

**ENVIRONMENT AND HEALTH**  
**EVR 4934**  
**SPRING 2010**  
**TU/TH 12:30-1:45 PM**

**Instructor:** Dr. Riach

**E-mail:** [riachj@fiu.edu](mailto:riachj@fiu.edu)

**Office hours (ECS 335):** TBA

**Course Description:**

This course introduces students to interdisciplinary approaches to studying and addressing the interconnections between environment and health. It will focus on the impacts of major environmental changes and patterns of economic activities and social behavior on the health of humans and other species. Students will analyze the contributions of ecosystems and biodiversity to human well-being and how ecosystem degradation, ecosystem degradation, and climate change threaten this well-being. The course will also examine the social and ecological environmental factors that contribute to increasing the abundance and distribution of disease among all species. Included in this discussion will be the causes and impacts of resurgent, new, and zoonotic infectious diseases; contaminant emergence; and the persistence of sanitation and water-related health problems. Students will review case studies of intervention programs that have succeeded in providing culturally appropriate, sustainable solutions that reduce current health problems and prevent future outbreaks. The structure of the course combines lecture and in-class discussion to become familiar with, and to critically assess, the state of knowledge of the topic and identify areas in need of additional research.

Upon successful completion of this course student will be able to:

- Model direct and indirect causes of major environmental changes and their health implications
- Identify and explain the impacts of ecosystem degradation, biodiversity loss, and climate change to human health
- Explain inter-relationships between social, cultural, and ecological environmental factors and the health of humans and other species
- Identify and explain the causes and impacts of resurgent, new, and zoonotic infectious diseases; contaminant emergence; and the persistence of sanitation and water-related health problems
- Develop strategies for research and redressing of environmental and health problems in a sustainable manner

**Readings**

The only required book for this class is listed below. All other readings will be sent to student's e-mails as .pdf articles prior to when they are due to be read as per the schedule in the syllabus (1st week readings may be an exception). Students may be called upon to discuss content from the readings during class. To be able to this, students are expected to do the readings before they are covered in class.

**Required Text**

Desowitz, Robert S.

1981 New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People. New York: W.W. Norton & Company.

**Homework**

Several study activities will be assigned as homework to help students combine and apply material from the readings with additional research to stimulate insightful in-class discussions about the topics. The homework is due at the start of class on the due dates as indicated in the syllabus. All assignments should be typed, unless otherwise indicated (drawings, illustrations, photos, etc...)

## Class Participation

Attendance will be taken at every class and student participation during class will be assessed. Students may be asked to start a discussion on the readings and/or homework assigned for the class. Participation in other in-class activities will also influence class participation grades. Failure to participate in the in-class discussions and activities will negatively affect the student's final grade.

## Video presentation

Students are required to produce and present a video structured around topics covered in class and in the readings. The video assignment is comprised of six graded components; 1) video proposal; 2) research documentation; 3) storyboard; 4) draft video; 5) final video; and 6) presentation. The due date, instructions, and grading criteria for the components are detailed in a separate handout provided by the instructor.

Students can use the video to inform the public about impacts of major environmental changes, human manipulation of the environment, and patterns of economic activities and social behavior on the health of humans and other species. Students may select a particular disease affecting humans or other species (swine flu) or may select a category of health problems (new infectious diseases, toxic contamination...). The video should not be just about the problem, but must also present intervention strategies that successfully and sustainably redress the problem.

Students may instead choose to provide an overview of the contributions of approaches such as conservation medicine, medicinal plant use (and conservation), ecological sanitation, or others as a means of simultaneously addressing both environmental and health problems.

## Exams

There will be two non-cumulative in-class exams. The exams will be a mix of multiple choice and short answer questions emphasizing material discussed in class and in the readings. Additional questions may come from videos shown in class or from presentations of guest speakers.

## Grading:

<u>Activity</u>	<u>Points</u>
Homework	15
Class participation	15
Video	30
<i>proposal</i>	1
<i>research</i>	6
<i>storyboard</i>	3
<i>draft video</i>	5
<i>final video</i>	12
<i>presentation</i>	3
Exam 1	20
<u>Exam 2</u>	<u>20</u>
<b>Total</b>	<b>100</b>

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## Schedule

### 1. Introduction

#### January 5-7: Introduction to class and to "The Problem"

**Readings:** Parasites, progress, and the past; Biodiversity and human health; The issue

**Homework due Jan 7:** Do the assigned readings. What is "the issue" referred to in the Lebel article and "the problem" that is the focus of the other 2 readings and of this class? Do additional research to find as many online examples of "the problem" as you can. Describe at least five of those examples that BEST exemplify "the problem" as it exists today.

