

# **Proposal for a University PhD Program in Environmental Policy**

September 18, 2009

## **1. Rationale, Relationship to Existing Programs, and the Market for Program Graduates**

### **1.1. Rationale and Relationship to Existing PhD Programs at Duke**

Duke has a strong tradition of research and education in environmental policy spanning multiple schools of the university. In 2000, the Center for Environmental Policy Solutions was founded by a group of faculty from several schools with a grant from the Provost Common Fund. The Center facilitated a widely attended seminar series, provided seed grants for faculty and graduate school research, and sponsored workshops and lectures. This highly successful center later evolved into the Nicholas Institute for Environmental Policy Solutions in 2005. As a result of this synergy across schools, U.S. News and World Report has ranked Duke as one of the top three graduate programs in the nation in environmental policy (although it has never been clear to which program/school the ranking applied).

The social science faculty of the Nicholas School has a long tradition of training Ph.D. students in environmental and resource policy in cooperation with faculty in other departments, particularly in economics, public policy, political science, and law. Recently, the Sanford School initiated an innovative, inter-disciplinary PhD program in Public Policy. Both the Sanford School and the Nicholas School have made recent hires of prominent environmental social scientists and several additional hires are planned. The most recent faculty hire in this area was a fully-joint appointment between the Nicholas School and Sanford School. Several faculty at the Nicholas School have secondary appointments at Sanford, and vice versa. Faculty across these departments are working together on joint research projects. Four new university institutes (Nicholas, IGSP, SSRI and Global Health) have all launched initiatives with direct connections to environmental policy issues. Faculty at both Nicholas and Sanford are working with these institutes on joint policy-relevant research projects. In addition, the Duke Global Health Institute and the Nicholas School are jointly recruiting a faculty member with expertise in global environmental health. A new Environmental Policy PhD program will be an important part of the fabric that will tie together the research and teaching in these many initiatives. Additional joint coordination of course and seminar offerings, and teaching and research opportunities will further enhance the total value we can create from existing and new resources in this area.

Duke also has significant strength in environmental science and specifically in the policy-relevant areas of environment and development, energy, marine resources, and forestry, and is developing a university-wide initiative in energy and environment. The program will also benefit from strong programs in agricultural and resource economics at NC State University and relevant research activities at the University of North Carolina, RTI International, and the U.S. Environmental Protection Agency in Research Triangle Park. These assets present an exciting

opportunity to develop a strong, interdisciplinary, cross-campus program for training graduate students in environmental policy.

Duke already attracts a sizable number of well qualified applicants for PhD study in environmental policy. Currently, there are seventeen students in the Nicholas School pursuing a PhD in Environment with a focus on environmental social sciences and policy. The Sanford School's new PhD program is receiving a large number of inquiries from students who are interested in a focus in environmental policy. Faculty in Nicholas, Sanford, Economics, and Political Science already serve on PhD committees of environmental policy PhD students based primarily in other departments, and we expect these interactions to increase in the future. These faculty and PhD students also often attend the same research seminars, including the Triangle Environmental Economics Seminar Series and the Environmental Institutions Seminar Series. We expect the formation of a PhD Program in Environmental Policy to enable us to recruit a greater number of the best national and international students to matriculate at Duke. Students with environmental policy interests will no longer face the difficult and confusing choice of emphasizing their environmental interests and applying to Nicholas or emphasizing their general public policy interests and applying to Sanford.

It is therefore expected that new PhD students focused on environmental social science and policy would be admitted to the new PhD in Environmental Policy, rather than the Public Policy or Environment PhD programs. Most PhD students with a focus on marine issues would be admitted to the PhD program in Marine Science and Conservation, which is geographically centered in Beaufort. As a result, the vast majority of PhD students remaining in the existing Environment PhD program would be focused on natural sciences.

The new program will facilitate communication, collaboration and cohesion of faculty in the Nicholas School, Sanford School, Economics Department, Political Science Department, Law School and Fuqua School. The program will also raise the visibility of environmental policy on campus and at the national and international levels, and build stronger linkages to the university institutes.

