

## Human Dimensions of Global Environmental Change

### Bloomington

#### Co-Directors

Distinguished Professor and Rudy Professor Emilio Moran\* and Associate Professor Tom Evans\*

#### Departmental E-mail

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#### Departmental URL

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### Core Graduate Faculty

(An asterisk [\*] denotes membership in the University Graduate School faculty with the endorsement to direct doctoral dissertations.)

#### Distinguished Professor and Rudy Professor

Emilio F. Moran\* (Anthropology, Geography, Public and Environmental Affairs)

#### Arthur F. Bentley Professor

Elinor Ostrom\* (Political Science, Public and Environmental Affairs)

#### Professors

Eduardo Brondizio\* (Anthropology), J.C. Randolph\* (Public and Environmental Affairs)

#### Associate Professors

Tim Bartley\* (Sociology), Tom Evans\* (Geography), Vicky Meretsky\* (Public and Environmental Affairs), Catherine Tucker\* (Anthropology)

#### Assistant Professors

Rinku Roy Chowdhury\* (Geography)

### Associated Graduate Faculty

#### Professors

Randall Baker\* (Emeritus, Public and Environmental Affairs, International Programs), Jerome Busemeyer\* (Psychology), Chris Craft\* (Public and Environmental Affairs), Hendrik Haitjema\*

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(Public and Environmental Affairs), Jeffrey Hart\* (Political Science), Dan Knudsen\* (Geography), J. Scott Long\* (Sociology), David Parkhurst\* (Emeritus, Public and Environmental Affairs), Scott Robeson\* (Geography), Rob Robinson\* (Sociology), Barry Rubin\* (Public and Environmental Affairs), Jeanne Sept\* (Anthropology), James Walker\* (Economics), Richard Wilk\* (Anthropology)

#### Associate Professor

Heather Reynolds\* (Biology)

#### Assistant Professors

Rebecca Lave (Geography), Rinku Roy Chowdhury\* (Geography)

#### Clinical Professor

Burnell C. Fischer\* (Public and Environmental Affairs)

#### Academic Advisors

Rudy Professor Emilio Moran\* (812) 855-6181; Associate Professor Tom Evans\* (812) 856-4587 or (812) 855-2230; Arthur F. Bentley Professor Elinor Ostrom\* (812) 855-0441

## Ph.D. Minor in the Human Dimensions of Global Environmental Change

The graduate minor will instruct students in theories and methods that combine the physical and social sciences on human dimensions of global environmental change (HDGEC). The curriculum, as described below, will familiarize students with (1) the major issues of the field through exploration of the available approaches to this kind of interdisciplinary work and creation of a research proposal; (2) institutional analysis and design; and (3) forest and institutions research methods. Students will be expected to become familiar with GIS and/or remote sensing as tools in the analysis of global environmental change through both formal courses and hands-on apprenticeship as part of team research projects.

#### Course Requirements

The Minor in Human Dimensions of Global Environmental Change requires 12 credit hours of approved courses. The core courses G515, E622, and Y673 are required, unless explicitly approved otherwise by the directors of the Center for the Study of Institutions, Population, and Environmental Change and the University Graduate School. Students who have (1) completed the required credit hours in good standing and (2) presented a dissertation to their research committee, at least one member of which must be a core faculty member associated with the program, will complete the minor.

## Core Courses

### University Graduate School

**GRAD G515 Research Design in Human-Environment Research (3 cr.)** Examines the research agenda on global environmental change. It aims to facilitate student participation in ongoing and future research through development of research proposed for dissertation work. Topics include deforestation, pollution, population, land use, and remote sensing. Offered spring semester every other year.

### Anthropology

**E622 Empirical Theory and Methodology: International Forest Resources and Institutions (3 cr.)** This course trains participants in the International Forestry Resources and Institutions (IFRI) research program, which explores how communities influence local forest conditions. Theories of institutional analysis and human dimensions of environmental change underlie the course. Methods include participatory techniques, interviews, forest mensuration. Participants conduct fieldwork in an Indiana community.

### Political Science

**Y673 Empirical Theory and Methodology (3 cr.)** Will count toward Minor when topic is "Institutional Analysis and Development: Micro." This research seminar addresses how and why fallible individuals achieve and sustain self-governing entities and self-governing ways of life. It seeks to understand how individuals affect the rules that structure their lives. This seminar provides the theoretical foundations for Y773.

