

# Long-Term Monitoring Data at CAP-LTER

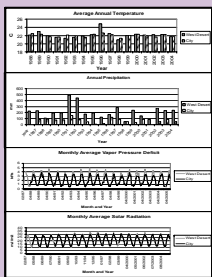
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## Climate

Climate parameters measured by two stations within the armet network, Litchfield Park and Phoenix Encanto

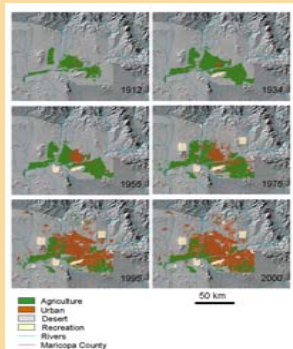


Precipitation is consistently higher in the Western outskirts of the city (Litchfield Park), while the vapor pressure deficit is lower in the irrigated neighborhood (Encanto). Differences in solar radiation are small.

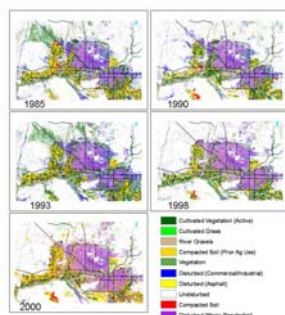
As a Long-term Ecological Research Site, CAP is accumulating several long-term datasets based on active monitoring efforts. Variables monitored include bird and ground arthropod diversity and abundance, water quality in the region's surface water, atmospheric deposition, and net primary productivity. Other long-term datasets are based on mining and analyses of data that covers a more extended period of time than does active monitoring. These datasets include land use-land cover and climate. Most data analyses to date have compared the different land uses. Here, we present time series of the available long-term monitoring data at CAP. Most time series follow the temporal pattern of rainfall to varying degrees. However, different patterns emerge in urban land uses, where rainfall has a lesser influence because of irrigation.

**Acknowledgements:** This material is based upon work supported by the National Science Foundation under Grant No. DEB-0423704, Central Arizona - Phoenix Long-Term Ecological Research (CAP LTER). Any opinions, findings and conclusions or recommendation expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF). We would like to thank the large number of faculty, graduate students, undergraduate student, and technicians who have been involved in this massive data collection effort.

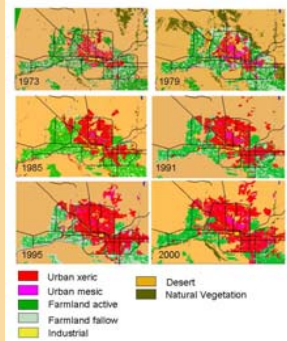
## Land-Use and Land-Cover



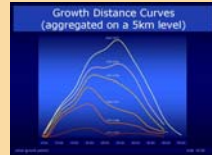
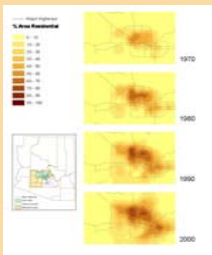
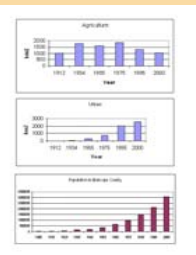
Land-Use classification based on historic land-use information and recent Maricopa Association of Governments land-use classification.



Land-Cover classification based on Landsat remotely sensed data and an Expert Oriented Classification System.



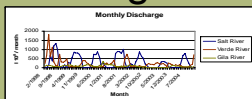
Land-Cover classification based on Landsat remotely sensed data and an Object Oriented Classification System.



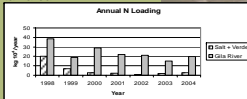
A variety of land use change models illustrate the shift from agriculture to residential development across the CAP LTER study area.

Despite dramatic growth of the urban population and expansion of residential and urban land uses in central Arizona, few directional trends in ecological variables have been observed. Rather, rainfall (or watering) exerts a primary influence on temporal pattern. Large differences in river discharge and chemistry, atmospheric deposition, and annual precipitation between urban and ex-urban locations reflect the compound effects of activities of the more than 3 million inhabitants of Phoenix.

## Biogeochemistry

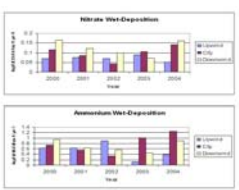


Discharge of Salt and Verde Rivers were measured below the dams, discharge of the Gila River was measured downstream of the metropolitan area.



During wetter years the Gila River transports about twice as much nitrogen out of the city as the Salt and Verde River bring into the city. This relationship changes during drier years.

In drier years wet deposition does not show a clear pattern of upwind-city-downwind concentration of Nitrogen. Within 20 years the concentration of Zink has gone up and Lead has gone down in the Phoenix atmosphere.



Atmospheric deposition was measured with local dry-wet bucket systems and lichens collected from the mountains in and around the metropolitan area.

## Biodiversity

Fig. A: Ground Arthropod Abundance in Different Land-Uses

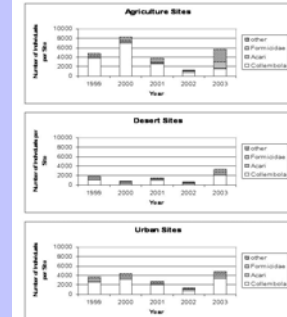
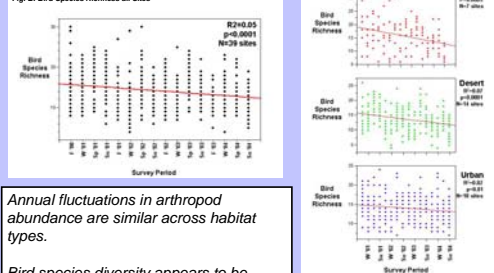


Fig. C: Bird Species Richness in Different Land-Uses

Fig. B: Bird Species Richness all Sites

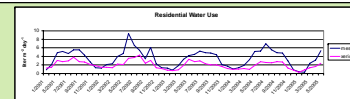
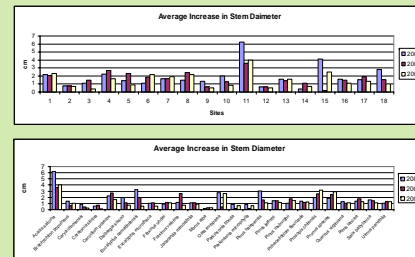


Annual fluctuations in arthropod abundance are similar across habitat types.

Bird species diversity appears to be declining over time.

Fig. B,C: Three observers counted birds using 15 minute point counts at each site over the course of 5 weeks in each season: Fall (F), Winter (W), Spring (Sp), and Summer (Su).

## Net Primary Productivity



Residential water use fluctuates seasonally in both mesic and xerically landscaped residences, however, a lot of water is used in xeric landscapes.

Net primary productivity varies by year, location, and species but is not significantly influenced by low rainfall as the sites are all irrigated.