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Willingness to Pay for Revegetating the City of Subiaco's Railway Reserve

A Choice Experiment to Determine Public Preferences

Gunther de Vos[a], Marit E. Kragt[a*], and Ram Pandit[a]

[a]School of Agricultural and Resource Economics, The University of Western Australia, Crawley, WA 6009, Australia

*E-mail address: marit.kragt@uwa.edu.au

This work was undertaken to fulfil the requirements for Mr. de Vos' Master degree in Environmental Science (Environmental Management) at the University of Western Australia. His supervisors were Dr Marit Kragt (UWA) and Dr Ram Pandit (UWA)

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Abstract

Residents of the City of Subiaco (Western Australia) demonstrate a willingness to pay for revegetating the Railway Reserve. The Railway Reserve is the area of land immediately along both sides of the Fremantle Railway Line. The City of Subiaco aims to revegetate all available land in the Reserve with native plants to create a green link between Kings Park, Bold Park and other parks in the area.

This study used a choice experiment to determine public preferences and to estimate willingness to pay for different ways of managing the Railway Reserve. Conditional logit model results show that residents prefer to have a larger proportion of the area revegetated, to add shrubs and/or trees to the ground-covering plants, and to add management for wildlife habitat such as nest boxes for birds and bats. No significant preference was found for the inclusion of interpretative signs.

The average respondent was willing to pay 0.27 Australian dollars per household per year for every extra percent of the Reserve to be revegetated. To add management for wildlife habitat, the average respondent was willing to pay 14.15 Australian dollars per household per year. A higher willingness to pay for a larger revegetated proportion and for the wildlife management was found among females and among frequent users of the walking and bicycle path along the railway line. Residents who live further away from the railway line and residents who feel less safe as a result of dense urban vegetation demonstrated a lower willingness to pay per percentage of area revegetated.

Results from the survey also indicate that respondents valued urban greenery more for the habitat it provides for wildlife than for the recreational opportunities or as a buffer against noise.

The results from the choice experiment reinforce the current management strategies by the City of Subiaco. The current management strategy represents a total willingness to pay among residents of 480,750 Australian dollars per year. This study could be replicated in other local council areas along the Fremantle Railway Line to determine the values that the Railway Reserve provides to residents of other areas in Perth.

Keywords: Conservation, Choice Modelling, Public Preferences, Urban Greenery, Western Australia, Wildlife Management.

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Table of Abbreviations

Throughout this Research Thesis, several abbreviations will be used. Below is an overview of all abbreviations and the page where they are introduced.

CE	Choice Experiment	12
CL	Conditional Logit	13
ML	Mixed Logit	13
WESROC	Western Suburbs Regional Organisations of Councils	11
WTP	Willingness to Pay	8

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Willingness to Pay for Revegetating the City of Subiaco's Railway Reserve

A Choice Experiment to Determine Public Preferences

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1. Introduction

The world's population increasingly concentrates in urban areas. Currently, 54 percent of the population worldwide lives in urban areas and this proportion is predicted to increase to 66 percent by 2050 (United Nations, 2014). Australia is one of the most urbanised countries in the world. The five largest cities account for more than 60 percent of the population and over 75 percent of the Australian population lives in the 20 largest cities of the country (Department of Infrastructure and Regional Development, 2015). The population of Perth, the capital of Western Australia, is expected to grow by 70 percent to 3.5 million by 2050 (Government of Western Australia, 2015).

To accommodate the urban population growth, native vegetation is often cleared. This puts pressure on biodiversity and threatens the habitat of fauna and flora in urbanised areas (Vitousek et al., 1997; Tzoulas et al., 2007). More vegetation is often cleared to provide space for transport corridors in cities such as railways and roads (Hansen & Clevenger, 2005).

'Urban greenery' or 'urban green space' are terms used for public and private areas in urban areas that are mainly covered by vegetation (Tuzin et al., 2002; Konijnendijk et al., 2006; Haq, 2011). Examples of urban green space include parks, forests, gardens, trees on streets and in squares and vegetated verges.

Governments around the world have implemented strategies to protect and enhance urban greenery. One such strategy is revegetation management: the process of reinstalling vegetation (native or non-native species) on an area of land (EPA, 2006). Two terms are frequently used to describe revegetation processes: rehabilitation and restoration. It is important to understand the difference between the two. Restoration aims to return the area to its original state while rehabilitation aims to return the area to a healthy state of native vegetation, for example when a return to the original state is not possible (McDonald, 2000; EPA, 2006). A successfully rehabilitated area is described by the Environmental Protection Agency of Western Australia as a sustainable native vegetation that secures "long-term stability of soils, landforms and hydrology" and that repairs "the capacity of ecosystems to provide habitats for biota and services for people" (EPA, 2006).

The peer-reviewed literature presents a wide range of studies investigating the benefits of urban greenery. Originally the focus of revegetation efforts was on aesthetic benefits, but now a wider range of social, environmental and economic benefits is acknowledged. Urban

greenery can create habitat for plants and wildlife to compensate the loss of biodiversity through land clearing for urban development (Alvey, 2006; Kowarik, 2011; Hobbs et al., 2011). Greenery in cities also removes pollution from the air, acts as a carbon sink, helps to mitigate climate change and reduces air temperature and energy consumption for air conditioning (Chaudhry & Tewari, 2001; De Ridder et al., 2004; Tzoulas et al., 2007; Haq, 2011; Konijnendijk et al., 2013; Santiago et al., 2015). Pandit et al. (2014) found that property values in Perth increase when there are trees in adjacent public areas. Urban greenery also has social and psychological benefits, as it increases the community feeling, helps to reduce stress and leads to a greater reported well-being (Herzog et al., 2002; Berto, 2005; Van den Berg et al., 2007; Lafortezza et al., 2009; Lee & Maheswaran, 2010).

Governments can involve the public in decision making around urban greenery if they understand public attitudes towards urban greenery (Hansla et al., 2008; Baur et al., 2013). Several methods have been used to determine public preferences. Stated and revealed methods of non-market valuation have been used to estimate the non-marketable economic value of environmental goods and services. Revealed preference methods include hedonic pricing and travel cost. Stated preference methods include contingent valuation and choice experiments (for a more detailed description, see Appendix A).

A valuation study by Pepper et al. (2005) showed people's willingness to pay (WTP) for the protection of urban bushland in Forrestfield (Western Australia) was higher than the cost to recreate similar services elsewhere. Similarly, a contingent valuation study in Finland estimated that the non-market valuation of an urban forest was higher than the maintenance cost. A contingent valuation study by Del Saz-Salazar and Raussell-Köster (2008) found that the WTP for urban greenery increases as income and education increase.

Using a choice experiment, Arnberger and Eder (2011) found that older respondents attach more importance to a clean and green environment. A choice experiment by Santiago et al. (2015) on a green urban square estimated a higher WTP among women than among men. A choice experiment on urban greenery by Juutinen et al. (2011) in Finland and by Koo et al. (2013) in South Korea found the public prefers urban parks that stimulate biodiversity.

Using more qualitative approaches, a Norwegian study by Nordh and Ostby (2013) found a clear public preference for park designs with vegetation that shields from disturbances. Harrison et al. (1987) found that residents of London preferred green space with options for interaction. Bauer et al. (2013) similarly found that options for wildlife watching positively affected attitudes towards urban parks. A survey by Bjerke et al. (2006) in Norway revealed that older people and people with a higher education preferred denser vegetation in urban green space compared to younger people or people with a lower education.

Aim and Objectives

This current study aims to improve the decision making process of the City of Subiaco for the revegetation planning and management of the Railway Reserve. The objectives contributing to this aim are to:

1) Assess what aspects of the City of Subiaco's revegetation project of the Railway Reserve are important to the public;
2) Estimate residents' willingness to pay for the revegetation of the Railway Reserve;
3) Determine how public preferences vary between specific attributes of the revegetation project;
4) Measure the influence of socio-demographic characteristics on the willingness to pay and on the preferences for the attributes;
5) Assess to what extent the current revegetation management by the City of Subiaco reflects public preferences.

We will test the hypothesises that the willingness to pay for the revegetation project will increase with the proportion of the Railway Reserve revegetated, with the addition of interpretative signs, and with management for wildlife habitat. We also hypothesise that willingness to pay will be higher among females, residents living closer to the railway, residents who have previously participated in planting and weeding events and for residents who have lived in Subiaco longer.

2. Case Study: Railway Reserve in the City of Subiaco

The topic of this study is the Railway Reserve in the City of Subiaco. The City of Subiaco is located west of the City of Perth in Western Australia. The City of Subiaco has a land area of 698 hectares and a population of 20,423 and consists of the suburbs Subiaco, Jolimont, Daglish, Shenton Park and Crawley and part of Nedlands (City of Subiaco, 2015). From 1 July 2016, the suburb of Crawley south of Aberdare Road will become part of the City of Perth and the population of the City of Subiaco will decrease by about 3,000 residents (City of Subiaco, 2016).

The Railway Reserve (Figure 1) is the area of land along the Fremantle Railway Line. The Railway Reserve covers multiple councils (the Cities of Perth, Subiaco, Nedlands and Fremantle, the Towns of Cambridge, Claremont, Cottesloe and Mosman Park and the Shire of Peppermint Grove). In the City of Subiaco, the Reserve is 5-20 metres wide on both sides of the railway line. It is over 4 kilometres long and about 10 hectares in size. A large section of the Reserve has a dual walking and cycling path.

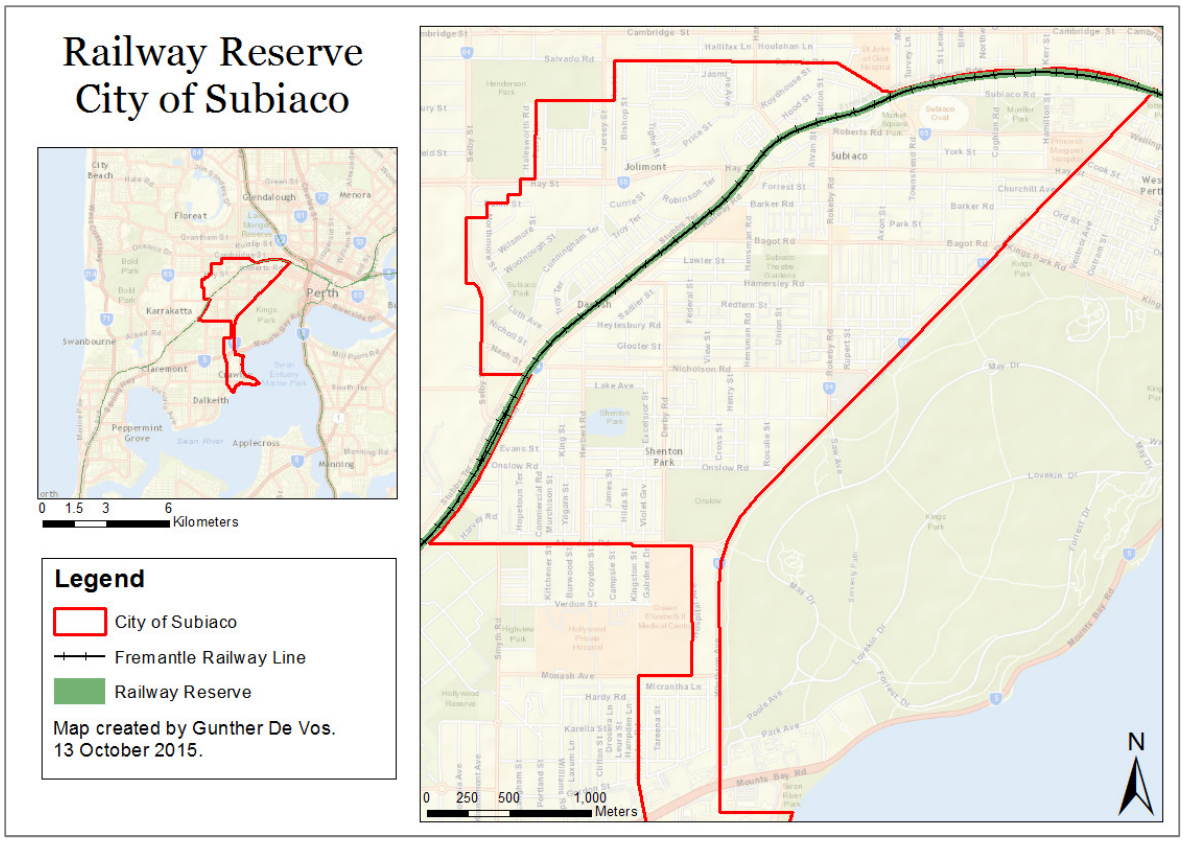

Figure 1. The Railway Reserve in the City of Subiaco.

