

**Integrating Inter-College Undergraduate Research
Affiliations into a Multi-campus Environmental Analysis
Program at
the Firestone Center for Restoration Ecology, Costa Rica.**

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Summary:

Funds are requested to support of the involvement of faculty from a broad spectrum of participating Mellon 23 institutions in exploring undergraduate research collaborations toward a multi-campus Environmental Analysis program at the Firestone Center for Restoration Ecology, Costa Rica.

Preamble:

The Firestone Center for Restoration Ecology (FCRE) reserve and field station is a 60-hectare (150 acre) property located on the southwest coast of Costa Rica, contiguous with the well-known Hacienda Barú Reserve (330 ha), near the town of Dominical. The property, originally lowland rainforest, was progressively cleared for cattle farming in the 1950's and 1960's. Since 1993, the property has been the subject of restoration and sustainable forestry efforts. Ownership of the property was transferred to Pitzer College in 2005, which manages the site through Scripps' Joint Science Department as a biological reserve and logistical base for Claremont-wide undergraduate ecological research and education. August 2008 saw the conclusion of our fourth undergraduate summer research program, which has now hosted a total of 17 students from CMC, Pitzer, Pomona, and Scripps Colleges for two months of full time ecological research.

Introduction:

The FCRE is a unique resource – we know of no other tropical field station and reserve operated year-round by a liberal arts college. This uniqueness allows us to focus on facilitating faculty-undergraduate research collaborations in a way that simply does not occur at other, graduate-student oriented tropical field stations. However, the complexity of tropical ecosystems places a premium on involving the widest range of faculty. To this end, we wish to extend an invitation to faculty at the other Mellon 23 colleges to participate in developing long-term, interdisciplinary research projects that contribute to our research objectives of restoring the property to lowland tropical moist forest whilst exposing undergraduates to practical biodiversity assessment and restoration ecology. Further details on the Firestone Reserve can be reviewed online at <http://costarica.jsd.claremont.edu>

Specific Request:

We propose to invite biology, environmental studies, environmental analysis, and related faculty of the Mellon 23 colleges to participate in a 5-day workshop on Creating Inter-College Undergraduate Research Affiliations Toward a Multi-campus Environmental Analysis Program at the Firestone Center in the first week of June, when summer research students are on site.

Faculty attendees would have an opportunity to familiarize themselves with the resources of the Firestone Reserve and then develop an outline for an Undergraduate Research Project Abroad (URAP) that is specific to Firestone Reserve and the ecological restoration and biodiversity assessment mission of the facility. An example of an on-going URAP at the FCRE is a study of butterfly biodiversity in riparian forest, secondary forest, bamboo plantation and recovering pasture using standardized trapping protocols and a custom-developed photographic key. The report of the 2006 work can be downloaded at:

<http://costarica.jsd.claremont.edu/pdf/ButterflyReport2006Haber.pdf>

Projects of interest include, but are not limited to:

Insect biodiversity studies (eg. Odontata, Coleoptera, Phasmidae)
Soil analysis in agricultural and recovering former agricultural lands.
Human land use patterns.
Stream and water supply mapping and evaluation
Propagation of native plant species
Regionally relevant strategies for forest restoration
Small-scale climate studies

We are particularly interested in projects which make use of our growing GIS database to weave multidisciplinary research into the fabric of the local biological and human community.

Participating faculty will be invited and strongly encouraged to return with their students and make use of the Firestone facilities, should they choose to do so. It is our intention that this workshop should build lasting and mutually synergistic collaborations between the participating faculty and our respective students, leading more regularly to joint faculty-student publications and cross-institutional collaboration on research and teaching. We believe that the opportunity for summer research students to be exposed to a variety of faculty from peer undergraduate institutions will serve both to maintain the essence of the liberal arts academic experience – early and meaningful contact with faculty and their research – and to ease the main limitation on departments in liberal arts colleges, that being their small size.

This project is designed to build on a faculty workshop held in May 2007 that initiated collaboration between Scripps, Vassar, Middlebury, Furman, Rhodes, and Denison and has produced a number of joint proposals to the National Science Foundation for support of specific research projects at the Firestone Center. With the imminent establishment of a five-college Environmental Analysis major at The Claremont Colleges, it is also focused on extending the dialogue initiated at the 2007 Mellon 23 Assembly on interdisciplinarity to a broader spectrum of Mellon 23 colleges.

