CRC for
Water Sensitive Cities

IRP2

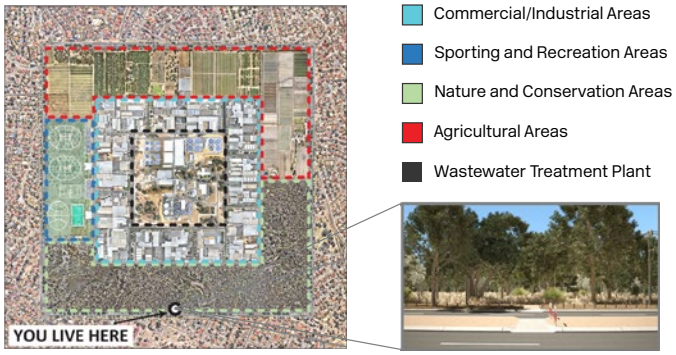
Industry Note

Social preferences for land uses in wastewater treatment plant buffer zones: a choice experiment analysis

Buffer zones are commonly applied to wastewater treatment plants to manage the area impacted by odour. They require a large area with land use controls to exclude odour sensitive land uses, such as residential. How that land is best used depends, in part, on community needs and values.

Introduction

Urban growth and the intensification of urban land use is a common global trend. While wastewater treatment plants are essential infrastructure for enabling urbanization, they emit odour which can negatively impact the amenity value of nearby residents. Consequently, water utilities are under increasing pressure to better manage the impacts of their activities and infrastructure, such as odour from wastewater treatment plants, on surrounding land use. Odour buffer zones are often defined around wastewater treatment plants to provide a 'line in the sand' to guide management of plants as well as infrastructure upgrades to mitigate odour impacts. To avoid the risk of incompatible land uses being approved in buffer zones, water utilities often seek planning restrictions, such as land use controls, on uses of land owned by others within a buffer zone. While land use controls are one approach to achieving land use outcomes, there are many others. Understanding what land uses the community would like to see in buffer zones is important in determining what policy and planning mechanisms could be used to achieve preferred land use outcomes.



Choice experiment

This study conducted a survey of 709 residents in Perth and regional Western Australia to better understand community preferences for a range of land uses within buffer zones. This non market valuation study used the choice experiment method, and was the first known study globally to apply this method to the context of wastewater treatment plant buffer zone management. It also sought to assess the impact of images on the preferences of survey respondents.

In the study, there were four land use options presented, with each land use option developed based on industry advice and focus group discussions. Two information conditions were used, one using text and tables only, the other provided the option for a respondent to view land use maps (see image).

Land use option

- *Nature conservation;* areas are managed to protect native plants and animals and provide some access for passive recreation activities.
- *Agriculture and Horticulture;* areas could include aquaculture, vineyards, orchards, market gardens, nurseries and livestock.
- *Sporting & Recreation;* areas providing spaces for organized sport and informal play and exercise such as grassed ovals, parklands, community gardens, playgrounds.
- *Commercial / Industry;* areas could include renewable energy e.g. biogas, waste to energy, solar and wind farms; warehouses; transport depots; general and light industry; solid waste transfer and recovery.

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Results

- From within the land use allocation levels considered in the study, the land use mix with: 50% nature, 30% recreation, 10% agriculture and 10% industry would generate the highest community value. The willingness to pay (WTP) for this combination of land uses is estimated at $522 per annum per household higher than 100% industrial, so the gain is relatively substantial.

- Presenting visual information was found to reduce the tendency of respondents to select the status quo option, and increase the use of information when making decisions.

- The study identified that there is a possibility of increases in community welfare from reallocating land in existing buffer zones towards nature-based land uses (Fig. 1). For example, for Plant A the net gain from moving to most socially preferable land use mix would be $62/annum/household. For Plant B the net gain from moving to most socially preferable land use mix would be $331/annum/household.

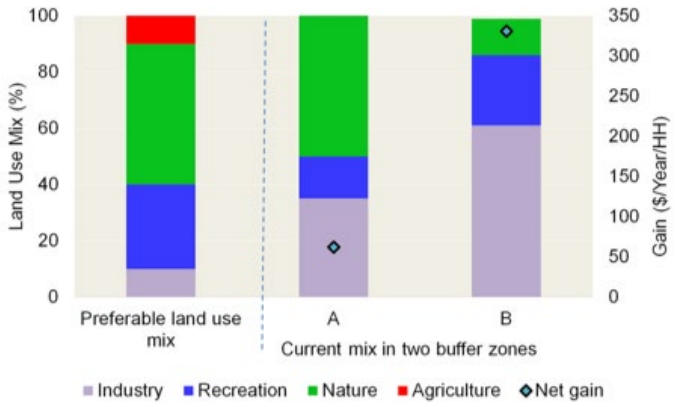

Fig. 1: Current land use mix & potential gains in values from changes in mix for two buffer zones

Concluding remarks

Non market valuation studies similar to our study could be useful in understanding social preferences of various land use or management options. Since the preferences are expressed as people's willingness to pay it is possible to use these numbers in formal benefit cost analysis of various options as part of infrastructure and land use planning processes. For example, the relative benefits of implementing socially preferred land use options within a current buffer could be compared against the cost of upgrading the odour control technology at the treatment plant, and relaxation of land use restrictions.

Other related work

This study feeds into the work that the CRCWSC are doing in Tranche 2's Comprehensive Economic Evaluation Framework project (IRP2). The framework includes economic tools and resources that users will apply to business case development and decision making at multiple levels in public and private sector organisations. Publications include a Review of non market values of water sensitive systems and practice, and the tools include a Benefit Cost Analysis (BCA) tool specific to water investments and built in consultation with industry. For a full list of publications and tools, visit the IRP2 website: https://watersensitivecities.org.au/content/project-irp2/

Further reading

Iftekhar, M.S., Burton, M., Zhang, F., Kininmonth, I and Fogarty, J. (2018). Understanding social preferences for land use in wastewater treatment plant buffer zones. Landscape and Urban Planning, 178, p 208-216. https://doi.org/10.1016/j.landurbplan.2018.05.025

Further information

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