The proposed program emphasizes the understanding of political, economic, and social systems in relation to the natural world; a strong focus on quantitative and qualitative research methods; a deeper knowledge of a particular disciplinary perspective, and an ability to think objectively about normative and ethical implications of environmental policy interventions. The proposed program is structured in two concentration areas, economics and political science, corresponding to existing faculty expertise and the structure of the existing Nicholas and Sanford Ph.D. programs. The structure reflects a consistent set of distributional requirements for qualification, as well as the specific requirements for disciplinary training in economics or political science. It is possible that additional concentration areas (e.g., decision analysis) could be added in the future, based on demand from new faculty and students as well as intellectual coherence with the overall program. In addition, for students with a particular topical focus (e.g., global health) linkages could be strengthened with existing and proposed programs, certificates, and seminar series (e.g., Global Health Certificate, University Seminar on Global Health).

## **1.2. Position Relative to Other Universities and the Market for Program Graduates**

We believe the proposed program can quickly develop into a top-tier PhD program and be strongly competitive in the field. It would also be a unique program. The top programs in environmental economics are currently Maryland, California-Berkeley, and California-Davis. These programs are rooted in economics or agricultural and resource economics departments and do not provide students the broader understanding of policy and environmental science contexts that the proposed program will provide. Duke has significant strength in this area, with Maryland and Berkeley being the only universities in the country with a greater number of environmental economists than Duke. Harvard, Yale, California-Santa Barbara, Indiana and California-Berkeley provide strong training in environmental politics, but with a more narrow focus. Duke's program would be the first to formally link a public policy school and environment school in a PhD program.

The graduates of our program should compete strongly for environmental policy faculty positions in public policy programs and environmental programs. In addition, a significant portion of Nicholas School PhDs now take positions in international organizations such as the World Bank, government agencies, conservation organizations, research organizations, think-tanks, and consulting firms. We would expect the same for the Environmental Policy program.

## **2. Program Structure**

The proposed Environmental Policy PhD program is structured with a consistent set of knowledge and skill requirements common to all students, plus two concentration areas, economics and political science, corresponding to existing faculty expertise and the structure of the existing Nicholas and Sanford Ph.D. programs. The structure reflects a consistent set of distributional requirements for qualification, as well as the specific requirements for disciplinary training in economics or political science. The structure of the program was developed with careful attention paid to the essential requirements for PhD training in this area, in consultation with relevant faculty and departments, and keeping in mind existing PhD programs and curricular structures. Additional concentration areas could be added in the future, within a consistent overall curricular framework. All the required courses already exist and there is sufficient capacity in these courses to handle the small number of additional PhD students that could come through a PhD in Environmental Policy.

### **2.1. Curriculum**

The Environmental Policy PhD Program would require students to:

1. Complete a set of common requirements, including courses in the political-economic theory of public policy and, a series of research workshops leading to the dissertation proposal.
2. Complete at least one course in environmental/resource economics.
3. Maintain a B average to demonstrate satisfactory progress in the first year.

4. Complete disciplinary concentration requirements—including those for core theory, the environment field (e.g., environmental economics, environmental politics), and research methods—in economics, political science, or another approved concentration area.
5. Complete an overall approved course of study.
6. Complete a minimum of 40 course credits (equivalent to approximately 13 3-credit courses). Please see list below.
7. Attain dissertation status, including meeting qualifying requirements and passing the preliminary exam, by the end of the third year.
8. Pass a final examination, which consists of an oral dissertation defense to an approved supervisory committee. This is typically completed by the end of the fifth year.
9. Regularly attend and participate in one or more research seminars in which faculty and others present their research.

Total course requirements are expressed in terms of credits (rather than a number of courses) because not all courses have equal credit. In addition, this approach is meant to provide a degree of consistency with how the existing PhD in Public Policy program requirements are expressed, as well as the manner in which Nicholas School social science PhD committees have historically structured individual student requirements. Following is a summary list of the 40 total credits (for details see next sections):

1. Political Economy of Public Policy (PUBPOL 501/502) (6 credits)
2. Environmental Social Science Research Workshop (ENV 391) (4.5 credits)
3. Environmental/resource economics (3+ credits)
4. Disciplinary Concentration (e.g., Economics, Political Science, other)
  - a. Core Theory (6+ credits)
  - b. Research Methods (6+ credits)
  - c. Environment Field (e.g., environmental economics, environmental politics) (6 credits)
  - d. Other requirements and electives

Appendices B and C show an illustrative timeline for Environmental Policy PhD students focused in the Economics and Political Science concentrations, respectively. The timelines illustrate how PhD students would navigate the requirements for a course of study in environmental policy throughout their graduate education.

