New WAter Ways

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Water sensitive urban design

Non-market values of water sensitive urban design

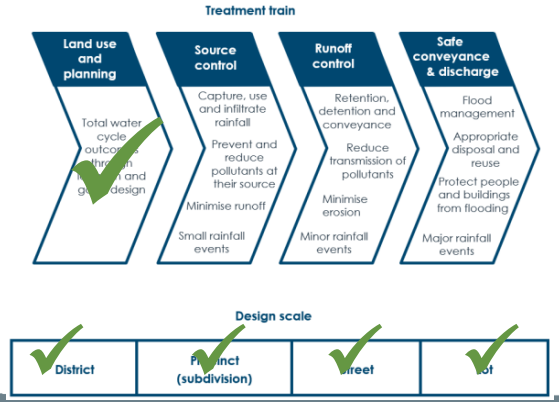
Summary

Most environmental goods and services, such as clean air and water and healthy ecosystems, are not traded in markets. Their economic value -how much people would be willing to pay for them- is not revealed in market prices. Instead, their monetary values can be estimated using non-market valuation methods.

Assigning non-market values allows for the benefits of Water Sensitive Urban Design (WSUD) to be considered as part of policy and planning as economically tangible variables, with set dollar values. This allows for a more robust assessment of the economic, social and environmental benefits that WSUD brings to urban areas.

Non-market values (NMV) are usually obtained through consumer research studies. Where no relevant study exists, values may be assigned using a benefit transfer approach that applies documented NMV to a comparable benefit-type.

Non-market valuation and benefit transfer allow for environmental benefits and WSUD to be valued alongside traditional factors as part of planning decision-making by providing a way for the benefits they bring to urban design to be quantitatively assessed.



Opportunities and benefits

- Assigning non-market values allows previously unevaluated or traditionally undervalued environmental benefits to be associated with modern economic valuations.
- Multiple study methods are available for determining non-market values to quantify a wide range of environmental benefits.
- Hedonic and choice experiment methods are well suited to the estimation of WSUD non-market values.
- Benefit transfer allows for the immediate determination of a monetary value for an environmental benefit without the need for research.
- Non-market values can be adjusted according to local conditions to retain accuracy during benefit transfer.

Considerations for NMV studies

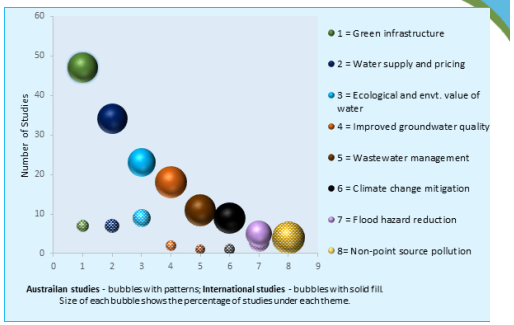
- Major non-market valuation methods include revealed and stated preference methods.
- Revealed preference involves using observations of purchasing decisions and other behaviours to estimate non-market value, such as hedonic pricing method or travel cost method.
- Hedonic price methods assess the environmental benefits built into house prices. This assessment is done by observing many house sales and applying multiple regressions to identify the various individual factors and benefits affecting price. Examples of this technique include valuing house prices for properties with rainwater tanks, or property prices based on the distance from a living stream, holding all other things equal. This method captures the private benefits of the local area only and does not include benefits to others.
- Stated preference methods involve asking people to make decisions and choices between project options to determine non-market value.
- Choice experiment methods involve offering a range of choices based on a differing set of attributes. Implicit values are then estimated from the willingness to pay (WTP) for additional attributes. Examples include the choice of land use in the buffer zone around a wastewater treatment plant [Iftekhar et al., 2018], or the various environmental benefits associated with stormwater management [Brent et al., 2017].

Considerations for Benefit Transfer

- Benefit transfer is often used when it is too expensive or there is too little time to conduct an individual NMV study, but a NMV is required.
- Benefit transfer can be in the form of an "as is" value or set of values transferred from one site to another, or as adjusted values. Values can be adjusted for many reasons, including income variation, purchasing power and expert opinion.
- Benefit transfer can have transfer error; however, this can be minimised by using similar benefits with similar policy transfer errors.

More Information

The CRCWSC is developing a WSUD non-market value benefit transfer database accessible through an Excel spreadsheet. The database includes a large number of national and international studies covering a wide range of WSUD solutions. The database will allow for the benefit transfer of non-market values in a short time, without the need for individual studies of specific benefits.



The figure above depicts the type (topic) and number of studies incorporated into the database.

Suggested Reading

Baker, R. and Ruting, B. 2014, Environmental Policy Analysis: *A Guide to Non-Market Valuation*, Productivity Commission Staff Working Paper, Canberra.

Gunawardena, A., Zhang, F., Fogarty, J., and Iftekhar, M. S., (2017). *Review of non-market values of water sensitive systems and practices: An update*. Cooperative Research Centre for Water Sensitive Cities, Melbourne, Australia.

Johnston, R.J., Rolfe, J., Rosenberger, R., and Brouwer, R. (Eds.), 2015, *Benefit Transfer of Environmental and Resource Values: A Guide for Researchers and Practitioners*, Springer.

Zhang, F. and Fogarty, J. (2014). *Nonmarket Valuation of Water Sensitive Cities: Current Knowledge and Issues*, Working Paper 1513, School of Agricultural and Resource Economics, The University of Western Australia, Crawley, Australia.

