

# **Interdisciplinary and Policy Dimensions of the Earth Sciences (IPDES) Self-Study**

## **Table of Contents**

### **Main Text**

|                   |                                       |
|-------------------|---------------------------------------|
| <b>Section A:</b> | <b>Unit Description</b>               |
| <b>Section B:</b> | <b>Teaching</b>                       |
| <b>Section C:</b> | <b>Research and Productivity</b>      |
| <b>Section D:</b> | <b>Relationships with other units</b> |
| <b>Section E:</b> | <b>Diversity</b>                      |
| <b>Section F:</b> | <b>NA</b>                             |
| <b>Section G:</b> | <b>Graduate Students</b>              |

### **Appendices**

|                    |   |
|--------------------|---|
| <b>Appendix A:</b> | <b>Graduate Student Statistical Summary</b> |
| <b>Appendix B:</b> | <b>Academic Unit Profile</b>                |
| <b>Appendix C:</b> | <b>Pathways</b>                             |
| <b>Appendix D:</b> | <b>Faculty</b>                              |
| <b>Appendix E:</b> | <b>Placement of Graduates</b>               |
| <b>Appendix F:</b> | <b>Mission Statement</b>                    |
| <b>Appendix G:</b> | <b>Abbreviated Faculty Curriculum Vitae</b> |
| <b>Appendix H:</b> | <b>HEC Board Summary</b>                    |

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## **Section A: Unit Description**

### **1. What are your unit's strengths?**

In 1997, The Program on the Environment (PoE) was established by the University of Washington to promote environmental education. Recognition that complex environmental challenges of the 21st century require a comprehensive interdisciplinary curriculum was the motivating factor in its establishment. Focusing on both undergraduate and graduate students, PoE's interdisciplinary programs include the Interdisciplinary and Policy Dimensions of the Earth Sciences Graduate Certificate. The major goals of IPDES are;

- *Apply earth sciences to issues of public policy*
- *Design graduate research that contributes to solving pressing problems confronting society*
- *Develop interdisciplinary thinking and problem-solving skills*
- *Experience the dilemma of crafting sensible policies in the face of ambiguous and often contradictory scientific findings.*

### **1. How do you measure the success of your unit as a whole?**

Success is measured on several dimensions:

- a). Students successful completion of a certificate and entry into a professional position in the area related to their study.
- b). The quality of the interdisciplinary dialog exhibited during the annual Winter Quarter capstone seminar and the connections sustained outside the seminar.
- c). Continued support for the program by the participating units and targeted recruiting for the program.
- d). External support for student fellowships.

What teaching, research and service performance criteria are typical in your field?

IPDES is neither a field nor a unit in the usual sense. It seeks to entrain the earth sciences in the attempt to integrate the knowledge, techniques, and insights from these fields and connect them to the solution of real societal problems. The program also seeks to teach students about the emerging agenda of science for sustainability. It maintains the teaching, research, and service criteria employed by each of the units, but, with their approval and participation, seeks to extend those fields in new directions in an integrated fashion.

Which units nationally do you consider to be your peers along these dimensions? Stanford's College of Earth Sciences; The Nicholas School of the Environment at Duke University; The College of Natural Resources at the University of Michigan; The Nelson Institute at the University of Wisconsin (Madison); and The Bren School at the University of California, Santa Barbara. These entities are all much

larger than IPDES, which is a very small program in the proof of concept phase at the University of Washington.

## **2. What are your unit's weaknesses?**

The IPDES program is not widely known on campus.

The social sciences units invited (Economics, Geography, Political Science) declined to participate.

The program has no start-up funds beyond the generous support of the Graduate School in the amount of two nine-month fellowships a year for three years.

No financial incentives exist for attracting faculty to succeed Miles.

Most private foundations do not give fellowship support.

No unit is perfect. Where could yours most use improvement?

In all the areas listed above.

What challenges or obstacles make it difficult for you to overcome these weaknesses?

The lack of funds.

What further challenges do you foresee in the coming years?

Launching a full scale development program with the support of UW and ensuring smooth transition after the retirement of the current director.

## **3. What changes have occurred in teaching, research and service in your field over the past decade that have influenced your conception of the unit's role?**

The clear general trend is the emergence of an interdisciplinary focus as a central theme in higher education in the U.S., recently analyzed at length in a NAS/NRC study in 2005 entitled *Facilitating Interdisciplinary Research*. This volume takes into account all dimensions of the Increasing cross-departmental ties and synergy between various academic fields, which are now clearly evident in the US. In addition, another NAS/NRC study (1999) made a very strong case for the science of sustainability entitled: *Our Common Journey*. This study has had a transformative impact on the field.

What pressures, internal and external, have caused significant changes, and what further pressures and changes do you anticipate in the next ten years?

IPDES is a very new program, about to begin its third year of operation, so it has no history. The challenges of the next ten years are presented in the assessment of weaknesses in #3 above. These challenges will be affected by the

intensification of problems of sustainability faced by the world, which are likely to create significant opportunities for the development of programs like IPDES.

What changes have taken place in the relationships between your field and other related fields?