## 2. Approaches For Addressing "The Problem"

### January 12-14: Conservation medicine and ecohealth

**Readings:** Defining conservation medicine; Conservation medicine: the birth of another crisis discipline; Ecohealth: a transdisciplinary imperative for a sustainable future

**Homework due Jan 14:** Do the assigned readings. Explain what distinguishes conservation medicine and ecohealth from conservation biology and public health. What are the potential strengths and weaknesses of conservation medicine and ecohealth? You may need to do additional research to find reviews of these approaches. Be prepared to discuss your findings in class.

## 3. Background: Ecosystems, Biodiversity, Climate Change, and Human Health

### January 19-21: Ecosystems

**Readings:** Why do ecosystems matter to human health? How have ecosystems changed and what are the health implications? How might ecosystems change and what would be the health implications? River blindness

**Homework due Jan 21:** Do the assigned readings. The instructor will assign some students a type of ecosystem change to do research on. Using the readings and other sources as necessary, students will draw a labeled model of the direct and indirect causes of that ecosystem change and explain in writing the implications of these changes to human health. Other students will be assigned a health problem to do research on. These students will explain in writing the types of ecosystem changes that help to contribute to this health problem and will draw a labeled model of the direct and indirect causes of these environmental changes. Be prepared to evaluate the models of your student peers and to make projections about how the environmental changes are going to progress into the future and to discuss how you would intervene to address direct and indirect causes of ecosystem change and the health implications.

### January 26-28: Biodiversity

**Readings:** Biodiversity; Ecosystem services; Medicines from natural sources; The value of plants, animals, and microbes to medical research; The role of biodiversity in world food production; Nonhuman primate self-medication with wild plant foods

### Video proposal due Jan 28

**Homework due Jan 28:** Do the assigned readings. Make a 24 hr log with an inventory of the biodiversity that directly affects your health and well-being during that time. Do some additional research to find out the geographical origin and conservation status of the biodiversity that MOST affected your health and well-being during this time. Be prepared to discuss your log and your findings in class.

### February 2-4: Climate change

**Readings:** Global climate change and health: an old story writ large; Impacts on health of climate extremes; Climate change and infectious diseases

**Homework due Feb 4:** Do the assigned readings. Based on the readings and additional research as necessary, identify the geographical regions that are expected to experience the most severe environmental and health impacts from climate change over the next 50-100 years. What kinds of environmental and health impacts are they predicted to experience? Who will experience the most severe problems? What kind of climate change is South Florida predicted to experience over the next 50-100 years and what would be the environmental and health impacts?

### February 9: EXAM 1

#### 4. *Emerging Conditions*

##### **February 11: New diseases**

**Readings:** New diseases; How the wise men brought malaria to Africa; Controlling the schistosome at a snail's pace

**Homework due Feb 11:** Do the assigned readings. Work on your video project and be prepared to discuss your progress with the project.

##### **February 16-18: Emerging infectious diseases**

**Readings:** Emerging infectious diseases: a key role for conservation medicine; The 10 most threatening emerging diseases; Emerging infectious diseases of wildlife – threats to biodiversity and human health

**Homework due Feb 18:** Do the assigned readings. Use the readings and additional research as necessary to research to find as many examples of new and/or emerging infectious diseases among humans or wildlife identified within the last 50 years. Describe at least three of these diseases that BEST exemplify the connection between human changes to, or manipulation of, the environment and diseases to both humans and wildlife. What are the social and ecological factors contributing to the health problems?

##### **February 23-25: Chemical contaminants**

**Readings:** Environmental pathogens; "Emerging" chemicals as pollutants in the environment: a 21st century perspective; Effects of endocrine disruptors on human and wildlife health;

**Homework due Feb 25:** Do the assigned readings. The instructor will assign students an environmental chemical pathogen or emerging chemical that is impacting the health of humans and/or wildlife to do research on. How did the chemical get there and why are wildlife and/or humans exposed to it? What are the health problems it is creating? How can the health threat be reduced or eliminated?

##### **March 2-4: Zoonosis**

**Readings:** Zoonosis; Monitoring the health and conservation of marine mammals, sea turtles, and their ecosystems; Emergence of infectious diseases in marine mammals; Dangerous nymphs of Nantucket

##### **Video research, storyboard and draft video due March 4.**

**Homework due March 4:** Do the assigned readings. The instructor will assign students an example of zoonosis to do research on. What is the nature of the zoonosis and what is known about the causes of the problem? Be prepared to discuss in class how the particular zoonosis you researched may be significant to the well-being of students, of others? What kind of research would you do to help address the problem?

