Perspectives on a Decade of Climate in the CAP LTER Region

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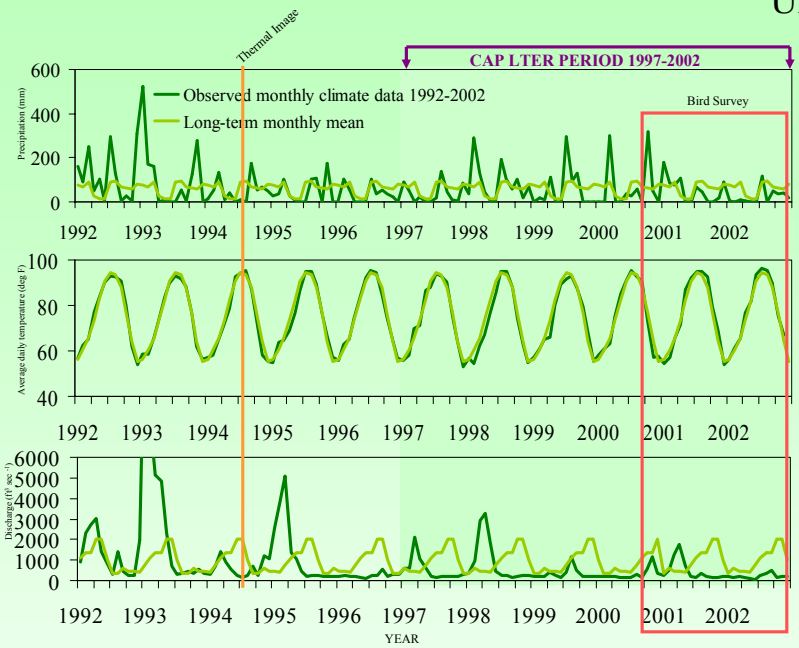

Figure 1. Monthly mean of average daily temperature and monthly sum of precipitation over the past decade for the CAP LTER region and mean discharge of the Salt River for the same period. The dark green line represents the observed data for the period 1992-2002. The light green line represents long-term averages of the same monthly values. The temperature and precipitation data were recorded at Sky Harbor Airport and the long-term record spans from 1948 to the present. Streamflow data were recorded directly above Roosevelt Dam and the long-term record spans from 1913 to the present.

Figure 2. Temperature images derived from airborne TIMS data acquired on July 14, 1995 at 2:45am. The temperatures vary from 38 to 104 degree F, with red: 98-104; orange: 92-97; yellow: 86-91; green: 80-85; cyan: 74-79; magenta: 68-73; blue: 62-67; and black: < 61. Interpretation and application of temperature images could be effected by anomalous temperature or precipitation regimes. See Fig. 2 for a more detailed look at local climate at the time the image was recorded.

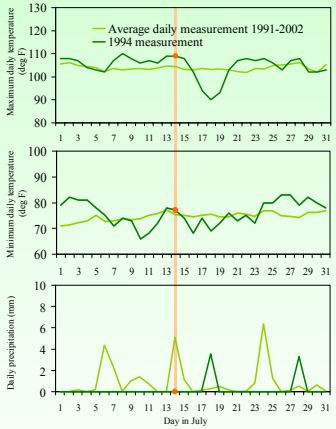

Figure 3. Daily maximum and minimum temperature and precipitation values (dark green line) for the time period surrounding July 14th, the date Fig. 2 was recorded. The light green line represents the mean values for each day in July for the period 1991-2002. Climate values recorded at the Phoenix Encanto climate station. The orange vertical line and dots highlight temperature and precipitation values for July 14th.

CLIMATE OF THE CAP LTER

Precipitation:
- All five years experienced a dry period in late spring and early summer.
- 1997 and 2002 received below-average precipitation.
- Notably dry periods occurred in Winter 1999-2000, late 2001, and early 2002.
- Wet winters of 1992-93 and 97-98 coincide with the El Niño/Southern Oscillation
- High variability of precipitation should be taken into account when interpreting ecological data.

Temperature:
- Average daily temperature was much less variable than precipitation and streamflow.
- Would slight changes in temperature between years play a large role in ecological dynamics?

Streamflow:
- Streamflow data from relatively unregulated section of the Salt River, above Roosevelt Dam.
- Peaks in streamflow coincide with El Niño winters (1992-93, 1994-95, 1997-98)
- Peaks in streamflow since CAP LTER establishment do not coincide with long-term seasons of peak flows (e.g. winter 1994-95, 1997-98).
- Extended periods of low flows occurred during CAP LTER period (e.g. June 2000 to present).

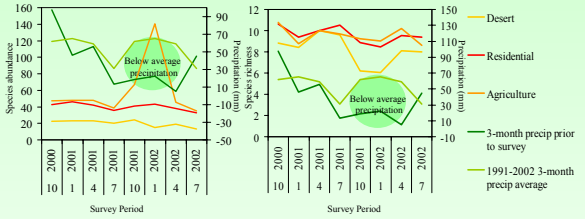

Figure 4. Bird species richness and abundance data compared to precipitation. The dark green line represents 3-month precipitation sum for the time period prior to when each bird survey was conducted. The light green line represents the 1991-2002 mean 3-month precipitation sum for the same time periods. Bird species abundance and richness were collected in desert, residential, and agriculture land-cover types.

??WHEN DID YOU COLLECT YOUR DATA???

WHERE CAN YOU FIND CLIMATE DATA?

RECENT METEOROGICAL DATA

NOAA's National Climatic Data Center provides daily, monthly, and annual climate data:
http://www.ncdc.noaa.gov/oa/ncdc.html

USGS provides daily and monthly streamflow, recent as well as historical:
http://az.water.usgs.gov/rtaz/html/rtsw.html

HISTORICAL DATA

High quality streamflow data from the USGS Hydro-climatic data network:
http://ingrid.ldeo.columbia.edu/SOURCES/.USGS/.HCDN/

PALEOCLIMATE DATA

NOAA's National Climatic Data Center hosts a paleoclimatic databank:
http://www.ngdc.noaa.gov/paleo/data.html

CLIMATE AND REMOTE SENSING IMAGE INTERPRETATION

- The region received **no precipitation during the two weeks prior to the recording of the remotely sensed image** (Fig. 3, bottom graph). Maximum and average daily temperatures showed typical values for the time period (Fig. 3, top and center graphs).
- **Variability in temperature and precipitation would effect the thermal characteristics of land covers in urban areas.** Identical images captured in different years would likely produce different temperature values. What remains to be determined is whether different temperature values would lead to different interpretations of the remotely sensed image.

RELATIONSHIPS BETWEEN DROUGHT AND BIRD SPECIES RICHNESS AND ABUNDANCE

- **The end of 2001 and beginning of 2002 received below-average precipitation.** In Fig 1, right graph and Fig. 4, the dark green line represents the recorded precipitation and the light green line represents the long-term average for the same time period.
- A comparison of preceding precipitation and bird richness showed **desert areas to be most responsive to periods of below average precipitation** (Fig. 4, top graph, yellow line). This may be due to the lack of influence of drought on agricultural and residential areas from irrigation.
- A comparison of preceding precipitation and bird abundance showed agricultural land cover to have high abundance during drought. The pattern of high abundance during below-average precipitation may be coincidental due to the large amount in variability found bird abundances in agricultural areas (error bars not shown).