Without any management, the Railway Reserve consists of grasses and weeds that are mown on a regular basis by Main Roads and Perth Transport Authority (G Pickard 2016, personal communication, 11 January). There are remnant trees (both native and non-native) left in some parts of the Railway Reserve. The City of Subiaco started a revegetation project in

2008 and has since revegetated some parts of the Railway Reserve with native plants. The rehabilitation project is part of the City of Subiaco's Wildlife Enhancement Plan to increase biodiversity and to conserve the habitat for native fauna and flora (City of Subiaco, 2014). The City is planning to further implement a revegetation project and expressed its interest in estimating the non-market value and public preferences through this study.

The Western Suburbs Greening Plan (WESROC, 2002) acknowledges that the Railway Reserve has a good potential to create a greenway and to provide a wildlife corridor between Kings Park, Bold Park and smaller parks and reserves in the area. The Western Suburbs Regional Organisations of Councils (WESROC), Main Roads, the Public Transport Authority and the City of Fremantle developed the Perth-Fremantle Transit Reserve Framework Plan 2010-2020 with guidelines for revegetation management of the Fremantle Railway Line (WESROC, 2011). The City of Subiaco is one of the participating local councils in the framework. All parties commit to:

> *working together to develop and maintain this important regional reserve as a green space that is attractive to those travelling through it and those living and working along it. (WESROC, 2011)*

The framework plan further lists local native plants that are naturally occurring in bushlands in the area and that can be used for the revegetation project. It also has a number of provisions to allow for a safe usage of the Railway Reserve for users of the public transport and the bicycle and walking path. Other local councils along the Fremantle Railway have also started revegetation projects, for example the City of Nedlands and the Town of Claremont, or are planning to introduce one (WESROC, 2011). This study focusses on the City of Subiaco because they expressed an interest in the results and offered to provide all required information and a scholarship for the study.

3. Methodology: Choice Experiment

3.1. Choice Experiment Theory

A review of the peer-reviewed literature (Appendix A) justified a choice experiment (CE) as the appropriate research method for this study. The CE is a stated preference method for non-market valuation. The revegetation project was already started by the City of Subiaco in 2008, but a stated preference method with hypothetical scenarios was preferred over a revealed preference method because the City does not know which are the relevant attributes of the project. The management of the Reserve could be amended in the future to better reflect public preferences for the project.

A CE allows to estimate WTP for future hypothetical management scenarios capturing use and non-use values. A CE also assesses the public preferences for different levels of the attributes of the revegetation project and it allows to measure the influence of socio-demographic characteristics on the preferences (Adamowicz, 1998; Bennett & Blamey, 2001).

In a CE, respondents choose their preferred option from a set of two or more hypothetical alternatives. In this method, the good or service is described by a list of attributes. The value the respondent attaches to each of these attributes determines the choice for one alternative over the others. The inclusion of a cost attribute allows an estimation of WTP. A CE can reveal which attributes are preferred by respondents and how the levels of each attribute influence the WTP. (Hanley et al., 1998: Louviere et al., 2000; Bennett & Blamey, 2001)

CE's have been used as a research method in many different fields, including consumer preferences (Van Loo et al., 2011; Lagerkvist et al., 2006), transport options (Hensher & Rose, 2007; Garrod et al., 2002), health economics (Ryan et al., 2008; Cheraghi-Sohi et al., 2008) and environmental and resource economics (Carlsson et al., 2003; Hanley et al., 2006; Kragt et al., 2016).

The CE method is grounded in Lancaster's consumer theory and Random Utility Theory (Hanley et al., 1998; Louviere et al., 2000; Bennett & Blamey, 2001). Lancaster's theory of value (Lancaster, 1966) states that a consumer's choice for a good or service is a result of their preference for different attributes that make up the good or service. Random Utility Theory states that people will try to optimise their utility if they receive a list of options (Manski, 1977). For the analysis of the data, RStudio software (RStudio, 2016) was used to estimate a Conditional Logit (CL) model[1] as described by McFadden (1974).

[1] Sometimes referred to as a Multinominal Logit Model.

In the CL model, the utility U of a good or service j for an individual i is given by:

$$U_{ij} = \beta' \boldsymbol{X}_{ij} + \gamma_j' \boldsymbol{Z}_i + \varepsilon_{ij}, j = 1, \dots, J_i \quad \text{(eq. 1)}$$

where β' is a vector of parameter coefficients for the attributes $\mathbf{X}_{ij}$, γ_j' is a vector of observed individual characteristics $\mathbf{Z}_i$, and ε_{ij} is the component representing unobservable determinants. These unobservable determinants are assumed to be independent and identically distributed, with type 1 extreme value distribution

$$F(\varepsilon_{ij}) = \exp\left(-\exp(\varepsilon_{ij})\right) \quad \text{(eq. 2)}$$

Under these assumptions, the probability of individual i choosing option j over the other alternatives q is

$$\text{Prob}\left(U_{ij} > U_{iq}\right) \text{for all } q \neq j \quad \text{(eq. 3)}$$

The independent type 1 extreme value distribution gives rise to the conditional logit model, in which the probability of choosing option j is

$$\text{Prob}\ (y_i = j) = \frac{\exp\ (\beta' \boldsymbol{X}_{ij} + \gamma'_j \boldsymbol{Z}_i)}{\sum_{q=1}^{J_i} \exp(\beta' \boldsymbol{X}_{iq} + \gamma'_q \boldsymbol{Z}_i)} \quad \text{(eq. 4)}$$

where y_i is the index of the choice made.

The trade-offs between a cost attribute and the other attributes is used to infer a marginal WTP (Hanley et al., 1998). The marginal WTP is the part-worth for a unit change in an attribute when all other attribute levels remain the same. The part-worth for an attribute s is the negative ratio between marginal utility for the attribute s and the marginal utility for the price attribute:

$$WTP_{jis} = -\frac{\beta_{si}}{\beta_{price}} \quad \text{(eq. 5)}$$

The CL model is traditionally used to analyse CE data and it offers a computationally convenient model for this Master's project. More recent studies have used Mixed Logit (ML) modelling approaches to analyse CE data. Examples of the ML modelling approach to CEs can be found in Kragt et al. (2016), Campbell (2007) and Carlsson et al. (2003).

ML models do not rely on the restrictive Independence of Irrelevant Alternatives (IIA) property, which assumes that the ratio of choice probabilities between alternatives is independent of any other alternatives in a choice set (Hensher et al. 2005). The ML model also allows the researcher to specify the model in a panel data set-up, where the error term is correlated between choices made by the same individual. But one of the most important features of ML models it their ability to capture unobserved individual heterogeneity in preferences for the choice attributes (Hensher & Greene, 2003; Hensher et al., 2005).

In the ML model, unobserved preference heterogeneity is captured by introducing random parameters β_i. These parameters vary among the population with a density function $f(\beta_i|\Theta)$, where Θ is a vector of parameters capturing individual deviations from the mean. The

distribution of Θ (for example normal, uniform or lognormal) has to be specified for the analysis.

The random parameter for attribute k for individual i can now be expressed as:

$$\beta_{ik} = \beta_k + \sigma_k v_{ik}, k = 1, \dots . K \qquad \text{(eq. 6)}$$

where β_k is the mean unconditional population parameter for the taste distribution and v_{ik} are the random and unobserved variations in individual preferences, distributed around the population mean with standard deviation σ_k. The unconditional choice probability of choice j by individual i in choice situation t is the expected value of the conditional logit probability over the parameter values (Kragt, 2013):

$$E(Pr_{ijt}) = \int Pr_{ijt}(\beta_i) - f(\beta i|\Theta) d\beta_i \qquad \text{(eq. 7)}$$

To estimate the model, simulated maximum likelihood methods are used as described by McFadden and Train (2000).

In this study, we will use CL and ML modelling to estimate an attributes-only model and CL modelling to estimate a model with socio-demographic interactions and to estimate the WTP.

3.2. Survey Development

In January and February 2016, interviews were conducted with the Environmental Project Officer of the City of Subiaco, with Environmental Officers from three other local councils along the Fremantle Railway Line and three experts on revegetation[2]. The question list for the expert interviews can be found in Appendix B. The aim of the interviews was to determine relevant attributes and attribute levels of the revegetation project for the Railway Reserve. The expert interviews also determined the status quo or no management scenario. Without any management, the Railway Reserve consists of grasses and weeds that are mown by Main Roads and Perth Transport Authority.

The expert interviews provided the information for a question list for three focus group workshops. A first workshop was conducted with nine students at the University of Western Australia on 15 February 2016. An updated question list (Appendix C) was then used for two more workshops on Saturday 27 February and 28 February in Jolimont with five (first workshop) and seven (second workshop) residents of the City of Subiaco. The participants received an information form and were asked to sign a consent form (Appendix D).

The aim of the focus group workshops was to determine the relevant attributes and attribute levels of the revegetation project for the survey. Table 1 below gives an overview of the relevant attributes of the revegetation project that were identified during the workshops – and subsequently used in the CE.

[2] Human Ethics Research Approval was granted by the University of Western Australia for the expert interviews, the focus group workshops and the online survey (Appendix E).

Table 1. Attributes identified during focus group workshops.

Attribute	Description	Attribute Levels
Your annual contribution[3]	To finance the revegetation project, an annual contribution would be imposed on all households in the City of Subiaco. This contribution would go into a special Revegetation Fund. This fund would only be used for the establishment and maintenance of the revegetation project	• $10 • $20 • $50 • $100
Proportion of the length of Railway Reserve revegetated	The percentage of the available land along the railway line in the City of Subiaco that will be revegetated. The revegetated area will be distributed along the railway line	• 25% • 50 % • 75 % • 100 %
Interpretative signs	Interpretative signs could provide information to the general public about the revegetation process and plants that are used. Two types of signs can be used: • Overview: signs near the train stations providing an overview of the revegetation project and the plants that are used • Individual: signs near individual plants with the name of the plant	• None • Yes, overview of project near train stations or points of interests • Yes, individual signs at regular intervals • Yes, overview signs and individual signs
Management for wildlife habitat	Management practices could enhance the creation of habitat for native wildlife such as birds, microbats and lizards. Such practices include: • Installing nest boxes in the area can provide additional habitat for birds (e.g. striated pardalotes). The boxes are designed to keep out invasive bees and rainbow lorikeets • Using vegetation to provide specific habitat and food sources for endangered species such as Carnaby's Black Cockatoos • Nest boxes for microbats. Microbats are small bats that feed on mosquitos and other insects • Leaving branches and leaf litter on the ground to create habitat for insects and lizards	• Yes • No

[3] The currency used in this study is Australian dollar.

