

The Japan Center for Michigan Universities

Environmental Sciences in Japan
Environmental Issues in Lake Biwa
3 credits

I. Course Description

This course is designed for science-majors and students interested in environmental sciences in Japan and plan to venture out for 3-week internships in Japan after completing a program in fundamental Japanese language.

II. Objective

By the end of this course participants will have learned many aspects of environmental sciences in Japan as shown in Table 1.

III. Class Schedule

Introductory Remarks of the ESJ Course

Prof. Shinji Ide

Lecture 1 Landscape with water and people

Prof. Shuichi Murakami

This lecture focuses on the variety of landscapes emerging from people's relationships to water in their lives. It introduces both the fact that rich landscapes of lakeshores and canals in the Biwa Lake region have been lost, and the several cases in which communities try to recover them.

Prof. Takuya Takahashi

Lecture 2 Forests and Mountain Villages---Human Ecology and Policy Challenges---

Forests and mountain villages in Japan underwent enormous ecological and economic changes in the last century, a period of Japan's rapid modernization. Today's challenges facing forest policy-makers in Japan will be explained and analyzed.

Lecture 3 Plankton Communities in Lake Biwa

Prof. Syuhei Ban

Over 400 species of planktonic plants and animals including 5 endemic ones live in the pelagic area of Lake Biwa. This lecture will provide an overview of general features of the diversity, distribution, behavior and dynamics of these organisms in the lake including the anthropogenic effects on them.

Prof. Masahiro Maruo

Lecture 4 Water Quality in Lake Biwa.

Lake Biwa, which supplies drinking water to 14,000,000 people, has been suffering from pollution and eutrophication caused by increased human activity. The lecture focuses on the chemical features and problems of water quality in Lake Biwa.

Prof. Shozo Sugiura

Lecture 5 Fishery Resource Management in Lake Biwa

Fish resources of Lake Biwa and its tributaries have been deteriorating in recent decades due to complex environmental problems. This class explores the current issues of fisheries in this region, with particular emphases on aquaculture and resource enhancement.

Prof. Shinji Ide

Lecture 6 Introduction to Lake Biwa and Lessons Learned from its Management

In this lecture we will examine the political and socio-economic factors of Lake Biwa and their influence on development and conservation. We will examine its past and current conditions, its history of degradation, and environmental management.

Prof. Tadashi Hayashi

Lecture 7 Minamata Disease and Japanese Environmental Policy

This lecture focuses on development process of environmental policy, especially how science affects environmental policy, featuring Minamata Disease, which is one of the Four Major Pollution Related Disease in Japan. We will examine the political and socio-economic factors of environmental degradation and history of environmental policy process.

Field Trips:

Field trip I: Arranged by Prof. Naoshige Goto

- Field Survey of Lake Biwa: Limnological survey of Lake Biwa using research vessel *Hassaka*. Students will take water samples and physical parameter measurements

Field trip II: Arranged by Prof. Takahashi

- Japanese Style Forest Management and Related Issues

Field trip III: Arranged by Mizuki Kitamura, JCMU

- Lake Biwa Museum, Guide, Dr. Robin Smith, Associate Research Scientist

ESJ Internship – 4 credits:

Five weeks: 60 hours

- Students should submit proposals prior to arrival at the Japan Center for Michigan Universities.
- Placement will be arranged during the first three weeks of the Program.
- Deadline for submission of Internship Report is TBA

