

This presentation premiered at WaterSmart Innovations

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Managing Water in the West

Can Parks Inhibit Outdoor Water Use?



U.S. Department of the Interior
Bureau of Reclamation

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WaterSmart Innovations
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Thanks to ...

- Dr. Rosalind Bark, co-investigator
- Faculty Advisors:
Dr. Chris Scott and Dr. Stephen Yool
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- GIS Data: Pima County
- Bureau of Reclamation, especially
Lynne Fisher, Eric Holler and Bob Michaels

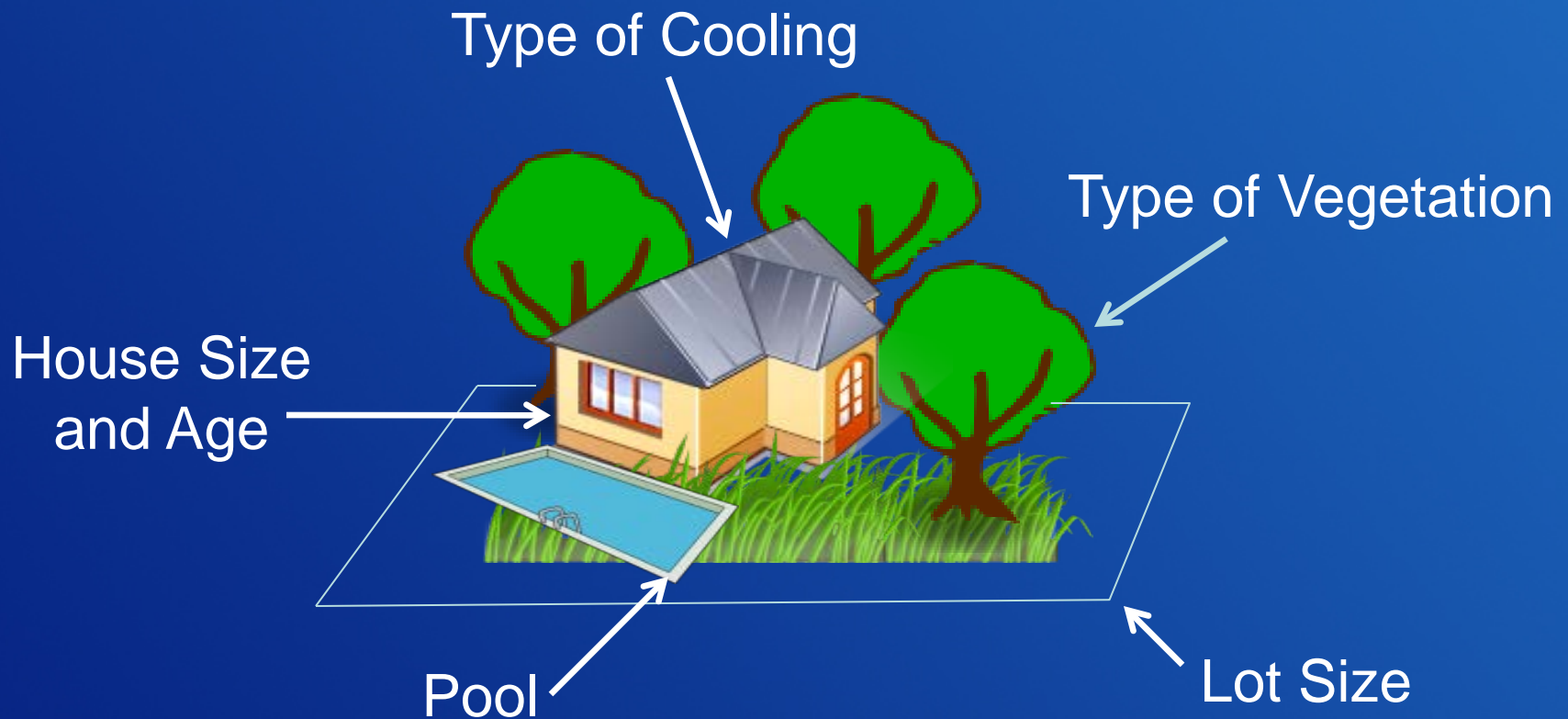
To what extent can a common amenity substitute for a private one?



