

DATE: March 14, 2003

TO: Dr. Henry L. Gholz
Program Director, Long-Term Ecological Research (LTER)
Division of Environmental Biology, National Science Foundation

FROM: Nancy Grimm and Charles Redman, CAP LTER Co-PDs

RE: 2002 General **Supplements Request** - NSF grant(s) # **DEB-9714833** (CAP LTER:
Land-use change and ecological processes in an urban ecosystem of the Sonoran
Desert)

CAP LTER is requesting supplemental funds in the amount of \$25,000 to buy landscaping materials with which to set up 18 Experimental Residential Yards.

**EXPERIMENTAL RESIDENTIAL YARD DESIGN
CAP LTER PERMANENT RESEARCH PLOTS**

A unique opportunity has been made available to us by the creation of a new campus with residences. These properties are being renovated and we can define landscape treatment. Close oversight will be provided by 2 CAP core scientists, Chris Martin and Jean Stutz, who are now located on ASU's East Campus.

Support is requested to purchase materials (namely plant, landscape surfacing, and irrigation materials and supplies) to create an experimental landscape framework of residential yardscapes at 18 rental properties owned by Arizona State University at its East campus location (ASUE). Our intent is to initiate complete residential yardscapes that will form the backbone for long-term experimental research at CAP. The experimental design consists of three different residential landscape / irrigation delivery types within ASUE's North Desert Village, which comprises a total of 152 homes.

The arid climate of the CAP study region means that sustainability of urban vegetation is predicated on irrigation to supplement the paucity of normal rainfall making it important to also consider method of water delivery coincident with landscape design type (Martin 2001). Moreover, CAP researchers have found that the structure and productivity of residential vegetation in the Phoenix area is related to human preference for oasis and mesic landscape design type (Martin et al. 2003). This preference pattern generally increases residential landscape water use and lowers vegetation water use efficiency (Martin & Stabler 2002) despite the emergent popularity of desert landscaping in Phoenix, which is predominately a top-down social

phenomenon directed by public and private interest groups for residential homeowner use (Martin 2001).

The three residential landscape design/water delivery types (mesic/flood, oasis/mixed, and xeric/drip) will recreate the three most prevailing residential yardscapes types found across the CAP study area during the last five years of research (Martin et al. 2003). The mesic design/flood type will consist of a mixture of exotic “high water use” vegetation and turfgrass that is irrigated by flood irrigation technology. The oasis design/mixed type will consist of a mixture of drip-irrigated, “high” and “low” water use plants and sprinkler-irrigated turfgrass. The xeric design/drip type will consist of drip-irrigated, “low water use” plants without turf grass. The three residential yard types will each be established in groups of 6 replicates, to form mini-neighborhoods. Common areas adjacent to each replicated yardscape type will be landscaped in a similar manner. The additional yards in this development (which are shortly to be converted to “xeroscape” i.e. gravel with no plants, by ASU facilities management) will serve as buffers and controls around the CAP experimental homes.

The residential yardscape plantings that this supplement will help to create, will provide a replicated residential landscape “framework” that will constitute a long-term experimental facility for CAP researchers. The overall design will be flexible to internal modifications and experimentation and will provide a replicated residential landscape within which numerous CAP research projects can be carried out (e.g. soil trace gas flux measurements, soil micro flora and arthropod studies, bird and small mammal diversity and behavior, net primary production and gas exchange work, microclimate monitoring). To date CAP research has relied on using privately owned residential properties on which to conduct the majority of its research and core monitoring on urban landscapes. The addition of a replicated residential yard “experiment” where CAP researchers can set up a factorial treatment design, on property owned by ASU, will make a significant contribution to CAP’s long-term research and will constitute a “showcase” example of urban ecological research.

REFERENCES

Martin, C.A. Landscape Water Use in Phoenix, Arizona. *Desert Plants* 2001 17:26-31.

Martin, C.A., L.B. Stabler. Plant gas exchange and water status in urban desert landscapes. *Journal of Arid Environments* 2002 51:235-254.

Martin, C.A., Peterson, K.A., Stabler, L.B. Residential landscaping in Phoenix, Arizona: Practices, preferences and covenants codes and restrictions (CC&Rs). *Journal of Arboriculture* 2003 29:9-17.