Table 1: Class description, objective, general outline, and others

Class	Instructors	Class time	Class Description	Objective	General Outline:
Introductory Remarks Regarding the ESJ Course	Prof. Shinji Ide		To introduce students to the “JCMU Environmental Science in Japan” course.	Basic understanding of the structure and schedule of the entire course.	
Lecture 1: The Landscape with Water and People	Prof. Shuichi Murakami Office #B2-304 at USP		<p>This lecture focuses on the variety of landscapes emerging from people’s relationships to water in their lives. It introduces both the fact that rich landscapes of lakeshores and canals in the Biwa Lake region have been lost, and the several cases in which communities try to recover them.</p> <ol style="list-style-type: none"> 1) Introduction of landscape in the Biwa Lake watershed Ohmi-hakkei/Biwako-hakkei/4 types of shorelines at present/Rural streams: the old village of Iba, Notogawa/Terraced paddy fields: the old village of Ohgi, Otsu 2) Case study - One: historical city and streams Old town district of Nagara, Otsu/Landscape in the past/Life with water in the past/Transformation of landscape/Landscape at the present/Life with water at the present 3) Case study - Two: the village and the lakeshore Old district of Yamada, Kusatsu/Landscape in the past/Life with water in the past/Transformation of landscape/Landscape at the present/Life with water at the present 4) Reclaiming the relationship of people with water Actions in case study One (Otsu)/Actions in Case study Two (Kusatsu) 5) Summary: problems and prospects for improvement 		
Lecture 2: Forests and Mountain Villages—Human Ecology and Policy Challenges—	Prof. Takuya Takahashi Office #B6-107 at USP		To acquire basic knowledge of the relationship between humans and the forest in Japan	Studying the forest-human relationship through lecture and field trip. Forests and mountain villages in Japan underwent enormous ecological and economic changes during Japan's rapid modernization. in the last century. Today's challenges facing forest policymakers in Japan will be explained and analyzed.	
Lecture 3: Plankton communities in Lake Biwa	Prof. Syuhei Ban Office #B3-201 at USP		To acquire basic knowledge of the lake ecosystem, especially plankton communities. The student will also be introduced to the diversity, distribution, behavior and dynamics of planktonic organisms in the largest lake in Japan, Lake Biwa.	To learn general features of the diversity and interaction of planktonic plants and animals in the lake ecosystem with actual examples from Lake Biwa ecosystem. Lake Biwa is the largest and oldest lake in Japan, having 400 species of phyto- and zooplankton including five endemic species. Participants will learn to overview the diversity of the planktonic organisms, interactions between them, effects of nutrient loading (bottom-up) and predators (top-down), and also anthropogenic effects on them. Additionally, participants will observe live zooplankton from the lake using a microscope.	
Lecture 4: Water quality in Lake Biwa	Prof. Masahiro Maruo Office #B3-204 at USP		Students, on the basis of chemistry and biology of aquatic systems, will examine the water quality of Lake Biwa, which supplies drinking water to 14,000,000	To acquire practical knowledge in order to comprehend water quality of the lake system which reflects geological and geographic features of its watershed. Lecture Outlines:	

