**Introduction**

A *Grand Challenge* is a politically-charged term that describes something that is highly valuable to society, and pretty hard to solve. For example, we want more food and clean water. We get those things from landscapes that used to have wildlife and fish. We have to balance our desire to have “natural” conditions (like national parks) with our need to produce goods and services from the landscape. Human society relies on ecosystems for all of our food and water as well as nearly all other elements of our well-being. Biodiversity is a central component of ecosystem health. Higher biodiversity increases resilience, ecosystem stability and resistance to stress; it increases productivity. Some values we derive from ecosystems are extractive (i.e., we take things from the ecosystems to derive benefit). For example, forestry, fishing and hunting are extractive uses. Other ecosystem attributes offer their value in-place (e.g., clean water, clean air, aesthetic beauty). The value we place on ecosystem attributes is expressed as *Ecosystem Goods and Services (EGS)*. In this class, we take a broad view of EGS, especially those related to fisheries, wildlife and/or conservation biology. We address the human-natural interface every day in this class. Each case study or class discussion or component of the Biodiversity Hot Spots exercise asks you to think about the trade-offs that must occur when we choose whether or not to manage to the benefit of one species versus another. Our goal is to engage you in the range of issues important in making decisions about natural resources. All of human society is engaged, more or less explicitly in addressing the Grand Challenge of natural resource management. Through this class, you will become better informed about that challenge, helping you become a better citizen and advancing your academic and professional goals.

**An Overview of Global and Local Issues**

In this class, we discuss natural resources in the context of society’s management concerns; we mix science with management, ecology with policy, values with decision-making. We draw examples from many places in the world, many cultures and many economies because there are useful similarities and instructive differences among them. We seek an overview of fisheries, wildlife and conservation biology and the broader issues they serve, to help you become better natural resource professionals and more informed citizens. The central environmental issue addressed in this class is informed decision making about the fish, wildlife and conservation biology issues we all face, locally and globally. The class addresses conservation in a broad sense, going into detail about a range of both species-level and...
landscape-scale issues as well as addressing the science-policy interface at a range of locations around the world. This class serves as a stepping stone in the Fisheries and Wildlife major, a required step taken during the sophomore year. We use scientific principles such as biodiversity and evolution as the basis to question and challenge decisions. Scientific principles are offered via short introductions to case studies, as well as in the text. Assessments such as Canvas posts and exams evaluate your grasp and use of those principles.

You will discuss the science-policy linkage in every aspect of the class. In conservation, our knowledge is incomplete and our uncertainty is high but society has high expectations. Society believes that we (as professionals) can “solve” environmental problems. A central issue woven through the entire class is decision making with uncertainty (i.e., we can take informed decisions, but we don’t solve problems). For example, climate change predictions are imperfect. We must take action now to reduce future impacts, but every action taken now is very expensive so decisions to act must be taken carefully. You will be exposed to a wide range of information, some of it conflicting. That is typical of the decisions we each face as a citizen or a natural resource professional. For example, a management action about an endangered species or a policy about climate change is influenced by a plethora of information. That information must be carefully evaluated to understand which aspects are credible and relevant to the decisions being considered. We routinely will ask you to evaluate those flows of information. For example, we discuss environmental issues as Ecosystem Goods and Services (i.e., EGS, attributes society desires from ecosystems). There always are conflicts between competing uses and limits to the kinds and amounts of EGS that can be provided by an ecosystem. Humans must make value judgments, choosing which attributes to retain and which to lose. Critically, every such decision also must be adaptive; that is, we must take actions, measure the results against our intended goals, and readjust either actions or goals as appropriate. That iterative, reflective, adaptive practice is built into every case study discussion, the Biodiversity Hot Spots experience and all aspects of assessment.

Active, constructivist learning, and a diversity of views and interactions
I strongly believe in active and constructivist learning. That is, I believe that each of us brings a unique perspective and we each have something to offer to the discussion. As we approach an issue or a discussion, each of us learns from the interaction and constructs new learning from that interaction. Therefore, the class relies upon an open, highly participatory, interactive format, both in class and through Canvas. People from all backgrounds and orientations are explicitly welcomed. I especially seek a wide variety of views and styles of interaction. If there are any ways I can make your participation more effective or if you have any special needs, I will try to accommodate them; please let me know.