Humans both affect and are affected by planetary systems. At the turn of the 21st century, for the first time in the history of the planet, through population growth, human land use patterns, energy consumption, and a wide range of environmental pollutants, human actions have impacts on a planetary scale. Some have said that humans are now one of the most if not the most powerful geomorphic force on earth. Since humans are now changing the planet on every scale, and since the human population is expected to double by 2100, we need to think systematically and creatively about human-induced planetary changes that may "... alter the capacity of the earth system to sustain life."

Some changes that may or may not be relevant to your unit include the rise of interdisciplinary studies, international study, experiential learning, and programs in civic education and leadership, as well as technological changes--the rise of online courses and new educational technology.

Which (if any) of these have had an impact on your unit?

The Earth Sciences play an indispensable role in a safe and prosperous society, but too often scientific wisdom does not translate to wise decision-making. This innovative new program provides graduate students in the Earth sciences a forum to explore interdisciplinary and policy dimensions of their science, and extend their graduate research to encompass those dimensions. Students earn a graduate degree in the home department, with the collaborative component recognized by the Graduate School as a Certificate in "Interdisciplinary and Policy Dimensions of the Earth Sciences".

*For interdisciplinary programs*, please comment on the level of cooperation and support to the program from contributing units.

IPDES benefits greatly from the presence of very great strengths in the earth sciences and in natural resource and environmental policy at UW. All the seven participating units "bought in" to the design of the program and are members of the Steering Committee. The program has also benefited from strong support of the Graduate School, strong support of PoE, and clear attraction to superb, enthusiastic students from each of the fields represented. Even from its second year of existence, the program has proved to be a recruiting tool for several of

the units. However, funds for development of the program beyond the initial phase are scarce and we need greater support from UW to ensure that these funds are secured.

Do you observe differences between your view of your role and college and university expectations of your unit?

No, things are very clear and working smoothly.

If so, what are these? Do you see any ways to resolve these differences?

N/A

### **Section B: Teaching**

**1. For each faculty member in your department, please list: number of courses taught per year, number of credits taught and total student credit hours. Numbers may be approximate and should illustrate a typical year.**

One one-credit course per year. ENVIR 500 in Winter Quarter

**2. How are teaching responsibilities allocated?**

*Dr. Ed Miles, Program Director teaches this course.*

**3. Other than classroom teaching, how are faculty involved in undergraduate student learning and development?**

.This is a graduate program only.

**4. How do faculty involve undergraduate students in research and scholarship?**

N/A

**5. How does the department evaluate the instructional effectiveness of faculty?**

Courses are formally evaluated by students and feedback given to Dr. Miles.

**6. Please summarize the data you collect, possibly using OEA or CIDR, to evaluate the impact of your teaching on student learning. You might want**

**to focus on illustrative examples. Please describe selected specific changes you have made in response to the data you have collected.**

The seminar course each year is co-developed between the instructor and the students. Constant interaction is encouraged and maintained via a list serve, students are proactive in searching out readings which are pertinent to problems which have been chosen for discussion, and students lead the class for seven sessions, while the instructor leads the class for three. Impacts on students are evident in the intensive dialog conducted on the list serve and in their choice of thesis or dissertation problems. The informal and formal student evaluations made during the first two years of the program's existence have been appended to this self-study.

**7. What procedures, such as mentoring junior faculty, does the department use to help faculty improve undergraduate teaching and learning? What training and support is provided to TAs to help them be effective in their instructional role?**

N/A

**8. How does the unit track and promote innovations and best practices in undergraduate and graduate student learning?**

Because the program is quite small, Dr. Miles is able to talk one-on-one with students on a regular basis. He is also in contact with colleagues who work in other graduate programs at the UW and around the country. Insights he gains on graduate student learning are incorporated into his mentoring and seminar activities.

### **Section C: Research and Productivity**

**1. How does your unit balance the pursuit of areas of scholarly interest by individual faculty with the goals and expectations of the department, school, college and University?**

How are decisions involving faculty promotion, salary and retention made? *For interdisciplinary programs:* How do you balance the demands of home departments and of the interdisciplinary unit? N/A

**2. How are junior faculty members mentored?**

N/A

**3. What has been the impact of your research on your field and more broadly over the past five years?**

Miles was elected to membership in the National Academy of Sciences in 2003 and was elected a Fellow of the American Association for the Advancement of Science (AAAS) on the basis of his published work in the field of Human-Environment Interaction. One of his responsibilities in the NAS is to serve on the Committee on the Human Dimensions of Global Change, which develops the research program in this area for the National Research Council. Within and outside NAS, he is also a member of the invisible college of scholars and practitioners working globally on problems of science for sustainability.

In what ways have advances in your discipline, changing paradigms, changing funding patterns, new technologies, or other changes influenced research, scholarship, or creative activity in your unit?

As described above, these changes led to the creation of IPDES.

