
- Alternate social and academic evenings with spare time to work on projects.
- Project presentations (work-in-progress) on the second last day of the course.
- Final project submission due four weeks after the course (**22 March 2013**).

### Sample Itinerary Only – To Be Confirmed

February Date	Morning	Afternoon	Evening
15 Friday	Leave UW at noon	Travel from Waterloo	Course introduction
16 Saturday	Biosphere Reserves	Guest: Complex Systems	Pub night - optional
17 Sunday	Guests: watershed reports	Project Discussion	MES talks
18 Monday	Travel to Nobel for lunch	Travel to Killbear. Hike	MES talks
19 Tuesday	Communications debate	Guest: Forestry	MES talks/night hike
20 Wednesday	Guest: Fisheries	Project Time	Resilience
21 Thursday	Guest: Wetlands	Ski. Dinner in Nobel	Open
22 Friday	Project Time	Winter Ecology Hike	Project Presentations
23 Saturday	Project Presentations	Course Evaluation	Travel Home option
24 Sunday	Travel Home	-	-

**8. Readings:** Some of these will be posted as PDF documents on LEARN, while others are online links provided below. A few (#9, 18, 19 below) are chapters from books of which you should track down or ask me for photocopies. A binder with hard copies of most readings will be available during the field course as a reference. I recommend that you loan or purchase “Resilience Thinking” (#18) online from Chapters or Amazon, or your local book store.

## Week One

1. UNESCO Biosphere Reserves <http://www.unesco.org/mab/BRs.shtml> and Georgian Bay Biosphere Reserve [www.gbbr.ca](http://www.gbbr.ca)
2. Madrid Action Plan for Biosphere Reserves (2008-2013)  
<http://unesdoc.unesco.org/images/0016/001633/163301e.pdf>
3. Biosphere Reserves: Benefits and Opportunities  
<http://unesdoc.unesco.org/images/0014/001424/142453e.pdf>
4. Articles by Francis, Pollock and Taylor in *Environments* Vol. 32 (3) Biosphere Reserves in Canada: Exploring ideals and experiences. George Francis and Graham Whitelaw, (eds).  
<http://www.environmentjournal.ca/index.php/ejis/issue/view/1119> (updated link).

Other sources for your project: <http://www.biosphere-research.ca/bibliography.htm>

## Week Two

5. Kay, J, Schneider, E.D, 1994. "Embracing Complexity, The Challenge of the Ecosystem Approach", *Alternatives* Vol 20 No.3 pp.32- 38  
[www.nesh.ca/jameskay/www.fes.uwaterloo.ca/u/jjkay/pubs/alt/alt.html](http://www.nesh.ca/jameskay/www.fes.uwaterloo.ca/u/jjkay/pubs/alt/alt.html)
6. Holling, C.S. 2001. Understanding the Complexity of Economic, Ecological, and Social Systems. *Ecosystems*, Vol. 4 (5), pp. 390-405.  
<http://www.tsa.gov/assets/pdf/PanarchyorComplexity.pdf>
7. Berkes, F. 2006. From community-based resource management to complex systems. *Ecology and Society* 11(1): 45. <http://www.ecologyandsociety.org/vol11/iss1/art45/>
8. Pahl-Wostl, C. Sendzimir, J., Jeffrey, P., Aerts, J., Berkamp, G. and Cross, K. Managing Change toward Adaptive Water Management through Social Learning, *Ecology and Society* 12(2):30. <http://www.ecologyandsociety.org/vol12/iss2/art30/>

Recommended reading: Folke, C., F. Berkes, and J. Colding. 1998. *Ecological practices and social mechanisms for building resilience and sustainability*. Pages 414-436 in F. Berkes and C. Folke. *Linking social and ecological systems*. Cambridge University Press: London, UK.

Other sources for your project: <http://www.ecologyandsociety.org>

### Week Three

9. Cairns, J. et al. 1993. A proposed framework for developing indicators of ecosystem health. *Hydrobiologia* 236:1, 1-44. [PDF]
10. Bertram, P. et al. 2003. Environmental and Socioeconomic Indicators of Great Lakes Basin Ecosystem Health, Chapter 70 in Rapport, D. J. (ed) *Managing for Healthy Ecosystems*. Boca Raton: CRC Press, pp. 703-720. [PDF]
11. Niemi, G. J. and M.E. McDonald. 2004. Application of ecological indicators. *Annu. Rev. Ecol. Evol. Syst.* 35:89-111. [PDF]
12. Bertram, P. et al. 2005. Developing indicators of ecosystem health. *State of Lake Michigan: Ecology, Health and Management*, pp. 505-519. [PDF]
13. Shear, H. et al. 2005. Development and Application of Ecosystem Health Indicators in the North American Great Lakes Basin in Jørgensen et al., *Handbook of Ecological Indicators for Assessment of Ecosystem Health*. Ch. 4, pp. 105-126. [PDF]

