

**THE AIM...**

Proposed core monitoring activities for CAP Phase II are shown in the central table, listed under the traditional LTER core areas of: primary productivity, populations, human dimensions, climate, watershed biogeochemistry and soils. During the course of the day we hope to establish how these monitored variables will link with research proposed under the five main Integrative Project Areas.

# Core Monitoring for CAPII

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## Core Monitoring Variables – Current and Proposed

Core Research Areas from CAP I	Primary productivity	Populations	Human Dimensions	Climate & Hydrology	Watershed BGC & Soils
<p><b>Legend:</b></p> <p><b>Bold indicates variables currently being monitored</b></p> <p><i>Italics indicate proposed additions</i></p> <p><b>What are the patterns &amp; drivers of land-use change in PHX?</b></p> <p><b>What are the social-ecological consequences of different trajectories?</b></p> <p><b>The urban fringe/rural interface</b> Impact of different scales, time lags, character socio-economic, type of development? Ecological consequences of interface/tension (lags, taxon) <i>Need monitoring here??</i></p> <p><b>What are the consequences of the temporal/spatial differences?</b> Between and among evolution/ecology/biology (taxon-specific) and socio-economic processes <i>Need monitoring here??</i></p> <p><b>Fragmentation –see populations group</b> (link with development time trajectory)</p> <p><b>Legacy effects</b> How important are historical imprints v. current use? Ecosystem memory Socio-economic factors leading to land-use changes</p> <p><b>Mismatch between Cultural/Sociological (faster?) &amp; Ecological (slower?) process rates?</b> Threshold effects, perturbation, age/lag effects on biota</p> <p>Frequency: * every 5 yrs on survey 200 ‡ quarterly at pilot PP sites &amp; President's House, DBC, Community Services ‡ bimonthly to quarterly at 200 survey sub-set ⊕ continuous at permanent plots</p>	<p>canopy cover*</p> <p>plant hgt*</p> <p>leaf scale gas exchange*</p> <p>soil respiration rates *</p> <p>shoot extension*</p> <p>chlorophyll content &amp; tree growth (annually @ 50 sites)</p> <p><i>foliar cover, plant height and canopy cover – especially for Salt R. riparian corridor (Stromberg)</i></p> <p>above ground plant biomass</p> <p><i>below ground biomass/roots/ mycorrhizae?</i></p> <p>algal PP in urban lakes</p>	<p>birds⊕ (@ 50 sites, including 10 riparian)</p> <p>pitfall traps for ground arthropods⊕</p> <p>sweep nets*</p> <p>mycorrhizae*</p> <p>plant sp. div.*</p> <p>pollen diversity &amp; abundance*</p> <p><i>plant ground cover by species in Salt R. riparian corridor (Stromberg)</i></p> <p>sweep netting in Salt R. riparian corridor (Stromberg)</p> <p><i>light traps, vacuum sampling &amp; Berlese funnels</i></p> <p>social insect colony surveys</p> <p><i>algal populations in urban lakes herps, fish, mammals</i></p>	<p>litter, graffiti, disturbance* landscape mgmt (irrigation type &amp; appearance)*</p> <p>human activity surveys*</p> <p>PASS (Harlan)??</p> <p>land cover &amp; NDVI via remote sensing (Stefanos)?</p> <p>water inputs to residential landscaping (@ pilot residential sites and Presidents House, monthly)</p> <p><i>land ownership &amp; land parcel data</i></p> <p><i>land &amp; housing values</i></p> <p>building permitting</p> <p><i>traffic measures (counts, density mapping, travel times)</i></p> <p><i>sensory surveys (e.g. viewsheds, sound, night-time lights)</i></p> <p>population age, ethnicity</p> <p>housing density</p> <p><i>yard management (fertilization, herbicide &amp; pesticide regimes, pruning frequency)</i></p>	<p>temperature⊕</p> <p>dewpoint ⊕</p> <p>relative humidity ⊕</p> <p>PAR ⊕</p> <p>windspeed &amp; direction⊕</p> <p>soil temp &amp; moisture⊕</p> <p>evaporation for Tempe town lake (last 3 yrs) and ASU main campus (since 1982)</p> <p><i>surface water flow rate and soil moisture (0-30 cm depth) in Salt R. riparian corridor (Stromberg)</i></p>	<p>WMP surface water chemistry (major nutrients &amp; ions) at 5 sites bimonthly</p> <p>ADP wet &amp; dry dep at 8 sites (major nutrients &amp; ions) monthly/after every rain</p> <p>soil N, C, P concentrations &amp; pools (0-30cm depth)*</p> <p>soil pH, texture &amp; conductivity*</p> <p>soil N min (sub-set of 200 survey)</p> <p>throughfall &amp; runoff chemistry (nutrients &amp; major ions)</p> <p>microbial community composition (Rainey)</p> <p><i>soil trace gas fluxes NO, NO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> (Kaye)</i></p> <p>atmospheric CO<sub>2</sub> (Kaye)</p> <p>plant tissue chemistry (Gries)</p> <p>air pollution monitoring</p> <p>nutrient turnover rates (Grimm?, Kinzig?)</p> <p>nutrient, heavy metals, PAH &amp; VOC build-up on impervious surfaces (Grimm, Stock?)</p> <p>subsurface water chemistry (Grimm?)</p> <p>litter decomposition</p> <p>household level nutrient budgets (Baker et al)</p>

### Land Use – Land Cover Change

What are the patterns & drivers of land-use change in PHX?

