

# Perceived Ecosystem Services and Disservices: Preliminary Findings and Reliable Survey Measures

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## Research Gaps and Purpose

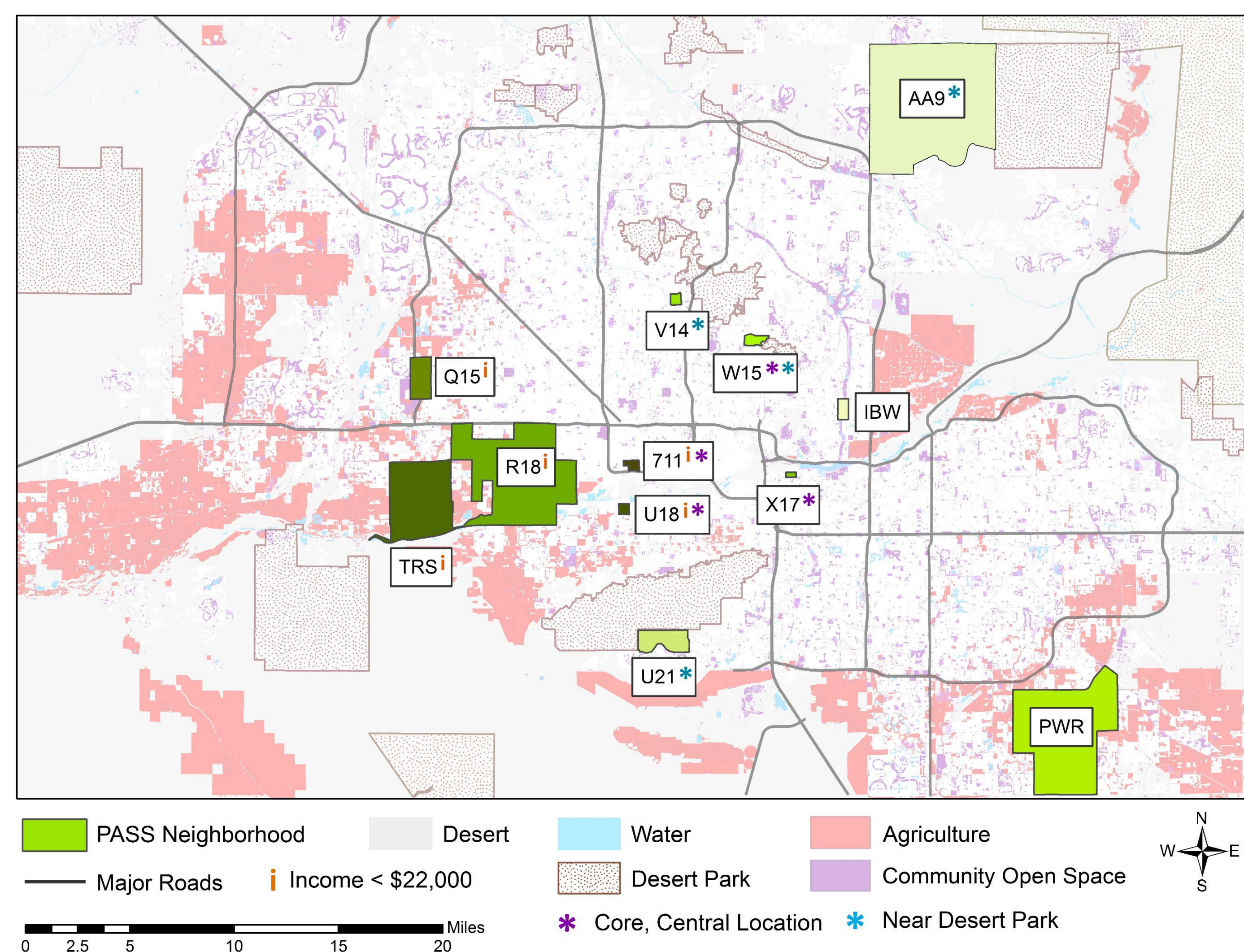
Research on ecosystem services (ES) has largely focused on the ecological functions or economic valuation of the benefits provided by ecosystems. Far less research has examined what people think about these services, and very little had examined how people view disservices (i.e., risks or environmental problems). The **2017 Phoenix Area Social Survey (PASS)** helps fill this gap.