##### **March 9-11: Food preparation, sanitation, and water-related health problems**

**Readings:** Emerging issues in water and infectious disease; On New Guinea tapeworms and Jewish grandmothers; *Itamae san, sashimi ni mushi, ga imasu!* (Waiter there's a worm in my *sashimi!*); Regarding Giardia

**Homework due March 11:** Do the assigned readings. The instructor will assign students a parasite to do research on. Find out the geographical distribution of the greatest threat to the health of humans and/or wildlife from this parasite. What is the threat to your health from this parasite? Identify the social and ecological environmental factors contributing to the abundance and distribution of this parasite. Describe a strategy to help reduce or eliminate the threat to health from this parasite.

#### **SPRING BREAK March 15-20**

## 5. Addressing "The Problem"

### March 23-25: Conservation medicine, medicinal plants, and ecological sanitation

**Readings:** Ecological health and wildlife disease management in national parks; The mountain gorilla and conservation medicine; Medicinal plants for healing the planet: biodiversity and environmental health care; Sanitize-and-recycle; A vision for the future; Unseemly behavior

**Homework due March 25:** Do the assigned readings. What were the most significant contributions of the conservation medicine approach in the first two readings and why? How can medicinal plants and ecological sanitation simultaneously address health and environmental concerns?

### March 30 - Project Amazonas

### April 1: EXAM 2

## 6. Presentations and Final Videos

### April 6-8

### April 13-15

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## References

### Section 1: Introduction

Desowitz, Robert S.

- 1981 Parasites, Progress and the Past. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 11-27. New York: W.W. Norton & Company.

Chivian, Eric and Sara Sullivan

- 2002 Biodiversity and Human Health. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 182-193. New York: Oxford University Press.

Lebel, Jean

- 2003 The Issue. In *Health: An Ecosystem Approach*. Pp. 1-8. Ottawa, Ontario, Canada: International Development Research Centre.

### Section 2: Approaches For Addressing "The Problem"

Tabor, Gary M.

- 2002 Defining Conservation Medicine. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 8-16. New York: Oxford University Press.

Ostfeld, Richard S., Gary M. Keffe, and Mary C. Pearl

- 2002 Conservation Medicine: The Birth of another Crisis Discipline. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 17-26. New York: Oxford University Press.

Wilcox, Bruce A., et al.

- 2004 Ecohealth: A Transdisciplinary Imperative for a Sustainable Future. *EcoHealth* 1:3-5.

### Section 3: Background: Ecosystems, Biodiversity, Climate Change, and Human Health

#### 3.1 Ecosystems

Corvalan et al.

- 2005 Why do Ecosystems Matter to Human Health? In *Ecosystems and Human Well-Being: Health Synthesis. A Report of the Millennium Ecosystem Assessment*. Pp. 12-26. Geneva: World Health Organization.

- 2005 How Have Ecosystems Changed and What Are the Health Implications? In *Ecosystems and Human Well-Being: Health Synthesis. A Report of the Millennium Ecosystem Assessment*. Pp. 27-29. Geneva: World Health Organization.

- 2005 How Might Ecosystems Change and What Would be the Implications? In *Ecosystems and Human Well-Being: Health Synthesis. A Report of the Millennium Ecosystem Assessment*. Pp. 30-37. Geneva: World Health Organization.

### **3.2 Biodiversity**

Chivian, Eric

- 2003 Biodiversity. In *Biodiversity: Its Importance to Human Health. Interim Executive Summary*. Pp. 6-12. Boston: Center for Health and the Global Environment, Harvard Medical School.
- 2003 Ecosystem Services. In *Biodiversity: Its Importance to Human Health. Interim Executive Summary*. Pp. 13-18. Boston: Center for Health and the Global Environment, Harvard Medical School.
- 2003 Medicines from Nature. In *Biodiversity: Its Importance to Human Health. Interim Executive Summary*. Pp. 19-25. Boston: Center for Health and the Global Environment, Harvard Medical School.
- 2003 The Value of Plants, Animals, and Microbes to Medical Research. In *Biodiversity: Its Importance to Human Health. Interim Executive Summary*. Pp. 26-33. Boston: Center for Health and the Global Environment, Harvard Medical School.
- 2003 The Role of Biodiversity in World Food Production. In *Biodiversity: Its Importance to Human Health. Interim Executive Summary*. Pp. 41-48. Boston: Center for Health and the Global Environment, Harvard Medical School.

Glander, Kenneth E.

- 1994 Nonhuman Primate Self-Medication with Wild Plant Foods. In *Eating on the Wild Side*. Nina Etkin ed. Pp. 227-239. Tucson: University of Arizona Press.

### **3.3 Climate change and health**

McMichael, A.J.

- 2003 Global Climate Change and Health: An Old Story Writ Large. In *Climate Change and Human Health: Risks and Responses*: A.J. Mc Michael, *et al.* eds. Pp. 1-17. Geneva: World Health Organization.

Hales, S., S.J Edwards, and R.S. Kovats

- 2003 Impacts of Health on Climate Extremes. In *Climate Change and Human Health: Risks and Responses*: A.J. Mc Michael, *et al.* eds. Pp. 79-102. Geneva: World Health Organization.

