

STEM Faculty Fellows Program 2009-2010 Proposal
Virginia Matzek, Assistant Professor
Department of Environmental Studies

ABSTRACT: I intend to submit a proposal to the National Science Foundation in late summer/early fall 2010 to establish a stand-alone Research Experience for Undergraduates site in “Restoration of Ecosystem Services in Riparian Areas of the Central Valley, California.” The main thrust of the research, already in progress, is to measure carbon sequestration in restored riparian forests. Collaboration with other researchers on and off campus could expand the scope of the research to include other types of ecosystem service measurements and habitat monitoring. The project would involve at minimum 30 undergraduates from CSU, Sacramento each year, as part of the ENVS curriculum and through summer internships. Benefits include retention of undergrads in STEM careers, professional and scholarly development for STEM faculty, and partnerships with off-campus researchers and public agencies.

DESCRIPTION OF PROJECT: Ecosystem services are essential services provided to humans by the natural functioning of intact ecosystems, such as crop pollination by wild bees and erosion control by forests. The state of California may soon pay private landowners for the ecosystem service of carbon sequestration (uptake and storage of atmospheric carbon dioxide in vegetation and soils), under the landmark greenhouse-gas reduction law AB 32. However, a significant barrier to participation in such a program is uncertainty about how much carbon sequestration can be expected from habitat restoration projects. There is a critical need for well-constrained predictions of rates of soil and biomass carbon accumulation on decadal time scales. A chronosequence approach—measuring carbon stocks in sites that differ in the age of their forest stand but are otherwise comparable—is a powerful method for getting reliable estimates of long-term carbon sequestration. Once suitable sites are identified, measurement of carbon stocks in

soils and vegetation is well within the grasp of the average undergraduate; in fact, I have already been teaching students the protocols for the last year in our Field Methods course, ENVS 121. Measurements of other kinds of ecosystem services, as well as traditional wildlife biology and habitat monitoring, could provide fodder for more in-depth summer research projects for self-motivated undergraduates.

I intend to propose the establishment of a National Science Foundation Research Experience for Undergraduates site in “Restoration of Ecosystem Services in Riparian Areas of the Central Valley, California.” Some REU grants are tacked on to existing NSF projects, but there is also a program for proposing “stand-alone” REU sites—whose deadline is likely to be Aug/Sep 2010. Another possibility is that during 2009-10 a relevant RFP will open up in “ecosystem services” and I can apply for an RUI (Research at Undergraduate Institutions) grant within that NSF program. My chances will be better if the project is rich with potential summer projects, so I will want to collaborate with other researchers at Sac State, as well as at CSU, Chico and UC Davis, to expand the research scope beyond carbon sequestration. I have already done some of the work of building partnerships and identifying chronosequence sites, in collaboration with the non-profit group River Partners and the California Department of Fish and Game (DFG). I have also applied for internal funding for summer 2009 to survey more sites for inclusion in the chronosequence, and should have preliminary data for the proposal by spring 2010.

Benefits to campus STEM disciplines include: (1) a minimum of 30, and possibly as many as 40, CSU Sacramento undergraduates working on the project each year; (2) professional and scholarly development for the faculty involved; (3) partnerships with off-campus agencies like DFG and with nearby universities.