Based on Larson et al. (2016) and Brown et al. (2016), we developed a multi-item question to evaluate residents' perceptions of the degree to which the **environment in their neighborhood**—as described below—provides particular services (amenities or benefits) and disservices (dis-amenities or problems).

*"the grass, plants, &/or trees in the area, along with the streets, sidewalks, patios, porches & built structures as well as parks & open spaces."*

## The 12 Surveyed Neighborhoods in Metro Phoenix, AZ

Light green nbhds. are those with the highest perceived services and dark green nbhds. are those with lowest perceived services (see boxplots at far right).



## The Development of Reliable Scales

Methodologically, 3 types of analysis informed the creation of the composite scales: 1) principal components analysis of the service vs. disservice variables (9 and 8 variables, respectively, in *italics* below); 2) bivariate (Spearman) correlations between individual variables (rho values in table below); and 3) reliability analysis (for scales with more than 2 variables) using Cronbach's alpha tests (presented below; alpha > 0.7 represents internal consistency).

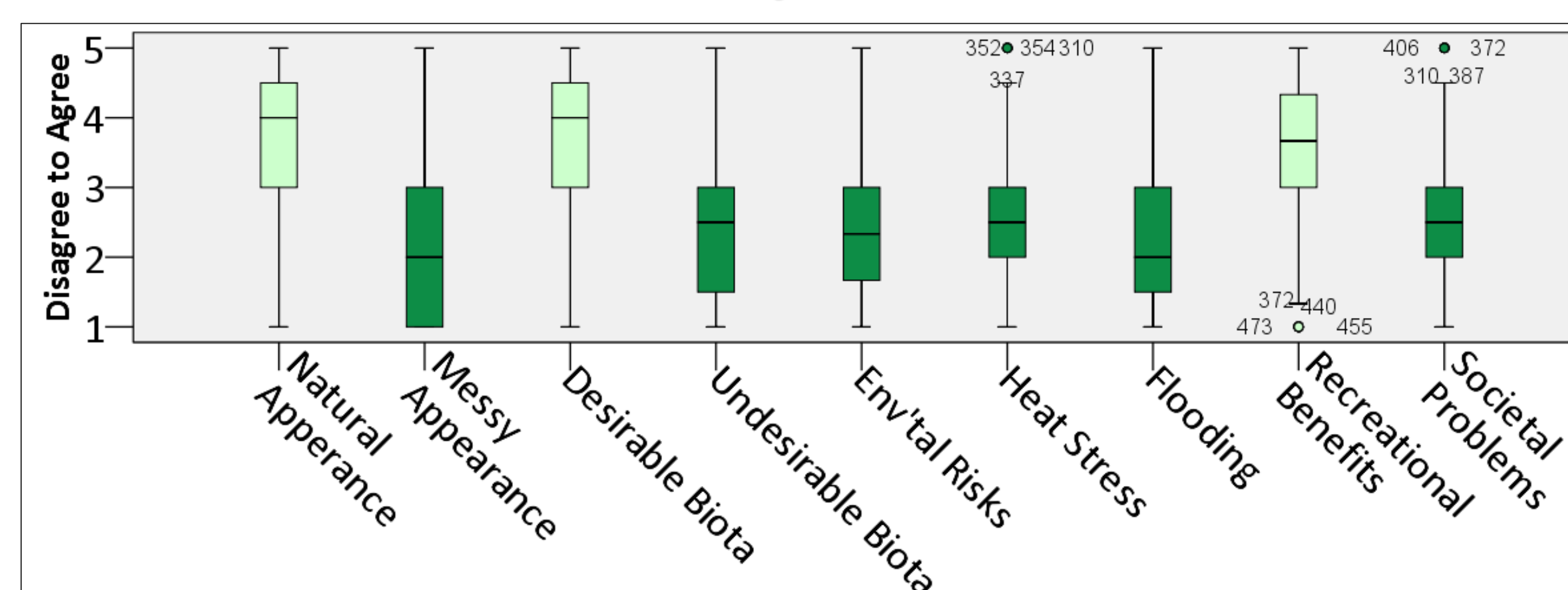
### Descriptive Statistics & Composite Scales