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Useful results from non-market valuation studies in Australia, as compiled by the CRCWSC

(The dollar estimates are in 2017 figures)

A one standard deviation increase in green infrastructure is associated with an increase in house prices of between AU$37,019 and AU$67,098 (Rossetti, 2013).

A 1% increase in tree cover along the foot path, within 100 m of a property, results in an increase in property values of between 0.08% and 0.1% in Brisbane (Plant *et al*., 2017).

A 10% increase in tree canopy cover on the adjacent public space was associated with an increase in property prices of approximately AU$17,264 in Perth (Pandit *et al*., 2014).

Households in Australian capital cities are willing to pay $1,570 per annum for a 1% increase in public open space in their local area (Ambrey and Fleming, 2014).

An increase of 1 m in distance to a larger park where bushwalking is possible reduced the property values by $12.42; and an increase of 1 m in distance to a sports reserve decreased property values, on average, by $38.29 (Pandit *et al*., 2013).

Those who perceived their neighbourhood as highly green had, respectively, a 1.4 and 1.6 times higher chance of having better physical and mental health compared with those who reported living in a neighbourhood with the lowest level of perceived greenness (Sugiyama *et al*., 2008).

People were willing to pay $162 in Melbourne and $254 in Sydney to completely eliminate water restrictions; $245 in Melbourne and $240 in Sydney to achieve improvements in local stream health; $47 in Melbourne and $57 in Sydney to decrease peak urban temperatures (Brent *et al*., 2017).

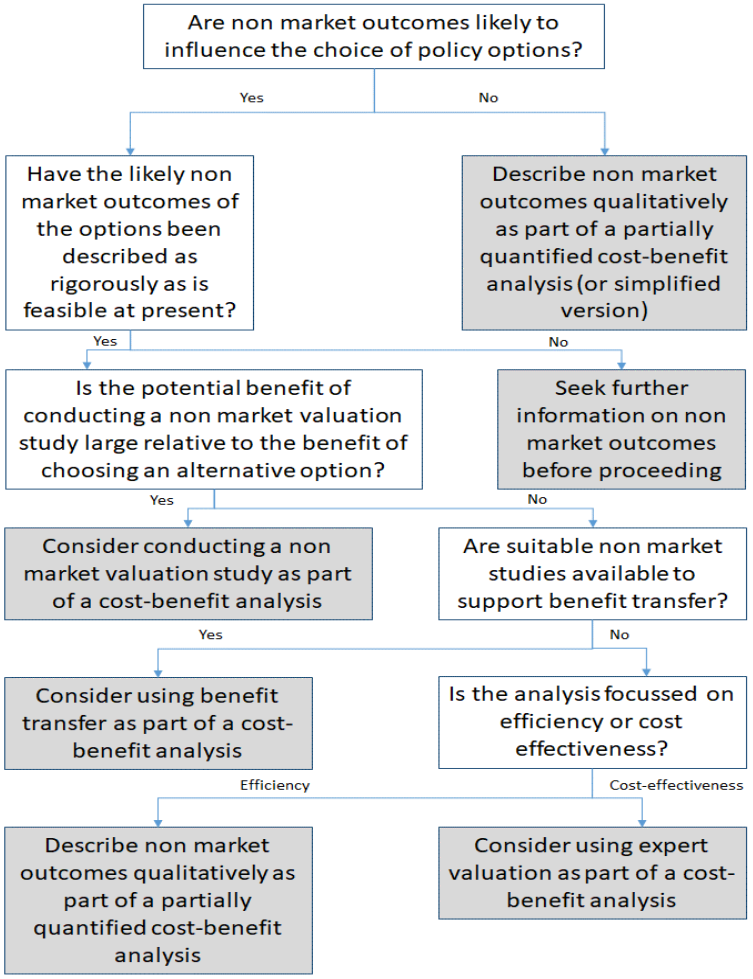
The presence of a rainwater tank on a property would add 0.04% to the median price of a typical house in Perth. This benefit is large enough to cover the total cost of installing and maintaining a tank (Zhang *et al*., 2015b).

The median home within 200 m of an urban drainage restoration project (Bannister Creek) had increased in value by an additional $12,053 to $16,669 after eight years. The study also found that the total benefit across all houses within 200 m of the project was more than enough to cover the cost of the restoration project (Polyakov *et al*., 2016).

The potential benefits (including health benefits) of the rehabilitation of a 1.23 km stretch of upper Stony Creek in Melbourne are around $77,000 per annum. The potential capitalized amenity benefit of the park was estimated at around $4.03 million (Mekala *et al*., 2015).

Steps to include mon-market outcomes in policy analysis

(Source: Baker and Ruting, 2014)



People in Tasmania were, on average, willing to pay AU$4.66 for a km increase in native riverside vegetation and $10.26 per species for the protection of rare native plants and animals (Kragt and Bennett, 2009).

See INFFEWS Value Tool for more studies and references.

Key fact sheet references

Brent, D. A., et al., 2017, Valuing environmental services provided by local stormwater management. *Water Resources Research* (53): 4907-4921.

Iftekhar, M.S, Gunawardena, A., Fogarty, F., Pannell, D. and Rogers, A., 2018, *Value tool of water sensitive systems and practices: Guideline (Draft): IRP2 Comprehensive Economic Evaluation Framework (2017 – 2019)*, Cooperative Research Centre for Water Sensitive Cities, Melbourne, Australia.

Iftekhar, M. S., et al., 2018, Understanding social preferences for land use in wastewater treatment plant buffer zones. *Landscape and Urban Planning 178*: 208-216.