Attribute	Description	Attribute Levels
Type of vegetation used	Three types of plants can be used for the revegetation project: • Ground-covering plants: native plants with a height of less than 1 metre replacing the groundcover of weeds and grasses. These do not block sunlight or sight • Shrubs: native plants with a height of 0.5 to 2 metres. Shrubs block sunlight and sight at 0.5-2 metres • Trees: native plants with a height of more than 2 metres. Trees block sunlight and sight at higher heights but are open at lower heights	• Ground-covering only • Ground-covering and shrubs • Ground-covering and trees • Ground-covering, shrubs and trees

The use of local versus non-local native plants or non-native plants was considered as an attribute but not included in the final survey. Revegetation experts and the City of Subiaco stated that they would only use local native plants that naturally occur in nearby bushlands and as such native versus non-native plants was not a realistic management attribute.

The experts and the focus group participants preferred an annual contribution towards a special management fund as the cost attribute. They stated that an annual contribution better reflects costs for implementation and ongoing management rather than a one-off payment. A one-off payment was also considered as unfair towards people leaving the City of Subiaco shortly after the one-off payment was implemented. There was no time limit included in the cost attribute: the annual contribution was described as an ongoing contribution. The participants of the focus group workshops were asked to anonymously write down the annual contribution per household they would be willing to make (Table 2). The data of these bids (in Australian dollar) were used to select the levels for the cost attribute.

Table 2. Contribution bids from focus group workshops

Workshop	Mean	Median	Lowest	Highest
1	$33	$35	$10	$55
2	$116	$125	$15	$200
3	$162	$125	$0	$500
Overall	**$91**	**$50**	**$0**	**$500**

Participants of the second and third focus group workshop also completed a test survey. The feedback on the test survey was used to improve the survey design.

3.3. Survey Design and Implementation

Given the number of attributes and attribute levels, there were a total of 512 hypothetical management options: 4 levels of proportion x 4 levels of vegetation type x 4 levels of interpretative signs x 2 levels of wildlife habitat management x 4 levels of annual contribution. To design an efficient survey, each respondent was presented with six choice sets containing two management options and the status quo option.

The choice sets were created using a fractional factorial design with Ngene software (Choice Metrics, 2016). In a fractional factorial design, a balanced subset of alternatives is created with an equal representation of each attribute level and with full independency between the attribute levels (Bennett & Blamey, 2001; Rose & Bliemer, 2014).

The design presented 24 sets of 2 options. For each choice set a third option was added representing the status quo or no management scenario. The 24 choice sets were grouped in 4 blocks of 6 choice sets each. Each respondent was randomly assigned one of the four blocks, with an even distribution between the four blocks. An overview of the experimental design is available in Appendix F.

The online survey was coded in the Qualtrics Online software (Qualtrics, 2016). The first part of the survey provided participants with background information on the Railway Reserve and included questions on previous knowledge of the revegetation project and attitudes towards urban vegetation.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	75 %	25 %	No management
Type of vegetation used	Ground-covering plants, shrubs and trees	Ground-covering plants, shrubs and trees	
Management for wildlife habitat	Yes	Yes	
Interpretative signs	None	Overview	
Your annual contribution	$100	$50	$0

Figure 2. Example of a choice set.

In the second part of the survey, respondents were presented with the status quo or no management scenario and a description and illustration of the attributes and attribute levels. They were then asked to complete one of the four blocks with six choice sets each. An example of a choice sets is shown in Figure 2. A cheap talk script was added as described by Cummings and Taylor (1999) to encourage respondents to make the same decisions as they

would in real-life situations. This reduces the risk of hypothetical bias, where respondents overstate their actual WTP. The cheap talk script used in the survey was:

> *Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.*

If a respondent selected five or six times the no management option, they were asked why they preferred the no management option. This allowed for the identification of possible protest responses.

Finally, the third part of the survey collected socio-demographic information from the residents. The survey was programmed to prevent the same respondent from doing the survey more than once and to allow for an equal distribution between the four blocks of choice questions. The online survey is available in Appendix G.

A web address (http://www.railwaysurvey.net) was created to facilitate the distribution of the survey. The survey was widely promoted among residents of the City of Subiaco through the use of social media channels of the City of Subiaco and the University of Western Australia, the door-to-door distribution of 2,000 flyers across the City of Subiaco, posters at public notice boards and publications in two local newspapers. Appendix H presents an overview of the materials used for the promotion of the survey.

As an incentive, respondents could enter a draw to win one of two $100 Wish Gift Cards. After the survey was closed, two email addresses were selected at random to determine the winners of the gift cards. The winners were contacted via email to arrange the delivery of their gift card.

The survey was published on Monday 11 April 2016 and was available for 35 days until Sunday 15 May 2016.

4. Results

4.1. Sample Characteristics

The survey was started by 188 respondents. Of those, 22 from outside the City of Subiaco were excluded, and 15 others did not complete the survey. Of the 151 completed surveys, three responses were identified as protest responses because the respondents did not trust the contribution fund or did not want to pay for additional revegetation management. Models estimated with the data without the protest responses resulted in similar results as the models estimated with the data including the protest responses. Appendix I compares the results of the models with and without the protest responses. The models in this thesis are based on the data with the protest responses.

Table 3 compares socio-demographic statistics of the sample with statistics for residents 18 years of age or older of the City of Subiaco from the 2011 Census (ABS, 2011). Significantly more people with a university degree participated in the survey than the 2011 Census (z-score 9.76, p=value 0), but the sample was representative for gender (z-score -0.54, p-value 0.29) and the mean age and mean income of the sample are similar to 2011 Census data.

Table 3. Comparison between sample data and 2011 Census data.

	Sample (n=151)	2011 Census
Gender		
Female	*50.33 %*	*52.54 %*
Age		
Mean Age	*45.99 years*	*44.04 years*
Education		
University Degree	*86.75 %*	*46.73 %*
Income		
Median Weekly Household Income	*$1,749*	*$1,602*

Table 4 presents the summary statistics of the socio-demographic variables that were collected in the third part of the survey and that were used for the model analysis.

Table 4. Summary statistics of socio-demographic variables (n=151).

Variable Name	Description	Mean	Range
AGE	Age (years)	45.99	20–70
AWARE	Proportion of respondents aware of project before starting the survey	0.26	0-1
DIST	Distance of residence from Fremantle Railway Line (meters)	848.68	50-2000
FEMALE	Proportion of females	0.51	0-1
HABIT	Agreement with statement: "I value urban vegetation because it provides habitat for wildlife" (0 = not, 4 = very much)	3.68	1-4
HOUSE	Proportion of respondents owning their own house	0.58	0-1
INCOME	Combined household income before tax (AUD/week)	1948.08	199.5-4500
PARTIC	Proportion of respondents who participated in planting or weeding events in the City of Subiaco	0.13	0-1
PATH	Use of the walking and bicycle path along the Fremantle Railway Line (times/week)	1.70	0-7
RAIL	Use of the Fremantle Railway Line (times/week)	1.45	0-7
SUBI	Number of years living in City of Subiaco	9.14	0.5-20
UNSAFE	Agreement with statement: "Dense urban vegetation makes me feel unsafe" (0 = not, 4 = very much)	1.20	0–4

In the first part of the survey, the respondents were asked about their attitudes towards urban vegetation. They had to indicate to what degree they agree with four statements about urban vegetation. A score between 0 (do not agree at all) and 4 (agree very much) was allocated to their responses (Table 5). People valued urban vegetation more for the habitat it provides for wildlife than for the buffer it creates against noise or the recreational activities it provides. The low score for the fourth question "Dense vegetation in urban areas makes me feel less safe" indicates that there are few respondents who do feel less safe as a result of dense urban vegetation.

Table 5. Responses to statements about urban vegetation.

Statement	Average score
I value urban vegetation as it provides habitat for wildlife	3.68
I value urban vegetation as a buffer to reduce noise	3.42
I value urban vegetation for the recreational possibilities it offers	3.34
Dense vegetation in urban areas makes me feel less safe	1.20

4.2. Attributes-Only Model

A first CL model was estimated including only the attributes of the revegetation project. Dummy variables were created for the non-continuous attributes as listed in Table 6.

Table 6. Variables for attributes of the revegetation project.

Variable Name	Description	Type
PROP	Proportion of length of Railway Reserve revegetated	Continuous
VEG.S	Vegetation types used: ground-covering plants and shrubs	Discrete
VEG.T	Vegetation types used: ground-covering plants and trees	Discrete
VEG.ST	Vegetation types used: ground-covering plants, shrubs and trees	Discrete
WILD	Management for wildlife habitat	Discrete
SIGN.O	Interpretative signs: overview signs	Discrete
SIGN.I	Interpretative signs: individual signs	Discrete
SIGN.OI	Interpretative signs: overview and individual signs	Discrete
SQ	Status quo scenario (no management)	Discrete
PAY	Annual contribution per household	Continuous

The CL model with attributes only estimates the following utility function:

$$U = \beta_1 PROP + \beta_2 VEG.S + \beta_3 VEG.T + \beta_4 VEG.ST + \beta_5 WILD + \beta_6 SIGN.0 + \beta_7 SIGN.I + \beta_8 SIGN.OI + \beta_9 SQ + \beta_{10} PAY$$

Results from this model are presented in Table 7. Significant positive coefficients are estimated for PROP, VEG.S, VEG.T, VEG.ST and WILD. This means that residents of the City of Subiaco have a preference to have a larger proportion of the Railway Reserve revegetated, to add shrubs, trees or both to the ground-covering plants and to include management for wildlife habitat. The results for the inclusion of interpretative signs were not significant. As expected, the coefficient for the payment attribute is negative: people prefer the options that require a lower annual contribution. The negative coefficient on the SQ shows that respondents, in general, prefer revegetation management of the Railway Reserve over the presented status option.

Table 7. Results of attributes only CL model.

Variable Name	Coefficient		Standard Error
PROP	0.011	***	0.002
VEG.S	0.335	*	0.178
VEG.T	0.723	***	0.191
VEG.ST	0.539	***	0.163
WILD	0.528	***	0.115
SIGN.O	-0.015		0.147
SIGN.I	0.008		0.172
SIGN.OI	-0.024		0.155
SQ	-0.364	*	0.207
PAY	-0.009	***	0.001
*Significance codes: *** = 0.01; ** = 0.05; * = 0.1* *Log-Likelihood: -817.39* *AIC: 1654.8* *n=151*			

In addition to the CL model, a ML model was estimated on the attributes of the revegetation project only. This ML model was included to investigate preference heterogeneity towards the attributes that could not be captured by respondents' socio-demographic variables. The ML models were initially specified with all choice attributes as random parameters. All attributes were specified as normally distributed, except for the cost attribute PAY, which has a constrained triangular distribution to ensure a negative coefficient over the full distribution.