## **2.2. Common Course Requirements**

Students in the Environmental Policy PhD program will take a common set of courses intended to introduce all students to a core theoretical literature about the nature of economic, political, and other institutions and systems, approaches to modeling how policy interventions translate into policy outcomes, and frameworks for normative evaluation of both processes and outcomes. All students are required to satisfy these common course requirements. These are:

*Political Economy of Public Policy (PUBPOL 501/502).* This two-semester course sequence, which is also an existing core requirement of the PhD in Public Policy, introduces students to a core set of social science ideas relevant to public policy. These include theories of collective action, institutions and governance, all of which draw from economics, political science and

sociology. The goal of the courses is to provide students with a broad framework for evaluating market, political and social failures; identifying possible policy interventions; and predicting the ways in which such interventions would translate into policy outcomes. The courses also introduce students to normative frameworks for evaluating public policies and governance processes to provide students with analytical bases to evaluate the public good, tradeoffs between efficiency and equity, political legitimacy and justice. Some of the social science PhD students in the existing Nicholas School PhD program have already been enrolling in these courses. Faculty from Sanford and Nicholas have already discussed how the courses might be fine-tuned to maximize their value within a PhD in Environmental Policy.

*Environmental Social Sciences Research Workshop (ENV 391)*. This workshop introduces PhD students to basic social scientific research methods and the research process, and provides a venue for students to present research proposals and preliminary work. Regular meetings also provide an opportunity for students to interact with program faculty and critique one another's work. Students will enroll in the workshop at least three times in their first through third years (for a total of 4.5 credits), culminating in their dissertation prospectus. This workshop has existed for several years for Nicholas School social science PhD students, and its structure and timing would be further regularized were it to become the official PhD workshop of the Environmental Policy PhD program. Faculty from both Nicholas and Sanford have participated in the workshop.

*Natural Sciences*. Students will need to ensure that they have appropriate training in natural sciences relevant to their area of environmental study. Many students will already have such training prior to entering the Ph.D. program. Others will need to acquire the necessary natural science knowledge and skills through coursework and/or independent study and research. The level and content of the training in the relevant natural sciences will be flexible, to be worked out in consultation with the student's advisor and committee.

### **2.3. Environmental/Resource Economics**

Microeconomic thinking is a central skill for understanding how individual preferences and behaviors translate into certain forms of collective action and, therefore, is a key analytic tool for public policy, as it has become for political science and economics. Every student is required to reach a level of proficiency in microeconomics as it applies to environmental and resource issues. The specific environmental economics requirements vary by disciplinary concentration (see below).

### **2.4. Concentration Requirements**

Although the Environmental Policy PhD Program is multidisciplinary, it is designed to ensure that students have strength in a particular disciplinary tradition. Students designate a disciplinary concentration when applying to the program and may opt to concentrate in economics or political science. In the future, additional concentration areas (e.g., decision analysis) may be added based on faculty and student demand, if approved by the DGS, and the program Steering Committee in consultation with the Dean of the Nicholas School, the Dean of the Sanford School and other relevant departments. The concentration requirements have been developed with careful consideration of the consistent availability of necessary courses, in consultation with the

departments offering those courses. For all specific courses, including those in departments other than the Nicholas School and the Sanford School, there is an understanding that PhD students in Environmental Policy would be able to enroll in those courses. Specific concentration requirements are described below.

These concentration requirements would impose minimal demands on the departments of political science and economics.

*Teaching*—No new courses would need to be created by other departments. On average, two or three students a year would need access to existing PhD courses in political science and economics.

*Advising and Committee Service*—Individual faculty members could opt into the program or not. It is likely that faculty with primary appointments at Sanford and Nicholas would conduct most mentoring, but faculty in other departments who wished to work closely with an Environmental Policy PhD student could choose to do so. There would also be some demand for service on committees, again on a voluntary basis.

#### **2.4.1 Economics Concentration**

In addition to the requirements below, students concentrating in economics must attain an overall B (3.0) average in the 18 credits of core economics courses (ECON 301, ECON 302, ECON 341, ECON 342, ENV 379, and ECON 395 or ECG 715)

##### ***Common Environmental Policy PhD Courses (10.5 credits)***

Political Economy of Public Policy (PUBPOL 501/502)

Environmental Social Sciences Research Workshop (ENV 391)

##### ***Core Theory Courses (6 credits and qualifying exam, if necessary)***

Microeconomic Analysis I (ECON 301)

Microeconomic Analysis II (ECON 302)

Students who do not receive a grade of B+ or higher in Microeconomic Analysis I or II must take and are expected to pass the associated qualifying exam(s) administered by the Economics Department for the associated course in the summer after the first year.

