

Biosphere Reserves as Social-Ecological Systems
ERS 422 & ERS 622
Course Outline 2015

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This is a reading course, with an 8-day field course component. It is a combination of undergraduate and graduate students. There are a variety of course requirements outlined below.

I am a graduate of ERS at Waterloo (2000) completed my Master's in Geography at University College London (UK) and my PhD at Trent-Carleton (2009). I am currently the Communications Manager at a non-profit organization based in Parry Sound (Ontario) called the Georgian Bay Biosphere Reserve, working with a dynamic team of staff and student interns.

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 beginning of Winter Term.

Photo (left to right): Kaitlin Chantler, intern; Greg Mason, general manager; Glenda Clayton, community outreach; Becky Pollock, communications manager; David Bywater, biologist; Brittany Mahnke, marketing coordinator.



Course Overview

ERS 422/622 will look at Parry Sound and the Georgian Bay Biosphere Reserve as a set of social-ecological systems. With over 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.

Course Objectives

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

Prerequisite

This is a 400-level course, cross-listed as a 600-level course, and therefore students must be in their third year or above, unless special permission is granted by the instructor.

Course Fee & Form

A deposit of \$100.00 is due to the UW Cashier (non-refundable unless a replacement student is found). Balance of \$300 is due to UW Cashier prior to course start or you will not be able to attend. This fee covers accommodations and equipment rental. A field trip form must be filled in, with contact, medical and insurance information. Food and travel are the student's responsibility (details below). Additional money to cover carpooling gas or rental cars may be required.

Important Dates

January 5-February 13, 2015

Course Readings

One set of readings will be required each week for the six weeks leading up to the course: Jan. 9, Jan. 16, Jan. 23, Jan. 30, Feb. 6, Feb. 13.

January 5-February 13, 2015

Study Questions (LEARN online)

Completion of weekly study questions shows the instructor you have read and understand the material and will be prepared to discuss it during the field course and reference it in your final projects.

February 11 at 5:00 p.m.

Project Proposals will be submitted by email.

A list of links and topics will be suggested to help students prepare for their final project.

You will email me your project ideas ASAP so I can respond and provide suggestions.

February 13-20, 2015

Field Course in Georgian Bay Biosphere Reserve

Transportation by carpooling will be arranged, leaving UW at about noon. Directions provided below.

During the field course we have lectures in the morning and field activities in the afternoon.

Alternate social and academic evenings with spare time to work on projects.

February 19, 2015

Project presentations (work-in-progress) during the course.

March 20, 2015 at 5:00 p.m.

Final project submission.

Assignments and Evaluation for UNDERGRADUATES in ERS 422

- 10% Readings & Study Questions: due weekly
Weekly readings are required on a scheduled basis (ie., they must be completed each week not read the week before the field course). Students should prepare answers to the study questions that are posted online LEARN and submit their answers using LEARN.
- 15% Participation in-class discussions and in the field:
The highlight of this course is the field component. Students should actively contribute to class discussions and small group workshops. They should engage with guest lectures and guided excursions with questions and comments. The instructor will note daily participation during the field component, including participation in shared duties (such as meal preparation and cleaning) to assess this grade. Full and positive participation by everyone is expected.
- 15% Project Proposal **Due 11 February 2015 at 5:00 p.m.**
Based on the readings and your own independent research, write a 2-page proposal outlining your final project. In single-space paragraphs and summary tables or 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. In addition to the 2-pages, you will attach a bibliography of references and that you have consulted. Please submit your proposal in Word format to rpollock@gbbr.ca
- 10% In-Class Assignments:
Assignments during the field course component include: (1) an informal presentation about a World Biosphere Reserve of your choice, (2) communication of a complex system or discussion about creating sustainable behaviour, and (3) the course evaluation.
- 10% Project Presentation: Near the end of the field course, you will have the opportunity to present a working draft of your project to see how well you “communicate complex systems” to your target audience. We will encourage class feedback to incorporate into your final project.
- 40% Final Project: **Due 20 March 2015 at 5:00 p.m.** Building from the course materials, students will work individually or in pairs to produce a tangible product *and* accompanying 20-25 page double-spaced written analysis. The academic paper must be properly referenced. The accompanying product might be a poster or public presentation, display or video, webpage or brochure, etc. Individual contributions in team work will be evaluated accordingly. All final

project topics must be approved in advance by the course instructor. Please submit final projects in PDF (or alternate digital format) and the final papers in Word to rpollock@gbbr.ca

Please have your assignments in on time, by email to rpollock@gbbr.ca. 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. Marked assignments will be returned by email, unless it is impractical to do so. Unclaimed assignments will be retained for (period of time*; or: "until one month after term grades become official in quest"). After that time, they will be destroyed in compliance with UW's confidential shredding procedures.