Attributes that did not have a significant standard deviation on the distribution were included as fixed coefficients in the final model. The ML model accounts for the fact that this is a panel data in which each respondent was presented with six choice sets. As a result, the errors of the choices by the same respondent are correlated. Furthermore, an error component EC was included to account for the fact that the errors of the two change options may be correlated and different from the error of the status quo option. This EC had a significant coefficient, which indicates that the errors for the two change options were indeed correlated and different from the status quo option. Table 8 presents the results for the ML model.

Table 8. ML model with attributes only.

Variable Name	Coefficient mean			Coefficient standard deviations		
PROP	0.028	***	(0.008)	0.052 ***		(0.008)
VEG.S	0.507		(0.465)	2.120 ***		(0.483)
VEG.T	1.678	***	(0.455)			
VEG.ST	1.279	***	(0.307)			
WILD	1.343	***	(0.418)	2.763 ***		(0.497)
SIGN.O	0.688	**	(0.336)			
SIGN.I	1.042	***	(0.403)			
SIGN.OI	0.717	**	(0.314)			
PAY	-0.025	***	(0.002)	0.025 ***		(0.003)
SQ	-2.492	***	(0.749)			
EC	4.046	***	(0.802)			
*Standard errors in parentheses; Significance codes: *** = 0.01; ** = 0.05; * = 0.1*						
Log-Likelihood: -611.18; AIC: 1250.4; n = 151						

As expected, the attribute-only ML model has a significantly better fit than the attribute-only CL model, as indicated by the higher log-likelihood and the higher AIC. The results from the ML model show significantly unobserved preference heterogeneity for the PROP, VEG.S, WILD and PAY attributes. Coefficient means are similar for the CL model and ML models, with the same signs on most choice attributes. Again, respondents prefer to pay less and have a preference for the change options over the status quo option as indicated by the negative coefficients on PAY and SQ.

Preferences are higher for trees than for shrubs and trees or shrubs only. Respondents also have a significantly positive preference for a higher proportion of Railway Reserve revegetated (PROP) and for wildlife management (WILD). The major difference with the CL model is that preferences for interpretative signs are now shown to be significantly positive. Further data analysis (e.g. including additional socio-demographic interactions or latent class model analysis) will be needed to investigate why the coefficients for signs are significant in the ML model but not in the CL results.

4.3. Model with Interactions

A second CL model was estimated including interactions between the attributes of the revegetation project and socio-demographic characteristics. This model reveals if and how preferences towards the attribute vary with socio-demographic characteristics of the respondent. A stepwise regression approach was used to determine the best fit model. First, all possible interactions between the attributes of the revegetation project and socio-demographic characteristics were added to the model. Then, the interactions with high p-values were removed from the model. This process was repeated until the model included only significant interactions. The results from the final model are presented in Table 9.

Table 9. Results of CL model with interactions.

Variable Name	Coefficient		Standard Error
PROP	0.018	***	0.005
x aware	0.011	***	0.003
x female	0.009	***	0.003
x path	0.007	***	0.001
x unsafe	-0.006	***	0.001
x dist	-0.006	***	0.002
VEG.S	0.410	**	0.194
VEG.T	0.545	**	0.250
x female	0.965	***	0.270
VEG.ST	0.682	***	0.180
WILD	0.456	**	0.229
x path	0.304	***	0.095
x unsafe	-0.279	***	0.099
SIGN.O	-0.058		0.169
x partic	0.815	**	0.328
SIGN.I	0.115		0.201
x aware	0.585	*	0.322
SIGN.OI	-0.011		0.179
x partic	0.929	**	0.406
SQ	-1.207	***	0.384
x subi	0.363	***	0.075
x income	-0.102	***	0.033
PAY	-0.042	***	0.006
x house	0.005	**	0.002
x habit	0.005	***	0.001
x age	0.001	*	0.001
x income	0.001	**	0.000
*Significance codes: *** = 0.01; ** = 0.05; * = 0.1*			
Log-Likelihood: -692.84	*AIC: 1439.7*		*n=151*

As expected, this model is a better fit for our data than the attributes-only CL- model. It explains the influence of socio-demographic characteristics on respondents' preferences. Similar to the attributes-only model, the CL model with interactions estimates a positive and significant coefficient for the proportion, the inclusion of shrubs or trees or both and the inclusion of management for wildlife habitat. The coefficients on the interaction terms show that females, people who were aware of the project before they started the survey and people who regularly use the walking and bicycle path have a stronger preference to have a larger proportion revegetated. On the other hand, people who live further away from the railway and people who indicated dense urban vegetation makes them feel less safe, have a lower preference for a larger revegetated proportion compared to people who live closer or people who sense of safety was not affected by dense urban vegetation.

Females also have a stronger preference to include trees compared to male respondents, whereas people who previously participated to planting and weeding events have a stronger preference to include interpretative overview signs or the combination of overview and individual signs. People who were previously aware of the revegetation project, showed a stronger preference for individual signs.

Regular users of the walking and bicycle path indicated a stronger preference to include management for wildlife habitat. People who said they feel less safe near dense vegetation in the city less preferred the addition of management for wildlife habitat.

The coefficient for the cost attribute is significant and negative. People with a higher income, older people, people who own their house and people who value urban greenery more for the habitat it provides for wildlife, all are more likely to choose options with a higher annual contribution. Residents who have been living in the City of Subiaco for a longer time, are more likely to choose the status quo option.

4.4. Part-Worth

The CL model with the interactions was used to estimate the part-worth of the different attributes of the revegetation project. The part-worth is the marginal WTP for one unit change if all other attributes remain the same. To estimate the part-worth, the averages of the socio-demographic characteristics were used as listed in Table 4. Table 10 shows the part-worth for the attributes which have a significant coefficient. Appendix J presents the marginal WTP for all significant interactions with socio-demographic characteristics.

Table 10. Part-worth estimated from CL model with interactions.

Variable Name	Part-worth (AUD/year)	Standard Error
PROP (per 1 % of Reserve revegetated)	0.27	0.07
VEG.S (shrubs yes/no)	9.80	4.78
VEG.T (trees yes/no)	24.63	5.90
VEG.ST (shrubs and trees)	16.29	4.78
WILD (yes/no)	14.15	3.59

The marginal WTP among respondents for revegetation of the Railway Reserve was $0.27 per year per household for every additional percentage of the area revegetated. The inclusion of trees in the revegetation project had a marginal WTP of $24.63 per year. For females, this marginal WTP was much higher ($36.07) than for males ($13.02). The marginal WTP for shrubs and trees was $16.29, while WTP for shrubs was $9.80. Respondents were willing to pay on average $14.15 per year for the inclusion of management for wildlife habitat. People who use the walking and bicycle path every day were willing to pay on average $31.93, whereas people who never use the path were only willing to pay on average $2.91 per year for the management for wildlife habitat. No marginal WTP could be estimated for the inclusion of interpretative signs as the coefficients for these variables were not statistically significant.

To illustrate the heterogeneity of the respondents, three resident profiles were created based on the socio-demographic characteristics with the most influence on the marginal WTP. The description and marginal WTP for the three profiles is presented in Table 11. These results show how different types of residents have a different marginal WTP for attributes of the revegetation project. For example, a female who uses the walking and bicycle path every day, who was previously aware of the project and who does not feel less safe near urban vegetation (profile 1) is willing to pay $1.15 per year per household for every extra percent of the Reserve that is revegetated. However, a male who never uses the path, did not know about the project before and who feels a lot less safe near urban vegetation (profile 3), has a negative marginal WTP of -$0.58 for every extra percent of the Reserve revegetated. This mean revegetation would yield a *dis*utility for such a resident. The results for the marginal WTP for the inclusion of wildlife management are also very different between profile 1 ($39.92) and profile 3 (-$15.77).

Table 11. Marginal WTP for three types of residents.

	Profile 1	**Profile 2**	**Profile 3**
Socio-demographic characteristics	✓ Female ✓ Uses path every day ✓ Previously aware of project ✓ Does not feel less safe near dense urban vegetation (score = 0)	✓ Female ✓ Uses path once a week ✓ Not previously aware of project ✓ Feels less safe near dense urban vegetation (score = 2)	✓ Male ✓ Never uses path ✓ Not previously aware of project ✓ Feels a lot less safe near dense urban vegetation (score = 4)
	Part-worth (AUD/year)		
PROP (+1 % revegetated)	1.15	0.27	-0.58
VEG.S	9.80	9.80	9.80
VEG.T	36.07	36.07	13.02
VEG.ST	16.29	16.29	16.29
WILD	39.92	12.08	-15.77

5. Discussion

5.1. Public Preference for Revegetation Project

The first objective of this study was to determine what aspects of the revegetation project for the Railway Reserve are important to the public. The CE determined that people have a preference for a larger proportion of the Reserve to be revegetated, to add shrubs or trees or both to the ground-covering plants, and to include management for wildlife habitat such as nest boxes for birds and bats. The study also estimated an average WTP of $0.27 per year per household for every extra percent of the Reserve that is revegetated. There is also a WTP for the addition of shrubs ($9.80), trees ($24.63), shrubs and trees ($16.29) and management for wildlife habitat ($14.15). The CE also revealed heterogeneity in the preferences and WTP among different types of residents, with a higher WTP for females and regular users of the walking and bicycle path along the railway line.

The results from the CE appear to confirm the hypothesis that the WTP increases with the addition of management for wildlife habitat. However, the results of the CL model reject the hypothesis that the WTP will increase with the addition of interpretative signs. As expected, there was a higher WTP among females, residents living closer to the railway and residents who had previous awareness of the project. There is no higher WTP for residents who have been living in the City of Subiaco longer.

The results of our CE study are similar to the findings of other non-market valuation studies of urban greenery. The higher WTP for urban greenery among females was also found for example in a CE study by Santiago et al. (2015) on the revegetation of an urban square in Puerto Rico. In the study by Santiago et al., both men and women had a preference for a green square with grass or trees, but this preference was relatively stronger among women. This corresponds with our results, where both men and women have a WTP for a larger revegetated proportion, but this preference is relatively stronger among women.

The WTP among residents of the City of Subiaco for management for wildlife habitat also corresponds with the results from other valuation studies. CE studies by Koo et al. (2013) in South Korea and by Juutinen et al. (2011) on a park in Finland, similarly found public preferences for management of urban greenery that incorporates management for wildlife habitat. The preference to have a larger proportion revegetated could not be compared to results from other studies. No previous valuation studies on urban greenery were found where the vegetated proportion of the area was included as an attribute.

5.2. Implications

While there is a growing number of non-market valuation studies in environmental economics, decision- and policy-makers in Australia do not frequently use the results from non-market valuation to develop policies or management strategies (Rogers et al., 2015). However, Rogers et al. (2015) found that decision makers acknowledge the benefits of non-market valuation studies as a decision making tool after the methodology was explained to them. This non-market valuation study was developed in close collaboration from the start with decision makers from the environmental department of the City of Subiaco. The City of Subiaco showed an interest in the results of the study for the development of future management strategies. This collaboration between the researcher and the City of Subiaco and the higher likelihood of an influence on the decision making process adds to the value of this study.

Currently, the City of Subiaco aims to revegetate the full available area of the Railway Reserve. The City currently uses a combination of ground-covering plants, shrubs and trees. The City implements management strategies for wildlife habitat (such as nest boxes) and does not use interpretative signs. These current management practices by the City of Subiaco correspond with the public preferences that were determined in this CE study. This study shows no significant public preference for the addition of interpretative signs.