Participants:

The core group of faculty consist of 8 faculty representing 5 Mellon 23 colleges plus Pitzer College (custodians of the Firestone Center). These faculty are:

Donald McFarlane (Convener). Professor of Biology, Scripps College. Tropical biology specialist.

Newton Copp, Professor of Biology, Scripps College. Invertebrate biologist.

Kristina Mead, Associate Professor, Denison University. Invertebrate biologist.

Char Miller, Professor of Environmental History, Pomona College. Environmental historian.

Gene Fowler, Associate Professor of Biology, Pomona College. Behavioral ecologist.

Jen Houghton, Assistant professor of Biology, Rhodes College.

David Harris, associate professor of Engineering Harvey Mudd College. GPS specialist.

Carol Brandt, Professor of Modern Languages and Vice President for International Programs, Pitzer College. Intercultural and language education specialist.

If funded, we expect to recruit an additional 2-4 faculty participants from the Mellon 23 cluster.

Timeline:

March – April 2009 - coordination with participating faculty.

June 2009:

Participants fly into San Jose, Costa Rica. Hotel accommodation provided.

Day 1: Travel to the FCRE from San Jose. (Coastal route with an opportunity to see oil-palm plantation development)

Day 2: Hiking and familiarization with the ecosystems of the Firestone and Hacienda Baru reserves. (Led by Scripps faculty).

Day 3: Faculty free to explore the Firestone reserve and surroundings in the context of their own specialties to develop Environmental Analysis research project possibilities. Team work across disciplines will be encouraged. Evening presentation on GIS as an integrative tool at the FCRE.

Day 4: Group GIS mapping exercise coordinated by Warren Roberts, GIS specialist. Evening discussion of applications of spatial analysis toward interdisciplinary research

Day 5: Faculty 'round-table' discussions of proposed Undergraduate Research Abroad Projects Group members will identify areas for research collaboration.

Day 6: Return to San Jose via paramo ecosystem. (faculty may stay for additional time at the FRCE if they wish)

Day 7: Participants fly out.

August 2009: Submission of individual URAP proposals by participants to be posted on the Firestone Center website.

Sept 2009 – Feb 2010: recruitment of students (up to 8 per year).

Summer 2010: Start of Mellon 23 URAP research projects in environmental analysis.

Evaluation:

The Joint Science Department (Scripps, Pitzer and Claremont McKenna Colleges) is committed to long-term engagement of undergraduate research and education at the Firestone Reserve, with well over \$100,000 invested in infrastructure and equipment at the facility. The currency of success for this Mellon project will be the number of URAP projects that are initiated, and the longevity of these projects. The URAP project descriptions and the annual URAP reports will be made available, open-access, on the Firestone Reserve website. We expect that after two or three years, some of these projects will begin to be published in the peer-reviewed literature. A recently published example is:

A preliminary investigation into Hayne estimates of Poison Dart Frog densities in recovering tropical forest habitats, southwestern Costa Rica. JENNIFER R. B. MILLER AND DONALD A.

McFARLANE

http://costarica.jsd.claremont.edu/pdf/FCRE%20Pubs/Miller_McFarlane_2008.pdf

We will also track the number of senior theses written based on URAP's and immediate post-graduate career trajectories of our FCRE-URAP alumni, to evaluate the role of the experience in their career decisions and successes.

Budget.

\$16,758 based on 10 participating faculty plus a GIS specialist.

Airfares (average \$800 per person) \$ 8800

San Jose hotel, (2 nights @ \$70 per person, shared rooms) \$1540

San Jose – Firestone transfers \$700

Accommodation, Hacienda Baru (\$30/night/person) \$1650

Dinner, Hacienda Baru (\$10/person/night) \$550

Breakfast, Hacienda Baru (\$5/person/day) \$275

Lunches (Firestone Center; \$7/day/person) \$385

Costa Rica Departure taxes (\$28 per person) \$308

Firestone Center Overhead costs \$1000

GIS specialist stipend: \$500

Vehicle rental \$600

Mini bus, daily transfers (\$150 day) \$450