New Zealand Agricultural & Resource Economics Society (Inc.)

Cultural differences in environmental valuation

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Paper presented at the 2012 NZARES Conference

Tahuna Conference Centre – Nelson, New Zealand. August 30-31, 2012

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Abstract

The application of stated preference non-market valuation approaches in settings where there are strong cultural differences in environmental perspectives potentially misrepresent strengths of preferences for different groups. This paper reports on a study that measured strength of affiliation with traditional Māori identity, strength of connection with nature, and monetary measures of value derived from a choice experiment. The relationships between these three measures are explored to test the alignment of Māori identity with connection to nature, and to test the dependence of monetary valuation on cultural identity and connection with nature. The tests are applied in the context of a case study addressing water management in the Waikato Region.

Keywords: cultural valuation, environmental valuation, choice modelling, cultural identity, water preservation, Māori values, connectedness to nature

1. Introduction

The use of freshwater resources in New Zealand is fast becoming a highly contested issue, fuelled by conflicting values regarding the allocation, misuse and degradation of these resources and the surrounding land. This is not only between users of the resource, but those who hold non-use values such as existence values, bequest values of preservation for future generations, and option values of knowing the resource is still available. The joint management agreement of the Waikato River is a recent example of where these conflicting values have been recognised and efforts are now being made to account for all of these in the future management of the River (Steenstra, 2009). The Ministry for the Environment (2004) state that this demand for water use will increase if current patterns are followed. Thus, there are pressures to increase the use of water resources for economic purposes, and to conserve the state of the resource for social and cultural wellbeing.

As a result of these pressures, it is essential for management and policy and decision makers not only to take these values into account, but to identify what they are, who holds them and how these can best be provided for in the decision making process. Many government documents identify goals and strategies to manage resources in a "sustainable" way by accounting for economic, social, cultural and environmental factors (Ministry for the Environment, 2004). These factors are hard to compare. For example, how should the cultural value of a mahinga kai (traditional food gathering) site on a river be evaluated in

comparison with the land owner's income gained from an intensive dairy farm? Or, the enjoyment from recreational activities compared with the value of ecosystems within a water body?

The Resource Management Act 1991 (s5-8) states a number of specific provisions for Māori cultural and spiritual values towards natural resources including; the cultural and traditional relationships of Māori and water bodies, waahi tapu and other taonga, their kaitiaki responsibilities and the principles of the Treaty of Waitangi. Despite these provisions and other legislative policies, Awatere (2008), Bennett (2005) and Townsend et al. (2004) suggest there is limited identification, measurement and accounting for these values in practice, due to the lack of measurement tools. On the other hand, the extent of subscription to traditional Māori values has been questioned by Meredith (1998), who pointed out the significant urban shift that has resulted in reduced tribal identity.

This paper aims to determine whether there is a significant difference between Māori and non-Māori values towards water resources. To investigate this matter;

- Values were calculated for both groups using choice modelling.
- A cultural identity scale was developed to examine diversity of values within the Māori population.
- A connectedness to nature scale was applied to measure environmental identity and its effect on the values held by individuals.
- The impact of Māori ethnicity, cultural identity and connectedness to nature on values revealed in the choice model were compared.

The paper is organised as follows. The remainder of this section provides an overview of the different techniques and applications to measure values, and provides background into the debate of measuring indigenous values. Section 2 outlines and describes the methodology. Section 3 provides results. Section 4 discusses implications of these results. Lastly, Section 5 finishes with concluding comments.

1.1. Measuring Value

Traditional Māori beliefs, like the beliefs of many Indigenous cultures, are centred around the view that Māori are an intrinsic part of the natural world. Water holds both spiritual non-use, and use significance for Māori. The natural environment sustains and protects all living things, and in turn Māori people have a kaitiaki (spiritual guardian) responsibility to respect and sustain the environment (Awatere, 2008). Tipa and Teirney (2006) have developed a cultural health index (CHI) for streams and waterways, incorporating techniques inclusive of the holistic principles that govern Māori management of natural resources. CHI was developed to aid participation in resource management processes and highlight strong Māori values. However, it does not provide a common measure that enables comparison of Māori values to those of non-Māori.