What are the social-ecological consequences of different trajectories?

**The urban fringe/rural interface**

Impact of different scales, time lags, character socio-economic, type of development?

Ecological consequences of interface/tension (lags, taxon)

*Need monitoring here??*

What are the consequences of the temporal/spatial differences?

Between and among evolution/ecology/biology (taxon-specific) and socio-economic processes

*Need monitoring here??*

**Fragmentation –see populations group**

(link with development time trajectory)

**Legacy effects**

How important are historical imprints v. current use?

Ecosystem memory

Socio-economic factors leading to land-use changes

**Mismatch between Cultural/Sociological (faster?) & Ecological (slower?) process rates?**

Threshold effects, perturbation, age/lag effects on biota

### Biodiversity

**I. Diversity and Trophic Structure**

What determine them?

How do they differ in urban areas?

*methods...*

Descriptive & comparative work (local & regional scales)

Manipulative expts (ASU East)

**Monitoring**

**II. Fragmentation**

Is urban fragmentation different? Which species are affected?

*methods...*

species-area relationships

compare urban land cover/patch types with similar sized desert remnants

**III. Invasive/Exotic Species**

What are the effects on local communities? Which life history features are favored?

*methods...*

Comparative (life histories).

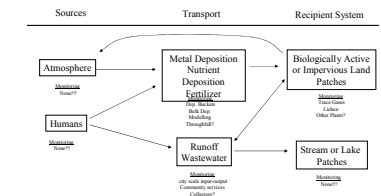
Expts. (ASU East)

reciprocal transplants (native:non-natives, invasive:non-invasives)

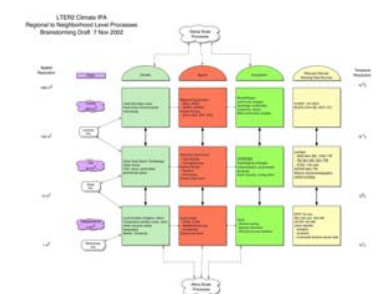
selection experiments

**YOUR INSTRUCTIONS...**  
Please take a few minutes to look at the CAP II research areas you are most interested in & give your comments on where clear links are with the proposed monitoring work OR where monitoring WOULD BE needed. Use the Post-It notes. Thanks!

### Land-Air-Water Linkages in Biogeochemistry



### Local Climate & Ecosystem Responses



### Urban Contaminants, Ecosystem Processes and Quality of Life

- Primary Research Questions:**
- How do contaminants and toxins (in atmosphere, soil, water) vary spatially, temporally, and sociodemographically?
  - What are the effects of peaks, averages, pollution hot spots & transport patterns on quality of life, neighborhood well-being, and ecosystem processes across different temporal and spatial scales?
  - What is the relationship between resident risk perceptions & actual contaminants and pollution loads at the neighborhood scale? [Link to 'Knowledge Exchange']
- Organizing Themes:**
- Peaks, averages, and the transport of contaminants**  
Examine acute and chronic concentrations of pollutants  
Assess human exposure and ecosystem effects  
Focus on air, water, soil and indoor/outdoor
  - Place-based community comparisons**  
Develop interdisciplinary case studies of three sites:  
i) urban industrial core (S/SW Phoenix) ii) older but non-industrialized residential area (N Phoenix) iii) developing urban periphery (converted ag or desert area?)  
Array sites along a transect from urban core to developing periphery
- Targeted Research Projects:**
- Monitor spatiotemporal variability in air pollutants & water contaminants**  
Develop spatially specific human impacts measures  
Link indicators (& contaminant distributions) to neighborhoods sociodemographics  
Include other species (e.g. birds) as additional markers of the biological effects  
*Expand LTER monitoring* to include persistent contaminants in targeted areas.
  - Characterizing the Phoenix 'riskscape'**
  - Legacy effects of contaminants and toxins**
  - Longitudinal Study of the Emissions Banking program in Maricopa County.** Acquire baseline measures of criteria air pollutant concentrations  
**Monitor** sociospatial patterns of participating businesses and local changes focusing on particulates, sulfur dioxide, carbon monoxide, nitrogen oxides, VOCs

### Water Policy