Example: Irrigated Green Space and Swimming Pools

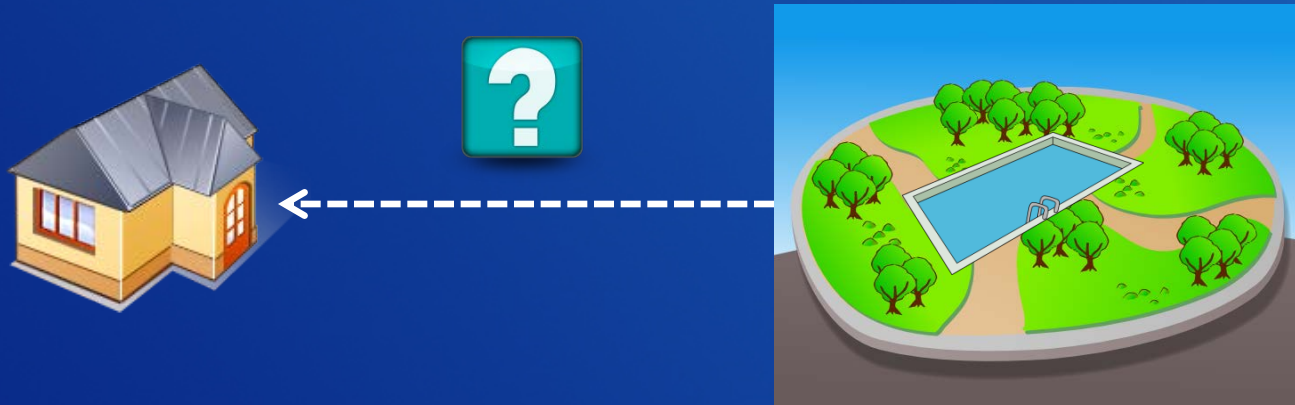
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Factors known to influence household water use



Research Focus: Effect of Neighborhood

Specifically, does being close to a (green) park or public pool influence household water use?



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Study Details



- Area of Interest: Tucson, AZ
- Data from Tucson Water (largest provider)
- Analyzed single-family residences (SFR)
- 45% of SFR water used outdoors
- Estimated 2007 SFR outdoor use: 31,000 acre-ft



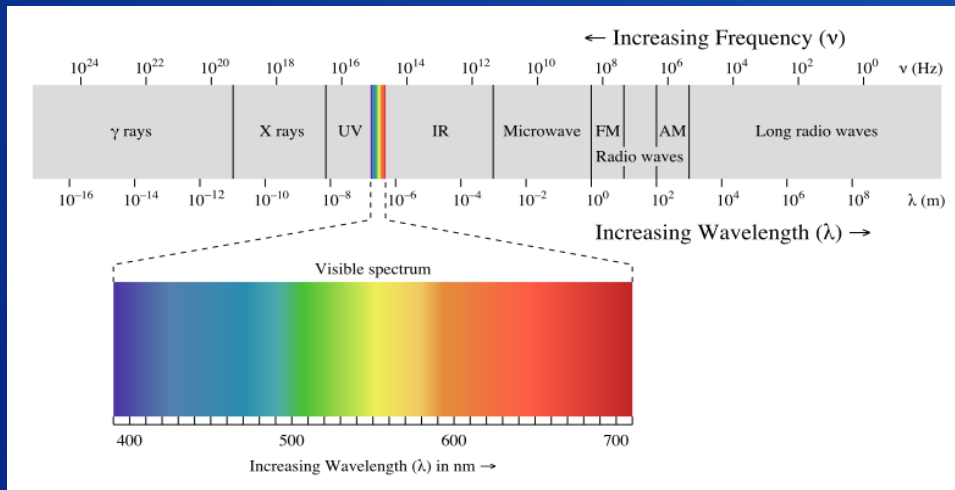
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Variables