**5. Some units are more heterogeneous than others. What variations exist among your faculty in terms of methodologies, paradigms, or sub-field specializations? Are faculty offices all in the same building, or are they geographically dispersed? What strengths and weaknesses for the unit as a whole are generated by differences among its faculty? Do any of these differences generate obstacles to communication? If so, what strategies has the unit developed to promote communication between different constituencies, and how successful have these strategies been?**

N/A

**6. What impediments to faculty productivity exist, and do you see ways of reducing these?**

Since Miles is the only faculty centrally involved, and he is simultaneously involved in a number of UW and external professional activities, excessive demands on his time from multiple sources definitely get in the way of his productivity. With respect to IPDES, a clear path to reduction is via entraining other faculty members in the substantive work of the program, including taking over responsibility for the program before Miles' formal retirement in three years.

**7. What steps has your unit taken to encourage and preserve productivity on the part of all segments of your staff?**

N/A (There is one-10% staff person.)

How are staff recognized and rewarded? N/A

What programs are in place to support professional development of staff? N/A

## **Section D: Relationships with other units**



**In what ways do you collaborate with units at other institutions or at the University of Washington?**

We collaborate with Atmospheric Sciences, School of Aquatic and Fishery Sciences, Earth and Space Sciences, School of Marine Affairs, School of Oceanography, College of Engineering, Civil and Environmental Engineering, College of Forest Resources. Specifically members serve on our Steering committee and Theses and Dissertation committees. Their students constitute the pool from which IPDES recruits its students.

**What are the impacts of these collaborations?**

Very positive

**Do members of your unit engage in or have opportunities to engage in interdisciplinary research?**

This is our primary focus.

**Do ties to other units or other kinds of interdisciplinary opportunities aid you in recruiting new faculty and graduate students?**

Yes

**In what ways, if any, do they improve your graduate and undergraduate education?**

The connections are pathways to recruiting very high quality graduate students.

**Do you face impediments to developing interdisciplinary research or connections with other units?**

Faculty support is the major issue in this arena. Many departments on campus could benefit from further development of interdisciplinary research, however they do not have the support to release faculty from current duties to pursue such research.

**How could the university aid you in strengthening such ties?**

More outreach both internal and external. More faculty support and "institutionalization" of the value of interdisciplinary studies. But most importantly, making support of this unit one of the items pursued by the UW Office of Development.

***For interdisciplinary programs: How do you maintain relationships with contributing units?***

Currently Dr. Miles is at the forefront of this effort. He attends all the Interdisciplinary Initiative meetings and continues to network on campus with

interested colleagues and departments. The central connection is via the Steering Committee for IPDES.

**Are there other units that could enhance your interdisciplinary perspective?**

Yes. We need to try again with the social sciences. Miles has had discussions with the Dean of the Evans School and she is very interested for her School to be a participating unit in IPDES.

**Do you face impediments in approaching these other units?**

Yes re the social sciences. Our requirement that social science students will have to take at least a series of upper division courses in the natural science disciplines relevant to solution of the problem they have chosen is a major hurdle.

**How could the university aid you in solidifying old relationships and fostering new ones?**

More resources in the areas mentioned above. Dedicated attention from the Office of Development.

**There is an expectation of faculty participation in the governance of the Department, the College or School, and the /University. How do faculty members within your unit meet this expectation? How is participation in shared governance encouraged and valued?**

N/A

**Section E: Diversity**

The University is committed to providing a supportive environment for all members of its community and ensuring that each is included in the life of the University in ways that benefit professional development and success. Underrepresented groups can vary by field, but are most commonly identified by gender, race, or ethnicity.

**1. Describe for your unit the inclusion of underrepresented groups for students (by entering cohort), faculty (by rank) and staff.**

Of the faculty and staff, Miles is an African-American. There have been three staff members so far: the first was a Caucasian male; the second a Caucasian female; and the third is a Japanese-American. This distribution is purely by chance. Of the seven students in the program during the first two years, there were three Caucasian males and four Caucasian females. No specific attempts

were made to recruit underrepresented groups because we must recruit from within each unit represented in the program. Two female Caucasian students were admitted for the fall of 2006.

- 2. Please provide data comparing the teaching loads and other duties of any members of underrepresented groups in your unit to others of comparable professorial rank.**

N/A

- 3. What steps, including outreach and recruitment, has your unit taken to ensure an environment that values diversity and supports all faculty, students and staff, including members of underrepresented groups?**

We need resources that we can use as incentives for the units to increase their enrollments with underrepresented groups.

- 4. Have you been able to retain students and faculty from these groups once you have recruited them? What factors aid or impede your efforts to recruit and retain members of underrepresented groups? Is there anything the University can do to help you with recruitment and retention?**

N/A

- 5. Has the increased diversity of the student body and/or faculty in your department generated any changes in your curriculum? In your unit's academic culture or climate? If so, what are the impacts of these changes? Is there anything the University or College can do to help you with these efforts?**

Provide dedicated funds for fellowships in this area.

## **Section F: Degree Programs**

N/A

## **Section G: Graduate Students**

### **1. Recruitment and retention**

- a. Please describe recruitment/outreach programs to attract graduate students. Describe the measures you use to assess the success of your efforts. How successful have they been?

Miles does most of the recruiting as he is in contact with many students and faculty on campus in participating departments. Also, the individual at PoE uses the website and email to recruit students

b. What are your retention rates for masters and doctoral programs? To what do you attribute attrition? What steps are taken to minimize attrition?  
N/A

## 2. Advising, Mentoring and Professional Development

a. In what ways do you communicate academic program expectations to students? Such information should include: timelines, phases and benchmarks of the degree program; procedures for committee formation; coursework, exam and presentation requirements; and standards of scholarly integrity.