Response Scale: 1=Strongly Disagree...3=Neutral...5=Strongly Agree

Composite Scales & Variables <i>Verbatim Wording for Individual Items</i>	Mean	Standard Deviation
<b>Cultural Aesthetic Values</b>		
<b>Natural Appearance (rho=0.70)</b>		
<i>Looks beautiful</i>	3.83	1.12
<i>Looks natural</i>	3.68	1.13
<b>Messy Appearance</b>		
<i>Looks messy</i>	2.22	1.24
<i>Has too many weeds</i>	2.38	1.28
<b>Biodiversity Provisioning</b>		
<b>Desirable Biota (rho = 0.52)</b>		
<i>Provides habitat for birds</i>	3.82	1.07
<i>Offers a variety of plants</i>	3.68	1.07
<b>Undesirable Biota (rho = 0.45)</b>		
<i>Attracts unwanted animals or pests</i>	2.63	1.25
<i>Has too many weeds</i>	2.38	1.28
<b>Regulating Disservices</b>		
<b>Environmental Risks (alpha = 0.72)</b>		
<i>Makes the summer heat worse</i>	2.53	1.09
<i>Causes flooding</i>	2.10	1.11
<i>Contributes to environmental pollution</i>	2.35	1.15
<b>Heat Stress (rho = -0.38)</b>		
<i>Makes the summer heat worse</i>	2.53	1.09
<i>[Doesn't] provide shade<sup>1</sup></i>	3.34	1.16
<b>Flooding (rho = -0.40)</b>		
<i>Causes flooding</i>	2.10	1.11
<i>[Doesn't] offer areas for rain to drain during storms<sup>1</sup></i>	3.73	1.23
<b>Socio-Cultural Values</b>		
<b>Recreational Benefits (alpha = 0.85)</b>		
<i>Provides opportunities for physical activities</i>	3.75	1.20
<i>...opportunities for social activities</i>	3.47	1.23
<i>...opportunities to explore &amp; learn about nature</i>	3.41	1.26
<b>Societal Problems (rho = 0.31)</b>		
<i>Contributes to health problems<sup>2</sup></i>	3.02	1.16
<i>Promotes criminal activities</i>	2.19	1.19

<sup>1</sup> For the composite scale, this item was reversed coded (i.e., for heat stress, to reflect *doesn't shade*, and for flooding, to reflect *doesn't provide for drainage*).  
<sup>2</sup> This item specified "allergies or asthma" in parentheses on the survey.

### Perceived Ecosystem Dis/Services: Composite Scales



## Preliminary Trends in Perceptions

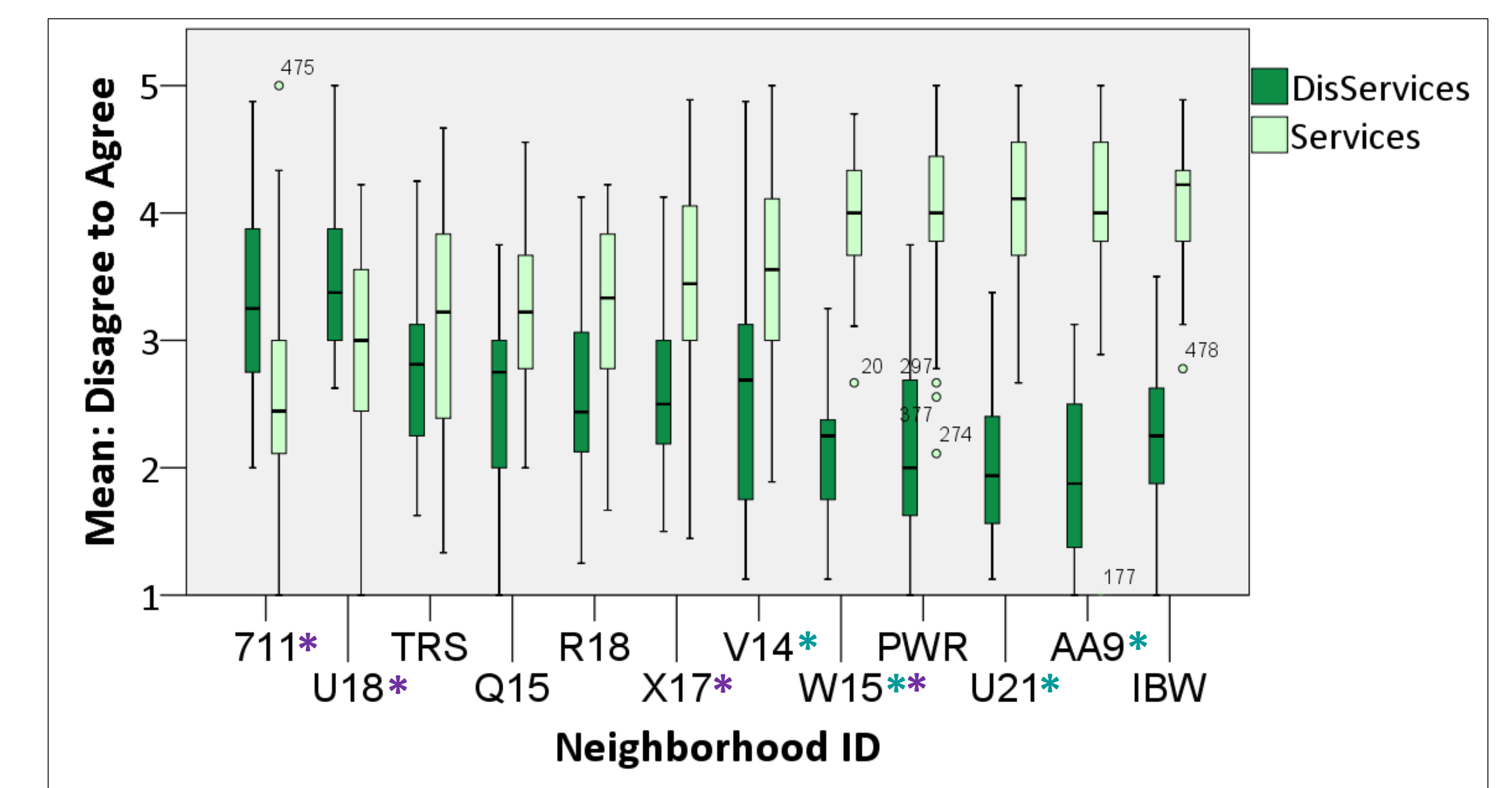
On average, residents perceived multiple ecosystem services (amenities) of their local environments while largely downplaying disservices (dis-amenities or risks). As indicated in the table and figure to the left, residents most...