## Minor Elective Courses

Any of these courses fulfill the fourth course for the minor and may, in some rare circumstances, replace one of the three core courses with the approval of the academic advisors and the University Graduate School.

### University Graduate School

**GRAD G513 Topics Seminar in Human Dimensions of Environmental Change (3 cr.)** Topical courses related to the study of institutions, population, and environmental change will be arranged in light of recent scientific developments and student and faculty interests. Analysis of human roles in environmental change is contextualized by attention to biophysical and ecosystemic relationships.

**GRAD G514 Fieldwork Practicum in Human Dimensions of Environmental Change (12 cr.)** P: Approval from directors of the Center for the Study of Institutions, Population, and Environmental Change. Gives students the opportunity to practice research methods in an individually designed project. The project must address a specific issue in the study of institutions, populations, and environmental change.

**GRAD G517 Seminar in Cultural Ecology: The Amazon in Crisis: Ecology and Development (3 cr.)** Provides an introduction to the ecology of the Amazon Basin of South America, focusing on its habitats, the use and conservation of the environment by its

native inhabitants, and examining the forces of development that threaten its very existence.

**GRAD G590 Seminar/Colloquium in Population Analysis (3 cr.)** P: Graduate status or consent from instructor. Topic varies. Elective status depends on topic and approval by the academic advisors.

**GRAD G591 Methods of Population Analysis and Applications (3 cr.)** P: An undergraduate course in statistics. This is a course about methods of measuring and projecting population dynamics. We focus on describing the three basic demographic processes (mortality, fertility, and migration) and showing how each one affects population size and age structure. An understanding of these basic processes is fundamental for studying behavioral aspects of population change.

**GRAD G593 International Perspectives on Population Problems (3 cr.)** International trends in population growth, characteristics, and structure with attention to major social, environmental, economic, and political implications. Comparisons between industrially advanced economies and less developed countries in Latin America, Africa, and Asia. Special emphasis will be placed on local and national circumstances affecting fertility, mortality, migration, and emerging roles of population policies in development planning.

### Anthropology

**E427 Cultural Ecology (3 cr.)** Surveys the major environmental studies in anthropology, the basic principles of ecological theory, and human adaptation as manifested in major ecosystems.

**E527 Environmental Anthropology (3 cr.)** Graduate course on theory and method in the study of human-environment interactions. Emphasis on contemporary debates and approaches and on research design in environmental research.

**E600 Topic Seminar: Land-Use and Land-Cover Change (3 cr.)** This course focuses on the relationship between land-use systems, human settlement patterns, and their impact on land cover and landscape structure. It aims to link the theoretical and methodological approaches that human ecology and landscape ecology bring to land use and production system analysis. The links between production system, land use, land cover, and landscape structure will be discussed in the context of contemporary problems, such as deforestation, agriculture intensification, and human dimensions of global environmental change.

**E600 Topic Seminar: Remote Sensing for Social Scientists (3 cr.)** This course combines a historical review on the use of remote sensing in the social sciences, conceptual discussions on applications of remote sensing to social science problems, and a formal introduction to remote sensing techniques based on hands-on laboratory sessions. The course will consist of a conceptual and a laboratory session each week.

**E600 Topic Seminar: People and Forest: Contemporary Issues on Deforestation, Forest Management, and Agroforestry (3 cr.)** The main goal of this seminar is to provide a semester-long

“environment” in which the student’s individual research interest (research paper, proposal, etc. related to “people and forest”) can be “nurtured” and discussed with an interdisciplinary group of graduate colleagues. The goal is to work on a single research paper or dissertation proposal or dissertation chapter during the whole semester while interacting with colleagues in class.

**E644 People and Protected Areas: Theories & Realities of Conservation (3 cr.)** Explores major theories and approaches to conservation, from “fortress conservation” to community-based and participatory strategies. It considers the implications of protected areas for local human populations and cultural diversity. It evaluates outcomes and unintended consequences of protected areas, and controversies over the “best” way to protect natural resources.

### **Geography**

**G511 Sustainable Development Systems (3 cr.)** P: G208 or consent of instructor. An examination of the notion of sustainable development and its meaning and implementation in the areas of resources, agriculture, water, transport, cities, and tourism. Also considers how such systems can be implemented in developed countries.

**G520 Migration and Population Redistribution (3 cr.)** P: G314 and G320, or consent of instructor. Study of international regional and intra-urban migration using micro- and macrolevel approaches, and the impacts of population redistribution on origin and destination. Topics include illegal immigration to the United States, rural-to-urban migration in LDCs, international migration and refugees, and gender differences in migration behavior.