This is all carried out one-on-one by Miles and the Departmental thesis or dissertation supervisory committee since the program is custom-tailored for each student.

b. In what ways do you inform students of your unit's graduation and placement record? Such information should include time to degree; average completion rates (Master's and Ph.D.); and employment of graduates two and five years after degree completion.

N/A

b. Please attach an example of your departmental mentoring/advising plan. Such information should include evidence that each student's work and progress are being evaluated on at least an annual basis and that the results of the evaluation are communicated to the student.

Students are mentored via individual "contracts" operative between:

- the co-chairs and the students; and
- the departmental co-chair and the departmental graduate program coordinator (GPC). These "contracts" contain, *inter alia*, all departmental requirements and expectations; an approved course of study; and, eventually, a dissertation topic or a Master's thesis topic where required. They could be changed but only after full review and agreement by the Supervisory Committee. Miles serves as the co-chair on two of the four students who have been in the program for one year. The coordination in each case was done informally in separate conversations between the co-chairs and between the co-chairs individually and the student. During each capstone seminar the students are asked to respond in some detail to the question what added value IPDES brings to their course of study and to their dissertations or theses. Three of the four students have now published

papers which clearly demonstrate this added value. One student will take her Ph.D. general exam in mid-September. In this case the entire Committee met during the summer to discuss the kind of exam that would be given and the two co-chairs collaborated in designing one question which integrates the biophysical with the social dimensions of the students "field".

- c. Please attach a copy of your professional development plan. Such a plan should address questions such as: "What are the career opportunities for a master's or Ph.D. graduate in your field?" "What skills/experiences contribute to success in the various academic and non academic career paths listed above?"

**Strategic Planning Document Attached.**

**3. Inclusion in governance and decisions**

- a. In what ways do you include graduate students in the governance of your department?  
Steering Committee requests input from graduate students as needed.
- b. Please describe your grievance process and characterize the nature of any grievances that have been lodged over the past 3 years. If the characterization is likely to reveal any students' identities, please address this issue in a separate but accompanying document addressed to the Dean of the Graduate School.  
No grievances filed. If there were they would go to David Secord Director of PoE.

**4. For graduate student service appointees, please describe:**

N/A

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### **III. GUIDELINES FOR SELF-STUDY: APPENDICES**

#### **Appendix A. Graduate Student Statistical Summary (10-year data)**

The Graduate School compiles data for this appendix. Department and college/school-wide data may be found

at: <http://www.grad.washington.edu/stats/index.htm>

Please note numbers above.

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## **Appendix B. Academic Unit Profile**

Academic Unit Profiles for each department and college/school are prepared by the Office of Institutional Studies. Reports may be found at:

**<http://www.washington.edu/admin/factbook/AcademicProfile/acadprof.html>**

Doesn't exist.

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**Appendix C. List of special pathways, options, certificates, etc. within degree**

This is a certificate program.

**Blank**

**Appendix D. List of faculty by rank; include list of dissertation committees chaired for past five years**

Dr. Edward Miles

Chairs: Smith Thummachua, Ph.D. 2003, School of Aquatic and Fishery Sciences (SAFS):

Committees: Joseph Casola, Dept. of Atmospheric Sciences, 2006; Heather Lazarus, Dept. of Anthropology, [Environmental Anthropology], 2005; Judith Little, SAFS, 2005.

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**Appendix E. Placement of graduates, last 3 years (include data on placements outside the academy)**

The Certificate has had one graduate, Dr. Edie Sonne, College of Forest Resources, Spring 2005, and she now holds a professional staff position at Weyerhaeuser.

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**Appendix F. Academic Unit's mission statement**  
**See attached**

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**Appendix G. *Abbreviated Faculty Curriculum Vitae*** – No more than **3** pages each, highlighting major career accomplishments but focusing on activity over the last 3 to 5 years. Please see attachment

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**Appendix H. HEC Board summary** – The Graduate School collects these summaries from all programs reviewed and submits them to the HEC Board in its Biennial Report. Submission of this material in electronic form as well as with the printed documentation facilitates the collection process. The summary should be no more than 5 pages total, specifically addressing each of the following items in order:

*a. Name of unit authorized to offer degrees:*

Graduate School authorizes Certificate developed as part of Dr. Miles Retention package. Is housed in the Graduate School but administered through the Program on Environment

*b. School or College(s) as applicable*

Students from Atmospheric Sciences, School of Aquatic and Fishery Sciences, Earth and Space Sciences, School of Marine Affairs, School of Oceanography, College of Engineering, Civil and Environmental Engineering, College of Forest Resources are encouraged to participate.

*c. Exact title(s) of certificate offered:*

Interdisciplinary Policy Dimensions of Earth and Space Sciences  
Graduate Certificate

*c. Year of last review*

N/A

*e. Brief description of the field and its history at the University of Washington (no more than one page).*

The Earth Sciences play an indispensable role in a safe and prosperous society, but too often scientific wisdom does not translate to wise decision-making. This innovative new program provides graduate students in the Earth sciences a forum to explore interdisciplinary and policy dimensions of their science, and extend their graduate research to encompass those dimensions. Students earn a graduate degree in the home department, with the collaborative component recognized by the Graduate School as a Certificate in “Interdisciplinary and Policy Dimensions of the Earth Sciences”.