##### ***Research Methods (12 credits)***

Econometrics I (ECON 341)

Econometrics II (ECON 342)

At least 6 credits of additional research methods courses as approved by student's committee. Courses satisfying student's *Additional Field* may qualify.

##### ***Environmental and Resource Economics Field (6 credits plus field exam)***

Natural Resource Economics (ENV 379)

*And Either*

Externalities/Pigouvian Policy (ECON 395) (1.5 credits) *and* Non-Market Valuation (ECON 395) (1.5 credits)

*Or*

Environmental and Resource Economics (NC State ECG 715)

A field exam in environmental and resource economics will be administered by the faculty of the PhD Program in Environmental Policy.

***Additional Field (6 credits)***

Students concentrating in economics will also choose an additional subfield, as approved by student's committee. These courses may overlap with other requirements.

***Elective Courses (sufficient to attain a minimum of 40 total credits)***

Students who have not taken macroeconomics before entering the Ph.D. program are strongly encouraged to take at least one semester of graduate-level macroeconomics through either the Department of Economics or Public Policy. Many courses in Nicholas, Sanford, Arts and Sciences, Law, and Business will be relevant to PhD students focused on Environmental Policy. There are also many natural science courses available at both the Nicholas School and the other sciences departments at Duke.

**2.4.2 Political Science Concentration**

In addition to the requirements below, students concentrating in political science must attain an overall B (3.0) average.

***Common Environmental Policy PhD Courses (10.5 credits)***

Political Economy of Public Policy (PUBPOL 501/502)

Environmental Social Sciences Research Workshop (ENV 391)

***Environmental and Resource Economics (3 credits)***

Resource and Environmental Economics (ENV270 or equivalent)

*Also recommended for students without prior training in economics:*

Intermediate microeconomics (e.g., Microeconomics: Policy Applications (PUBPOL 311))

***Core Theory Courses (9 credits, plus field exam)***

Students must complete a minimum of three courses in one or more of the following four field areas: International Relations; Comparative Politics; American Politics; or Political Economy. This must include at least one course from category A.

*Qualifying courses include:*

Category A:

Classics in American Politics (PS 304)

Seminar in International Relations (PS 309)

Seminar in Comparative Politics (PS 324)

Positive Political Theory (PS 230)

Category B:

New Institutionalism (PS 317)

Theories of International Political Economy (PS 213)

Political Economy of Institutional Change (PS 398)

Political Applications of Game Theory (PS 243)

A field exam in core theory relevant to each student's course of study will be administered by the faculty of the PhD Program in Environmental Policy.

***Research Methods (6 credits)***

PhD students concentrating in political science must take at least two research methods classes including one statistics course. Students are encouraged to take both quantitative and qualitative methods courses, as approved by their committee.

*Qualifying courses include:*

Intermediate Statistical Methods (PS 233)

Scope and Methods in Political Science (PS 310)

Positive Political Theory (PS 230)

Political Applications of Game Theory (PS 243)

Empirical Methods in International Relations (PS 398)

Program Evaluation of Environmental Policies (ENV 350)

Social Science Surveys for Environmental Management (ENV 280)

Applied Qualitative Research Methods (ENV 298.87)

Research Design & Qualitative Methods (PS 330)

***Environmental and Resource Politics Field (6 credits, plus field exam)***

Global Environmental Politics (ENV 326)

*Or* International Environmental Regimes (PS 271)

*And at least one other course, including from among:*

Collective Action, Property Rights, and the Environment (PS 205)

Political Economy of Environmental Resources (PS 205)

International Energy Policy (PUBPOL 388.08)

Political Ecology (ENV 360S)

A field exam in environmental and resource politics will be administered by the faculty of the PhD Program in Environmental Policy.

*Elective Courses (sufficient to attain a minimum of 40 total credits)*

Many courses in Nicholas, Sanford, Arts and Sciences, Law, and Business will be relevant to PhD students focused on Environmental Policy. There are also many natural science courses available at both the Nicholas School and the other sciences departments at Duke.

