

Central Arizona–Phoenix Long-Term Ecological Research
2011 Combined Supplements Request for NSF Grant # BCS-1026865
Dan Childers, CAP LTER Project Director and Lead PI

A. INFORMATION/DATA MANAGEMENT SUPPLEMENT REQUEST

Investigator: Philip Tarrant

GeoNIS: Management, documentation, and publication of spatial data within the NIS

Background: Traditionally spatial data has been stored in systems and formats that were separate from many long term tabular study databases, and the metadata was created to the Federal Geographic Data Committee (FGDC) standard for geospatial metadata. IM supplement funds were used in 2010 to begin creating metadata for spatial data and to investigate translators for converting the metadata to EML and meeting LTER EML Best Practices. This provided a strong knowledge base to continue working toward developing “PASTA-ready” (Provenance Aware Synthesis Tracking Architecture) spatial data for inclusion in the NIS. The LTER GIS Working Group has developed “LTERMapS” to allow a common geographic view of all sites using the network database SiteDB, and to begin the process of integrating geographic/spatial data into the NIS. The first phase of LTERMapS resulted in a Google Maps application deployed from the LTER Network Office (<http://www.lternet.edu/map/>). The next phase will provide a portal for more detailed site level data, linkage to study site data for five pilot LTER sites, and access to site spatial data through EML. The pilot sites are Andrews (AND), Baltimore (BES), Bonanza (BNZ), Konza Prairie (KNZ), and Georgia Coastal (GCE). Central Arizona Phoenix (CAP), as a non-pilot site, will provide programming support to assist with the design, development and testing of the project. An LTERMapS Product Oriented Workshop meeting is scheduled for Fall 2011, which includes meeting with LNO staff to formulate a plan for integrating spatial data into the NIS through SiteDB and EML. The GeoNIS project will build on previous workshops and focus on developing best practices for documenting and incorporating spatial data into the NIS.

Proposal: The GeoNIS project has three related components. As a participating site, CAP will use IM supplement funds for the following:

1. One CAP representative will attend a workshop to create a best practices document for converting FGDC-style metadata into PASTA-ready EML and discuss strategies for optimizing the process through development of scripts and/or models that can be shared by all LTER sites. The group will continue discussions with the LNO on integrating spatial data into the NIS and making enhancements to SiteDB.
2. CAP will employ a student programmer to convert existing CAP spatial metadata to EML, with specific URL links to the spatial data, following the best practices developed at the workshop. The use of student programming resources in this area will enable the CAP project representative to participate in more complex development activities. This representative will share progress through scheduled conference calls and assist in the creation of generic conversion tools to be shared with all sites via the LTER IM website. All CAP related spatial data will ultimately be published via the NIS.
3. LTERMapS pilot sites will prepare their site spatial data for inclusion into the web portal developed through the LTERMapS2 project. CAP’s project representative has spatial

data skills that can make a significant contribution to the development of these spatial data functions and data conversion tools. This resource will be made available to assist with the design, development, and testing of the LTERMapS2 functions.

Outcomes: CAP LTER has a substantial spatial data catalog of more than 300 datasets, of which over 200 are publicly available. These data constitute a valuable resource for researchers that we wish to make more readily available through a combination of visualization and simplified access. This project will prepare these data for inclusion in the NIS. Generic products will include a spatial data management best practices document, and participation of five pilot sites in the geospatial data portal.

Development environment for NIS integration

Background: In addition to working with other sites on the GeoNIS collaboration, CAP is planning to migrate our existing, separate metadata/data repositories into an integrated data repository capable of contributing PASTA-ready data packages for inclusion in the LTER Network Information System (NIS). This system will support the progressive development of project metadata during the life cycle of a research project, culminating in the integration of data and metadata at project completion. This solution will be an open source, modular platform that can be shared with the broader LTER community, and will support both tabular and spatial data.

Proposal: In order to achieve this goal, we plan to take advantage of the NIS elements currently in development. However, integration of these elements will require extensive development and testing without compromising our existing production environment. Our current server architecture does not have the capacity to support this separate development platform, so we plan to create a new, dedicated development environment where we can test the PASTA framework in conjunction with our new data repository. Supplement funds will be used to:

1. Purchase a development server to support the testing and integration of NIS elements with CAP’s metadata/data management system.
2. A student programmer will be employed to test the interfaces between CAP’s data and metadata repository and NIS elements. This will ensure CAP metadata/data packages can be successfully and accurately harvested.
3. To facilitate collaboration with the LNO and other LTER sites, support is requested for travel. These travel funds will allow CAP to fund three trips for our programming personnel to travel to the network office and other LTER sites to work directly with LNO staff and IM colleagues on NIS activities. These are unique, targeted, development opportunities that enable dialogue and learning for our personnel, and ensure that CAP participates fully in the development of information management within the LTER network.

Outcomes: This project will provide the development environment needed to support the first phase of integration between the NIS and CAP’s new metadata/data management system.