*f. Documentation of continuing need for your program*

Board on Sustainable Development, National Research Council. 1999. *Our Common Journey*. (Washington, D.C.: National Academies Press).

Kates, Robert et al. 2000. Sustainability Science, *Science*, vol. 292 (5517):641 et seq.

Schellnhuber, H. J. and V. Wenzel. 1998. *Earth System Analysis*, (Berlin and Heidelberg: Springer-Verlag).

Schellnhuber, H.J. 1999. 'Earth System' Analysis and the Second Copernican Revolution. *Nature*, Vol. 402, Supp., 2 December, C19-C23.

Schellnhuber, Hans Joachim, Paul J. Crutzen, William C. Clark, Martin Claussen, and Herman Held. 2004. *Earth System Analysis for Sustainability*, (Cambridge, MA. and London: MIT Press), Report of the 91<sup>st</sup> Dahlem Workshop, Berlin, May 25-30, 2003.

Schellnhuber, Hans Joachim, Paul J. Crutzen, William C. Clark, and Julian Hunt. 2005. Earth System Analysis for Sustainability. *Environment*, Vol. 47, NO. 8: 10-25.

*g. Assessment information relating to student learning outcomes and program effectiveness*

*Student evaluations attached*

*h. Please complete the following grid:*

|  |                         |                         |  |
|--|-------------------------|-------------------------|--|
| <i>Number of Certificates granted in the last three years.</i> | <b>2004</b><br><b>0</b> | <b>2005</b><br><b>1</b> | <b>2006</b><br><i>Probably</i><br><b>6</b> |
|--|-------------------------|-------------------------|--|

*i. Plans to improve the quality and effectiveness of the program. What is the process by which your unit sets its overall goals? How often are departmental goals reviewed and reassessed? In what ways do you anticipate the goals of your program will change in the next ten years? Describe your goals for the next 5-7 years. Describe areas and strategies for developing your potential for academic and pedagogical leadership in your field. How could the college and/or university assist you in achieving your goals, especially through means other than increased budgets?*

The Steering Committee of IPDES met on May 11, 2006 to prepare a strategic plan. The starting point for discussion was a SWOT (Strength, Weaknesses, Opportunities, Threats) analysis of IPDES prepared by Miles as shown in Table 1 below.

**Table 1: A SWOT ANALYSIS OF IPDES**

| Strengths  | Weaknesses   |
|--|--|
| <ol style="list-style-type: none"> <li>1. Great strengths in earth sciences &amp; policy @UW.</li> <li>2. Program design &amp; buy-in from all earth science units.</li> <li>3. Strong support of Grad. School.</li> <li>4. Superb, interested grad. students.</li> <li>5. Strong support of PoE.</li> </ol>                           | <ol style="list-style-type: none"> <li>1. Severely limited financial support for fellowships &amp; costs of expanded program: advertising, recruiting, students, faculty &amp; staff support.</li> <li>2. Program not widely known across campus, but intensive advertising not useful without funds to support students.</li> <li>2. Unwillingness of social sciences to be involved, apart from SMA &amp; Evans School.</li> </ol> |
| Opportunities  | Threats  |
| <ol style="list-style-type: none"> <li>1. C21st is century of environment: huge problems → great need for IPDES graduates.</li> <li>2. Idea &amp; need could provide the basis for a development program by UW.</li> <li>3. Approach Anthropology (Environmental Anthropology Program) as new recruit from social sciences.</li> </ol> | <ol style="list-style-type: none"> <li>1. Very little start up funds.</li> <li>2. No incentives for attracting faculty to succeed ELM.</li> <li>3. Most private foundations do not give fellowship support.</li> </ol>   |

## NEEDS

The initial target of the program is defined to be 10 students. On the basis of Spring 2006 dollars, one student per year @ two quarters (20 credits) costs \$16,200. The total cost per year is therefore \$160,200 ; over five years that means our initial development goal is \$801, 000. The foundation with the closest fit to this program seems to be the Surdna Foundation which does provide fellowship support.

## STRATEGIES

Align the IPDES objectives with the general issue of how to generate interdisciplinary research at UW as the launching pad for the program. Collectivize the vision and methods for similar programs at UW looking in parallel for support and make the argument on the basis of what these programs all have in common. Seek the support of the Earth Institute and the Development Office in the Graduate School to make the collective effort a high priority focus of the UW Office of Development. In an attempt to get IPDES better known on the UW campus, ask the participating units to put this program on their web sites and seek to establish a link with the Program on Climate Change (PCC). Ask the participating units to support any of their faculty to get involved with Miles to provide for continuity after Miles steps aside in three years.

## EXPANDING DIVERSITY

Recognizing the constraint that all participants in the program must come through the participating units, seek to link IPDES firmly with all earth sciences graduate recruiting efforts on a routine basis. Use a portion of IPDES funds generated by development efforts to matching a quarter of funding with each quality applicant identified from underrepresented groups. Leverage this vis-a-vis GOMAP funds. Pay close attention to Evans School strategies for expanding diversity.