CLE Writing Intensive
This class has been approved by the university’s Council on Liberal Education as meeting the criteria for Writing Intensive. Writing is integral to the course objectives; the WI criteria require that you offer at least 2,500 words (i.e., about 10 pages) of finished writing. A central goal of this class is to assist you in developing your abilities to think critically and express yourself persuasively in a professional setting. You will offer successive drafts of a synthetic paper that describes your analysis of Biodiversity Hot Spots on campus, and you will offer several (about 15) Canvas posts which address your position about a case study we discussed in class. More than 60% of the class grade is based on your writing performance. In order to help you do well in that writing, we will offer explicit sessions on writing (i.e., both in-class sessions and grading rubrics) and you will have the opportunity to learn from revising drafts. In the latter, you will present a draft of your final paper, perform a peer review, receive reviews from the instructors and a peer, and submit a final draft.
CLE Environmental theme
This class has been approved by the university’s Council on Liberal Education as meeting the criteria for the Environment Theme.

- The course raises environmental issues of major significance. The central issue we address in class is wise decision making about the fish, wildlife, and conservation biology issues we all face, locally and globally. We address conservation in a broad sense, going into detail about a range of species-level and landscape-scale issues as well as addressing the science-policy interface at a range of locations around the world.
- The course gives explicit attention to interrelationships between the natural environment and human society. We address that interface every day in this class, through the case studies, class discussions and the Hot Spots exercise. Each of those experiences engages you in the trade-offs that must occur when we choose whether or not to manage to the benefit of one or more species.
- The course introduces the underlying scientific principles behind the environmental issues being examined. This class serves as a stepping-stone to advanced classes in the Fisheries and Wildlife major. We use scientific principles such as biodiversity and evolution, as the basis to question and challenge decisions. Scientific principles are offered via short introductions to themes as case studies, and through the reflective discussion and writing that follows each case. Assessment such as Canvas posts and exams evaluate your grasp and use of those principles.
- You will explore the limitations of technologies and the constraints of science on the public policy issues being considered. The key constraint in the science-policy linkage is that our knowledge is incomplete and often our uncertainty is high, but society has high expectations that professionals can “solve” environmental problems. A central issue woven through the entire class is decision making with uncertainty.
- You will learn how to identify and evaluate credible information concerning the environment. You will be exposed to a wide range of information. For example, a management action about an endangered species or a policy about climate change is information-rich but that information is of variable quality. It must be carefully evaluated to understand which aspects are credible and which are relevant to the decisions being considered.
- To excel in the class, you will have to demonstrate an understanding that solutions to environmental problems will only be sustained if they are consistent with the ethics and values of society. We discuss many environmental issues; there always are conflicts among competing uses and limits to the kinds and amounts of EGS that can be provided by an ecosystem. Humans must make value judgments, choosing which attributes to retain and which to sacrifice. Critically, every such decision also must be adaptive; that is, we must take actions, measure the results against our intended goals, and readjust either actions or goals as appropriate. That iterative, reflective, adaptive practice is built into every case study discussion, the Hot Spots experience and all aspects of assessment.

Student Learning Outcomes
The University has adopted seven Student Learning Objectives that apply to all students. This class specifically advances objectives 1 (i.e., identify, define and solve problems), 2 (i.e., locate and critically evaluate information) and 3 (i.e., master a body of knowledge and mode of inquiry). The first two objectives are assessed through the Hot Spots field exercise and paper, the case study analyses and the exams. The third objective is assessed primarily through examinations and writing. The class focuses on the interdependence of humans and their environment, stressing the ways humans alter landscapes and the positive and negative impacts that alteration has on biodiversity and ecosystem goods and services. The class discusses in many ways the regenerative aspects of the biosphere (i.e., the ways biotic and abiotic influences can remove or mitigate negative aspects of human actions). Fisheries, wildlife, and conservation biology all function as products of both social and ecological influences. For example,
human values determine our goals for landscape management, which are used to establish policies, which guide our choice of management practices. These issues are woven throughout the course materials, learning activities, and assessments.

Discussion, Analysis and Synthesis
You will be expected to participate in discussions and presentations in order to improve your grasp of the material as well as to improve your communication abilities. You will be expected to develop and demonstrate an ability to think critically and to weigh alternatives. Performance evaluations in the class depend on critical analyses of issues and interpretations of scenarios, as well as text-based facts and concepts inherent to the field.

