



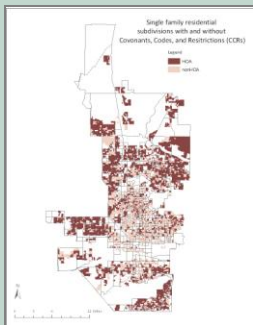
# Water Demand Management in Planned Residential Developments

V. Kelly Turner

School of Geographical Sciences and Urban Planning  
Arizona State University

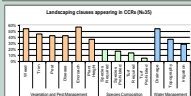
## Privatizing Residential Landscapes

Private residential communities have emerged as a dominant feature in urban landscapes, and while some communities require water intensive management practices, others do not. These communities are privately designed and managed by a network of stakeholders in the development industry. These stakeholders influence both landscape structure and maintenance practices by virtue of Covenants, Codes, and Restrictions (CCRs) enforced by Homeowners Associations (HOAs). This research presents a typology of networks associated with private residential development--top-down, centralized, and collaborative--and identifies the ways in which different network structures potentially influence outcomes of management decisions. Furthermore, networks are situated in a broader social-ecological context, therefore, discourses related to this broader context were identified through stakeholder interviews.



Approximately 60% of single family homes have CCRs.

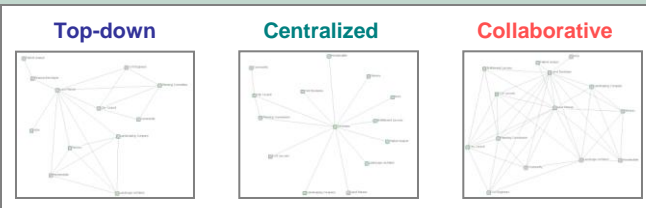
Privately developed and managed communities increasingly dominate the landscape.



CCRs influence water demand by regulating vegetation and pest management, species composition, and water management.

## Structure of Networks

Planned community development networks may exhibit top-down, centralized, or collaborative structures. Differences in how relationships between actors are structured influence decision-making outcomes.



Four types of network centrality were ranked low, medium, and high relative to the other models.

| Model         | Density | Centrality | Betweenness/Modularity             | Broker                  |
|---------------|---------|------------|------------------------------------|-------------------------|
| Top Down      | Medium  | Medium     | High Modularity, Low Betweenness   | Land Planner            |
| Centralized   | Low     | Highest    | Low Modularity, Low Betweenness    | Developer               |
| Collaborative | High    | Lowest     | Low Modularity, Medium Betweenness | Developer, Land Planner |

## Adaptive Management Capacity

Elements of adaptive management are facilitated or constrained by different network structures. The table below, derived from Bodin, Crona, and Ernstson (2005), connects measures of centrality to elements of adaptive management.

|                          | Top Down   | Centralized  | Collaborative  |
|--------------------------|--|--|--|
| <b>Social Memory</b>     | High modularity inhibits retention.                    | Low density limits retention.  | High density increases retention.  |
| <b>Heterogeneity</b>     | High modularity increases diversity of thought.        | Low density increases diversity of experiences. Low modularity promotes group-thinking.                      | High density reduces diversity of experiences. Low modularity promotes group-thinking.                           |
| <b>Redundancy</b>        | High modularity increases potential for fragmentation. | Low density increases potential for fragmentation. Low modularity decreases the potential for fragmentation. | High density decreases potential for fragmentation. Low modularity decreases potential for fragmentation.        |
| <b>Learning</b>          | High modularity promotes transfer of knowledge.        | Low modularity inhibits transfer of knowledge.   | Low modularity inhibits transfer of knowledge. Low centrality increases opportunities for experimental learning. |
| <b>Adaptive Capacity</b> | Medium modularity and density.                         | High level of centrality increases coordination. Low density reduces social constraints.                     | Low centrality decreases coordination. High density increases social constraints.                                |
| <b>Trust</b>             | Low density inhibits collective identity.              | Low density inhibits collective identity. Low modularity undermines trust.                                   | High density increases collective identity. Low modularity undermines trust.                                     |

Network Type: **Collaborative**

Measure of Centrality: **Density**

Rank: **High**

Adaptive Management Feature: **Social Memory**

Adaptive Management Implication: **High density increases the retention of social memory.**

Implication: **Less likely to utilize older knowledge or learn from the past.**

## Stakeholder Interviews

|                 |   |
|-----------------|---|
| Interview       | Snowball, semi-structured (n=6)   |
| Representation  | Project developer (1), landscape architect (1), land planner (1), lawyer (2), and retired (1) |
| Question Themes | (1) Project Involvement<br>(2) Collaboration<br>(3) Drivers of Landscaping Design Change      |

In semi-structured interviews, respondents identified collaborators on specific projects as well as broader socio-ecological themes relevant to landscaping in Phoenix. Responses were used to construct networks and identify discourses.

## Networks are Situated in Place

Place dependent discourses are collected by and negotiated between actors in a network as discourses. Several discourses about the broader social-ecological contexts emerged during interviews.

### Trends & Legacies

*In the 1980s everybody wanted this place to look like Ohio. Most everybody had come from someplace else and everybody who moved here from someplace else thought the place they came from was better. "Oh this desert stuff. Lay down turf, put up palm trees from California." Seriously, that was cool in the 1980s. In the 90s there was a movement toward, "Hey, we're from Arizona, we should be proud of it," toward natural landscaping.*

Agricultural legacies impact aesthetics and "grandfather in" rights to water.

### The Public

*Meeting the demands and concerns of the public is important because they are the consumers. They can also work to block a development.*

### Policies & Governance

Municipal Environmental Codes

ADWR species lists

*CCR's are like the constitution: very hard to change.*



### Sustainability & Environment

*Available plant pallets have expanded and desert plants are increasingly popular, although not necessarily native.*

*Yeah all the water that we use is measured drip and we monitor it. Water's expensive and you do it because you want to use your pennies wisely but it's also the right thing to do for the environment.*

### Markets & Economy

*In a good economy "everybody wants to be a developer." Companies diversify portfolios through real estate.*

*During a recession, cost efficiency is key. This can lead to reductions in water use.*

*Niche markets can promote sprawl or "green" development.*

### Conclusions

- There exists a distinct typology of network structure in Phoenix planned residential community development.
- A set of recurrent discourses emerge within that community.

### Next steps

To what extent do network structures and the broader social-ecological context play a role in shaping residential landscape form and management?