**UNIVERSITY OF WASHINGTON  
NEW COLLABORATIVE GRADUATE CERTIFICATE PROGRAM  
IN THE INTERDISCIPLINARY AND POLICY DIMENSIONS  
OF THE EARTH SCIENCES**

**ABSTRACT**

Eight units in four colleges and one University-wide program propose a new collaborative Graduate Certificate program in the Interdisciplinary and Policy Dimensions of the Earth Sciences. Each student will enroll in a home department authorized to award an appropriate graduate degree, and must meet both departmental and collaborative program requirements as defined below. Graduate degrees will be granted by the home department with the collaborative component recognized by the Graduate School as a Certificate program. The curriculum to be followed by each student will be custom-designed according to program rules to be elaborated below. The initial participating units are:

**College of Art and Sciences  
Science**

Atmospheric Sciences  
Sciences  
Earth and Space Sciences

**College of Ocean and Fishery**

School of Aquatic and Fishery  
School of Marine Affairs  
School of Oceanography

**College of Engineering**

Civil and Environmental  
Engineering

**Program on the Environment**

**College of Forest Resources**

**OVERVIEW AND GOAL**

The goal of the program is to foster interdisciplinary and policy dimensions of the Earth sciences for students completing disciplinary graduate degrees. Students enter an existing graduate degree program in a participating department and then petition to enter the graduate certificate program. The course of study to earn the graduate certificate is tailored to the individual student, but will consist of no less than 15 credits,<sup>1</sup> with a minimum of 9 from courses numbered 500 or higher. Students will participate in a common seminar and will be required to incorporate interdisciplinary dimensions into their thesis or dissertation in a manner that complements and extends the discipline-based

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<sup>1</sup> Students on fellowship support will be required to comply with the University minimum of 10 credits per quarter. In those cases, the Graduate Certificate will be awarded for 20 credits of course work.

studies. The composition of the dissertation/thesis supervisory committee must therefore be approved both by the home department and the interdisciplinary program. To earn the certificate, the student's thesis or dissertation outline, as well as the finished product, must be approved by the interdisciplinary program. The graduate certificate will not be awarded until an approved dissertation/thesis is completed. A student may withdraw from the graduate certificate program at any time without jeopardizing his/her status in the home department.

## **RATIONALE FOR THE PROGRAM**

The planet as a whole is a coupled system with the following components: atmosphere, hydrosphere (oceans, rivers, groundwater, water vapor), lithosphere, cryosphere, biosphere, and humans. Humans both affect and are affected by the planetary systems and, for the first time in the history of the planet, human actions now have planetary scale effects as a result of population growth, land use patterns (urbanization, agriculture, forests and forestry), the use of fossil fuels as sources of energy, and a wide range of environmental pollutants contained in organic and inorganic waste streams. Human impacts on the planet are exerted both directly and indirectly, the latter primarily through the fundamental biogeochemical cycles: carbon, nitrogen, phosphorous, sulfur, and trace metals. Human impacts are also mediated through human social institutions, which ignore the natural processes that govern the behavior of the earthsystem. Since humans are now changing the planet on every scale, and since the human population is expected to double by 2100, we need to think systematically and creatively about human-induced planetary changes that may "... alter the capacity of the earth system to sustain life." (P.L. 101-606, 1990).

## **SIGNIFICANCE OF THE PROGRAM**

The earth sciences have usually stopped with doing science; what is exciting about this new departure at the University of Washington is that it seeks to train generations of earth science students to develop a policy capability. The UW thereby joins 12 other universities nation-wide in systematically pursuing the need for "sustainability science" (NRC, 1999. *Our Common Journey*) in which integrated research is applied to important social problems via new curricula. These curricula make a commitment to finding solutions as well as increasing understanding and promote learning about big, complex problems.

## **WHAT WILL BE NEW ABOUT THIS PROGRAM IN THE EARTH SCIENCES?**

The program will systematically link the earth sciences to the relevant policy dimensions of problems chosen for dissertation and thesis research at the Ph.D. and M.S. levels. For example, a student working on the planetary carbon cycle would be expected to combine research on the pathways and dynamics of natural variability in rates of carbon exchange between the atmosphere, the

ocean, and the terrestrial environment with seeking to understand and evaluate the possibilities and consequences of managing carbon, integrating economic, social, political, and environmental perspectives.

Alternatively, students working on the physical dynamics of climate variability and change could choose to link this capability with integrated assessments of the impacts of climate variability and change on specific regions of the earth, seeking to understand both risks and opportunities. Three questions are pertinent here: 1. What is the sensitivity of region X to climate variability and change? 2. How vulnerable is region X to climate variability and change and in what ways? 3. What alternative and adaptation strategies are available for increasing resiliency?