### Week Four

14. Environmental Report Cards: these are models for the Georgian Bay Biosphere Reserve's own *State of the Bay* program, which is in development, scheduled for publication in May 2013. As a class we will help to design the GBBR report card based on other models, below:

(a) Muskoka Watershed Council:

<http://www.muskokaheritage.org/mwc/programs/watershed-report-card/> (updated link). Check out the most recent report card (2010), as well as the scientific background report (2010). The MWC's Indicators of Watershed Health (2003) is also interesting in that it outlines their initial approach in producing their first report card in 2004.

(b) Lake Simcoe Region Conservation Authority, Watershed Report Card 2008:

<http://www.lsrca.on.ca/reports/>

(c) Grand River Conservation Authority:

[http://www.grandriver.ca/publication/Grand\\_Fall\\_2011\\_web.pdf](http://www.grandriver.ca/publication/Grand_Fall_2011_web.pdf)

(d) Toronto Region Conservation Authority, Humber River: scroll down on this page until you find "Listen to Your River, 2007" and then skim sections of the report.

<http://trca.on.ca/protect/watersheds/humber-river/resources.dot>

(e) Environment Canada. 2009. State of the Great Lakes 2009 Highlights. 16pp.

[http://binational.net/solec/sogl2009/sogl\\_2009\\_h\\_en.pdf](http://binational.net/solec/sogl2009/sogl_2009_h_en.pdf)

## Week Five

15. Veale, B. 2010. Assessing the Influence and Effectiveness of Watershed Report Cards on Watershed Management: A Study of Watershed Organizations in Canada. Abstract of her Ph.D. Dissertation, UW. <http://www.uwspace.uwaterloo.ca/handle/10012/5610>

Or for a summary: Veale, B. 2011. Bolstering the Role and Influence of Watershed Report Cards, *Plan Canada* 5(2): 37-40. [PDF]

16. Conservation Ontario. 2003. Improving Public Access to Information. [PDF]

17. McKenzie-Mohr, D. and W. Smith. 1999. *Fostering Sustainable Behavior: an introduction to Community-Based Social Marketing*. Skim through the book, but see chapter six for "Creating Effective Messages" for your term project.

Now that you are experts in ecosystem indicators and reporting, we need to think more clearly about how to communicate those reports to a wide variety of audiences. See the CBSM site <http://www.cbsm.com> for specific resources and strategies to communicate and influence sustainable behaviour. Do a search on a specific topic or initiative, for a particular audience, and be prepared to report back to the class what you've learned (You'll only need 1 page of notes).

## Week Six

18. Walker and Salt, 2006. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington, D.C.: Island Press. [read: Chapters 1-6 and your choice of one of their 5 case studies. Available from Amazon.com]

19. Resilience Alliance [read: Key Concepts] <http://www.resalliance.org/576.php>

*Note: The Resilience Alliance has developed two workbooks for assessing resilience in social-ecological systems. "Assessing and managing resilience in social-ecological systems: A practitioners workbook" has been designed specifically to provide guidance to people engaged in natural resource management, through a set of activities designed to explore system parameters and management options for their own system of interest from a resilience perspective. Please become familiar with these before we use them in the course.*

20. The Resilience Alliance. 2007. Assessing and managing resilience in social-ecological systems: A practitioners workbook. Volume 1, version 1.0. <http://www.resalliance.org/3871.php>

21. The Resilience Alliance. 2007. Assessing and managing resilience in social-ecological systems: A practitioners' workbook, Vol. 2 supplementary notes [read: Chapters 1-2] at <http://www.resalliance.org/3871.php>

Note: **ERS 675 Graduate Students Only** A second workbook "Assessing resilience in social-ecological systems - A workbook for scientists" emerged from case-study comparisons of regional social-ecological systems in the Resilience Alliance, and builds on an earlier framework. It is intended as a guide for those familiar with the basic concepts of resilience and systems dynamics. We will be using the tables of questions on pages 8-13 in our case study analysis and/or for your final projects.

22. The Resilience Alliance. 2007. Assessing resilience in social-ecological systems: A scientists workbook. Available [online] <http://www.resalliance.org/3871.php>

Optional: for more on applying resilience to resource management (forestry, fisheries, etc.) read: Folke et al. 2004. Regime Shifts, Resilience, and Biodiversity in Ecosystem Management. *Annu. Rev. Ecol. Evol. Syst.* 35: 557-81.