For the current management of the Railway Reserve as implemented by the City of Subiaco, we can estimate a WTP per household per year for an average respondent:

100 percent x $0.27 (PROP) + $16.29 (VEG.ST) + $14.15 (WILD) = $57.44

For the 8,369 households in the City of Subiaco (ABS 2011), this scenario would represent a total WTP of $480,715 per year for the revegetation of the Railway Reserve as currently planned by the City of Subiaco. The costs for the revegetation of the Railway Reserve are estimated to be approximately $175,000 per hectare (G Pickard 2016, personal communication, 11 January). For the total available area of approximately ten hectares, this would be an estimated cost of $1,750,000. The WTP of residents of the City of Subiaco that is estimated in this study would allow for 2.75 hectares to be revegetated yearly. Ongoing management costs of the revegetated area would need to be added to these annual costs too but information about such costs was not available at the time of writing.

One of the socio-demographic characteristics that leads to an increased WTP, is previous knowledge of the revegetation project. One in four survey respondents of the survey were aware of the project and these respondents showed a higher WTP for a larger revegetated proportion and for the management for wildlife habitat. The City of Subiaco could implement a communication plan to increase the awareness among residents about the revegetation

project for the Railway Reserve. This study indicates that such a communication plan could raise residents' WTP for the revegetation project. During the focus group workshops, several participants who lived within 500 metres of the Railway Reserve said they were not aware of the project. After they received more information about the project and its possible benefits, these residents said they had a more positive attitude towards the project. More knowledge about the project increased their support and WTP for the revegetation of the Railway Reserve.

5.3. Limitations and Further Study

The status quo or no management scenario that was used for our CE, does not reflect the current state of the Railway Reserve along the full length of the railway line. The City of Subiaco started a revegetation project for the Reserve in 2008. Some parts of the Reserve are already revegetated with local and non-local native vegetation. The status quo was selected because this would be the situation without any revegetation management. The discrepancy between the status quo scenario in the survey and the current state of some parts of the Reserve might have caused bias, with respondents more often choosing the status quo scenario. The lower WTP for a larger revegetated proportion among people who have been living longer in the City of Subiaco might be a result of this. They might prefer the status quo scenario because they want to keep the current and sometimes already revegetated scenario. However, people who indicated that they were aware of the revegetation project before they started the survey, did not select the status quo scenario more often. On the contrary, people with previous awareness had a higher WTP for a larger revegetated proportion. This rejects the status quo bias and is rather an indication of a participation bias.

This participation bias occurs when the respondents who took the time to complete the survey were the residents of the City of Subiaco who showed an interest in the topic of the survey. Residents who are not interested in the topic and thus might have a lower WTP, might be less likely to participate despite the incentive that was offered. The socio-demographic statistics of the respondents (Table 3) indicate that the sample was representative for the population of the City of Subiaco on gender, income and age. A more representative sample on education and on interest in urban greenery could be obtained by using a professional agency to recruit the respondents. However, this approach was beyond the financial means of this Master's project.

To understand the public preferences on a larger scale, further study could be done by replicating the CE for other local council areas along the Fremantle Railway Line. Residents from other local councils might have different preferences and a comparison of these results could reveal further suggestions for management of the Reserve.

This study used CL model specification to estimate an attributes-only model and a model with interactions between the attributes and socio-demographic variables. This second CL model was subsequently used to estimate marginal WTP for the project attributes. Where the CL model included socio-demographic interactions to explain the sources of preference

heterogeneity, an attributes-only ML model was also estimated to test for *unobserved* heterogeneity in preferences towards the attributes. This testing revealed some unobserved heterogeneity in preferences towards the proportion, wildlife management, shrubs and payment attributes. The other preference parameters broadly showed the same signs and significance as the CL model results, with the exception of the interpretive signs which were significant and positive in the ML models. Further testing will be needed to explain these results and to determine whether different specifications of the ML model, for example with different random parameter distributions or adding observable preference heterogeneity, would provide a better model fit. However, such further extensive testing was considered outside the scope of this Master's project.

This study included four different levels for the attribute of interpretative signs, but none of these levels had a statistically significant effect (Table 9) in the CL model. The presence of four levels might have made the choice questions too complicated for some respondents, even though these levels were based on focus group discussion and consultation with experts. A replication of this study with a simple discrete yes/no option for the inclusion of interpretative signs could possibly yield insightful results on the inclusion of interpretative signs.

6. Conclusion

This study using a choice experiment reveals preferences among the residents of the City of Subiaco to have a larger proportion of the Railway Reserve revegetated. Residents are willing to pay on average $0.27 for every additional percent of the Reserve that is revegetated. The study also found a preference among residents to add shrubs, trees or both to the ground-covering plants. Residents further have an average willingness to pay of $14.15 to add the management for wildlife habitat.

These results reinforce the current management practices for the Railway Reserve by the City of Subiaco. Residents support the revegetation management for the Railway Reserve that aims to vegetate a large proportion of the area using shrubs or trees or both and with the inclusion of nest boxes for birds and bats and other management strategies to increase wildlife habitat. There is no significant public preference to include interpretative signs in the revegetation project.

Acknowledging the limitations presented by the sample size, the results of these study reveal public support for the further revegetation of the Railway Reserve by the City of Subiaco. Improved communication by the City of Subiaco to raise awareness of the project can increase the willingness to pay among residents. Respondents with previous awareness had a relatively higher willingness to pay for a larger revegetated area.

The results from this study can also be useful for other local councils along the Fremantle Railway Line to support their decision making process for the management of the Railway Reserve.

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Appendix A: Expert Interview Questions

Interviews with experts will be conducted to determine relevant attributes of the revegetation project of the Railway Reserve in the City of Subiaco and to determine relevant levels for these attributes. The interviews with the experts will follow this structure: introduction, questions, closure.

1. Introduction

The researcher will introduce himself and describe the aims of the project.

The researcher will ask the permission to record and to take notes and will assure the confidentiality of the interview.

2. Questions

The researcher will lead an open discussion about the revegetation project of the Railway Reserve. Below is a set of questions to be used for the interviews.

General

1. What do you see as potential benefits or drawbacks of urban revegetation of the Railway Reserve in Subiaco?
2. What are the different management options for the Railway Reserve along the Fremantle Railway Line?
3. What are the main priorities with revegetation projects in your council area along the Fremantle Railway Line?
4. What would be the ecological condition of the Railway Reserve without revegetation efforts?

Characteristics and levels

1. When you design or implement a revegetation project, what are the characteristics or outcomes that are most important to you/the council to achieve?
2. Which plants would you most like to use for revegetation of the Railway Reserve?
    a. What benefits do they offer?
3. One of the considerations you may have is to use native or non-native species. How would you make the decision about using native vegetation versus non-native species?
    a. What positive or negative features of (non-)native species are relevant for this project?
4. Is there a minimum proportion of native species you would want to use? Realistically, would you ever vegetate the railway reserve with 100 percent non-native vegetation or with 100 percent native vegetation?

5. Is it possible to fully restore native biodiversity functions? How is full restoration defined?
    a. How high should the percentage of native versus non-native plant species be to achieve this?
6. Could the revegetation of the Railway Reserve create a greenway (wildlife corridor) between existing parks in the area such as Kings Park, Bold Park and other smaller parks?
    a. What proportion of the Railway Reserve should be vegetated to create a corridor?
7. Do you use density of vegetation as a measure of successful rehabilitation?
    a. If yes, what should be the density of vegetation for a successful rehabilitation?
8. Are there any things that you would use to successfully create a wildlife corridor? For example, specific species that should be included, a minimum density that is necessary, a minimum proportion of native species?
9. Would have interpretative signs in the Railway Reserve provide a value to you?
    a. If yes, is the number of signs important?
    b. Would there be a minimum number of interpretive signs that you would need to see before they become valuable / useful to you?
    c. Is there a maximum number of interpretative signs that you would like to see, so that having more becomes a nuisance rather than a benefit?
10. Would having nest boxes in the Railway Reserve provide a value to you?
    a. If yes, is the number of next boxes important?
    b. Would there be a minimum number of nest boxes that you would need to see before they become valuable / useful to you?
    c. Is there a maximum number of nest boxes that you would like to see, so that having more becomes a nuisance rather than a benefit?
11. Is there anything else that you think that is relevant for this project that we have not talked about yet?

Monetary attribute

What would be the predicted extra costs to revegetate the Railway Reserve?

3. Closure

Thanking the participations for their time.

Asking whether the participations need additional information on the project.

Offering the participants the option to receive a digital copy of the Research Project upon completion.

Appendix B: Focus Group Questions

This Focus Group workshop will be about the revegetation project of the Railway Reserve in the City of Subiaco. The workshop will take approximately 1.5 hours. You will first receive a Participant Information Form and a Participant Consent Form. Next, we will go through an introduction of the project, followed by an open discussion. Finally, you will be asked to complete a survey.

1. Introduction

The researcher will introduce herself/himself and describe the aims of the project.

The researcher will ask the permission to record and to take notes and will assure the confidentiality of the interview.

2. Questions

1. Are you familiar with the Railway Reserve? What does that name imply to you?
2. How would you like to see the Railway Reserve to be managed? We think about revegetation, but perhaps the respondents want to see a completely different use of the stretch of land (e.g. buildings)
3. What do you see as potential benefits or drawbacks of this revegetation project? Are there any good things or bad things that you can think of?
4. Which plants would you prefer to be used for revegetation of the Railway Reserve?
    a. What benefits do they offer to you?
5. One of the considerations is to use native or non-native species. How would you make the decision about using native vegetation versus non-native species?
    a. What positive or negative features of native or non-native species are relevant to you?
    b. Is there a minimum proportion of native species you would want to be used?
6. Does revegetation of the Railway Reserve have an impact on you feeling safe around the Railway Reserve?
    a. Which aspects of the revegetation can enhance or reduce your feeling of safety?
7. Is the height of the plants used for revegetation important to you?
    a. Why is the height of the vegetation important to you?
    b. Do you prefer creepers and herbs, shrubs or trees?
8. One of the considerations is whether to vegetate patches of the railway reserve, or to perhaps revegetate continuously along the rail-line. This continuous strip may not necessarily be of the same quality as the individual patches. Would that make a difference to you?
9. Is the density of the vegetation important to you?
    a. If yes, what is your preferred density of vegetation?
10. Would having interpretative signs in the Railway Reserve provide a value to you?
    a. If yes, is the number of signs important?

   b. Would there be a minimum number of interpretive signs that you would need to see before they become valuable / useful to you?
   c. Is there a maximum number of interpretative signs that you would like to see, so that having more becomes a nuisance rather than a benefit?
11. Would having nest boxes in the Railway Reserve provide a value to you?
   a. If yes, is the number of next boxes important?
   b. Would there be a minimum number of nest boxes that you would need to see before they become valuable / useful to you?
   c. Is there a maximum number of nest boxes that you would like to see, so that having more becomes a nuisance rather than a benefit?
12. The revegetation of the Railway Reserve will cost money, which the City of Subiaco will need to raise through fundraising or an annual levy for all residents of Subiaco.
   a. Do you think it is reasonable to ask resident households to contribute to this project?
   b. Would you be willing to contribute if you lived in Subiaco?
   c. What would be a reasonable contribution you would be willing to make? Ask participants to write this on a piece of paper rather than voice out.
13. Could you rank the attributes of the revegetation project according to relevance?
   - Length revegetated
   - Percentage of native plants
   - Density of vegetation
   - Use of nest boxes
   - Use of interpretative signs
   - Annual contribution
14. Did we forget anything else related to the Railway Reserve that has not yet been discussed?