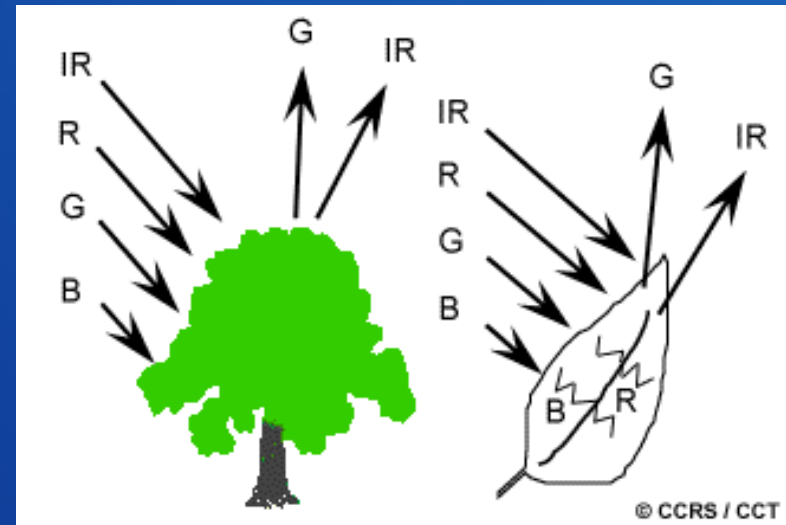
- House characteristics
 - House Size, Age
 - Yard Size
 - Evaporative Cooling
 - Pool (presence only, size not available)
 - Elevation about sea level
- Location characteristics
 - Distance to nearest (green) park
 - “Greenness of park
 - Size of park
 - Public pool

Vegetation Characteristics

- High-resolution aerial photography (6/25/2007)
- Vegetation Index derived from red and infrared bands, ranges from 0 to 1



Courtesy of Philip Ronan and Wikipedia



Source: Natural Resources Canada



Source: NASA

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Tucson homes vary widely in “greenness”



...as do Tucson's parks



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Study details

- Linear Regression Analysis
- Dependent Variable: Average of Single Family Outdoor Water Use, Spring 2007
- N (number of data samples) = 110,111
- Analyzed homes with and without pools separately

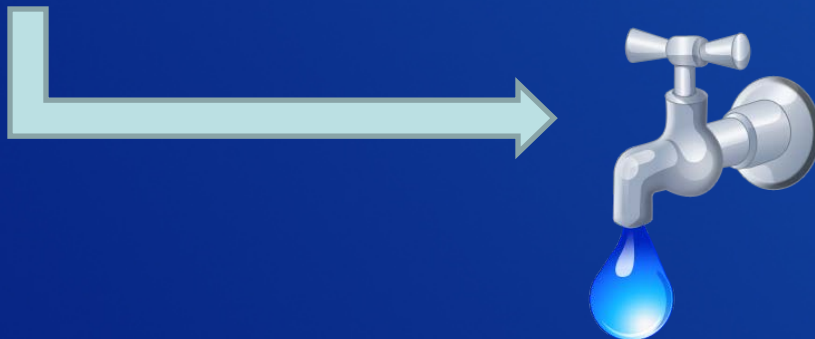
In conceptual terms, what factors influences SFR use, and how much?

“Property” Variables:

- House Size
- House Age
- Yard Size
- Pool
- Evaporative Cooler
- Elevation
- Yard “Greenness”