Information Management Budget	Amount (\$)
Student programming resources (800 hours @ \$16 p.h. + 1.5% ERE)	19813
Development server (2 CPU, 8GB)	4316
Travel (to support GeoNIS workshop and three additional NIS collaboration activities)	5856
Total	29985

B. EDUCATION SUPPLEMENT REQUEST: RAHSS

Investigators: Dan Childers and Kelli Larson

RAHSS Activities

We propose a RAHSS experience from January-August 2012 that focuses on understanding urban ecological footprints of urban youth. The students will experience this in two modules that deal with the social and ecological aspects, respectively. Together, these modules will provide our cohort of three under-represented high school students with an important interdisciplinary view of urban consumption, waste, recycling, and interconnectivity.

Spring 2012: Understanding the Ecological Footprint of Phoenix Urban Youth

Defined as the area of land needed to provide the necessary resources and absorb the wastes generated by a community, the ecological footprint concept highlights the impact of cities on the environment. We will engage our RAHSS students in research about patterns of consumption, production, and waste disposal that shape food systems and impact the ecology of cities. The students will work with Dr. Kelli Larson and Ph.D. candidate Erin Frisk to develop and conduct youth surveys and educational workshops for identifying the motivations and barriers to reducing the urban ecological footprints of youth in the Phoenix area. They will also assist in the development and delivery of youth education programs that discuss sustainable food and waste practices. These activities will expose the students to methods of collecting and analyzing quantitative and qualitative data through tools such as Excel and Survey Monkey. The students will also conduct background research using search engines and web-based research tools.

Summer 2012: The Many Facets of Water in an Arid City

Our 3-student cohort will focus their summer research on water in Phoenix in an experience that will include both lab and field activities. They will study how a constructed treatment wetland at the city's largest wastewater treatment facility is able to deliver expected ecosystem services (e.g. water purification, wildlife habitat) in a hot, arid environment. They will experience the myriad approaches to managing stormwater in Scottsdale through participation in CAP's intensive stormwater research program. And they will examine the habitat values of restored urban wetland environments. In all three cases, the focus will be on ecosystem services and human needs for water management. The students will work full-time throughout Summer 2012 with Dr. Dan Childers and Dr. Laura Turnbull in ASU's Wetland Ecosystem Ecology Lab.

ASU Mentoring Plan

The three RAHSS students will move through the two modules as a cohort, and ASU faculty, postdocs, graduate students, and undergraduates will mentor them. In spring 2012, Dr. Kelli Larson and graduate student Erin Frisk will mentor the students. Ms. Frisk's doctoral dissertation focuses on youth engagement in sustainability education, and she has been a fellow in the GK-12 Sustainability Science for Sustainable Schools initiative. The three RAHSS students participated in Ms. Frisk's 2011 science, technology, engineering, and mathematics (STEM) summer enrichment workshop on sustainability. In summer 2012, the students' research experience in ASU's Wetland Ecosystem Ecology Lab will be directed with an innovative, multi-level mentoring experience that will include Drs. Childers and Turnbull, Ph.D. students (Ben Warner and Jorge Ramos), and a summer Research Experience for Undergraduates (REU) student (Chris

Sanchez, University of Miami), who had three productive and successful years of RAHSS experience at the Florida Coastal Everglades LTER Program. Additionally, during the students' tenure at ASU, we will arrange for them to interact with the ASU Strategies for Ecology Education, Diversity, and Sustainability (SEEDS) chapter of the Ecological Society of America and to develop a mentoring relationship with undergraduates in this organization who can share experiences of pursuing a science education at ASU.

Advancement of RAHSS Students

While the students will be working with CAP LTER scientists and graduate students only over a seven-month period, we are committed to the students' long-term academic success and ultimate matriculation into higher education. We will continue to engage the students in our scientific program through poster presentations at our January 2013 All Scientists Meeting and through Ecology Explorers' activities that involve high school students. As noted above, we intend to foster a long-term relationship between the RAHSS students and the ASU SEEDS chapter.

All three students are currently involved in the AZ Quest program, which prepares students, who would otherwise not have the opportunity, for success in higher education through mentoring, enrichment, and college guidance. AZ Quest works to ensure that participating students are college bound, and 89% of the students in the program have enrolled in higher education institutions directly after high school.

We also will work with ASU to build the students' awareness of the various programs at the university that support students from underserved populations in their dreams to attain a college education. Such programs include the Upward Bound Program, which assists students in graduating from high school and earning a Baccalaureate degree, and the Collegiate Scholars Program, which allows seniors in high school to take courses at Arizona State University for credit.

Education Supplement Budget	
Participant Costs	
Stipends (3 students @ \$4000 each)	\$12,000
Other: participant supplies & travel (\$1000/student)	\$3,000
Total Direct Costs	\$15,000
Indirect Costs (25% on stipends)	\$3,000
TOTAL	\$18,000