

In Partial Fulfillment of the Requirements for the Degree of

Master of Science
Geneviève Metson

Will defend her thesis

Phosphorus Cycling in Metropolitan Phoenix

Abstract

Phosphorus (P), an essential element for life, is becoming increasingly scarce, and its global management presents a serious challenge. As urban environments dominate the landscape, we need to elucidate how P cycles in urban ecosystems to better understand how cities contribute to—and provide opportunities to solve—problems of P management. The goal of my research was to increase our understanding of urban P cycling in the context of urban resource management through analysis of existing ecological and socio-economic data supplemented with expert interviews in order to facilitate a transition to sustainable P management. Study objectives were to: I) Quantify and map P stocks and flows in the Phoenix metropolitan area and analyze the drivers of spatial distribution and dynamics of P flows; II) examine changes in P-flow dynamics in the urban-agricultural interface (UAI), and the drivers of those changes, between 1978 and 2008; III) compare the UAI's average annual P budget to the global agricultural P budget; and IV) explore opportunities for more sustainable P management in Phoenix. Results showed that Phoenix is a sink for P, and that agriculture plays a primary role in the dynamics of P cycling. Internal P-dynamics in the UAI shifted over the 30-year study period, with alfalfa replacing cotton as the main locus of agricultural P cycling. Results also suggest that the extent of P recycling in Phoenix is proportionally larger than comparable estimates available at the global scale due to the biophysical characteristics of the region and the proximity of various land-uses. Uncertainty remains about the effectiveness of current recycling strategies and about best-management strategies for the future because we do not have sufficient data to use as basis for evaluation and decision-making. By working in collaboration with practitioners, researchers can overcome some of these data limitations to develop a deeper understanding of the complexities of P dynamics and the range of options available to sustainably manage P. There is also need to better connect P

management with that for other resources, notably water and other nutrients, in order to sustainably manage cities.

Friday April 29, 2011
1:00 p.m.
Wrigley Hall, Room 481

Faculty, students, and the general public are invited.

Supervisory Committee:
Dr. Dan Childers (co-chair)
Dr. Rimjhim Aggarwal (co-chair)
Dr. Charles Redman (member)