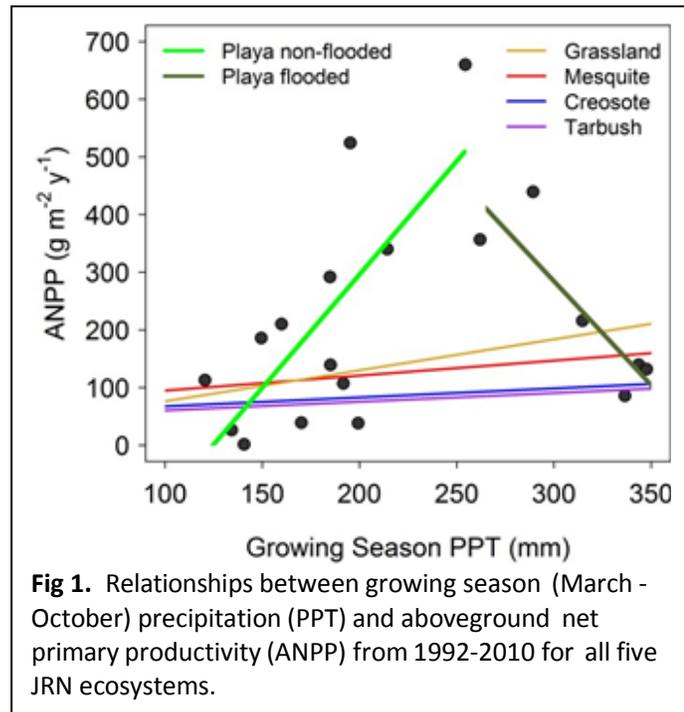


Playa wetlands as hot spots of desert nutrient storage and ANPP

Contact(s): Owen McKenna and Osvaldo Sala

Abstract: Drylands are biologically and physically shaped by water. The temporal heterogeneity of water delivery to drylands controls ecosystem functioning and creates a landscape with a spatially heterogeneous nutrient distribution. Playas are ephemerally flooded wetlands located in topographic low areas of closed

dryland catchments. Recharge playas are flooded via precipitation and surface runoff from the upland areas of the closed catchment. Little is known about the functioning of lowland areas such as recharge playas that receive water runoff from upland ecosystems. Due to the difference in water-cycling dynamics between playas and upland ecosystems we believe playas to function uniquely in both space and time. We have two research questions about the role of playas as biogeochemical hotspots. (1) Do playa soils store a disproportionately large amount of nutrients and cations, relative to their area within a desert basin? (2) Do playas function through time differently than upland ecosystems? To answer these questions we combined newly collected soil chemistry data with long-term soil, climate, and ANPP data from the Jornada LTER (JRN). We found that playas are the only ecosystem type in JRN that contain a disproportionately large amount of soil nutrients and cations relative to their area. Playa ecosystems had the highest mean ANPP from 1992-2010. They also had the highest coefficient of variation in that same time. The major differences between the response of playa and upland ecosystem ANPP to PPT are only apparent when flooding is taken into account. In years that the playa did not flood, the response of ANPP to PPT is ~7 times greater than upland ecosystems. Playas are important areas of ANPP and soil-nutrient storage. Strong responses to precipitation make playa functioning very susceptible to climate change.



Relationship with the LTER VI proposal: This is most related to Objective 5a of the LTER-VI objectives: “Hydrologic lateral connectivity.”

Literature Cited: McKenna, OP and Sala OE. In Prep. Playa wetlands as hot spots of dryland biogeochemistry. Ecology.