ERS 622 Graduate students have the same readings but different assignments and evaluation. See below for details on graduate assignments.

Field Course Logistics

Field Course Location: We will be based 20 minutes outside of the town of Parry Sound (250 km north of Toronto) in Killbear Provincial Park lodge. 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, and quinzee-building.

Travel: Students are required to assist with transportation. Our best options are car-pooling or car rental. A bus is also available from Toronto. At the beginning of term, students will be contacted to see if they have access to a car and if there is sufficient car-pooling, or drivers for rental cars. Typically all students leave EV2 at noon on Friday of the field course. They share the costs of gas for the week.

Meals: you are required to plan, purchase and cook simple healthy meals at the camp with your classmates during your stay. I will coordinate cooking groups for those who do not know anyone in the class; I recommend meeting with your group to determine a meal schedule & which groceries you need (there will be time on arrival to do shopping). Any food allergies shall be reported on your mandatory Field Course health forms and all groups will be informed.

In the past, the first night pizza is provided. The second night we go to the pub, if everyone agrees. Mid-week is a potluck. Then 4 dinners remain for your group. In the past the following have been popular: fajitas or tacos, chili and brown rice, stir fry, curry, pasta, soup or stew (vegetarian or not).

Equipment: we aim to provide snowshoes at the lodge, and encourage students to bring their own. If you have cross-country skis, these may be used during free time. We rent equipment at the Ski Club.

SAMPLE ONLY	Morning	Afternoon	Evening
13 Friday	Leave UW at noon	Travel from Waterloo	Course introduction
14 Saturday	Biosphere Reserves	Georgian Bay Biosphere	Pub night - optional
15 Sunday	Social-ecological systems	Killbear Park Hike	Project roundtable
16 Monday	Ecosystem health	State of the Bay	MES lectures
17 Tuesday	Communications	Sustainable Forestry	Night hike/camp out
18 Wednesday	Fisheries Ecology	Cross country ski club	Species at Risk research
19 Thursday	Project Presentations	Project presentations	Course evaluation
20 Friday	Pack/Clean	Travel to Waterloo	

Assignments and Evaluation for GRADUATE STUDENTS in ERS 622

- 10% Readings & Study Questions: due weekly.
Course readings are required on a scheduled basis. Students should prepare answers to the study questions and submit them on LEARN. These are for discussion during the course and some will be referenced in your term paper.
- 10% Class Lecture:
Students must select a topic and prepare an introductory 30 min. undergraduate-level lecture based on the weeks' readings and discussion questions. Please contact me to book your topic.
- 15% Participation in-class discussions and in the field:
The highlight of this course is the field component. Students should actively contribute to class discussions and small group workshops. They should engage with guest lectures and guided excursions with questions and comments. The instructor will note daily participation during the field component, including participation in shared duties (such as meal preparation and cleaning) to assess this grade. Full and positive participation by everyone is expected.
- 10% Project Proposal: ***Due 11 February 2015 at 5:00 p.m.***
Based on readings and general research, provide 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 in Word format to rpollock@gbbr.ca
- 10% In-Class Assignments:
Assignments during the field course component include: (1) an informal presentation about a World Biosphere Reserve of your choice, (2) communication of a complex system or discussion about creating sustainable behaviour, and (3) the course evaluation.

5% Paper Presentation:
Near the end of the course, you will have the opportunity to present a working draft of your paper. We will encourage the audience to give you feedback to incorporate into your final paper. This is scheduled for 19 February 2015.

