

**JINS 336: The Environment**  
**Water World: Human Influences on Aquatic Ecosystems**  
**3 credit hours**  
**Spring 2006**

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**CATALOG DESCRIPTION:**

Water World is designed to make students aware of the variety, complexity, magnitude, and immediacy of water-related issues that modern human societies must cope with. The two main disciplinary approaches will be biology and political science.

**REQUIRED TEXTS:**

Outwater, Alice. 1996. *Water, A Natural History*. Basic Books: New York. 212 pp.

National Research Council. 2002. *The Missouri River Ecosystem, Exploring the Prospects for Recovery*. National Academy Press: Washington, D.C. 175 pp.

**GENERAL OVERVIEW OF COURSE:**

This course will involve an investigation and analysis of the ways that issues or problems relating to human use of aquatic ecosystems can be understood from the perspectives of both natural science and political science.

Natural sciences: We will study the diversity and complexity of natural freshwater ecosystems, the reliance of modern human societies on aquatic ecosystems, the need for societies to manipulate aquatic resources (e.g., for maintenance of public health, for agriculture, etc.), and the biological consequences resulting from human manipulation of these systems.

Political science: We will examine how American society, through its political system, makes decisions about water use. We will specifically emphasize the Clean Water Act and how it is implemented. We will also analyze why our environmental laws fall short of their objectives, despite massive expenditure and effort. In part, this analysis will consider issues of political structure, for example, compromise during legislation, intentional vagueness of legislation, and existence of regulatory agencies that have contrasting missions.

**WATER WORLD IS AN INTERDISCIPLINARY COURSE:**

Interdisciplinary outcomes will be achieved through lectures, class discussions based on readings drawn from both the natural sciences and political science, and through student research projects culminating in written and oral reports.

**Water World is designed to engage students in interdisciplinary work by emphasizing interdisciplinary outcome #2: Investigation of ways in which a given topic or concept may be understood and questioned by two or more different disciplines within a larger civic, cultural or professional context:**

**Water will be the topic or concept in question.** Modern problems or issues concerning use of water typically relate to water shortage, including the uneven or unpredictable distribution of water on earth. Thus, decision-making through political processes is central to determining how this limiting resource gets apportioned among "competing" groups. Because solutions to water-related issues always involve human modification of natural patterns of water flow, often on a very large scale, the solutions invariably have significant impacts on natural ecosystems. Predicting and understanding these impacts fall within the realm of the natural sciences, but must also be part of the decision-making process if wise decisions are to be made. The impacts of these modifications ultimately also affect human societies and have political consequences. Water is a significant topic for a JINS course, because both our needs for water and our impacts on aquatic ecosystems become larger as human populations grow and become more technologically advanced.

Examples of water issues that are appropriately understood from both political and biological perspectives include protection of wetlands and the damming of rivers, but possible examples are myriad. Wetlands are legally protected in the United States. The fact that their modification by developers requires special permits acknowledges their importance in flood prevention and as natural systems for purifying water. The issue of wetlands regulation is complicated by the variety of types of wetlands that exist, and by the various political routes that stakeholders can use to either invoke or avoid those regulations. Construction of a dam to even out seasonal variations in water supplies typically involves displacement of the traditional users of a watershed to benefit a distant population that has the monetary resources to build the dam. Construction of a dam changes a free-flowing river with seasonal fluctuations to a nearly still reservoir, with consequent changes in the biotic community. A common consequence is the destruction of a native fisheries upon which depend downstream users of the watershed. Thus, a political decision to construct a dam has enormous impacts on both human constituencies and natural ecosystems. Likewise, ongoing discussions about removal of dams to re-establish traditional watersheds (e.g., from the Columbia River to prevent extinction of salmon) might involve similar political processes to achieve sharply contrasting outcomes.

**Outcome #4: Students must demonstrate knowledge of, and reflection on, how advanced-level content from two or more disciplines interacts:**

The course will involve reading and discussion of upper-level texts to establish a common baseline of advanced knowledge about both aquatic ecosystems and environmental politics and policy. The text is interdisciplinary and leads student to the primary disciplinary literature. *Informed* participation in class room discussions contributes to the final grade. Most significantly, assignments pertaining to the writing-enhanced component of the course require students to investigate

interdisciplinary connections and to reveal knowledge of the roles of both politics and natural science to specific water-related issues.

For example, for the final class project, a student might contrast the proposal of the Army Corps of Engineers to raise dams and widen locks along the Mississippi River (to facilitate barge traffic) with the contrasting proposal of the U.S. Fish and Wildlife Services to keep dams low and begin opening dams periodically in order to facilitate seasonal flooding of wetlands (fostering reproduction of endangered sturgeons and other wetlands-dependent river species). Both organizations are legally mandated agencies of the federal government. To demonstrate interdisciplinary competence pertaining to this issue, a student would need to relate the effects of dams on hydrodynamics and sedimentation, the reproductive biology of pallid sturgeons, the legal missions of these two agencies, the economics of shipping on the Mississippi, the values of stakeholders that influence these agencies, and the roles of the federal legislative branch, the presidency, and state governments in the decision-making processes.

**Outcome # 5: Students must demonstrate integrated analysis of the problems incorporating knowledge of the approaches and methods of both disciplines.**

Lectures and classroom discussions of assigned readings will provide students with foundational knowledge of the approaches and methods of the natural sciences and political sciences. Informed participation in these discussions contributes to the student's final grade. More significantly, writing assignments that constitutes the major part of the final grade require students to demonstrate this knowledge through an integrated analysis of a specific issue.

**WATER WORLD IS A WRITING-ENHANCED COURSE:**

By reflecting on and writing about specific issues pertaining to aquatic resources, students will use writing as a mode of learning as well as a method of communicating their ideas. Students are asked to keep a journal and to write one short report (2+ pages) and two longer papers (8+ pages each).

**Cognition:** Throughout the class, students will use journal writing as method for organizing their thoughts and searching for original insights about water-related issues. Focused analyses of a particular issue will be based on selective readings of the scientific and political science literature and the generation of a formal written report. There are many links between writing of a report and development of understanding about the topic. As they write, students will need to decide which aspects of a problem are most important and should be emphasized in a report. As they try to write clearly about their subject, they should come to recognize and resolve short-comings in their knowledge of the concepts needed to discuss the issue. A significant part of the grade will depend upon how well students provide their own analysis of both "natural issues" and "political setting," and how effectively and explicitly these two aspects are related to each other. Because the subjects of the reports will involve integrating technical information from two distinct academic disciplines, students will need to apply higher order thinking skills, such as analysis,

interpretation, and synthesis of information to a topic they have not previously explored in any depth.

**Process:** Students will brainstorm ideas and reflect on information presented in readings and class discussions by keeping a writing journal. Particular water-related issues will be developed in informative outlines and written reports that will be due at regular intervals throughout the semester. Students will be asked to read and critique drafts of each other's reports, and then, after in-class discussions based on the drafts, will submit the critiqued draft and a revised report that reveals significant improvement based on the critiques and discussions. Each report will be critiqued by the instructor, graded, and returned before the next one is due -- the reports should get successively better as students learn from the commentary provided.

**Product:** In addition to the journal, students will write two informative outlines, a formal response paper and a term paper based on outside research. Grades will be based on both the quality and content of the writing. It is expected that the papers will be well-organized, clearly and concisely written, and thoroughly documented. The journal & written reports will constitute about 65% of the final grade. Through their writing, students are communicating to the instructor the level of their knowledge. This is especially true of the longer project reports. Thus, students are asked to write for a professional audience.

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