3. Closure

Thanking the participations for their time.

Asking whether the participations need additional information on the project.

Offering the participants the option to receive a digital copy of the Research Project upon completion.

Appendix C: Experimental Design

Prop = Proportion of the length of Railway Reserve revegetated (25%; 50%; 75%; 100%)

Veg = Type of vegetation (0 = ground-covering plants only; 1 = ground-covering plants and shrubs; 2 = ground-covering plants and trees; 3 = ground-covering plants, shrubs and trees)

Wild = Management for wildlife habitat (0 = no; 1 = yes)

Sign = Interpretative signs (0 = none; 1 = overview; 2 = individual; 3 = overview + individual)

Cost = Annual contribution per household ($10; $50; $100; $200)

	Choice Option 1					Choice Option 2				
Choice Set	**Prop**	**Veg**	**Wild**	**Sign**	**Cost**	**Prop**	**Veg**	**Wild**	**Sign**	**Cost**
BLOCK 1										
1	100	2	0	0	200	50	3	0	1	10
2	25	3	1	1	10	50	0	0	3	50
3	50	1	1	2	50	75	2	0	0	50
4	25	0	0	0	10	25	0	0	1	200
5	100	3	0	1	200	75	0	1	2	50
6	50	2	1	1	50	25	3	0	3	200
BLOCK 2										
7	100	1	1	3	50	50	2	1	1	10
8	25	0	1	3	100	75	3	1	3	10
9	100	1	1	0	100	100	0	0	3	100
10	75	3	0	2	10	25	2	1	3	100
11	75	3	1	0	100	25	3	1	0	50
12	75	2	1	2	50	100	1	0	2	10
BLOCK 3										
13	75	2	1	3	100	100	2	0	0	200
14	50	2	1	2	200	25	0	1	2	100
15	50	3	0	3	100	75	1	0	1	10
16	50	1	0	2	100	50	3	0	2	200
17	25	0	0	0	200	100	2	1	3	50
18	75	1	0	1	50	75	3	0	2	100
BLOCK 4										
19	50	2	0	1	10	100	2	1	0	100
20	100	0	1	0	10	75	1	1	1	200
21	25	3	0	2	50	100	1	1	1	200
22	25	1	1	1	200	50	1	1	0	100
23	100	0	0	3	10	50	1	1	2	50
24	75	0	0	3	200	25	0	0	0	10

Appendix D: Online Survey

Q1.1.

Thank you very much for taking your time to answer the questions in this survey.

This Research is being undertaken by Mr. Gunther De Vos as part of his Master of Environmental Science at the University of Western Australia. The project is supervised by Dr. Marit Kragt and Dr. Ram Pandit at the School of Agricultural and Resource Economics.

This survey is about the City of Subiaco's revegetation project of the Railway Reserve. We aim to find out what aspects of revegetation are important to you. The information from this survey will help inform science and the City of Subiaco about community preferences for different ways to manage the Railway Reserve. You don't need to be familiar with revegetation management to do this survey. We want to hear everybody's opinion!

Participation is voluntary and completely anonymous. This survey will take about 10 minutes to complete. You are free to withdraw from the survey at any time.

The information gathered from this survey is strictly confidential and will not be used for any other purposes than this Research Project. No individual data will be revealed, only summary statistics for the survey as a whole will be used for the Project. The data will be stored on a password protected computer in accordance with UWA data retention policies. Your answers will be completely anonymous and your identity will not be revealed in any publication arising from this study.

If you have any questions about this survey, please feel free to contact Dr. Marit Kragt at the School of Agricultural and Resource Economics. You can keep a copy of this information sheet by clicking here.

If you consent to participate in this survey, please start answering the questions that follow.

At the end of this survey, you will have the option to enter into a prize draw. Two winners will be drawn to receive a $100 Wish Gift Card each.

Dr Marit E. Kragt – Senior Lecturer

School of Agricultural & Resource Economic, University of Western Australia
M089 / 35 Stirling Highway, Crawley WA 6009
ph: 08 6488 4653
e: marit.kragt@uwa.edu.au

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time.

In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics Office at the University of Western Australia on (08) 6488 3703 or by emailing to humanethics@uwa.edu.au

All research participants are entitled to retain a copy of this Participant Information Form.

Q1.2.

Are you 18 years or over and do you live in the City of Subiaco (suburbs Subiaco, Daglish, Jolimont, Crawley, Shenton Park)?

- Yes
- No

Q1.3. We are sorry, this survey is for residents aged 18 or over of the City of Subiaco only.

This question was not displayed to the respondent.

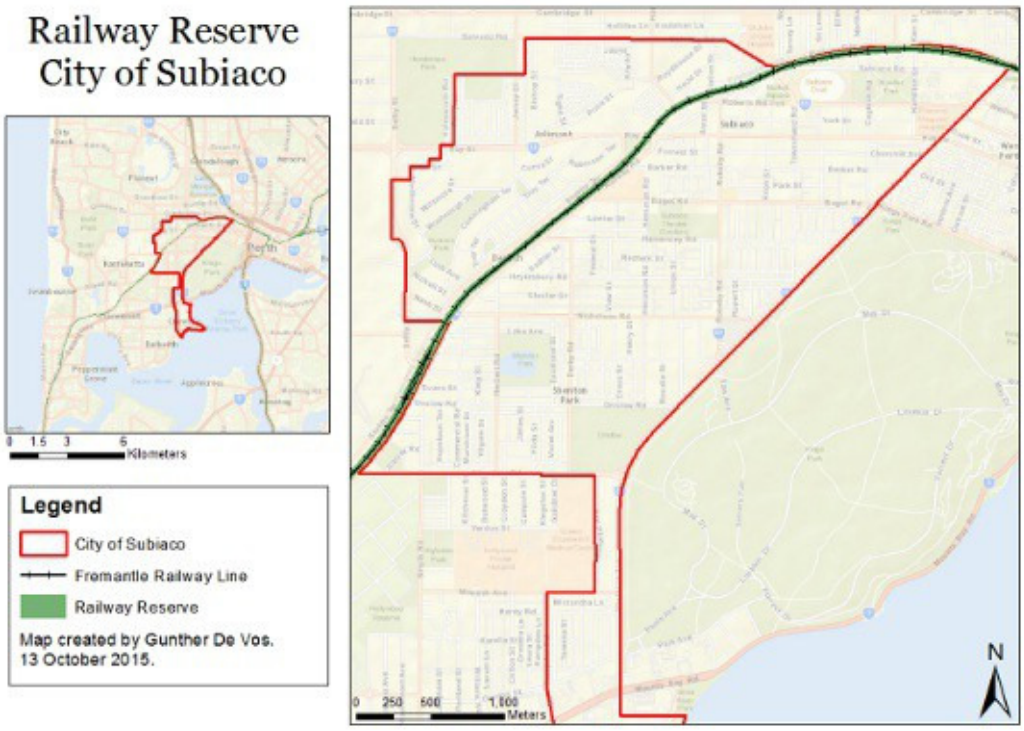
Q1.4.

There are three parts to this survey:

- An introduction to the Railway Reserve in the City of Subiaco
- Questions about your preferences for revegetation management of the Reserve
- Some questions about you

Q2.1.

The Railway Reserve (shown in green in the map below) is the area immediately along the Fremantle Railway Line. The area is about 5-20 metres wide on both sides of the Railway. It is over 4 kilometres long and about 10 hectares in size. The City of Subiaco is planning a revegetation project for the Railway Reserve within the City's boundaries.



Q2.2.

Before you started this survey, were you aware of the City of Subiaco's revegetation project for the Railway Reserve?

- ○ Yes
- • No

Q2.3.

The City of Subiaco organises regular planting events for volunteers to help revegetate the area along the railway line. Such events help to increase biodiversity and to conserve the habitat for native fauna and flora.

Q2.4. Have you ever participated in planting or weeding events such as National Tree Day organised in the City of Subiaco?

- ○ Yes
- • No

Q2.5. The primary purpose of the Railway Reserve is to facilitate public transport.

How often do you use the bicycle or walking path along the Fremantle Railway Line?

- ○ Every day
- ○ 3 to 6 times a week
- • 1 to 2 times a week
- ○ Less than once a week
- ○ Never

Q2.6. How often do you use the Transperth Fremantle Railway Line?

- ○ Every day
- ○ 3 to 6 times a week
- ○ 1 to 2 times a week
- • Less than once a week
- ○ Never

Q2.7. Do you agree with the following statements about vegetation in urban environments?

Do you agree with the following statements about vegetation in urban environments?

	Strongly agree	*Agree*	*Neutral*	*Disagree*	*Strongly disagree*	*I do not know*
I value urban vegetation as it provides habitat for wildlife	○	●	○	○	○	○
I value urban vegetation for the recreational possibilities it offers	●	○	○	○	○	○
I value urban vegetation as a buffer to reduce noise	○	○	●	○	○	○
Dense vegetation in urban areas makes me feel less safe	○	○	○	○	●	○

Q3.1.

Without any revegetation management, the Railway Reserve would consist of grasses and weeds. These are mowed on a regular basis by Main Roads and Public Transport Authority. The picture below shows a section of the Railway Reserve where no revegetation works have been done.

In the questions that follow, the 'no management' scenario will capture this situation (with grasses and weeds mown on a regular basis).

Q3.2. Management Options

The City of Subiaco could implement the revegetation program within its boundaries in different ways. Native plants that naturally occur in bushland areas near the Railway Reserve would be used for the revegetation program. The use of native plants reduces the costs for maintenance and irrigation, and can provide food and habitat for native animals.

Management guidelines are in place to maintain a safe railway infrastructure and to keep the shared path for bicycles and pedestrians free from plants, branches and large tree fruits and nuts.

Below is a picture of a section of the Reserve that was revegetated less than one year ago.

Below is a picture of a section of the Reserve seven years after revegetation.

Q4.1.

Management Preferences

We are now going to show you six choice questions. Each question will show 3 different options to manage the Railway Reserve. One of these options will be the 'no management' option with grasses and weeds mown on a regular basis.

The different management options will be described by five different features:

- Proportion of the length of Railway Reserve revegetated
- Type of vegetation used
- Management for wildlife habitat
- Interpretative signs
- Your annual contribution

Below, you see an example of a choice question. In the questions that follow, you will be asked to choose the one option you most prefer from each choice question shown to you.

	Option A	Option B	Option C
Proportion of the length of Railway Reserve revegetated	100 %	50 %	No Management
Type of vegetation used	Ground-covering plants, shrubs and trees	Ground-covering plants and shrubs	
Management for wildlife habitat	Yes	No	
Interpretative signs	Overview	Individual	
Your annual contribution	$50	$10	$0

Q4.2.

Before we ask the choice questions, we will describe the five management features. Please read these descriptions carefully, as you will need them later in the survey.

Q4.3. Feature 1: Proportion of the length of Railway Reserve revegetated

This is the percentage of the available land along the railway line in the City of Subiaco that will be revegetated. The revegetated area will be distributed along the railway line.