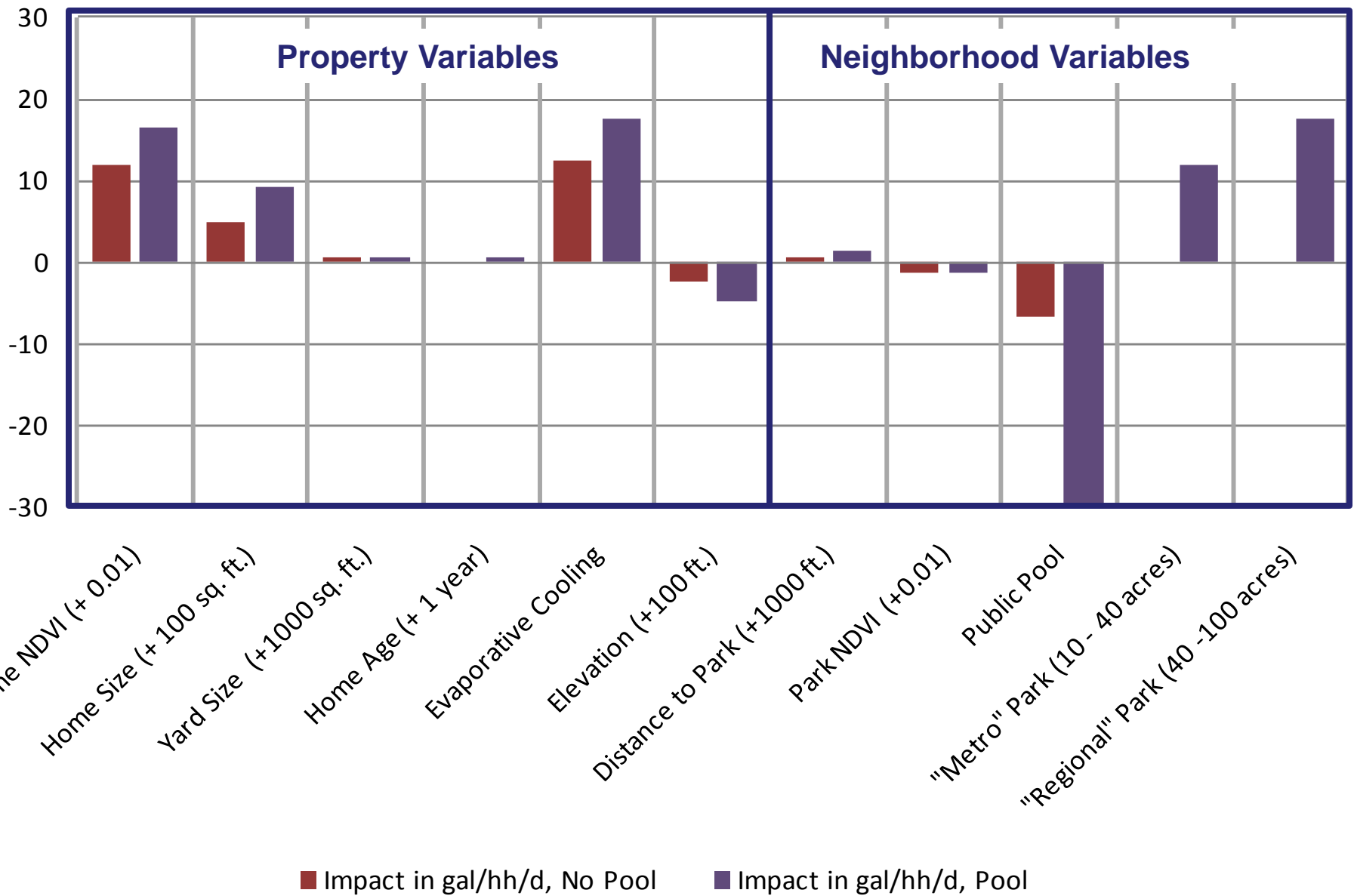
“Neighborhood” Variables

- Distance to Park
- “Greenness” of Park
- Public Pool
- Size of Park / Facilities