The text is the context for and conceptual framework of the class content; that is the core material we cover in the class. To excel in the class, you will need to become sufficiently familiar with that material that you can discuss it intelligently and can refer to it as necessary. You will not be asked to memorize and repeat material; rather your goal should be to become conversant with ideas and approaches and become comfortable using the concepts in the text as a reference for practical analyses, interpretation and decision making as necessary. We will help you bridge the gap between text and cases in two ways: we will provide exemplary terms from the text that may be useful in understanding the case. The terms do not represent a list of words to memorize; rather, they are concepts you might find relevant. Second, you will play the role of case synthesizer several times through the semester. As synthesizers, you are expected to explicitly seek linkages between the case and the text.

Class Conduct
In this class, we use a wide variety of strategies to capture your interest and optimize your learning. You will notice that there is a wide range of exercises. Consider each as a step that helps build your critical and analytical abilities and helps develop your decision-making and management skills. We often use role-playing to engage with cases. The role play usually follows the format of a jigsaw, where a reading and writing assignment is posted on Canvas. Each assignment represents a unique piece of a problem with conflicting viewpoints/approaches/roles (e.g., roles a, b, c, and d). Each person is assigned one of these roles; assignments are posted on the class site in advance. Your assigned role might conflict with your personal beliefs/values. However, you do need to adopt that role during the case discussion and defend it to the best of your abilities. In your defense of that position, interpret text-based concepts together with what you have learned so far in the course and in life, as it applies to your assigned role in context and content.

Meeting with the Instructors
We will make time available during class and directly after class for questions on course material. We encourage you to initiate discussion and/or ask questions at any time. Jim will hold office hours at Lori’s on Wednesdays (see below), and will respond quickly to e-mail questions as well. He is not available for unscheduled meetings. XXX has scheduled office hours as shown on Canvas. If you encounter difficulty with course material, please ask questions and see us for help.

Seeing you at Lori’s
Each Monday at 10:30 and Thursday at 11:30, Jim will be at Lori’s Café (Cleveland and Buford) to meet with students. Please join us. We talk about class problems, environmental management, personal growth, getting out of the University, getting a job, surviving in real life as a student or a professional and/or anything else. On average, 6-10 people show up; you will not be alone and will not be in a big crowd.

Credits and Workload Expectations
This is a 3 credit class; university policy is that each semester credit carries an expectation of 15 hours of instructor-interaction, and an additional 30 hours of study and work outside of class. We will meet face to face for two, 75-minute class sessions per week (the equivalent of three, 50-minute sessions) during the semester. Each person is expected to invest a minimum of four and one half hours per week outside of class studying the material and preparing written materials for submission.

Student Requirements

- **Participation**
  Every student is required to participate in class discussions, post individual and group assignments on Canvas, participate in the field sampling project and participate in writing the group paper.

- **Biodiversity Hot Spots Project**
  Every person is required to participate fully in the field project, which includes conducting field work as a group and both individual and group writing.

- **Examinations**
  We will have two examinations. Each will require most of a full class session and will consist of short answer and short essay questions.

Grading

Our core philosophy of grading is that you should be given the benefit of doubt whenever possible. We feel that you should have wide varieties of opportunities to excel. We stress analysis, communication, expression and concepts more than details.

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<th>Point distribution: 479 points possible</th>
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<td>• 4 for your first reactions</td>
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<td>• 150 points (31% of grade) for the Hot Spots field sampling project</td>
<td>90.0%-92.9%=A-</td>
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<td>• 160 points (34% of grade) for exams (60 for 1st and 100 for 2nd)</td>
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<td>• 165 points (35% of grade) for Canvas case discussions</td>
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<td>• Up to 17 points Extra credit will be available for planned and announced occasions and up to 20 additional points may be awarded for exemplary contributions to discussions and/or exemplary Canvas postings</td>
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Policy on late work

Our class relies on interaction among people, thought about that interaction and with the material, and a writing experience based on all of that. Work must be submitted in a timely way to maintain your thoughts and growth through the class. Therefore, our late policy is *Work submitted within 24 hours after the submission deadline may be eligible for a maximum of 50% credit, at the discretion of the instructors. Work submitted greater than 24 hours after the deadline is not eligible for credit.*

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1 See details in *Writing Instructions*
Text
The reading material for the course is Sodhi & Ehrlich, *Conservation Biology for all*, available in the St. Paul Bookstore, Amazon and similar sources, both used and new. It also is on reserve in McGrath Library. Note that the electronic version of the text is available free through the Society for Conservation Biology, see https://conbio.org/publications/free-textbook