Stated preference economic valuation techniques are capable of measuring both use and non-use values and thus have the potential to identify environmental, economic and social values (Bennett et al., 2008). As a result, contingent valuation and choice modelling have been widely utilised in New Zealand to calculate preferences and willingness to pay values that can be used in decision making processes (Yao & Kaval, 2007). While these techniques are

theoretically capable of measuring all aspects of environmental value, there is debate over their validity and appropriate use in regards to indigenous cultures. Awatere (2005a, 2008) questioned the application of neoclassical economic valuation to indigenous values that are often considered to be intangible and/or sacred, and should not be subjected to monetary reductionism, ideas supported by Steenstra (2009) and Venn and Quiggin (2007). This is not to say that these Māori values cannot be measured using these techniques, but, in accordance with Adamowicz et al. (1998), potential problems need to be accounted for in the survey design. Cultural groups may share similarities, but they are unlikely to be homogenous (Adamowicz et al. 1998). While some may hold strong or even intangible values towards natural resources, this is unlikely to hold true for all. Therefore, it is important to consider heterogeneity within the Māori population.

1.2. Measuring Environmental Identity

While the values held by an individual can be formed as a result of cultural background, they can similarly be affected by adopted beliefs, worldviews and ideologies, independent of culture. The environmental movement which began in earnest in the 1970s (Dunlap et al., 2000) is generally centred around bio-centric and eco-centric benefits to the water resource itself (De Steiguer, 2006). Consequently "non-use" values such as ecology, conservation, existence and bequest values tend to take a higher level of importance over recreational and economic values. This environmental worldview developed out of western society and is based on western concepts; however, in regards to the approach to environmental issues, there has been recognition of the similarities between this worldview and indigenous worldviews (Groenfeldt, 2003).

A number of different techniques are available to measure environmentalism, environmental worldviews, environmental concern and environmental identity. The New Ecological Paradigm (NEP) scale is a commonly used measure of environmental worldview (Dunlap & Van Liere, 1978), along with Weigel and Weigel's (1978) Environmental Concern Scale and Blaikie's (1992) Ecological World View Scale. These are generally in the form of attitudinal questions that can be compared to calculated stated preference values. The Connectedness to Nature Scale (CNS), developed by Mayer and Frantz (2004), measures emotional connection to nature, which is a concept similar to the Maori traditional worldview in which humans are a part of nature. For this reason it has the potential to resonate well with both Māori and non-Māori.

1.3. Measuring Cultural Identity

There is a wide scope of people who identify as Māori, yet have very different levels of immersion in cultural life and practices (Awatere, 2005b). As Awatere (2005a) suggests, many ethnic Māori live a predominantly Pākehā (New Zealand European) life. This heterogeneity within Māoridom may have important implications, both for acceptance of environmental valuation and the estimates of values measured by it.

In New Zealand a number of measures have now emerged to deal with disparities between ethnicity and cultural immersion by calculating Māori identity. The most frequently utilised measure was developed by Te Hoe Nuku Roa (1996) using a number of cultural indicators indicative of Māori descent, self-created identity and cultural affiliation. Te Hoe Nuku Roa's MCI, is part of a longitudinal study that has been developed over a number of years. As a universal measure of Māori Identity that can be applied to all situations, it is a good starting point. However, it fails to account for more specific aspects of the Māori belief system and

connection to the natural world, which is of interest in this study. Awatere (2008) used an adaption of this measure on the basis that knowledge of the values and principles of Māori resource management should be incorporated when assessing environmental issues. Awatere's identity scale included indicators regarding kaitiakitanga (spiritual guardianship), mahinga kai (traditional food gathering sites) and traditional restoration practices. A further scale, the Multi-dimensional Model of Māori Identity and Cultural Engagement (MMMICE), developed by Houkamau and Sibley (2010) includes components of spirituality and beliefs that were not incorporated in the previous two scales, addressing the essence of 'being' Māori.

Awatere (2010) found little evidence to confirm a relationship between cultural identity and concern for the environment. He concluded that a person's cultural identity should not be reduced to a single number, and suggested that caution is necessary in relying on these scales. Franceško et al. (2005) used a similar scale to measure European identity, finding that identity is not an unchanging state or number that can apply to numerous situations, but a process that develops and transforms. For this reason they used cluster analysis to identify groups, where respondents differ significantly between groups, but are broadly similar within groups. Clusters were used as criteria for classification of different levels of identity (Franceško et al., 2005). This technique could be applied to Māori identity scales in an attempt to apply Awatere's suggestions.

2. Methodology

Data was obtained from a sample of students enrolled at Waikato University in the first semester of 2012. Participants were recruited to the online survey by email, the social networking site Facebook, and faculty newsletters. This particular case study population was chosen because of the high proportion of Māori students[1]. Limiting the population to university students reduced diversity of a number of socio-demographic characteristics, such as age[2], income and education.