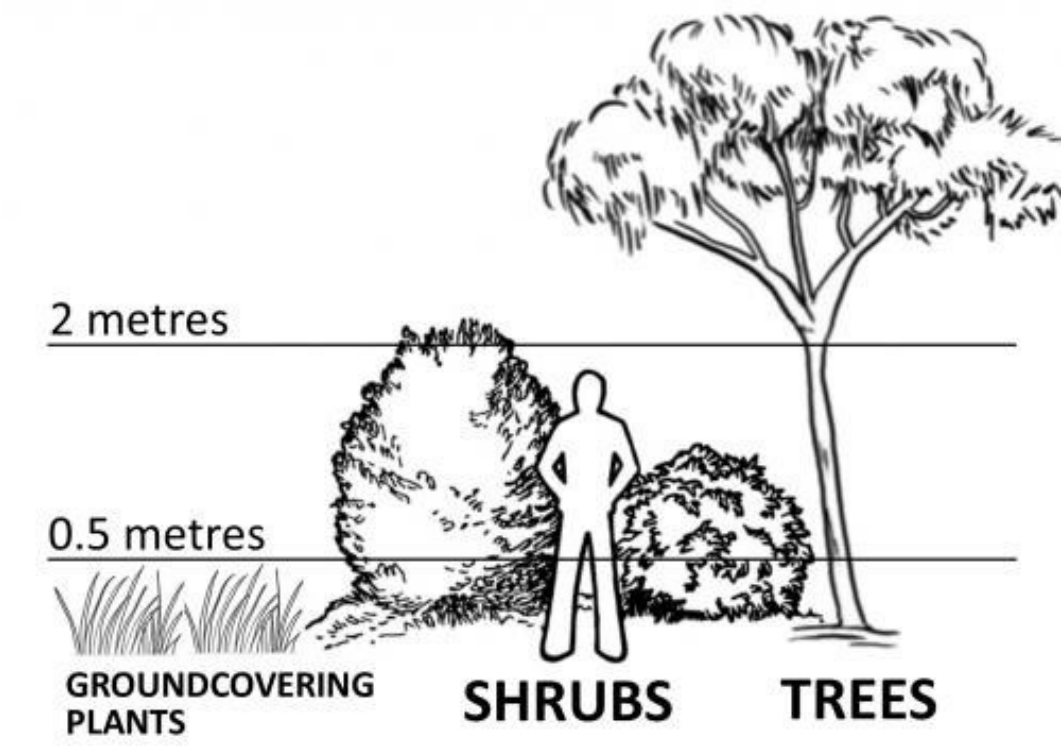
The choice questions will include 4 different possibilities for this feature:

- 25 % of the length of the Railway Line revegetated
- 50 % of the length of the Railway Line revegetated
- 75 % of the length of the Railway Line revegetated
- 100 % of the length of the Railway Line revegetated

Q4.4. Feature 2: Type of vegetation used

Three types of plants can be used for the revegetation project.

- Ground-covering plants: native plants with a height of less than 1 metre replacing the groundcover of weeds and grasses. These do not block sunlight or sight
- Shrubs: native plants with a height of 0.5 to 2 metres. Shrubs block sunlight and sight at 0.5-2 metres
- Trees: native plants with a height of more than 2 metres. Trees block sunlight and sight at higher heights but are open at lower heights



The choice questions will include 4 different possibilities for this feature:

- Ground-covering plants only
- Ground-covering plants and shrubs
- Ground-covering plants and trees
- Ground-covering plants, shrubs and trees

Q4.5. Feature 3: Management for wildlife habitat

Management practices could enhance the creation of habitat for native wildlife such as birds, microbats and lizards. Such practices include:

- Installing nest boxes in the area can provide additional habitat for birds (for example striated pardalotes). The boxes are designed to keep out invasive bees and rainbow lorikeets
- Using of vegetation to provide specific habitat and food sources for endangered species such as Carnaby's Black Cockatoos
- Nest boxes for microbats. Microbats are small bats that feed on mosquitos and other insects
- Leaving branches and leaf litter on the ground to create habitat for insects and lizards

Below is an example of a nest box for birds (left) and a nest box for microbats (right). (Photos taken at Mabel Talbot Reserve)

The choice questions will include 2 different possibilities for this feature:

- Yes, wildlife management practices will be implemented
- No, no wildlife management practices will be implemented

Q4.6. Feature 4: Interpretative signs

Interpretative signs could provide information to the general public about the revegetation process and plants that are used. Two types of signs can be used:

- Overview: signs near the train stations providing an overview of the revegetation project and the plants that are used
- Individual: signs near individual plants with the name of the plant

Below is an example of an overview sign (left) and of an individual sign (right). (Photos taken at Kings Park)

The choice questions will include 4 different possibilities for this feature:

- No signs
- Overview signs
- Individual signs
- Overview and individual signs

Q4.7. Feature 5: Your annual contribution

To finance the revegetation project, an annual contribution would be imposed on all households in the City of Subiaco. This contribution would go into a special Revegetation Fund. This fund would only be used for the establishment and maintenance of the revegetation project.

The choice questions will include 4 possible levels of this feature. All these contributions are per year, and per household.

- $10
- $50
- $100
- $200

You will need to consider the cost of each option relative to your income.

Q5.1. We will now show you 6 different choice questions. For each choice question, please choose the one management option that you like best.

Q7.1.

Choice Question 1 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	100 %	50 %	No management
Type of vegetation used	Ground-covering plants and shrubs	Ground-covering plants and trees	
Management for wildlife habitat	Yes	Yes	
Interpretative signs	Overview and individual	Overview	
Your annual contribution	$50	$10	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.2.

Choice Question 2 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	25 %	75 %	No management
Type of vegetation used	Ground- covering plants only	Ground-covering plants, shrubs and trees	
Management for wildlife habitat	Yes	Yes	
Interpretative signs	Overview and individual	Overview and individual	
Your annual contribution	$100	$10	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.3.

Choice Question 3 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	100 %	100 %	No management
Type of vegetation used	Ground-covering plants and shrubs	Ground- covering plants only	
Management for wildlife habitat	Yes	No	
Interpretative signs	None	Overview and individual	
Your annual contribution	$100	$100	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.4.

Choice Question 4 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	75 %	25 %	No management
Type of vegetation used	Ground-covering plants, shrubs and trees	Ground-covering plants and trees	
Management for wildlife habitat	No	Yes	
Interpretative signs	Individual	Individual and overview	
Your annual contribution	$10	$100	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.5.

Choice Question 5 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	75 %	25 %	No management
Type of vegetation used	Ground-covering plants, shrubs and trees	Ground-covering plants, shrubs and trees	
Management for wildlife habitat	Yes	Yes	
Interpretative signs	None	None	
Your annual contribution	$100	$50	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.6.

Choice Question 6 of 6

Please consider each of the following three management options carefully. Suppose that these are the only options available. Which one option would you choose?

Please answer this question as if you were really intending to support this management of the Railway Reserve and consider how much your household can afford to pay.

You can click on the features in the first column or on the 'no management' option to see a description of the features.

	Option A	Option B	Option C
Proportion of length of Railway Reserve revegetated	75 %	100 %	No management
Type of vegetation used	Ground-covering plants and trees	Ground- covering plants and shrubs	
Management for wildlife habitat	Yes	No	
Interpretative signs	Individual	Individual	
Your annual contribution	$50	$10	$0

I choose:

- ○ Option A
- • Option B
- ○ Option C

Q7.7. You often selected Option C, no management. Was this because

Q10.1. Thank you for completing the survey this far!

Finally, we would like to ask some questions about you so we can see how different types of people feel about the topic. Rest assured that all your answers will remain anonymous and confidential.

Q10.2. What is your gender?

- ○ Male
- • Female

Q10.3. What is your age?

- ○ 18-24 years
- ○ 25-34 years
- ○ 35-44 years
- • 45-54 years
- ○ 55-64 years
- ○ 65 years or over

Q10.4. What is the total combined weekly income before tax of your household?

- ○ less than $399 / week (less than $20,799 / year)
- ○ $400-$599 / week ($20,800 - $31,199 / year)
- ○ $600-$799 / week ($32,200 - $41,599 / year)
- ○ $800-$999 / week ($41,600 - $51,999 / year)
- ○ $1,000-$1,249 ($52,000 - $64,999 / year)
- • $1,250-$1,499 ($65,000 - $77,999 / year)
- ○ $1,500-$1,999 ($78,000 - $103,999 / year)
- ○ $2,000-$2,499 ($104,000 - $129,999 / year)
- ○ $2,500-$2,999 ($130,000 - $155,999 / year)
- ○ $3,000-$3,499 ($156,000 - $181,999 / year)
- ○ $3,500-$3,999 ($182,000 - $207,999 / year)
- ○ $4,000 or more ($208,000 or more / year)

Q10.5. What is the highest level of education you have completed?

- ○ Primary School only
- ○ High School only
- • TAFE
- ○ University – Undergraduate
- ○ University - Postgraduate

Q10.6.

Do you own your property or are you renting?

- ○ I own my property
- • I am renting

Q10.7. How long have you been living in the City of Subiaco?

- ○ Less than 1 year
- • 1-3 years
- ○ 3-5 years
- ○ 5-10 years
- ○ More than 10 years

Q10.8. In which of the zones below do you live?

To find your zone, click here to open a map of the City of Subiaco showing the different zones.

- ○ Zone A (within 100 metres of Railway - pink on map)
- • Zone B (100-500 metres from Railway - yellow on map)
- ○ Zone C (more than 500 metres from Railway and North of Aberdare Road - purple on map)
- ○ Zone D (South of Aberdare Road - blue on map)

Q11.1. Thank you for completing this survey!

If you have any feedback on the survey, please share your comments with us.

Great initiative, I love having green in the city. Only remark: There are not enough lights along the pathways. I go for runs along the train line in the evening and I can't see the path or other people, which has scared me or caused me to trip on multiple occasions.

Q11.2.

To show our gratitude to you for completing this survey, we want to invite you to enter a draw to win a $100 Wish Gift Card. Two participants will win a $100 card each. Click here for more information on the Wish Gift Card.

Do you want to enter the draw?

- Yes
- No

Q11.3. To enter the draw, please leave your email address below. Your answer to this question will be separated from the rest of your answers to this survey.

xxxxxxxxxxxxxxxxxxxxx@xxxxxxxx.xxx

Q11.4.

The results of this Research Project will be available in August 2016. Are you interested in receiving a digital copy of the results?

- Yes
- No

Q11.5. To receive a copy of the results from this survey, please leave your email address here. Your answer to this question will be separated from the rest of your answers to this survey.

This question was not displayed to the respondent.

Appendix E: Survey Promotion

Share your thoughts on Subi's rail reserve

A UWA student is surveying Subiaco residents' opinions on how the council looks after the railway reserve.

The railway reserve is the area immediately next to the railway line.

The bit of it that is in Subiaco is between 5m and 20m wide on both sides of the railway. It is more than 4km long and about 10ha in area.

Subiaco council is planning a revegetation project for the reserve and organises regular planting events for volunteers to help increase biodiversity and conserve the habitat for native fauna and flora.

As part of his master's research project, UWA student Gunther de Vos would like to know what residents think about the council's revegetation project.

He also wants to finds out what aspects of the project are important to residents.

Completing the survey will take about 10 minutes and residents do not need any knowledge of revegetation.

All information gathered from the survey is strictly anonymous and confidential.

People taking part can enter a draw to win a $100 gift card.

The survey is at railwaysurvey.net and is open until May 1.