## **2.5. Qualifying Requirements**

Throughout their course of study in Duke's PhD in Environmental Policy Program, doctoral students will be required to meet qualifying requirements. Failure to meet any of these requirements may result in dismissal from the program. Qualifying requirements for the Environmental Policy PhD Program include:

- Satisfactory performance in the core disciplinary concentration courses (3.0 GPA or better average).
- Meeting disciplinary qualifying standards as appropriate to the student's chosen disciplinary concentration. Students will normally complete these requirements by the end of their second year.
- Passing a field qualifying exam in the student's chosen disciplinary concentration. Students will normally take this exam at the end of their second year.
- Satisfactory completion of a DGS-approved course of study.
- Successful passage of the doctoral Preliminary Exam (dissertation prospectus defense). Students will normally take the preliminary exam during their third year.

Over their first three years, students will take the Environmental Social Sciences Research Workshop (ENV 391). This course provides each student with an opportunity to develop a dissertation proposal. All students are required to prepare a dissertation proposal. The proposal should describe a research project in detail sufficient to permit an evaluation of both its merit and feasibility. The PhD program expects that this dissertation proposal will include a thorough literature review, an evaluation of current knowledge in the field, and a statement of how the dissertation will add to that body of knowledge. The proposal should reflect a thorough understanding of the disciplinary research methods that will be used in the dissertation.

A student will not be accepted as a candidate for the PhD degree until the preliminary exam has been passed. The student is required to submit his or her dissertation proposal to all members of the PhD Committee at least two weeks before the preliminary exam. The preliminary exam includes an oral defense of the dissertation proposal and an oral exam evaluating the depth of dissertation area knowledge and the research methodologies to be used in the dissertation.

## **2.6. Dissertations**

A successful Environmental Policy PhD dissertation must constitute a significant contribution to policy-relevant knowledge, either through innovative application of social science methods to policy problems, or by innovation in theory or methods appropriate for addressing public policy problems. Students are generally expected to have defended a dissertation proposal by the end of their third year. Normally, in years four and five, students work on their dissertations, defending their dissertations (i.e., passing the Final Examination) by the end of the fifth year.

### **The PhD Advisory Committee**

The PhD Advisory Committee will include at least four members total and at least three members of the Environmental Policy PhD Program faculty. At least one member of the committee will be from a department or school different from the other committee members, or from outside the student's primary disciplinary concentration. The committee will be chaired by a faculty member with the rank of assistant, associate or full professor who holds a primary or secondary appointment in Nicholas or Sanford. Faculty from Nicholas, Sanford, Economics, and Political Science have already historically served on PhD committees for students focused on environmental policy within the other departments. The committee will be appointed by the Director of Graduate Studies, in consultation with the student, early enough to advise in the formulation of the student's program and in defining the research topic for the dissertation. The student must form an initial PhD Advisory Committee at least two months prior to the Preliminary Examination, although students will be encouraged to do so by the beginning of their second year. Students may adjust their PhD Advisory Committee before the Final Examination (dissertation defense).

## **3. Participating Faculty and Institutions, and Program Administration**

### **3.1. Participating Faculty, Departments, and Institutes**

The core faculty of the Environmental Policy PhD Program would be comprised of the social science faculty of the Nicholas School and the Sanford School faculty working in the area of environment and natural resources. The Appendix lists this faculty along with other faculty at Sanford, Nicholas, and other units at Duke who are also likely to engage with the program. Additional faculty of the Graduate School and professional schools (Law, Fuqua, Pratt), as well as researchers at the Nicholas Institute, the Global Health Institute, the Social Science Research Institute, and Institute for Genome Sciences and Policy, will be added to the list with the approval of the DGS and Steering Committee.

### **3.2. Program Administration**

The Environmental Policy PhD Program would be administered jointly by the Nicholas School and the Sanford School. A Director of Graduate Studies (DGS) for the Environmental Policy PhD will be nominated jointly by the Dean of the Nicholas School and the Dean of the Sanford School in consultation with the Chairs of the Department of Political Science, the Department of Economics, and other affiliated university departments and schools. The DGS for the PhD in Environmental Policy would be a separate position from other existing DGS positions at Nicholas and Sanford, but would consult with the other Nicholas and Sanford DGSs, particularly the DGS for the PhD in Environment and the DGS for the PhD in Public Policy.

A Steering Committee composed of members of the Environmental Policy PhD faculty and representative of the Nicholas School and Sanford School faculty would be appointed by the DGS and advise and assist the DGS in overseeing programmatic issues, programmatic requirements, graduate student progress through the program, and new faculty appointments.