> *Other Recommended Course Readings:*

23. Georgian Bay Islands National Park [http://www.pc.gc.ca/pn-np/on/georg/index\\_e.asp](http://www.pc.gc.ca/pn-np/on/georg/index_e.asp)
24. Nature Conservancy of Canada's Great Lakes Blueprint [http://science.natureconservancy.ca/initiatives/blueprints/greatlakes\\_w.php](http://science.natureconservancy.ca/initiatives/blueprints/greatlakes_w.php)
25. Cvetkovic, M. and P. Chow-Fraser. 2011. Use of ecological indicators to assess the quality of Great Lakes coastal wetlands. *Ecological indicators* 11:1609-1622 [PDF]
26. Great Lakes Fisheries Commission reports: an overview of Lake Huron with reference to eastern Georgian Bay <http://www.glfcc.org/lakecom/lhc/lheooverview.pdf> and the State of Lake Huron (2004) [http://www.glfcc.org/pubs/SpecialPubs/Sp08\\_1.pdf](http://www.glfcc.org/pubs/SpecialPubs/Sp08_1.pdf)
27. NCC/MNR Ecological Survey of Eastern Georgian Bay [Read the Conclusions] <http://science.natureconservancy.ca/resources/docs/EcolSurveyEastGBayCoast.pdf>
28. Westwind Forestry [read: Homepage, Forestry 101] <http://www.westwindforest.ca>

*Reminder: Weeks One to Six – you must undertake readings to support your project proposal and list them in your proposal's bibliography.*

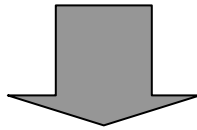
## 9. Suggestions for Project Topics: “Communicating Complex Systems”

- Communicating the *State of the Bay* ecosystem health in Georgian Bay
- Resilience analysis of a sub-system of your choice
- Adaptive management of a social-ecological system of your choice
- Governance for sustainable development – the role of biosphere reserves
- Sustainable development in eastern Georgian Bay – opportunities and challenges
- Education/curriculum development - Species at Risk, Cultural Heritage, Ecology
- Other topics of your choice!

ERS 475 students, please contact me with ideas about your project topic ideas ASAP.

If you have any questions about course expectations, please contact me by email.

**ERS 675 Graduate students have the same readings (except resilience workbook, above) but different assignments and evaluation. PLEASE SEE BELOW page 9, for details.**





## 10. Assignments and Evaluation for ERS 675 Graduate Students

- 10% Participation on UW-ACE:  
Advanced readings are required on a scheduled basis. Students should prepare answers to the study questions for discussion during the course and link them to their project.
- 10% Class Lecture:  
Students must select a topic and prepare an introductory 30 min. undergraduate-level lecture based on the weeks' readings and additional materials: (1) adaptive management (2) social-ecological systems or (3) resilience. Other topics may be possible with instructor's permission.
- 15% Participation in-class discussions and in the field:  
Students should actively contribute to class discussions and small group workshops. They should engage with guest lectures and guided field trips with questions and comments.
- 10% Project Proposal: **Due Tuesday 12 February 2013.**  
Based on readings and general research, provide us with a 2-3 page proposal for your final project. You will outline the project topic, rationale, background questions, key course concepts you will use, and the final presentation format you envision for your project (see below). In addition, you will attach a bibliography of references and related resources that you have consulted. Please also include additional information that you still need to find to complete your project over the field course and we will try to help you locate them. Please submit this to me digitally in Word format (where possible) [rpollock@gbbr.ca](mailto:rpollock@gbbr.ca)
- 10% In-Class Assignments:  
Assignments may include a rapid appraisal of community sustainability; quizzes on readings and lectures; natural history interpretation; and discussions on resilience analysis.
- 5% Paper Presentation:  
Near the end of the course, you will have the opportunity to present a working draft of your paper to see how well you "communicate complex systems" to a public audience. We will encourage the audience to give you feedback to incorporate into your final paper.
- 40% Term Paper: Communicating Complex Systems: **Due Friday 22 March 2013.**  
  
Building from the course readings, lectures, and discussions, students will prepare a 30-page (double-spaced) term paper to submit to the journal *Environments*, analyzing a subsystem of the Georgian Bay biosphere reserve, using concepts introduced in the course. There is a wide range of topics available (see ideas listed above) that should be discussed with the course instructor early in the term. It may be the same as your M.E.S. thesis topic, or something different. Your choice. Please submit final projects to me digitally in Word format (where possible) [rpollock@gbbr.ca](mailto:rpollock@gbbr.ca)

If you have any questions about course expectations, please contact me by email, thanks.