Feedback interviews were conducted after the initial development of scales and identification of possible attributes for the choice experiments, to test the acceptance of these measures and the general attitudes and values of a small selection of the sample population. Participants in the feedback group consisted of 13 University of Waikato students, both Māori and non-Māori, who were not invited to participate in the final survey.

2.1. Survey design

The Māori Cultural Identity (MCI) scale used in this study was developed from the Te Hoe Nuku Roa scale (1996), the adaption of this scale by Awatere (2008), and the Multi-dimensional Model of Māori Identity and Cultural Engagement (MMMICE) (Houkamau & Sibley, 2010).

The MCI, displayed in Appendix 1, assesses four dimensions; (1) racial identity and Māori relationships (Q1, Q2 and Q6), (2) active engagement in cultural practices (Q4, Q5 and Q7), (3) subscription to Māori beliefs, values and spirituality (Q3, Q8, Q9 and Q10), and (4) self-identity and evaluation of individual membership (Q11 and Q12). Dimensions 1 and 2 were

[1] 18% of the total student population, which is significantly above the national average of 9% (Ministry of Education, 2011)

[2] 85% of university students in New Zealand are within the age range of 18-39 years (Ministry of Education, 2011)

well covered in Te Hoe Nuku Roa's MCI. Awatere incorporated some aspects of dimension 3 with beliefs regarding natural resources, while Houkamau and Sibley highlight the importance of dimension 4, particularly self-identity. Although this scale has not been tested elsewhere, the pre-existing scales were unable to capture many of the complex dimensions of Māori identity in relation to natural resources. In order to test the adapted scale, Māori participants in the feedback interviews were asked to critically evaluate it, resulting in the removal of one of the original questions and rewording other questions for improved clarity.

The Connectedness to Nature Scale (CNS) developed by Mayer and Frantz (2004) was used to measure environmental identity of respondents and their emotive connection with nature. This scale, consisting of 14 questions, required respondents to answer on a 5-point Likert scale, ranging from strongly agree to strongly disagree (Appendix 2). Feedback interviewees were satisfied with the scale, despite concerns of vagueness raised by colleagues.

Choice experiment attributes and their corresponding levels were chosen based on an extensive review of literature, identifying features of water resources most important to both Māori and non-Māori, and in consideration of relevant issues in the Waikato region. Harmsworth and Warmenhoven (2002), in their development of Māori community goals for enhancing ecosystem health, and Tipa and Tierney (2006), in their development of the CHI, outlined a number of attributes that were important to Māori. Similarly, important attributes to non-Māori were selected based on Kerr and Sharp's (2003) study of community mitigation preferences and Kerr and Swaffield's (2007) extensive review of attributes used in choice modelling. Recurring attributes included; water clarity, water quality, water safety, wildlife habitat, ecosystem abundance and diversity, river flow and levels, riverbank condition, riverbank vegetation, access, recreation, water use, and surrounding land use. In consideration of the potential problems with asking Māori to put a money value on water, alternative cost numeraires considered were the number of local jobs (Marsh, 2010) and change to the regional economy (Mallawaarachchi et al., 2001; Rolfe et al., 2000).

Choice model attributes were posed to participants in the feedback interviews. Participants tended to be concerned with water quality from a safety and use view, i.e. whether it was safe to drink, swim in, or fish in. River flow and level were of less concern, consistent with the low priority given to this issue in the region in comparison to urgent problems with water quality (Waikato Regional Council, 2011). The resulting attributes and levels are shown in Appendix 3. All attributes were characterised by three levels, aside from water clarity which had only two levels. Visual aids were used to ensure respondents could unambiguously interpret the choice options available to them.

The choice sets were identified using Ngene experimental design software. The design consisted of three alternatives and six generic variables. Parameters for the design were chosen based on the value estimates for each attribute obtained from the feedback interviews. Because all alternatives were unlabelled and no status quo alternative was used, there was no need for alternative specific constants. Feedback interviews highlighted the different weighting from respondents on improvements in the environmental attributes from one level to another, which were non-linear for riparian vegetation, water quality and water clarity, so these three variables were dummy-coded.

The efficient Multinomial Logit (MNL) design adopted consisted of 18 choice situations which were separated into three different blocks requiring each respondent to answer six choice sets. The survey was undertaken online using Qualtrics software.