An Admissions Committee composed of members of the Environmental Policy PhD faculty would be appointed by the DGS and make admissions and financial aid recommendations to the DGS. (See below).

### **3.3. Admissions**

The Environmental Policy PhD Program would be advertised as an admitting program for PhD students in the Graduate Bulletin. Students would be directed to the Environmental Policy PhD Program as the admitting program for students interested in studying the environment using social science and policy methods and also for students interested in policy with a focus upon the environment. If applicants with these interests were to mistakenly apply to the existing Environment PhD Program or the Public Policy PhD Program, they would be forwarded to the Environmental Policy PhD Program. Students would apply directly to the program (initially or as forwarded) indicating their intended concentration (i.e., economics, political science, or another approved field). Program faculty would nominate PhD applicants for admission and admissions recommendations to the Graduate School would be made by an Admissions Committee to include the DGS for the Environmental Policy PhD Program and representative faculty of the Program.

## **4. Resource Needs and Sources**

### **4.1. Student Funding**

Environmental Policy doctoral students would be fully funded for five years. Normally, for the first two years students would be expected to hold a teaching assistantship assigned by the department providing the associated support, unless the student has other sources of support (e.g., research assistantship, external fellowship). Teaching assistance would normally take the form of assisting with an existing faculty-led course, rather than PhD students fielding their own courses. Social science PhD students within the existing PhD in Environment program typically serve as teaching assistants in this manner for many masters-level courses at the Nicholas School, and it is expected that students in the new PhD in Public Policy program would do the same. In the future, it would be advantageous to secure resources for PhD fellowships to alleviate the need for first-year students to act as teaching assistants. In latter years, and during summers, students would normally be fully funded from a combination of external funding, University dissertation support, research assistantships, or teaching assistantships. Funding for these students would be shared by Nicholas and Sanford, particularly in the students' first two years. Research Assistantship and PhD Fellowship contributions will also come from the Global Health Institute, the Nicholas Institute, and other entities.

In addition to student quality, the number of student admissions in any given year would depend on the availability of teaching assistantships, research assistantships, and other sources of funding. Our longer-term goal is to matriculate approximately six new students each year to the Environmental Policy PhD program. Assuming a 5-year study duration, in the long run this would imply a program of about 30 students. This is equal to about 3 students per each of the roughly 10 current Nicholas and Sanford faculty that would be likely to bring in students through a PhD Program in Environmental Policy.

In the near-term, given existing funding sources, the Nicholas School will initially commit to supporting about 4 new students per year, or a total of about 10 teaching assistantships at any given time, assuming students are supported by other means after the first 2-3 years. The Sanford School will initially commit to supporting one new entering student each year, with expectations that it will increase its support to two new students each year when monies from the Oak Foundation become available (or a total of 2-5 students at any given time). This implies a near-term total of about 12-15 students supported on teaching assistantships. The program's ability to eventually support a total of 30 students will depend on the availability of additional resources for research assistantships, teaching assistants, and/or other fellowship support. Nonetheless, even in the near-term we expect to be able to move many students from teaching assistantships to research assistantships after the first 2-3 years, as has been the case in the past.

Sanford and Nicholas will also provide support for economics concentration students for the Mathematics for Economists course students take in the late summer upon entering the program.

#### **4.2. Advising, Teaching, and Seminars/Workshops**

Entering students would be assigned an advisor upon admission from among the program faculty. This advisor would normally be expected to serve as chair of the student's dissertation committee. We envision that the program would require very little additional course teaching. The core courses in public policy (501/502) would continue to be the primary responsibility of Sanford, although faculty from Nicholas might also teach in this area. Nicholas would continue to take primary responsibility for core track courses in Environmental Politics, Environmental Economics, and the Environmental Social Science Research Workshop. Several methodology and disciplinary cores would continue to be taught primarily in the disciplinary departments, Economics and Political Science. The program will also benefit from strong programs in agricultural and resource economics at NC State University and relevant research activities at the University of North Carolina, RTI International, and the U.S. EPA in Research Triangle Park.

A few additional directed readings/independent credit courses will likely be necessary in both Sanford and Nicholas. Credit for this teaching would be handled by each school according to its normal criteria. Regularized support for the existing Triangle Resource and Environmental Economics (TREE) Workshop and Environmental Institutions Seminar will also be provided by the Nicholas School and Sanford School.

