Water webs connect spiders, residents in Southwest

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During dry periods, thirsty wolf spiders pursue crickets more aggressively, seeking water rather than nutrition. (Photo credit: Kevin McCluney/Arizona State University)

(PhysOrg.com) -- If you are a cricket and it is a dry season on the San Pedro River in Arizona, on your nighttime ramblings to eat leaves, you are more likely to be ambushed by thirsty wolf spiders, or so a June 19 study suggests, published in the journal *Ecology*, and featured in the journal *Science*.

A potential horror story for any cricket. However, it is also a tale of water limitation that looks beyond how most ecosystem studies are

considered. Much current work about the relationships between predators and prey is based on nutrients or energy limitation - via a food web.

The research, performed by graduate student Kevin McCluney and associate professor John Sabo in School of Life Sciences at Arizona State University, demonstrates that under restricted water conditions, crickets consume more moist green leaves and wolf spiders more crickets. This distinct increase is driven by water limitation and the connectivity between organisms based on water - a water web.

With water the key ingredient to life, especially in the desert, why the focus on crickets and spiders and water webs? Studies on insects and riparian ecosystems such as these lend specific insights into how arid and semi-arid environments and their flora and fauna may be specifically affected by global climate change.

The authors note: “Water seems to be the ecological currency governing consumption behavior at multiple trophic levels, which indicates a role for water in understanding effects of global change on animal communities.”

This article coincides with the June 18 release of the national report “Global Climate Change Impacts in the United States,” funded by the National Science and Technology Council and authored by members of the U.S. Global Change Research Program, including ASU professor Nancy Grimm. The report contains a special section on the Southwest. Major changes in soil moisture and precipitation are expected as a result of climate change. McCluney and Sabo’s study highlights one way ecological communities may be affected.

“Kevin’s experiments suggest that by understanding water webs, we can find clues about how biodiversity may change as our region experiences

drier climates under climate change," adds Sabo.

In that way, this study of crickets and spiders offers a looking glass into a future that extend much farther than the banks of one of the last undammed perennial rivers in the Southwest and the vibrant riparian community it supports.

"Drylands constitute more than one third of the land mass on Earth," McCluney notes. "While further testing is needed, our study may have implications for other ecosystems in light of recent reports of droughts and rivers drying up globally."

In addition to examining the water ties that bind inhabitants of terrestrial systems, Sabo and his students also examine aquatic ecosystems and the effects of human activity and water policy in the Southwest. In 2008, with funding from the National Science Foundation, Sabo launched a series of workshops to examine the impacts of dams on waterways in the United States held at the National Center for Ecological Synthesis and Analysis at University of California, Santa Barbara.

Participants are working to define the ecological footprint that dams have had on water quantity and quality, the number of native and non-native species in rivers, the salinity of soils in some of the most productive agricultural areas, and the demand for irrigated water by the 100 largest cities in the United States. Along with studies by his ASU colleagues in the Global Institute of Sustainability and the College of Liberal Arts and Sciences, such as Juliet Stromberg, author of "The Ecology and Conservation of the San Pedro," Sabo seeks to illuminate the complexity of relationships behind developing sustainable management of water resources for both human and biodiversity needs.

Provided by Arizona State University (news : web)