2.2. Data Analysis

Response rates for this study were very low, possibly due to the timing of participant recruitment close to the exam period. Over 1000 students were directly emailed and more were targeted via social networking site Facebook and faculty newsletters. Only 102 people completed the survey, with 23 of those respondents identifying as Māori.

The responses from the CNS scale were added to give each individual a score indicative of their connection with nature. Those with scores less than 26 were classified as High CNS scores, reflective of a stronger connection to the natural world. Cluster analysis was carried out using the Statistical Package for Social Sciences (SPSS) to classify Māori respondents into groups of similar identity based on their responses to the MCI questions (Table 1). Data was first classified using Ward's method and squared Euclidean distance to identify the optimal number of clusters. Steps in the difference between coefficients in the agglomeration schedule suggested two, four, or seven clusters would be adequate. The option of seven or four clusters could immediately be dismissed. With only 23 Maori respondents some groups would contain only four or fewer members.

K-means cluster analysis was performed with two clusters. The observed significance in one way ANOVAs indicated that all variables aside from question five were significant, thus this question was removed from the classification. The characteristics of the two clusters are described in Table 1.

Table 1 - Cluster groups from the MCI scale

Cluster	Identifier	Description
1	Strong MCI	Strong Māori cultural relationships, beliefs and self identity. Moderate participation in Māori cultural practices
2	Weak MCI	Limited or no participation in Māori cultural practices. Moderate to weak relationships, beliefs and self identity

Choice analysis was carried out using NLogit 4.0 to test for differences between Māori and non-Māori values, the differences in CNS scores and individual preferences, and the difference between the different MCI clusters and individual preferences. To estimate utility function parameters and their impacts, a combined approach was taken. Attributes for riparian vegetation, water quality and water clarity are effects coded to account for non linear effects in attribute levels (Hensher et al, 2005). Initially, the MNL was applied. In order to investigate respondent heterogeneity and its underlying drivers, the Latent Class Model (LCM) and the Random Parameters Logit (RPL) model were used. The LCM allocates respondents into classes based on similarity of preferences and evaluates the effect of covariates on class allocation. RPL examines preference heterogeneity around the population mean parameter estimate and the influence of covariates on this heterogeneity (Hensher et al., 2005).

3. Results

The sample of 102 Waikato University students was comprised of 65% females, and 35% males, of which 63% identified as New Zealand European and 23% Māori. Approximately half of the respondents had resided in the Waikato region for over five years. The age range

was consistent with the previously stated Ministry of Education (2011) national average[3], with the majority of the sample between 18 and 23 years old, and 86% of the sample under 40 years of age. Over half of the students were completing a bachelor's degree; the next most popular degree was a master's (24% of the sample).The Faculty of Science and Engineering was the largest contributor, supplying 37% of the sample, followed by Waikato Management School (19%), the Faculty of Arts and Social Sciences (17%), and the Faculty of Law (14%).

Separate MNL models were estimated for non-Māori and Māori respondents, which were compared to a pooled model. The pooled model (Model 1, Table 2) resulted in utility coefficients for all parameters that were significant to the 1% level. A log-likelihood test was used to evaluate whether the overall preferences in the two ethnically separated models were significantly different. The log-likelihood test statistic (3.2996) is distributed chi-squared with 9 degrees of freedom. It is not statistically significant (p=0.9512), indicating that the separate models do not offer a superior fit.

Table 2 - Discrete Choice Modelling estimates

	Model 1 - MNL	**Model 2 - LCM**			**Model 3-RPL**	
Utility parameters		***Class 1***	***Class 2***	***Class 3***	***Mean***	***Variance***
Unhealthy riparian vegetation	-0.4085***	-4.7802***	-0.2843***	-0.3341***	-0.4065***	0.4337***
Healthy riparian vegetation	0.3809***	3.6855**	0.0886	0.5801***	0.4345***	0.0355
Water clarity	0.9248***	2.4748*	1.3513***	0.2202	0.9907***	0.9102***
Moderate water quality	0.2694***	1.3829**	0.0884	0.5308***	0.3625***	-
High water quality	0.4133***	-1.3393	0.7245***	0.1160	0.3716***	-
Unhealthy ecosystems	-0.9507***	-4.9695***	-1.0532***	-0.4400***	-1.0634***	-
Healthy ecosystems	0.8341***	4.0434***	0.6312***	0.6618***	0.97047***	-
Local jobs available	0.0056***	0.0144*	0.0130***	-0.0085***	0.0064***	-
Regional economy	0.0728***	0.3035**	0.1452***	-0.0930***	0.0713***	-
Covariate influence on heterogeneity						
Māori: unhealthy riparian vegetation					-0.5690*	
Strong MCI: water clarity					-0.9936*	
Class determinants (constant)			0.6805**			
Class determinants (high CNS)			-1.3616*			
Class probabilities		0.190	0.509	0.301		
Summary statistics						
Number of observations	612		612		612	
Log likelihood (model)	-609.6184		-571.3540		-596.2870	
Log likelihood (constant)	-671.3776		-671.3776		-671.3776	
AIC	2.0216		1.9750		2.0075	
BIC	2.0866		2.2132		2.1374	
Rho^2	0.0853		0.1254		0.0999	
Notes: *,** and *** indicate statistical significance at the 10%, 5%, and 1% level						

