Primary Productivity at the CAP LTER

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CAP LTER PP Research Specialty Areas and Lead Investigators

Remote Sensing, Dr. John Briggs
Abiotic impacts on terrestrial primary productivity, Dr. Thomas Day
Primary productivity of urban lakes, Dr. Milton Sommerfeld
AM fungal biodiversity in cities, Dr. Jean Stutz
Human impacts on terrestrial primary productivity, Dr. Chris Martin

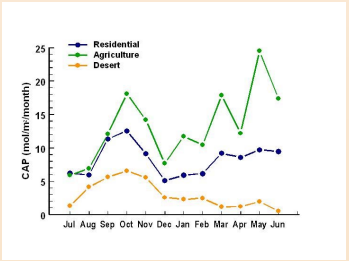
CAP LTER PP research activities are in response to compelling research questions

What changes in PP are characteristic of 1) conversion of natural vegetation and agriculture to suburban and urban uses, 2) supplementation of water availability via irrigation, and 3) at the largest scale, long-term trends in land use patterns?

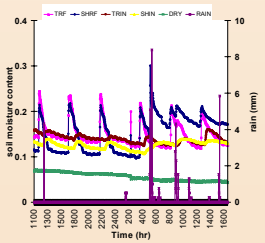
What are the rates of PP exhibited by terrestrial and aquatic vegetation associated with various land-use patches of the region and how are rates at larger scales dependent on patch size, shape, location, and configuration?

How does water chemistry, algal biomass and algal composition in urban lakes relate to lake source water type and lake age?

Do land use changes affect patterns of arbuscular mycorrhizal fungal biodiversity and below ground NPP?



Carbon acquisition potential (CAP) of vegetation at residential, agricultural, and remnant Sonoran Desert sites during 1998-99.



Weekly time course of diel cycles of soil moisture at 20-cm depth at the Desert Botanical Garden long-term monitoring site. Each value is an hourly mean. High volume irrigation of trees and shrubs = blue and magenta. Low volume irrigation of trees and shrubs = yellow and red. Non-irrigated soil = green. One hour precipitation values are also shown as line bars.

Scope of CAP LTER PP Projects

1. Studies of six urban lakes spanning maximum variation in age and water source.

2. Comparative study of former land use history and landscape design type.

3. Study of landscape surface on microclimate and productivity of oleander.

4. Analysis of AMF diversity in soil samples from 200 site survey.

5. Spatial patterns of below ground carbon fluxes in drip irrigated residential landscapes.

6. Effects of human management practices on landscape productivity.

Key Recent Findings

1. Urban lake source water type was more influential than lake age in determining lake physicochemistry and biology.

2. Dissolved metals and organic (BTEX) were found at low or undetectable levels in urban lakes.

3. Impervious surfaces decreased oleander productivity during summer and increased productivity during winter during to increased heat storage and re-radiation.

4. Trees were more highly colonized by AMF at desert sites than residential sites.

5. Urban terrestrial primary productivity was driven by irrigation water inputs. Seasonal productivity was highest in fall and spring with highest water use efficiency in winter.

Some Future Research Initiatives

1. Conducting intensive and extensive long term monitoring at residential, commercial, industrial, and public sites

2. Using remote sensing to study carbon source/sink relations in response to land cover and land use changes

3. Studying mechanistic linkages exist between socioeconomic factors, human landscape preferences, and the structure, composition, and productivity of urban plant communities? -

4. Analyzing AMF biodiversity and impacts on terrestrial plant productivity