



CRC for
Water Sensitive Cities



Valuing stormwater management: Who is willing to pay?

Industry Note
Program A: Society
Project A1.1

There are many characteristics that impact a person's willingness to pay for public goods. Willingness to pay for environmental services, such as stormwater quality improvement or cooler temperatures in suburbs, varies significantly across households with different incomes. Insights on community preference and the value placed on various environmental strategies are helping to inform decisions on project investment and policy design.

The CRC for Water Sensitive Cities (CRCWSC) can now estimate people's willingness to pay for specific actions and their benefits, and how this varies by income. The figures below plot the willingness to pay for (a) cooler temperatures and (b) improvements in stream health against income.

Higher income households are willing to pay more for environmental benefits. However, income does not affect willingness to pay for all attributes in the same manner. While households with higher incomes consistently display stronger preferences for cooler temperatures, there is a peaking effect for moderate improvements in stream health, with a decrease in willingness to pay among the wealthiest households.

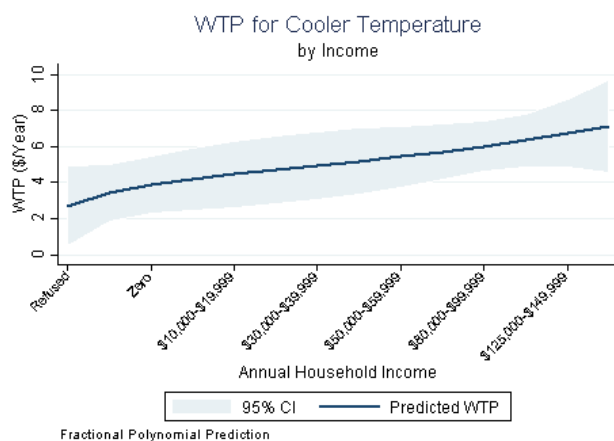
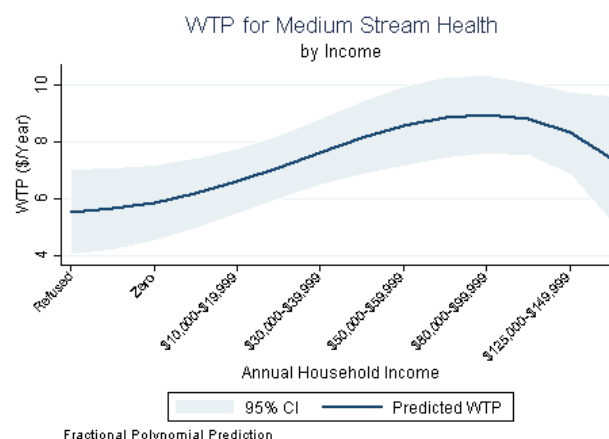


Figure 1 shows that willingness to pay for cooler temperatures consistently rises as household income increases. Similarly, as shown in Figure 2, for households earning less than \$100,000 annually, higher incomes correspond to higher values placed on stream health. However, these values peak and in households with annual incomes above \$100,000 the willingness to pay for stream health actually decreases.

There are many other characteristics (beyond household income) that impact willingness to pay; hence paying attention to differences across individuals provides useful insights when designing policy.



One explanation for this result is that this income group may seek a different strategy or investment than the option given as part of the survey. For example, wealthier households may prefer greater increases in the health of streams than the option given and would be willing to pay for it.

When using this information to build a business case, or in undertaking a cost benefit analysis for a specific strategy or action, it is not only important to assess if the total benefits exceed the costs, but also who in the community will gain most and who may be disadvantaged. This is particularly sensitive if those who may be disadvantaged are considered vulnerable or are part of a low socio-economic group. Lower income households may be expected to have lower values for environmental improvements, which makes the distribution of income in a given location an important consideration when transferring values across communities.



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How willingness to pay is determined

A choice experiment is a survey that presents a set of alternative scenarios or choices from which a respondent selects his or her most preferred option. In this project, the survey examined the willingness to pay for various benefits associated with stormwater management. A respondent could choose the status quo, which would not offer any improvements and does not impose any costs, or could select Option A or Option B that provide benefits funded through increases in annual water rates.

Each respondent makes decisions on 10 choice sets that vary the benefits and costs for Options A and B. An example choice set and more details on the survey are available in Brent et al. (2014). There is always an option to choose the status quo that does not increase costs and provides no new benefits. Analysing how respondents make these choices reveals how they trade off between costs and benefits.

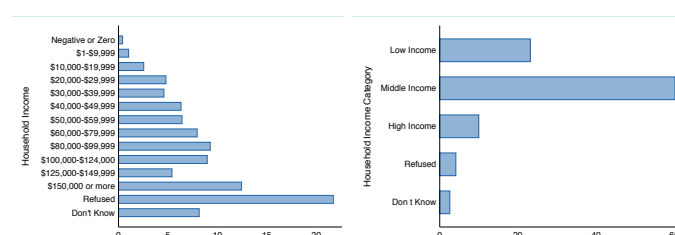
In this survey, researchers looked at five attributes related to stormwater management:

- lifting water restrictions
- reducing the frequency of flash floods
- improving stream health
- improving recreation and amenities
- lowering summer temperatures.

These attributes were selected through a discussion with scientists and policy-makers from government and were tested in focus groups. Staff from Manningham and Moonee Valley

Councils in Victoria, and Fairfield and Warringah Councils in New South Wales helped to develop the survey.

In addition to the survey responses, researchers collected data on the income and demographic characteristics of the 981 respondents across the four Councils. Figure 3 displays the distribution of annual income, as well as a subjective assessment of whether a respondent is high, medium, or low income.

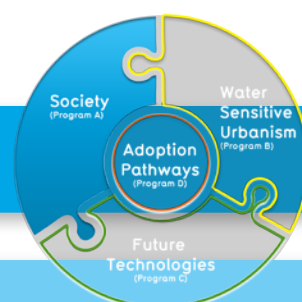


We estimate willingness to pay for each individual using an econometric model (Revelt and Train, 1998). While the impact of income on selecting the status quo is intuitive, there are deeper relationships that we can explore with our statistical model, such as regional and council-level preferences and the role of environmental values.

In the future, research will continue to develop our understanding of how people value environmental benefits to help leaders make informed decisions about water sensitive urban design.



Website:
<http://watersensitivecities.org.au/programs-page/society-program-a/project-a/>



Further reading:

Brent, D., Gangadharan, L., Leroux, A., & Raschky, P. (2014). Putting One's Money Where One's Mouth is: Creating Saliency in the field. Monash University Department of Economics Discussion Paper

Carson, Richard T. "Contingent Valuation: A Practical Alternative when Prices Aren't Available," *Journal of Economic Perspectives*, 2012, 26 (4), 27-42.

Hensher, David A, John M Rose, and William H Greene, *Applied choice analysis: a primer*, Cambridge University Press, 2005.

Theodore Groves, "Incentive and informational properties of preference questions," *Environmental and Resource Economics*, 2007, 37 (1), 181-210.

Revelt, David and Kenneth Train, "Mixed logit with repeated choices: households' choices of appliance efficiency level," *Review of economics and statistics*, 1998, 80 (4), 647-657.



Talk to:

Dr Daniel A Brent, Department of Economics
Monash University
danny.brent@monash.edu

Professor Lata Gangadharan, Department of Economics,
Monash University
lata.gangadharan@monash.edu

Dr Anke Leroux, Department of Economics
Monash University
anke.leroux@monash.edu

Dr Paul A Raschky, Department of Economics
Monash University
paul.raschky@monash.edu