			people in the Kinki region, Students will acquire a basic knowledge of the chemical components in freshwater and their annual variation in Lake Biwa as well as eutrophication by human activity.	<ol style="list-style-type: none"> 1) “Basic parameters” of water quality (dissolved oxygen, electroconductivity, pH, water temperature, transparency etc.). 2) “Major chemical components” in freshwater are mainly supplied from watershed or direct precipitation by natural processes. 3) “Minor elements” exist in very low concentration but some of which regulate biological activity in water as nutrients or toxin. 4) Search for instruments for chemical analysis. 5) “Nutrients (phosphorous, nitrogen)” regulate primary production in water and are supplied by human activities to cause eutrophication. 6) “Budgets of elements and water” in Lake Biwa. 	
Lecture 5: Fishery Resource Management in Lake Biwa	Prof. Shozo Sugiura Office #B5-204 at USP		To introduce students to general fisheries, particularly inland fisheries, as they are closely related to the aquatic environment in Shiga prefecture. Both scientific and cultural aspects of fisheries will be discussed. The format of the class is based on discussion-oriented learning, rather than lectures. Both regional and global issues on fisheries and fish supply will be discussed. Questions we shall examine include but are not limited to: How can we restore fish resources in Lake Biwa? How can we preserve traditional fishery culture in Shiga? How can we effectively maintain biodiversity in Lake Biwa habitats. How can we feed the world through fisheries? Students are expected to prepare for class discussions	To acquire a general understanding of fisheries in regional and global perspectives.	To learn about fishery science and culture. This introductory course outlines current status and problems of fishery in Lake Biwa: the major aquatic species, aquaculture techniques, and fish as food and culture. A short lecture on the above subjects will be followed by discussion-based learning that constitutes a major part of the class. The instructor will attempt to make a contrast between Shiga and the US or other parts of the world, including underdeveloped countries. Since Shiga is best-known for <i>Funazushi</i> , an old form of sushi made from local carp-like fish, the instructor will talk about the recipe, science, and culture of <i>Funazushi</i> . Audiovisual materials and handouts will be used to facilitate students understanding. Also, students will have an opportunity to taste <i>Funazushi</i> and other <i>Narezushi</i> in the class.
Lecture 6: Introduction to Lake Biwa and Lessons Learned from its Management	Prof. Shinji Ide Office #B1-207 at USP		To introduce students to Lake Biwa and its administrative history.	Basic understanding of environmental and socio-economic issues at Lake Biwa.	To examine the political and socio-economic factors of Lake Biwa and their influence on development and conservation. We will examine its past and current conditions, its history of degradation, and environmental management.
Lecture 7: Minamata Disease and Japanese Environmental Policy	Prof. Tada-shi Hayashi Office #B3-305 at USP		To introduce Minamata Disease and history of counter measure of public administration and remedy policy.	Basic understanding of environmental policy process.	To examine development process of environmental policy regarding cause-and-effect relationship between industry and pollution.
Field trip I: Field Survey of Lake	Prof. Nao-shige Goto		For students majoring in science with no prior background of studying limnology in-	To acquire the method of some limnological	Students will participate in a field survey of Lake Biwa.

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Biwa	Office #LUSP at USP		terested in acquiring experience in limnological surveying.	measurements, and comprehend Japanese culture and environmental issues in Lake Biwa.	Students will conduct Limnological Surveys of Lake Biwa using the research vessel <i>Hassaka</i> , including some water samplings and physical parameter measurements. If possible, we will visit Chikubu-island in the lake, an important ecological heritage site though experiencing severe environmental issues.
Field trip II: Japanese Style Forest Management and Related Issues (Wednesday or Friday)	Prof. Takahashi Office #B6-107 at USP		See “Lecture 3: Forests and Mountain Villages—Human Ecology and Policy Challenges—”		
Field trip III: Lake Biwa Museum	Mizuki Kitamura, JCMU		Students will examine the relationship between Lake Biwa and humans.		Guides: <u>Dr. Robin Smith</u> , Associate Research Scientist

*Classroom A4-210 at USP

Table 2: Class textbook and grading policy

Class	Textbook	Grading Policy (Tentative)			Notes
		Attendance, Classroom Participation	Assignments (report)	Quizzes	
Introductory Remarks of the ESJ Course					
Lecture 1: Landscape with water and people	No textbook Handouts	70%		30%	
Lecture 2: Forests and Mountain Villages---Human Ecology and Policy Challenges---	No textbook Handouts	50%	50%		
Lecture 3: Plankton communities in Lake Biwa	No textbook Handouts	50%		50%	
Lecture 4: Water quality in Lake Biwa	No textbook Handouts	50%	30%	20%	
Lecture 5: Fishery Resource Management in Lake Biwa	No textbook Handouts	30%	70%		
Lecture 6: Introduction to Lake Biwa and Lessons Learned from its Management	No textbook Handouts	50%	50%		
Lecture 7: Minamata Disease and Japanese Environmental Policy		50%	50%		
Field trip I: Field Survey in Lake Biwa		50%	50%		

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Field trip II: Japanese Style Forest Management and Related Issues (Wednesday or Friday)		50%	50%		
Field trip III: Lake Biwa Museum, International Lake Environmental Committee		50%	50%		