- **Positively rated:** aesthetic beauty and bird habitat as well as stormwater management and recreational opportunities; and,
- **Negatively rated:** messiness and undesirable biota, especially weeds.

Examining the omnibus scales of perceived services and disservices across the 12 study neighborhoods (figure below), a number of trends emerge.

- **Income:** ratings of services rise with affluence. The 5 nbhds. (at left in graph) have highest perceived disservices and lowest income levels.
- **Location:** perceived services increase toward suburban and fringe nbhds., especially in the east and north (i.e., relative to core\*, central areas).
- **Infrastructure:** assessments of services increase near large parks, particularly in nbhds. near desert preserves\* and Indian Bend Wash (IBW).

### Perceived Ecosystem (Dis)Services: Neighborhood Trends



Neighborhoods are ordered from lowest (left) to highest (right) perceived services.

## Survey Methods & Response Rates

The University of Wisconsin Survey Center administered the PASS in the summer of 2017. Surveys were delivered by mail only. Addresses were randomly selected from census block groups for each neighborhood.

For the 1,400 sampled households, the response rate was 39.4%, yielding 496 survey respondents. At the neighborhood level, the response rates varied from a low of 22.2% (n=22) in one of the lowest income areas (711) to a high of 55.6% (n=60) for a middle-income agricultural fringe area (PWR).

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## Conclusions & Recommendations

This research offers a novel approach to evaluating ecosystem services and disservices of urban neighborhoods from the subjective perspectives of diverse residents. Future research with the composite scales will examine how various demographic and geographic factors—including proximity to blue, green, and grey infrastructure—influence perceived dis/services.

To further test the reliability of the survey measures, we recommend applying this conceptual and methodological approach in other ecosystems and places, urban and otherwise. Comparing beliefs about ecosystem dis/services to ecological structure and function will also aid knowledge about how to design cities and/or manage ecosystems in ways that are both socially and environmentally sustainable.

**Works Cited:** Larson, K.L., K. Nelson, S. Samples, S. Hall et al. 2016. Ecosystem services in managing residential landscapes: Value priorities, dimensions, and cross-regional patterns. *Urban Ecosystems* 19(1): 95-113. Brown, G., D. Pullar, and V.H. Hausner. 2016. An empirical evaluation of spatial value transfer methods for identifying cultural ecosystem services. *Ecological Indicators* 69: 1-11.