For more information, email Gunther at 21541369@student.uwa.edu.au.

Figure 1. Article published in Subiaco Post newspaper on Saturday 16 April 2016. (Circulation: 50,000 copies in the Western Suburbs)

REVEGETATION PROJECT SURVEY

A SURVEY on the City of Subiaco's revegetation project of the Railway Reserve along the Fremantle rail line is open to residents until May 1.

The 10-minute survey is part of a master's research project at the University of WA to discover what aspects of the revegetation project are most important to Subiaco locals.

All information gathered from the survey is strictly anonymous and confidential.

Participants can enter a draw to win a $100 gift card.

Visit www.railwaysurvey.net or email Gunther De Vos at 21541369@student.uwa.edu.au for more information.

Figure 2. Article published in Western Suburbs Weekly newspaper on Tuesday 26 April 2016. (Circulation: 43,100 copies in the Western Suburbs)

Dear Resident,

THE UNIVERSITY OF WESTERN AUSTRALIA

We are interested in your opinion about the City of Subiaco's revegetation project of the Railway Reserve, the area along the Fremantle Railway Line. You are invited to complete an online survey. This survey is a Master's Research Project at the University of Western Australia. We seek to know what aspects of the revegetation project are important to residents of the City of Subiaco.

Completing the survey will take about **10 minutes**. You don't need to be familiar with revegetation, we want to hear everybody's opinion! All information gathered from the survey is strictly anonymous and confidential.

Participants of the survey can enter a draw to win a $100 Wish Gift Card.

You can now access the survey at www.railwaysurvey.net. The survey is open until 1 May 2016.

For more information, please contact Gunther De Vos at 21541369@student.uwa.edu.au.

HE Approval RA/4/1/8051 *This flyer is printed on 100% recycled paper.*

Figure 3. Flyer (A5 format) and poster (A4 format) used for distribution in the City of Subiaco. (Copies distributed: 2,000 flyers distributed door-to-door in selected streets across the City of Subiaco; 15 posters distributed at supermarkets, library and other public places)

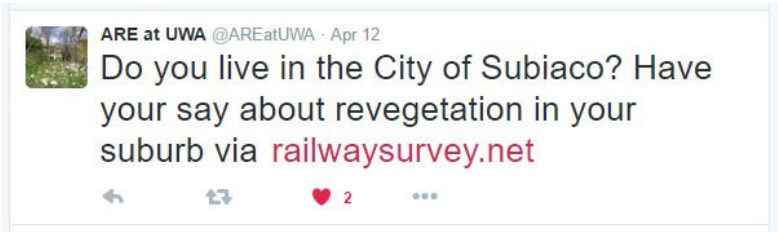


Figure 4. Post on Twitter account of School of Agricultural and Resource Economics (266 followers)

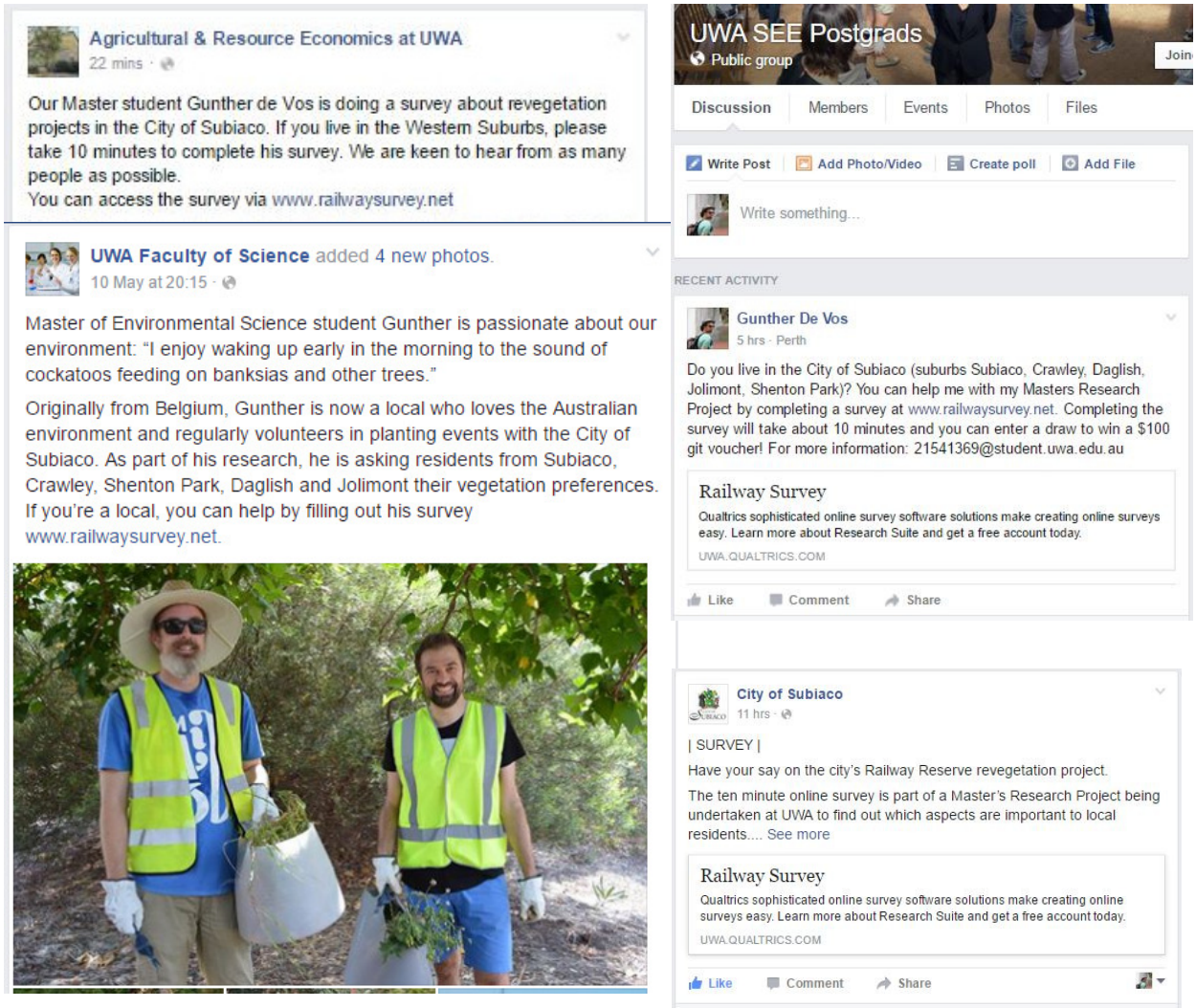


Figure 5. Facebook posts by Agricultural and Resource Economics at UWA (850 likes), UWA Faculty of Science (2,583 likes), the City of Subiaco (299 likes) and UWA See Postgrads (180 members)

Appendix F: Protest Responses Comparison

Attributes Only CL Model

	Data with protest responses			Data without protest responses		
Variable Name	Coefficient	Standard Error		Coefficient	Standard Error	
PROP	0.011	0.002	***	0.011	0.002	***
VEG.S	0.335	0.178	*	0.335	0.182	*
VEG.T	0.723	0.191	***	0.728	0.196	***
VEG.ST	0.539	0.163	***	0.562	0.167	***
WILD	0.528	0.115	***	0.559	0.117	***
SIGN.O	-0.015	0.147		-0.015	0.150	
SIGN.I	0.008	0.172		0.013	0.176	
SIGN.OI	-0.024	0.155		-0.021	0.159	
SQ	-0.364	0.207	*	-0.478	0.213	**
PAY	-0.009	0.001	***	-0.009	0.001	***
	*Significance codes: *** = 0.01; ** = 0.05; * = 0.1* *Log-Likelihood: -817.39* *AIC: 1654.78*			*Significance codes: *** = 0.01; ** = 0.05; * = 0.1* *Log-Likelihood: -780.70* *AIC: 1581.39*		

CL Model with Interactions

Variable Name	Coefficient	Standard Error		Coefficient	Standard Error	
PROP	0.018	0.005	***	0.019	0.005	***
x aware	*0.011*	*0.003*	***	*0.009*	*0.003*	***
x female	*0.009*	*0.003*	***	*0.012*	*0.003*	***
x path	*0.007*	*0.001*	***	*0.008*	*0.001*	***
x unsafe	*-0.006*	*0.001*	***	*-0.007*	*0.001*	***
x dist	*-0.006*	*0.002*	***	*-0.007*	*0.002*	***
VEG.S	0.410	0.194	**	0.404	0.197	***

Variable Name	Coefficient	Standard Error		Coefficient	Standard Error	
VEG.T	0.545	0.250	**	0.527	0.253	**
x female	*0.965*	*0.270*	***	*1.097*	*0.276*	***
VEG.ST	0.682	0.180	***	0.689	0.184	***
WILD	0.456	0.229	**	0.473	0.231	**
x path	*0.304*	*0.095*	***	*0.316*	*0.098*	***
x unsafe	*-0.279*	*0.099*	***	*-0.290*	*0.103*	***
SIGN.O	-0.058	0.169		-0.028	0.172	
x partic	*0.815*	*0.328*	**	*0.765*	*0.332*	**
SIGN.I	0.115	0.201		0.152	0.207	
x aware	*0.585*	*0.322*	*	*0.541*	*0.325*	*
SIGN.OI	-0.011	0.179		0.192	0.183	
x partic	*0.929*	*0.406*	**	*0.930*	*0.409*	**
SQ	-1.207	0.384	***	-1.288	0.393	***
x subi	*0.363*	*0.075*	***	*0.287*	*0.078*	***
x income	*-0.102*	*0.033*	***	*-0.068*	*0.033*	**
PAY	-0.042	0.006	***	-0.044	0.006	***
x house	*0.005*	*0.002*	**	*0.005*	*0.002*	**
x habit	*0.005*	*0.001*	***	*0.006*	*0.001*	***
x age	*0.001*	*0.001*	*	*0.001*	*0.001*	**
x income	*0.001*	*0.000*	**	*0.001*	*0.000*	**
	*Significance codes: *** = 0.01; ** = 0.05; * = 0.1*			*Significance codes: *** = 0.01; ** = 0.05; * = 0.1*		
	Log-Likelihood: -692.84			*Log-Likelihood: -662.60*		
	AIC: 1439.68			*AIC: 1379.21*		

Appendix G: Part-Worth for Interactions

Variable Name	Part-worth (AUD/year)	Standard Error
PROP (% of reserve revegetated)	0.27	0.07
aware: yes	*0.47*	*0.10*
aware: no	*0.20*	*0.07*
male	*0.16*	*0.07*
female	*0.38*	*0.08*
path: never	*0.18*	*0.08*
path: 7 times /week	*0.67*	*0.13*
unsafe: 0	*0.45*	*0.09*
unsafe: 4	*-0.15*	*0.11*
dist: 50m	*0.54*	*0.11*
dist: 2000m	*0.09*	*0.08*
VEG.S (shrubs: yes/no)	9.80	4.78
VEG.T (trees: yes/no)	24.63	5.90
male	*13.02*	*6.15*
female	*36.07*	*7.53*
VEG.ST (shrubs and trees)	16.29	4.78
WILD (yes/no)	14.15	3.59
path: never	*2.91*	*4.48*
path: 7 times /week	*31.93*	*7.93*
unsafe: 0	*22.14*	*5.12*
unsafe: 4	*-4.53*	*7.24*