## **HOW WILL THE PROGRAM WORK?**

The program will be based on defined pathways within existing degree granting units, all of who agree to collaborate under the following rules:

- a) all students access the program only through participating departments/units;
- b) the program will be two-track, permitting interdisciplinary curricula both within the natural sciences and across the natural and social sciences and, eventually, law.
- c) the program will be based on custom-tailored courses of study to fit each student's interests; however, such cognate fields must consist of at least 15 credits (at least 9 numbered 500 or above), including a 3-credit seminar required of each student participating in the program. In addition, the cognate fields will be constructed primarily from a list of pertinent courses chosen on a University-wide basis by the Governing Program Committee. This list must be kept up to date.
- d) there shall be a departmental supervisor as co-chair of the Committee with a co-supervisor/chair from the cognate area in each case.
- e) quality control would be exercised via individual "contracts" operative between:
  - the co-chairs and the students; and
  - the departmental co-chair and the departmental graduate program coordinator (GPC). These "contracts" would contain, *inter alia*, all departmental requirements and expectations; an approved course of study; and, eventually, a dissertation topic or a Master's thesis topic where required. They could be changed but only after full review and agreement by the Supervisory Committee.
- f) the program would be run by a small (<10) inter-unit faculty Committee whose responsibilities would include: seeking funding for students,

overseeing the preparation of lists of pertinent courses, prioritizing applicants, getting unit faculties to agree formally to participate under the rules established for this program, designing the required 3-credit course required of all participating students, and approving all courses of study, including the composition of the Supervisory Committee.

- g) the program will be housed in the Graduate School but administered through the Program on Environment under the same arrangements, which apply to graduate certificate programs in Global Environmental Chemistry and Conservation Biology Policy.

## **APPLICATION PROCEDURES FOR PROGRAM AND FELLOWSHIPS**

The program will get underway as of Fall Quarter 2003. To assist the start-up, the Graduate School has made available 3 two-quarter fellowships to cover the period of time earth sciences students will be taking course work in the policy dimension. Fellowship support will require 10 credits of course work per quarter.

To facilitate start-up, on a one-time basis only, the initial application deadline for academic year 2003-2004 is September 15, 2003. Applications should be addressed to Prof. Edward Miles, School of Marine Affairs, Box 355685, email: [edmiles@u.washington.edu](mailto:edmiles@u.washington.edu). Applications should contain a statement of the problem the candidate is proposing to work on, tentative co-chairs and members of the Supervisory Committee, prospective courses in the policy dimension, and a timeline for completing the degree.

From the academic year 2004-2005, the application procedure will be as follows:

1. depending on available funding, the program will be advertised either once or twice a year with deadlines of October 15 and April 15.
2. The advertisement will describe the procedures to be followed and the documentation to be provided.
3. Submission will be to Miles but applications will be sent to the PoE staff member charged with administering IPDES.
4. When the application procedure is complete, all files will be distributed to the Steering Committee for evaluation and selection. Business will be conducted electronically unless there is a need for the Committee to meet face-to-face.
5. The IPDES staff member will maintain a record of decisions and draft letters to the candidates for Miles' signature.

# Edward L. Miles

Virginia & Prentice Bloedel Professor of Marine, Public Affairs, and Senior Fellow, Joint Institute for the Study of Atmosphere and Oceans (JISAO)

Email:edmiles@u.washington.edu

## Education

- Ph.D. 1965, University of Denver, Graduate School of International Studies  
International Relations/Comparative Politics
- B.A. 1962, Howard University  
History/Political Science

## Research and Professional Experience

|              |   |
|--------------|---|
| 1965-66      | Instructor in International Relations, Graduate School of International Studies (GSIS),<br>University of Denver |
| 1966-70      | Assistant Professor of International Studies, GSIS, University of Denver  |
| 1970-74      | Associate Professor of International Studies, GSIS, University of Denver  |
| 1974-Present | Professor of Marine Studies and Public Affairs, Institute for Marine Studies,<br>University of Washington       |
| 1982-1993    | Director, School of Marine Affairs (formerly Institute for Marine Studies),<br>University of Washington         |
| 1994-Present | Virginia and Prentice Bloedel Professor of Marine Studies & Public Affairs,<br>University of Washington         |
| 1995-Present | Senior Fellow, JISAO  |

## Honors and Awards (Selected)

|              |   |
|--------------|---|
| 1962         | Phi Beta Kappa  |
| 1969-76      | Member, Board of Editors, <i>International Organization</i>   |
| 1970-72      | Member, Advisory Panel, National Sea Grant Program, National Oceanic &<br>Atmospheric Administration, U.S. Department of Commerce     |
| 1972-73      | International Affairs Fellowship, Council on Foreign Relations, Inc.  |
| 1972-81      | Executive Board, Law of the Sea Institute, University of Hawaii   |
| 1973-74      | James P. Warburg Fellow of the University Consortium for World Order<br>Studies, Center for International Affairs, Harvard University |
| 1973-74      | Senior Fellow, Woods Hole Oceanographic Institution   |
| 1973-Present | Associate Editor, <i>Ocean Development and International Law Journal</i>  |