#### **4.3. Administration**

A part-time Assistant to the DGS would be necessary for program coordination, admissions, students advising, and other assistance to the DGS as needed. The DGS for the PhD in Environmental Policy may require some teaching relief.

## Appendix A: Faculty of the Ph.D. Program in Environmental Policy

### **Environment (Nicholas)**

#### *Core Social Science*

Richard Anderson  
Xavier Basurto  
Lori Bennear  
Lisa Campbell  
Deborah Gallagher  
Robert Healy  
Randall Kramer  
Marie Lynn Miranda  
Lynn Maguire  
Brian Murray  
Richard Newell  
Michael Orbach  
Dalia Patino-Echeverri  
Subhrendu Pattanayak (joint, Sanford)  
James Salzman (joint, Law)  
Martin Smith  
Jeffrey Vincent  
Erika Weinthal  
*Other Nicholas*  
Paul Baker  
Celia Bonaventura  
Joseph Bonaventura  
Alan Boudreau  
William Chameides  
Norman Christensen  
James Clark  
Bruce Corliss  
Larry Crowder  
Richard Di Giulio  
Richard Forward  
Peter Haff  
David Hinton  
Robert Jackson  
Prasad Kasibhatla  
Gabriel Katul  
William Kirby-Smith  
Emily Klein  
Susan Lozier  
Joel Meyer  
Brad Murray  
Ram Oren  
Stuart Pimm  
Lincoln Pratson

Kenneth Reckhow  
James Reynolds  
Curtis Richardson  
Joseph Ramus  
Andrew Read  
Daniel Richter  
Dan Rittschof  
Rafe Sagarin  
Heather Stapleton  
Jennifer Swenson  
Dean Urban  
Cindy Van Dover  
Avner Vengosh

### **Public Policy (Sanford)**

#### *Core Environment/Resources*

Robert Conrad  
James Hamilton  
Frederick Mayer  
Natalia Mirovitskaya  
Subhrendu Pattanayak (joint, Nicholas)  
Alexander Pfaff (secondary, Nicholas)  
*Other Sanford*  
Elizabeth Ananat  
Marc Bellemare  
Anthony Brown  
Allen Buchanan  
Evan Charney  
Charles Clotfelter  
Christopher Conover  
Phillip Cook  
Robert Cook-Deegan  
William Darity  
Kenneth Dodge  
Fernando Fernholz  
Joel Fleishman  
Elizabeth Frankenberg  
Anna Gassman-Pines  
Christina Gibson-Davis  
Graham Glenday  
Kristin Goss  
Alex Harris  
Sherman James  
Bruce Jentleson  
James Joseph

Judith Kelley  
Roy Kelly  
Robert Korstad  
Anirudh Krishna  
Cory Krupp  
Bruce Kuniholm  
Helen Ladd  
Frances Lethem  
Ellen Mickiewicz  
Gunther Peck  
William Raspberry  
Gangadhar Shukla  
Donald Taylor  
Thomas Taylor  
Susan Tift  
James Vaupel  
Elizabeth Vigdor  
Jacob Vigdor  
Kate Whetten

### **Other Duke Faculty**

#### *Anthropology*

Ralph Litzinger

#### *Biology*

Sherryl Broverman

Katia Koelle

#### *Business (Fuqua)*

Robert Clemen

Leslie Marx

Jim Smith

#### *Economics*

Pietro Peretto

Chris Timmins (secondary, Nicholas)

Alessandro Tarozzi

#### *Law School*

James Salzman (joint, Nicholas)

Jonathan Wiener (secondary, Nicholas)

#### *Medicine*

Mariano A. Garcia-Blanco

Michael Merson

#### *Political Science*

Margaret McKean (secondary, Nicholas)

#### *Sociology*

Gary Gereffi

## **Appendix B: Timeline for PhD in Environmental Policy, Economics Concentration**

### Summer before year 1

Take Mathematics for Economists in August  
Attend the Responsible Conduct of Research (RCR) fall orientation  
Meet with primary advisor to discuss Year 1 courses

### Semester 1

Political Economy of Public Policy (PPOL 501)  
Microeconomic Analysis I (ECON 301)  
Econometrics I (ECON 341)

Engage in teaching as a teaching assistant or in research as a research assistant  
If required, enroll in English proficiency courses required by the Graduate School for certain international students.