**G535 Introduction to Remote Sensing (3 cr.)** Principles of remote sensing of the earth and its atmosphere, emphasizing satellite data in visible, infrared, and microwave portions of the electromagnetic spectrum. Emphasis on practical applications and digital image analysis. A satellite data analysis project is required.

**G536 Advanced Remote Sensing: Digital Image Processing (3 cr.)** P: G535. Advanced remote sensing theory and digital image-processing techniques with an emphasis on environmental science applications. Hands-on computer exercises provide significant experience in digital image-processing techniques for extraction of qualitative and quantitative information about Earth’s terrestrial and aquatic environments.

**G538 Geographic Information Systems (3 cr.)** Overview of the principles and practices of geographic information systems (GIS). Spatial data models, database design, introductory and intermediate GIS, operations and case studies of real-world GIS applications. Laboratory exercises will provide significant hands-on experience. Lecture and laboratory. Taught every semester.

**G539 Advanced Geographic Information Systems (3 cr.)** P: G538 or consent of instructor. Intermediate and advanced top-

ics in geographic information science and spatial analysis techniques using GIS software. This advanced course is for students who seek a greater understanding of this rapidly developing field and to learn how to construct, manage, and analyze their own GIS data and models. Taught once per year.

**G639 Seminar in Geographic Information Science (3 cr.)** Applications of geographic information science principles in the collection and analysis of spatial data. Integration of GIS, remote sensing, and/or GPS technologies. Review of current literature on techniques, theory, technology, and applications with an emphasis on environmental issues. Discussions, laboratory, and research project. Taught every third semester.

### **Political Science**

**Y669 International Relations: International Political Economy (3 cr.)** Illustrative topics: international conflict, international organization, quantitative international relations, analysis and evaluation of policy making, U.S. foreign policy, Russian and Soviet foreign policy, international and comparative communism, international political economy.

**Y773 Empirical Theory and Methodology: Revisiting Collaborative Forest Communities in Indiana (3 cr.)**

### **School of Public and Environmental Affairs**

**E465 Environmental Management in the Tropics (3 cr.)** Historical examination of land use in tropical, non-Western cultures. Resource use in physical and cultural settings is explored through an interface with ecology, economics, and policy analysis. Common principles of analysis are used to help the students understand the cultural and historical dimensions of how people relate to their environment.

**E518 Vector-Based Geographic Information Systems (3 cr.)** Geographic information systems using vector data structure. Vector GIS capabilities and uses. Data structure and file management of spatial data. Laboratory exercises use ARC/INFO software.

**E522 Urban Forest Management (2–3 cr.)** Originally an outgrowth of arboriculture, urban forestry now encompasses the broader concepts of managing the trees, forests, and other natural resources of cities for ecological, economic, and social benefits. Lectures, discussion, and field projects will be supplemented by outside speakers. (IUB and Bloomington will be the field laboratory.)

**E527 Applied Ecology (3 cr.)** P: One introductory-level ecology course. Ecosystem concepts in natural resource management. Techniques of ecosystem analysis. Principles and practices of ecological natural resource management.

**E528 Forest Ecology and Management (3 cr.)** P or C: E538 or V506. Field and laboratory exercises in quantitative analysis of forest ecosystems. Sampling and data collection methodologies. Data analysis and interpretation. Concepts in forest ecology and forest management.

**E534 Restoration Ecology (3 cr.)** The course will cover basic concepts of ecosystem restoration, including development of energy flow and nutrient cycles, soil formation, mechanisms of species dispersal, and colonization and mutualistic relationships. Restoration of specific terrestrial and aquatic ecosystems, including grasslands, forests, lakes, rivers and streams, and wetlands, will be covered.

**E555 Topics in Environmental Science: Sustainable Forestry (2-3 cr.)** This class will review and discuss the science base for sustainable forestry, the human-dimensions interactions, and the political realities. The course format will be discussion-based with students leading the discussion on various assigned articles and publications. Each student will write and present several papers based on literature reviews and analyses.

**E557/E457 Conservation Biology (3 cr.)** P: One 300-level ecology course. Ecological principles associated with rare species and with biodiversity, laws and statutes used to conserve biodiversity, and land and species management practices. Our aim is to understand scientific and political complexities of conservation biology and to study different methods used to conserve living resources and resolve conflicts associated with conservation.