40% Term Paper: **Due 20 March 2015, at 5:00 p.m.**

Building from the course readings, lectures, and discussions, students will prepare a 30-page (double-spaced) term paper to submit to the journal *Environments*, using concepts introduced in the course. It may be related to your M.E.S. thesis topic, or something different: this is your choice. Please submit final projects to me in Word and PDF format by email: rpollock@gbbr.ca

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

Readings for ERS 422/622

This is a reading course. So enjoy the readings! I expect you to read the majority of the following list, in order to answer study questions, prepare for class discussions, and your term papers and projects. Most of these are available online (URLs provided) or as documents on LEARN, with the exception of a few book chapters. Please excuse any broken links; sometimes URLs change over time. I will email the new links or substitutes to the class.

Week One – What are UNESCO Biosphere Reserves?

1. UNESCO Biosphere Reserves <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/>
2. The Seville Strategy for Biosphere Reserves (Statutory Framework) <http://www.unesco.org/mab/doc/brs/Strategy.pdf>
3. Madrid Action Plan for Biosphere Reserves (2008-2013) <http://unesdoc.unesco.org/images/0016/001633/163301e.pdf>
4. Biosphere Reserves: Benefits and Opportunities <http://unesdoc.unesco.org/images/0014/001424/142453e.pdf>
5. 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.environmentsjournal.ca/index.php/ejis/issue/view/1119> (updated link).
6. Georgian Bay Biosphere Reserve www.gbbr.ca

7. Pollock, R.M. "Governance for Sustainability: the Role of Biosphere Reserves"
Unpublished doctoral dissertation. (Chapter 8 is about Georgian Bay Biosphere Reserve)
<https://uwaterloo.ca/biosphere-sustainability-project/sites/ca.biosphere-sustainability-project/files/uploads/files/RPollock%20BR%20govnc%20for%20sust.pdf>
8. Eastern Georgian Bay Stewardship Council
http://www.helpourfisheries.com/Spawning_Habitat_Rehabilitation_Program/index.php
9. Westwind Forestry [read: Homepage, Forestry 101] <http://www.westwindforest.ca>
10. Georgian Bay Forever <http://georgianbayforever.org/water-quality>

> Other sources for your project:

Biosphere Sustainability Project

<https://uwaterloo.ca/biosphere-sustainability-project/research-contributions>

Georgian Bay Islands National Park

<http://www.pc.gc.ca/eng/pn-np/on/georg/natcul/natcul1.aspx>

Jalava, J.V., W.L. Cooper and J.L. Riley, 2005. Ecological Survey of Eastern Georgian Bay.
Toronto: NCC (Nature Conservancy of Canada) – available at the library?

Preparing for the In-Class Assignment: during the course of your research about UNESCO World Biosphere Reserves, select one biosphere reserve that interests you and summarize briefly its name, location, year of designation, primary conservation activities, selected sustainable development activities, and one aspect that relates somehow to the Georgian Bay Biosphere.

Week Two – Complex Systems; Linking Social and Ecological Systems

11. 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
12. 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>
13. Berkes, F. 2006. From community-based resource management to complex systems. *Ecology and Society* 11(1): 45. <http://www.ecologyandsociety.org/vol11/iss1/art45/>

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 – Development of “ecosystem health” indicators for monitoring

14. Cairns, J. et al. 1993. A proposed framework for developing indicators of ecosystem health. *Hydrobiologia* 236:1, 1-44. [PDF]
15. 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]
16. Niemi, G. J. and M.E. McDonald. 2004. Application of ecological indicators. *Annu. Rev. Ecol. Evol. Syst.* 35:89-111. [PDF]
17. Bertram, P. et al. 2005. Developing indicators of ecosystem health. *State of Lake Michigan: Ecology, Health and Management*, pp. 505-519. [PDF]
18. 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]
19. 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 – Ecosystem Health Reporting

20. Environmental Report Cards: these are models for the Georgian Bay Biosphere Reserve's own *State of the Bay* program, first published in July 2013. As a class we will assess the GBBR report card as an effective tool for communicating science to the public, as well as other models, below:

(a) Muskoka Watershed Council: <http://www.muskokawatershed.org/stewardshipworks/>
Check out the most recent report card (2014), as well as the scientific background report. 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 2013:
http://www.lsrca.on.ca/about/watershed_report_card.php

