Assessing connectivities in green infrastructure ecosystem services with science-policy dialogues

Mitchell Pavao-Zuckerman[1] & Andrea Gerlak[2]
[1]University of Maryland [2]University of Arizona

mpzucker@umd.edu
ec0p0lis
pavaozuckerman.wordpress.com

BACKGROUND:

- Arid cities use a lot of potable water for landscaping
- Harvesting rain and stormwater with GI can potentially meet this demand
- But in practice, water harvesting has not been implemented to meet this potential

We ask: ***if managers view this semi-arid urban system differently & what are the implications for GI policy and practice?***

METHODS
20 stakeholders from city, county, non-profit, design, neighborhood assoc. sectors

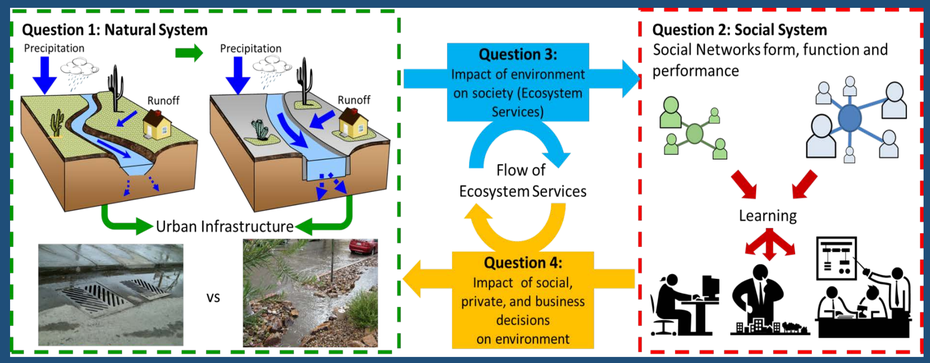
1. Discussed **barriers** and **solutions** to increase water harvesting with GI
2. Groups built **fuzzy conceptual models** of water harvesting in Tucson

RESULTS

- Conceptual models reveal different stakeholder **knowledge systems**
- Policy, management, design, perception, and external drivers were emphasized by different groups as solutions or barriers.

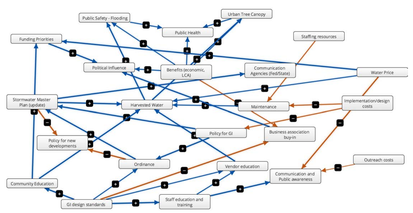
		City	County	Designers	Neighborhood	Non-Profits
Policy, Mgt.	Policy/Ordinance	•		•		•
Policy, Mgt.	Water Mgt/Regulation Driver			•	•	
Policy, Mgt.	Rebates/Incentives				•	•
Policy, Mgt.	Agency Coordination/Silos			•	•	
Design/Tech.	Urban Design and Planning		•	•	•	•
Design/Tech.	Design/Maintenance Standards	•	•	•	•	•
Design/Tech.	Design/Maintenance Training Implementation	•		•	•	
Design/Tech.	Design/Maintenance Costs	•	•		•	
Design/Tech.	Technical Features of GI (#, soils, size)		•	•	•	•
External	Climate/Drought		•			•
External	Price of water	•	•			•
Percept.	Benefits and Values from GI	•	•			•
Percept.	Public Awareness and Education	•	•	•	•	•
Percept.	Culture of water harvesting				•	•

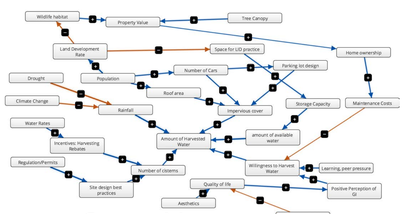
Conceptual maps reveal differences in perception of barriers and solutions for implementing green infrastructure.

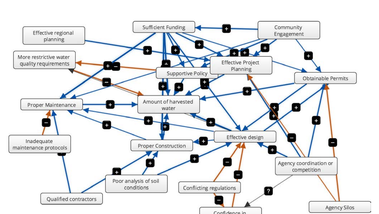


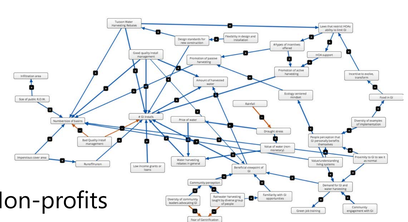
We explore the balance between what is possible and what is practical for water harvesting with green infrastructure. Ecosystem services of green infrastructure serves as a bridging concept between design, policy, and practice.

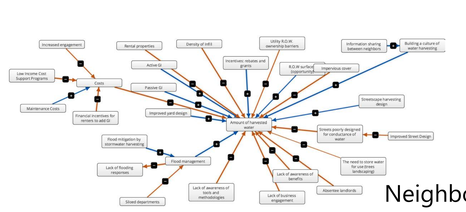
DIGITIZED FUZZY COGNITIVE MODELS


City Managers

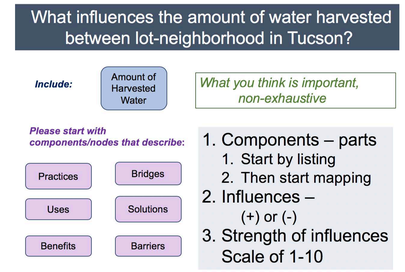

County Managers

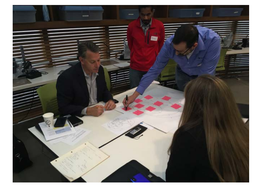

Designers


Non-profits


Neighborhood

Mental Models focused on factors that could increase or decrease water harvesting

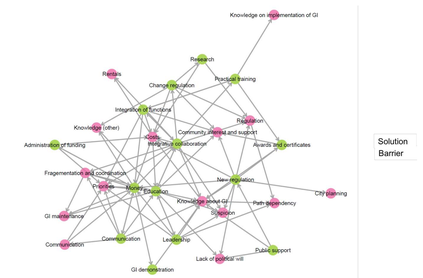





Structural metrics indicated different degrees of complexity and connectedness in models.

	City	County	Designers	Neighborhood	Non-Profits
# Components	23	29	18	29	39
# Connections	36	32	42	28	56
Connection/var	1.57	1.1	2.33	0.97	1.44
#Drivers	6	9	8	23	13
#Receivers	5	1	1	2	6
#Ordinary	12	19	9	4	20
Complexity	0.83	0.11	0.125	0.09	0.46
Density	0.07	0.04	0.14	0.03	0.04

Barrier and solution connections



Some barriers have lots of solutions
knowledge, costs, priorities
Some barriers have few solutions
communication, planning, technical knowledge
Some solutions important for several barriers
education, new rules, integrative collaboration

This work was supported by NSF CNH grant (#1518376). Thanks to Neha Gupta, Lena Berger, David Dziubanski, Yoga Korgaonkar, Phil Guertin, Allison Elder, Liliana Fernandez, Drew Sanderford, Tom Meixner, Adam Henry, Gary Pivo for logistical support and help with facilitation.

UNIVERSITY OF MARYLAND
THE UNIVERSITY OF ARIZONA