Just Add Water:
Benefits of Serendipitous Restoration in an Urban Floodplain

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Introduction and Objectives

As the world urbanizes, efforts to restore urban rivers are on the rise. Despite its high cost, river restoration does not always accomplish its goals. An alternative to actively restoring degraded lands is to allow wetlands to self-assemble at urban storm drains and effluent outflows. For the Salt River in the Phoenix metro area we asked:

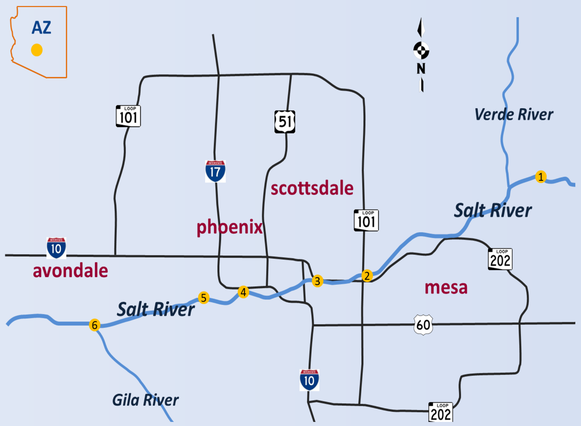
1. Is species diversity at actively restored urban sites similar to that at nonurban controls?

2. Are self-assembled (serendipitously restored) sites as diverse as those that were actively restored?

Methods

To broadly assess ecosystem structure, we sampled abundance, composition, and diversity of several taxonomic groups as well as stream water quality and quantity.

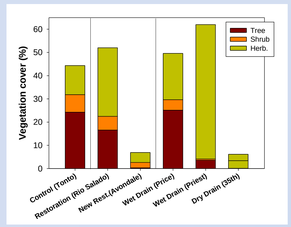
Variable Sampled	Sampling Times	Sampling Method
Riparian vegetation	2012: March, June, Sept	Quadrat sampling (30, 2-m² plots)
Aquatic vegetation	2012: March, June, Sept	Quadrat sampling (9, m² plots)
Herpetofauna	2012: March, June	Visual encounter surveys (6, 20x10 m plots)
Birds	2012: March, June, Dec	Point count surveys (6, 25-m radius stations)
Bees (Hymenoptera)	2012: 4 to 6-week intervals	Aerial net and pan sampling (3, 100 m transects)
Aquatic macroinvertebrates	2012: August	Kick net sampling (18, m² channel and pool plots)
Stream water quality (N, P, DO, EC)	2012: March, June, Sept, Dec	Measured in field or ASU (Lachat Flow Inj. Anal.)
Stream velocity, depth, discharge	2012: March, June, Sept, Dec	Flow meter; meter stick

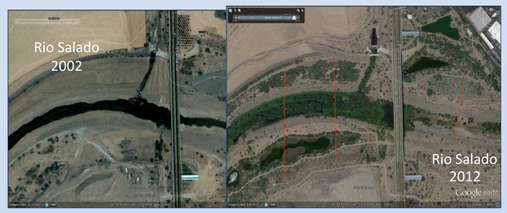


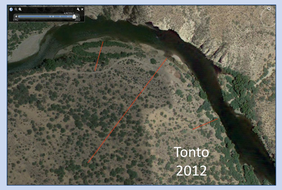
We collected data at 6 reaches along the regulated Salt River: (1) nonurban control (Tonto), (2 & 3) perennially wet drains (Price and Priest), (4) actively restored (Rio Salado), (5) ephemerally wet drain (35th Ave.), (6) newly restored (B&M-Tres Rios at Avondale).

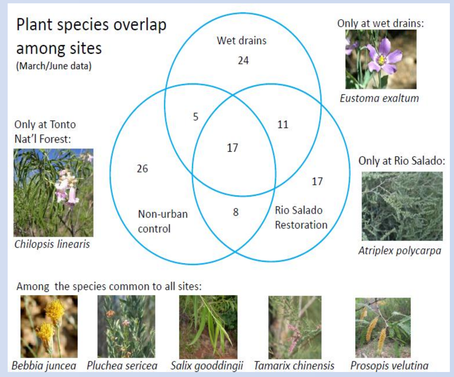
Results: Active Restoration vs. Control

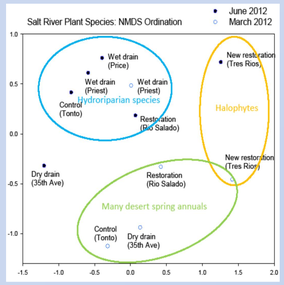
The Rio Salado Restoration site, sustained by pumped ground-water, supports dense plant cover and high diversity of many taxa. However, it has lower richness of reptiles, desert birds, and xeroriparian plants than the control site. Additionally, compared to other sites, Rio Salado has relatively few 'unique' species.









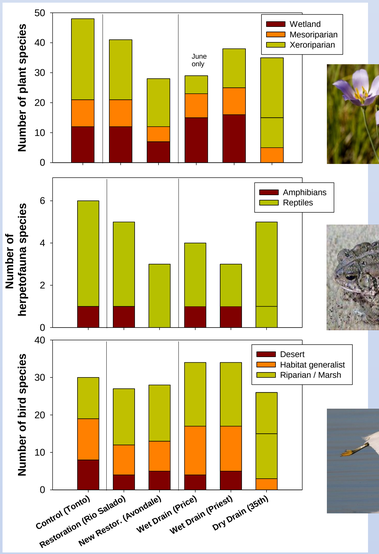


The B&M - Tres Rios (Avondale) site was restored in 2012, via bulldozing and planting.

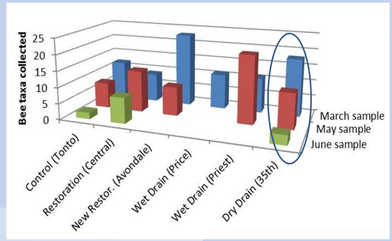
Given its brackish water, "volunteer" halophytes such as *Atriplex* are abundant.

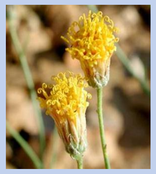
Results: Serendipitous vs. Active Restoration

Storm drain outfalls and/or effluent create perennial flows in the Salt River at Priest and Price Drains. The diversity of amphibians, wetland birds, and wetland plants (and all plants) at such sites was similar or higher to that at actively restored sites.



Flows in the Salt River at 35th Avenue are ephemeral and irregular. Xeroriparian shrubs dominate, and support high numbers of bees.





Conclusions

- The urban restoration site was depauperate in xero-riparian taxa. Restoring such species to urban settings will require widening floodplains or providing connectivity to adjoining terraces.
- Serendipitous wetlands sustain high diversity of wetland taxa, including some rare species. Storm drains and effluent can provide inexpensive high quality restoration, provided a permanent water source is secured.
- Ephemeral-flow drains support taxa such as xeroriparian shrubs and bees (important local pollinators) and thus contribute to river-wide diversity.

Acknowledgments

- Funding provided from CAP LTER
- Field assistance by Rebecca DePuydt, Robert Madera, Andy Bridges, Cody Woodrow, Shero Holland, Rachael Cernetic
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