[3] 85% of university students aged between 18 and 24 years (Ministry of Education, 2011)

Latent Class Models with two, three and four classes were explored. A three class model was selected as the base for continued analysis due to superior significance of parameter coefficients, a lower Akaike information criterion (AIC) statistic and higher McFadden's adjusted R^2 values. The three class model (Model 2, Table 2) is characterised by 23 out of 27 parameter estimates significant at least to 10%. Class one is not significantly concerned with high water quality, class two is not significantly concerned with healthy riparian vegetation and moderate water quality, and class three is not significantly concerned with water clarity or high water quality. The only statistically significant determinant of class membership was high CNS, which decreased probability of membership in class 2.

The RPL model (Model 3, Table 2) was applied to test the presence of heterogeneity around the mean of parameter estimates on the basis of measured covariates. In determining the best model fit and significance, only the variables for unhealthy riparian vegetation, healthy riparian vegetation and water clarity were treated as random parameters. Māori ethnicity was found to have a significant influence on the heterogeneity around the mean for unhealthy riparian vegetation. Similarly, strong MCI has a significant influence on water clarity.

4. Discussion

The limited correlation between Māori and variance in the estimated choice models suggest that Māori ethnicity has little influence on choice behaviour. Based on this observation there is no significant difference between Māori and non-Māori respondents in this study. This is not a surprising outcome with similar studies looking and cultural valuation in New Zealand, by Awatere (2008) and Lambert et al. (1992), coming to the same conclusion. This study does not reflect a representative sample of the population and cannot be extrapolated in any way. However, these findings support the notion that in a situation where Māori and non-Māori are similarly educated, and integrated into an urban western society, there may be little difference between the values of the two populations. It should be noted that carrying out a similar study on a small rural community in the North Island where strong tribal ties are retained could produce very different results (Panelli & Tipa, 2007).

Based on the results from this study, there was no evidence of a positive correlation between stronger affinity with nature, as reflected in the CNS scores, and higher preference for environmental attributes in the choice experiments. The CNS score demonstrated only a weak correlation with choice behaviour of respondents in class two of the LCM, and this relationship indicated people with a higher CNS were less likely to be assigned to that class. Looking at the response to the CNS scale, there were a large number of respondents scoring in the middle range. This may indicate indifference to the scale, neither agreeing nor disagreeing with the questions asked. As a result the scale may have only picked up those have a very strong affinity to nature and those who felt none, or little affinity. While comparisons and tests with the high CNS group should have avoiding this problem, with only 18 out of the 102 total respondents assigned to this group, it is a small sample to work with in making statistically significant comparisons.

The main limitation in this study was the small sample size of both Māori respondents and, as mentioned above, respondents with a high CNS. While the Cultural Identity Scale was able to be classified into two clusters of strong and weak Māori identity, the small sample size of Māori and the large variance within these clusters could explain why the strong MCI group had only limited influence on respondent choice. The two cluster classification used created a "strong identity" group that is more reflective of a strong to moderate identity, not quite as distinct as Te Hoe Nuku Roa's "secure identity" group (Stevenson, 2004). Therefore, it is

possible that with a larger sample of Māori, three of four clusters would have been statistically feasible, allowing for a group that exhibited full immersion in all dimensions of the Cultural Identity Scale. Similarly a larger Māori sample could have aided. Similarly, with the LCM, 50% of the sample assigned to class one, with 20% and 30% in the other two classes. With only 23 Māori respondents is it possible that these smaller classes had very few Māori which inhibited any significant relationship to be calculated.