(c) Grand River Conservation Authority:

http://www.grandriver.ca/publication/2012_Fall_Grand.pdf

(d) Toronto Region Conservation Authority, Humber River, Watershed Report 2013

<http://www.trca.on.ca/dotAsset/166590.pdf>

(e) Environment Canada. 2009. State of the Great Lakes 2011

<http://binational.net/solec/sogl2011/sogl-2011-technical-report-en.pdf>

(f) Georgian Bay Biosphere Reserve, 2013. State of the Bay: ecosystem health report for eastern and northern Georgian Bay. 16pp.

www.stateofthebay.gbbr.ca

Week Five – Assessing Ecosystem Health Reporting

21. 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.

http://dev.conservationontario.ca/members/members_watershed_monitoring/documents/Article_BolsteringValueofWatershedRptCards.pdf

22. Conservation Ontario. 2003. Improving Public Access to Information.

http://www.conservationontario.ca/projects/pdf/fact%20sheets/PHASE%20II/water_resource_information_english.pdf

Week Six – Communicating Complex Systems

23. McKenzie-Mohr, D. and W. Smith. 1999. *Fostering Sustainable Behavior: an introduction to Community-Based Social Marketing*. Online book: <http://www.cbsm.com/pages/guide/preface/> or at the library or from Amazon.

Familiarize yourself with Community-Based Social Marketing as a way to influence complex systems through identification of specific “behaviour change.”

In particular, read section 6 in the book or here:

<http://www.cbsm.com/pages/guide/communication:-creating-effective-messages/> and think about why this approach is likely to work more than traditional “information/awareness” campaigns.

Preparing for the In-Class Assignment: Pick one very specific topic or initiative, for a particular audience, and be prepared to “communicate a complex system” or “foster a sustainable behaviour” with the class. (You’ll only need 1 page of notes to present and hand-in). You might visit the CBSM “Forum” for ideas <http://www.cbsm.com/forums/index.lasso> or use your own project topic to test out on them.

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at: <http://www.lib.uwaterloo.ca/ait/>

When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

Within ENV, those committing academic offences (e.g. cheating, plagiarism) will be placed on disciplinary probation and will be subject to penalties which may include a grade of 0 on affected course elements, 0 on the course, suspension, and expulsion. Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>

Guidelines for Group Work

1. All team members have referenced and footnoted all ideas, words or other intellectual property from other sources used in the completion of this assignment.
2. A proper bibliography has been included, which includes acknowledgement of all sources used to complete this assignment.
3. This is the first time that any member of the group has submitted this assignment or essay (either partially or entirely) for academic evaluation.
4. Each member of the group has read the full content of the submission and is assured that the content is free of violations of academic integrity. Group discussions regarding the importance of academic integrity have taken place.
5. Each student has identified his or her individual contribution to the work submitted such that if violations of academic integrity are suspected, then the student primarily responsible for the

violations may be identified. Note that in this case the remainder of the team may also be subject to disciplinary action.

Research Ethics: Please also note that the 'University of Waterloo requires all research conducted by its students, staff, and faculty which involves humans as participants to undergo prior ethics review and clearance through the Director, Office of Human Research and Animal Care (Office). The ethics review and clearance processes are intended to ensure that projects comply with the Office's Guidelines for Research with Human Participants (Guidelines) as well as those of provincial and federal agencies, and that the safety, rights and welfare of participants are adequately protected. The Guidelines inform researchers about ethical issues and procedures which are of concern when conducting research with humans (e.g. confidentiality, risks and benefits, informed consent process, etc.). If the development of your research proposal consists of research that involves humans as participants, the please contact the course instructor for guidance and see <https://uwaterloo.ca/research/office-research-ethics>

Note for students with disabilities: The AccessAbility Office 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 AccessAbility Office at the beginning of each academic term.

Mental Health: The University of Waterloo, the Faculty of Environment and our Departments consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges - physical and / or emotional. **Please note that help is available.** Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services <http://www.uwaterloo.ca/counselling-services> is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

Religious Observances: 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.

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 your Undergraduate Advisor for details.

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