

A New Approach to Combat Invasive Species: PROJECT-BASED TRAINING FOR GRADUATE STUDENTS

by Susan Musante

Biologists cannot solve the problem of invasive species by themselves. Doing that requires a coordinated effort between scientists, policymakers, and others in the community. Unfortunately, the skills necessary to address complex environmental problems are not traditionally taught to scientists as part of their formal education. They are left on their own to learn how to communicate and collaborate. Now, however, one university is offering interdisciplinary, project-based training to its graduate students to help them more effectively address the issues of biological invasions.

In the mid-1990s, the National Science Foundation implemented a new program, Integrative Graduate Education and Research Traineeship (IGERT), to restructure graduate education in a wide range of disciplines and change the way in which scientists are trained. A team of faculty from the University of California at Davis (UC-Davis) applied for and received an IGERT grant, recognizing the connection between the goals of IGERT and the challenges of solving problems related to invasive species.

The UC-Davis Biological Invasions (BioInv) IGERT program (www.cpb.ucdavis.edu/bioinv/) incorporates ethical, sociocultural, political, economic, legal, and scientific aspects of this environmental problem. BioInv IGERT focuses primarily on graduate students, though some undergraduate students and postdoctoral fellows also participate. Students in the program take a core course during their first year to gain a broad overview of the issues and the perspectives of those from many disciplines. In the second year, fellows with different backgrounds (e.g., ecology, economics, history, policy) work on a yearlong, collaborative, interdisciplinary project.

Heidi Weiskel, a BioInv IGERT fellow and ecology graduate student and recipient of the 2004 AIBS Emerging Public Policy Leader Award, studies disturbance regimes and the impact of invasive species on biodiversity. This fall she and her colleagues will investigate the role of the aquarium and horticulture industries on invasive species problems in the San Francisco Bay area.

"IGERT has changed the way we [students] think about invasive species management," says Weiskel. "It makes us realize that we won't be able to do it in isolation." The program emphasizes the importance of communicating and collaborating with people outside academia.

The BioInv IGERT students participate in media training to develop their communication skills. Susan Williams, BioInv IGERT ecology trainer, former Aldo Leopold Fellow, and director of the Bodega Marine Laboratory at UC-Davis, says scientists need to learn to know how to translate current understandings about invasive species, based upon scientific research, for other professionals and for those in the larger community. Williams does admit that gaining and applying these skills is a challenge for both students and scientists.

"Realizing that not everyone thinks the same way you do is one of the toughest lessons to learn," adds Holly Doremus, a professor of law and co-principal investigator of BioInv IGERT. As an attorney with a PhD in plant physiology, she provides a unique perspective, encouraging students to see the nonscientific as well as the scientific aspects of environmental problems. "If real change is to occur, real understanding and communication, scientists need to move beyond telling others the way it should be," agrees Weiskel.

As a BioInv IGERT fellow, Jeanine Pfeiffer organized a symposium titled "Biological Invasions and Biocultural Diversity." The symposium brought individuals from non-governmental organizations, local communities, national and local government, and universities together to discuss the social impacts of invasive species management in a professional context. "It was challenging," says Pfeiffer, "because not everyone is comfortable with incorporating human complexities to solve problems initially defined as biological issues."

Pfeiffer, now a PhD ethnoecologist, is working on a long-term, collaborative, bioculturally diverse conservation research

program with an indigenous community in Indonesia; in California, she is also investigating the impact of invasive species on native cultures. Her involvement in BioInv IGERT enabled her to combine theories

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and techniques from a wide range of disciplines and perspectives to better understand the relationships between biological diversity (taxa), cultural diversity (related traditions), and invasive species (a category that Pfeiffer describes as encompassing "flora, fauna, microbes, GMOs [genetically modified organisms], and sometimes even *Homo sapiens*.")

It is not easy to implement interdisciplinary programs and effect change. It takes a considerable amount of time and institutional support and, adds Doremus, "a commitment from those involved to step outside the academic box." Though not all faculty members have the resources to restructure their graduate program the way that UC-Davis has, others can adopt its interdisciplinary, project-based approach to teach about biological invasions.

Faculty at any institution can work with students to identify invasive species issues in their community. Students can be encouraged to organize interdepartmental events and challenge participants to consider the ethical and social implications as well as the ecological impacts of invasions.

"This is a new generation of graduate students," says Williams. "They want to do really good research and they want it to be worth something for people." For this to happen, these scientists will need to have both a solid background in science and the skills to work on a team. Only then will they be properly equipped to solve complex environmental problems.

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