Patz, J.A. et al.

- 2003 Climate Change and Infectious Diseases. In *Climate Change and Human Health: Risks and Responses*: A.J. Mc Michael, *et al.* eds. Pp. 103-132. Geneva: World Health Organization.

## **Section 4: Emerging Conditions**

### **4.1 New Diseases**

Link, Kurt

- 2007 New Diseases. In *Understanding New, Resurgent, and Resistant Diseases: How Man and Globalization Create and Spread Illness*. Pp. 107-124. Westport: Praeger.

Desowitz, Robert S.

- 1981 How the Wise Men Brought Malaria to Africa. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 46-58. New York: W.W. Norton & Company.
- 1981 Controlling the Schistosome at a Snail's Pace. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 103-127. New York: W.W. Norton & Company.

### **4.2 Emerging Infectious Diseases**

Daszak, Peter and Andrew Cunningham

- 2002 Emerging Infectious Diseases: A Key Role for Conservation Medicine. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 40-61. New York: Oxford University Press.

Consortium for Conservation Medicine

N/A The 10 Most Threatening Emerging Diseases. Fact Sheet. New York: Consortium for Conservation Medicine.

Daszak, Peter, Andrew A. Cunningham, and Alex Hyatt

2000 Emerging Infectious Diseases of Wildlife – Threats to Biodiversity and Human Health. *Science* 287: 443-449.

#### **4.3 Health problems caused by chemical elements in the environment**

Link, Kurt

2007 Environmental Pathogens. In *Understanding New, Resurgent, and Resistant Diseases: How Man and Globalization Create and Spread Illness*. Pp. 95-104. Westport: Praeger.

Daughton, Christian G.

2005 "Emerging" Chemicals as Pollutants in the Environment: A 21st Century Perspective. *Renewable Resources Journal*. 23(4): 6-23.

Colborn, Theo

2002 Effects of Endocrine Disruptors on Human and Wildlife Health. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 40-61. New York: Oxford University Press.

#### **4.4 Zoonosis**

Link, Kurt

2007 Zoonosis. In *Understanding New, Resurgent, and Resistant Diseases: How Man and Globalization Create and Spread Illness*. Pp. 55-72. Westport: Praeger.

Aguirre, Alonso, A., *et al.*

2002 Monitoring the Health and Conservation of Marine Mammals, Sea Turtles, and their Ecosystems. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 79-94. New York: Oxford University Press.

House, Carol, Alonso A. Aguirre, and James A. House

2002 Emergence of Infectious Diseases in Marine Mammals. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 104-117. New York: Oxford University Press.

Desowitz, Robert S.

1981 Dangerous Nymphs of Nantucket. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 146-158. New York: W.W. Norton & Company.

#### **4.5 Food preparation, sanitation, and water-related health problems**

World Health Organization

2003 Emerging Issues in Water and infectious Disease. Pp. 5-20. France: WHO

Desowitz, Robert S.

1981 On New Guinea Tapeworms and Jewish Grandmothers. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 36-45. New York: W.W. Norton & Company.

1981 *Itamae san, sashimi ni mushi, ga imasu!* (Waiter there's a worm in my *sashimi!*) In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 159-171. New York: W.W. Norton & Company.

1981 Regarding Giardia. In *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. Pp. 172-185. New York: W.W. Norton & Company.

### **Section 5: Addressing "The Problem"**

#### **5.1 Conservation medicine, medicinal plants, and ecological sanitation**

Cranfield, Michael, *et al.*

2002 The Mountain Gorilla and Conservation Medicine. In *Conservation Medicine*. Aguirre, A. Alonso *et al.* eds. Pp. 282-296. New York: Oxford University Press.

Gillin, Colin, Gary M. Tabor, and Alonso Aguirre

2002 Ecological Health and Wildlife Disease Management in National Parks. In Conservation Medicine. Aguirre, A. Alonso *et al.* eds. Pp. 253-264. New York: Oxford University Press.

Desowitz, Robert S.

1981 Unseemly Behavior. In New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People. Pp. 186-205. New York: W.W. Norton & Company.

Peters, Charles

1997 Medicinal Plants for Healing the Planet: Biodiversity and Environmental Health Care. In Biodiversity and Human Health. Francesca Grifo and Joshua Rosenthal, eds. Pp. 221-242. Washington D.C: Island Press.

Esrey, Steven A., et al.

1998 Sanitize-And-Recycle. In Ecological Sanitation. Sheila Jones copy editor. Pp.8-19. Stockholm: Department for Natural Resources and the Environment.

1998 A Vision for the Future. In Ecological Sanitation. Sheila Jones copy editor. Pp.8-19. Stockholm: Department for Natural Resources and the Environment.