### Semester 2

Political Economy of Public Policy (PPOL 502)  
Microeconomic Analysis II (ECON 302)  
Econometrics II (ECON 342)  
Environmental Social Sciences Research Workshop (ENV 391)

Engage in teaching as a teaching assistant or serve as research assistant

### Summer after year 1

Students who do not receive a grade of B+ or higher in Microeconomic Analysis I or II take associated qualifying exam(s).  
Recommended: Engage in research as a research assistant  
Begin to form research agenda  
Student and primary advisor form a PhD Advisory Committee to approve program of study and oversee Preliminary Examination

### Semester 3

Natural Resource Economics (ENV 379)  
Research methods course  
Additional field course

Participate in one or more other research seminars

Engage in teaching as a teaching assistant or in research as a research assistant  
A PhD Advisory Committee has been established by the end of the fall semester

#### Semester 4

Environmental and resource economics field course  
Research methods course  
Additional field or elective course  
Environmental Social Sciences Research Workshop (ENV 391)

Participate in one or more other research seminars  
Engage in teaching as a teaching assistant or in research as a research assistant

#### Summer after year 2

Students take field exam in environmental and resource economics.  
Engage in research as a research assistant  
Continue forming research agenda

#### Semesters 5 and 6

Environmental Social Sciences Research Workshop (ENV 391)  
Complete any additional coursework recommended by committee

At least two months in advance of Preliminary Examination, student and primary advisor make any necessary changes to PhD Advisory Committee  
Write dissertation prospectus and attain dissertation status by end of third year by passing the doctoral Preliminary Exam (dissertation prospectus defense)  
Participate in one or more other research seminars  
Engage in research as a research assistant

#### Semesters 7-10

Write dissertation  
Student and primary advisor make any necessary changes to PhD Advisory Committee that will oversee the Final Examination (dissertation defense)  
Participate in one or more other research seminars  
Engage in research as a research assistant  
Prepare for environmental economics and policy job market  
Final Examination

## **Appendix C: Timeline for PhD in Environmental Policy, Political Science Concentration**

### Summer before year 1

Attend the Responsible Conduct of Research (RCR) fall orientation  
Meet with primary advisor to discuss Year 1 courses

### Semester 1

Political Economy of Public Policy (PPOL 501)  
Global Environmental Politics (ENV 326) or International Environmental Regimes (PS 271)  
Core theory course in political science  
Microeconomics course for students without prior training

Engage in teaching as a teaching assistant or in research as a research assistant  
If required, enroll in English proficiency courses required by the Graduate School for certain international students.

### Semester 2

Political Economy of Public Policy (PPOL 502)  
Collective Action, Property Rights, and the Environment (PS 205)  
Research methods course  
Environmental Social Sciences Research Workshop (ENV 391)

Engage in teaching as a teaching assistant or serve as research assistant

### Summer after year 1

Recommended: engage in research as a research assistant  
Begin to form research agenda  
Student and primary advisor form a PhD Advisory Committee to approve program of study and oversee Preliminary Examination

### Semester 3

Resource and Environmental Economics (ENV270)  
Core theory course in political science  
Research methods course

Participate in one or more other research seminars  
Engage in teaching as a teaching assistant or in research as a research assistant  
A PhD Advisory Committee has been established by the end of the fall semester

#### Semester 4

Core theory course in political science  
Environmental and resource politics field course  
Elective course  
Environmental Social Sciences Research Workshop (ENV 391)

Participate in one or more other research seminars  
Engage in teaching as a teaching assistant or in research as a research assistant

#### Summer after year 2

Students take field exam in Environmental Politics and Policy  
Students take field exam in core political theory (International Relations, Comparative Politics, or American Politics)  
Recommended: Engage in research as a research assistant  
Continue forming research agenda

#### Semesters 5 and 6

Environmental Social Sciences Research Workshop (ENV 391)  
Complete any additional coursework recommended by committee

At least two months in advance of Preliminary Examination, student and primary advisor make any necessary changes to PhD Advisory Committee.  
Write dissertation prospectus and attain dissertation status by end of third year by passing the doctoral Preliminary Exam (dissertation prospectus defense)  
Participate in one or more other research seminars  
Engage in research as a research assistant

#### Semesters 7-10

Write dissertation  
Student and primary advisor make any necessary changes to PhD Advisory Committee that will oversee the Final Examination (dissertation defense)  
Participate in one or more other research seminars  
Engage in research as a research assistant  
Prepare for environmental politics and policy job market  
Final Examination