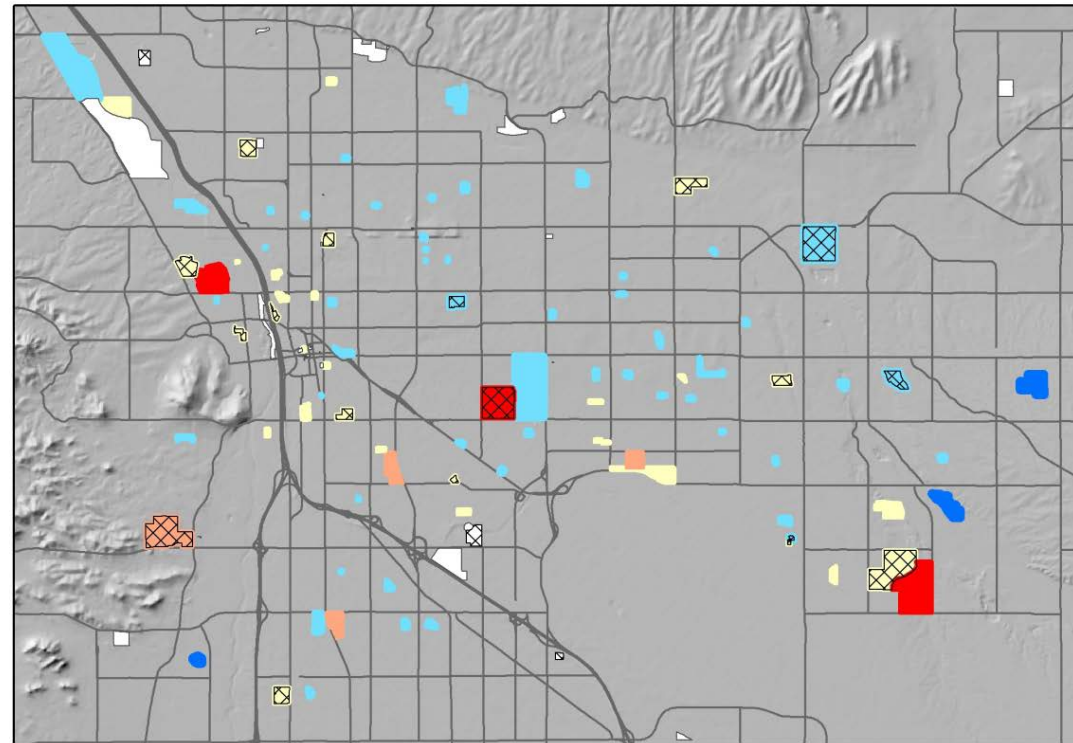
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Effect of Standard Changes on SFR Outdoor Water Use (Gallons per Household per Day)



Are parks net water savers?

- Estimated 2007 “park-induced” SFR water use changes
- Compared to data on 2007 park water use
- Most small parks appear to be net “savers”, larger parks may or may not be.




Legend


Sum of SFR Water Use Suppression and Park Water Use,
April, May, June 2007, GPD


Mean = 33,868 GPD; S.D. = 198,003 GPD




 Park Pool
 No Data

 -165,344 - -65,134
(min to mean - 1 S.D.)

 -65,133 - 0
(mean - 1 S.D. to 0)

 1 - 132,869
(1 - mean + 1 S.D.)

 132,870 - 330,872
(1 S.D. - 2 S.D.)

 330,873 - 1,748,015
(2 S.D. - max)

0 2.5 5 Miles

Resource substitution - Reclaimed Water

- Larger parks have access to reclaimed water
- Substitution of a lower quality resource for a higher one is another form of conservation

Net Effect of Induced Residential Savings and Water Use by Parks, in Acre -Feet

Park Type	Number of Parks Evaluated	Class Total-Park Potable Water Use (A)	Class Total-Park Reclaimed Water Use (B)	Class Total-Park Water Use, All Types (A + B)	Class % Reclaimed Water (B / (A + B))	Class Total - Sum of Park Effects on SFR Water Use (C)	Class Total-Difference of Park SFR effects and All Types of Park Water Use (A + B + C)
Mini + Neighborhood	58	396,177	183,646	579,823	31.7%	-1,014,040	-434,217
Community	16	251,312	837,661	1,088,973	76.9%	-835,418	253,555
Metro + Regional, excluding golf courses	14	451,118	1,824,931	2,276,049	80.2%	-815,221	1,460,828
Metro + Regional, including golf courses	17	556,545	4,432,599	4,989,144	88.8%	-916,802	4,072,341

Conclusions

- Being close to irrigated green space and public pools inhibited outdoor water use in SFRs
- Homes with pools more sensitive to most factors
- Small parks generally show net water savings
- Large parks may or may not generate net savings,
 - substituting reclaimed for potable water may be considered an additional benefit