|              |   |
|--------------|---|
| 1974-79      | Chairman, Ocean Policy Committee, National Academy of Sciences/National Research Council  |
| 1976-80      | Principal Investigator, North Pacific Project, Institute for Marine Studies, University of Washington, supported by the Rockefeller Foundation  |
| 1980-83      | Principal Investigator, North Pacific Project, Institute for Marine Studies, University of Washington, supported by the National Science Foundation   |
| 1985-87      | Principal Investigator, The World Fisheries Project, Institute for Marine Studies, supported by the Andrew W. Mellon Foundation   |
| 1985-93      | Executive Board, Law of the Sea Institute, University of Hawaii   |
| 1986-87      | Sabbatical Award University of Washington. Appointed Consultant to the Nuclear Energy Agency, OECD, Paris, France   |
| 1989-93      | President, Law of the Sea Institute, Univ. of Hawaii  |
| 1990-92      | Chairman, Advisory Committee for International Programs, National Science Foundation  |
| 1993-94      | Sabbatical Award of University of Washington. Appointed Consultant to the Intergovernmental Panel on Climate Change, WMO, Geneva; Visiting Professor, Institute of Political Science and Center for International Climate and Energy Research (CICERO), University of Oslo; Senior Fellow, Fridtjof Nansen Institute, Lysaker, Norway |
| 1993-1995    | Member, Advisory Committee for the Social, Behavioral, and Economic Science, Nat'l Science Foundation   |
| 1995-Present | Principal Investigator Project on the Impacts of Climate Variability, Climate Change, and Response Strategies in the Pacific Northwest, supported by the Office of Global Programs, NOAA  |
| 1996-2003    | Member, Climate and Global Change Advisory Panel, Office of Global Programs, NOAA   |
| 1996-2004    | Member, Advisory Committee on Applications, International Research Institute for Climate Predictions, Lamont-Doherty Earth Observatory, Columbia University   |
| 1999-Present | Trustee, the H. John Heinz III Center for Science, Economics, and the Environment, Washington, D.C.   |
| 1999         | College of Ocean and Fisheries Sciences, University of Washington, Distinguished Research Award   |
| 2003         | Elected to membership in the U.S. National Academy of Sciences  |
| 2005         | Elected Fellow of the American Association for the Advancement of Science   |

## SELECTED PUBLICATIONS

- Edward L. Miles (ed.). The Management of World Fisheries: Implications of Extended Coastal State Jurisdiction, (Seattle, WA: University of Washington Press, 1989).
- Edward L. Miles and William T. Burke. "Pressures on the United Nations Convention on the Law of the Sea of 1982 Arising from New Fisheries Conflicts: The Problem of Straddling Stocks," Ocean Development and International Law Journal, Vol. 20 No. 4 (1989), pp. 343-357.
- Edward L. Miles. "Concepts, Approaches and Applications in Sea Use Planning and Management," Ocean Development and International Law Journal, Vol. 20, No. 3 (1989), pp. 213-238.
- William Burke, Marc Freeberg, and Edward Miles. "The United Nations Resolutions on Driftnet Fishing: An Unsustainable Precedent for High Seas and Coastal Fisheries Management," Ocean Development and International Law Journal, Vol. 25 (1994), pp. 127-186.
- Venugopalan Ittekkot, Su Jilan, and E. Miles. "Oceans," Chapter 8 in Robert T. Watson et al. (eds.). Climate Change 1995, Vol. II of the Second Assessment Report of the Intergovernmental Panel on Climate Change, (Cambridge: Cambridge University Press, 1996), pp. 267-288.
- Edward L. Miles. "Personal Reflections on an Unfinished Journey Through Global Environmental Problems of Long Timescale," Policy Sciences, Vol. 31 (1998), pp. 1-33.
- Edward L. Miles. Global Ocean Politics: The Decision-Process at the Third United Nations Conference on the Law of the Sea, (The Hague: Kluwer Law International, 1998), 750 pp.
- Bridget Callahan, Edward L. Miles, and David Fluharty. "Policy Implications of Climate Forecasts for Water Resources Management in the Pacific Northwest," Policy Science, (The Hague: Kluwer Academic, 1999) Vol. 32, pp. 269-293.
- Edward L. Miles, Amy K. Snover, Alan F. Hamlet, Bridget Callahan, and David Fluharty. "Pacific Northwest Regional Assessment: The Impact of Climate Variability and Climate Change on the Water Resources of the Columbia River Basin," Journal of the American Water Resources Association, Vol. 36, No. 2 (2000), p. 399-420.
- Edward L. Miles, Arild Underdal, Steinar Andresen, Jørgen Wettestad, Jon Birger Skjaereth, and Elaine Carlin. Environmental Regime Effectiveness: Confronting Theory with Evidence, (Cambridge, MA: MIT Press, 2002).
- Strom, Are, Robert C. Francis, Nathan J. Mantua, Edward L. Miles, David L. Peterson. 2004. North Pacific Climate Recorded in Growth Rings of Geoduck Clams: A New Tool for Paleoenvironmental Reconstruction. Geophysical Research Letters, Vol. 31, L06206, doi:10.1029/2004GL019440, 2004.
- Strom, Are, Robert Francis, Nathan J. Mantua, Edward L. Miles, David L. Peterson. 2005. Preserving Low-frequency Climate Signals in Growth Records of Geoduck Clams (*Panopea abrupta*). Paleogeography, Paleoclimatology, Paleoecology, 228 (1-2):167-178.