5. Conclusion

Without extrapolating results there are still key messages that can be gained from this study. In a modern society the gap between Māori and non-Māori values may be becoming increasingly blurred. The classification of an assimilated ethnic group such as Māori as a homogenous group with homogenous values is not a reality in New Zealand. Policy and planning in New Zealand needs to think about the benefits in some cases of recognising the similarities between our two majority cultural groups rather than highlighting the differences, particularly in regards to the natural environment.

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Appendicies

Appendix 1 - Adapted Māori Cultural Identity (MCI) Scale

		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	I have an in depth knowledge of my Māori ancestry (Whakapapa)	◯	◯	◯	◯	◯
2.	My involvement with my whānau plays a very large part in my life	◯	◯	◯	◯	◯
3.	I support the reclamation and retention of Māori land	◯	◯	◯	◯	◯
4.	I am fluent in Te Reo Māori	◯	◯	◯	◯	◯
5.	I often gather, hunt and collect kai for myself, my whānau, or my friends	◯	◯	◯	◯	◯
6.	Most of my friends and contacts are Māori	◯	◯	◯	◯	◯
7.	I frequently visit Marae	◯	◯	◯	◯	◯
8.	Māori values such as Manaakitanga, Whanaungatanga, Kaitiakitanga and Rangatiritanga are important to me and influence how I live my own life	◯	◯	◯	◯	◯
9.	I believe that as Māori, we are interconnected with the land, with each other and with our ancestors	◯	◯	◯	◯	◯
10.	Tapu, taonga and mauri are fundamental to my beliefs	◯	◯	◯	◯	◯
11.	My ancestry and my identity as Māori are very important to me	◯	◯	◯	◯	◯
12.	I try to involve myself in Māori culture whenever I get the opportunity	◯	◯	◯	◯	◯

Appendix 2 - Connectedness to Nature Scale (CNS) developed by Mayer and Frantz (2004)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. I often feel a sense of oneness with the natural world	○	○	○	○	○
2. I think of the natural world as a community to which I belong	○	○	○	○	○
3. I recognise and appreciate the intelligence of other living organisms	○	○	○	○	○
4. I often feel disconnected from nature	○	○	○	○	○
5. When I think of my life, I imagine myself to be a part of a larger cyclical process of living	○	○	○	○	○
6. I often feel a kinship with animals and plants	○	○	○	○	○
7. I feel as though I belong to the earth as equally as it belongs to me	○	○	○	○	○
8. I have a deep understanding of how my actions affect the natural world	○	○	○	○	○
9. I often feel a part of the web of life	○	○	○	○	○
10. I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force'	○	○	○	○	○
11. Like a tree can be a part of a forest, I feel embedded within the broader natural world	○	○	○	○	○
12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature	○	○	○	○	○
13. I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees	○	○	○	○	○
14. My personal welfare is independent of the welfare of the natural world	○	○	○	○	○

Appendix 3 – Choice model attributes and levels

Riverbank vegetation	
1. Unhealthy Riverbank Vegetation	Little to no vegetation on the riverbank. Sparse woody trees, dominated by exotic grass
2. Moderately Healthy Riverbank Vegetation	Moderate cover of vegetation scattered on the riverbank. A range of exotic and native grasses and woody vegetation
3. Healthy Riverbank Vegetation	Abundant and dense cover of vegetation on the riverbank. A diverse range of native grasses, shrubs and woody vegetation
Water clarity	
1. Poor Water Clarity	You can see less than 1m underwater
2. Good Water Clarity	You can see more than 4m underwater
Water quality	
1. Low Water Quality	Unsafe for drinking, swimming or fishing
2. Moderate Water Quality	Safe for fishing and swimming, unsafe for drinking
3. High Water Quality	Safe for fishing, swimming and drinking
Ecosystem Health	
1. Unhealthy Ecosystem	Few large fish, shellfish, birds, and aquatic plants. Small eels may still be present and algal blooms are possible
2. Moderately Healthy Ecosystem	Some species of fish, shellfish, birds and aquatic plants are present in moderate abundance. Small fish and eels are present. Hard to find shellfish
3. Healthy Ecosystem	Abundant and diverse species of fish, shellfish, birds and aquatic plants. No risk of algae
Jobs	
1. 50 Fewer Jobs Available	There are fewer local jobs available in the area
2. No Change	The total number of jobs in the region is unaffected
3. 50 More Jobs Available	There are more local jobs available in the area
Loss of income to the region	
1. $5 Million Increase	Growth of the regional economy by $5 million per year
2. No Change	The regional economy is unaffected
3. Loss of $5 Million	The regional economy is reduced by $5 million per year