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Final Report

How 'valuable' are the ecosystem services of the Wet Tropics World Heritage Area to residents and tourists?



Michelle Esparon, Natalie Stoeckl, Silva Larson,
Marina Farr and Joann Schmider



Australian Government
Department of the Environment

 **Reef &
Rainforest**
RESEARCH CENTRE

How 'valuable' are the ecosystem services of the Wet Tropics World Heritage Area to residents and tourists?

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Acronyms Used In This Report

AUS	Australian
AUD	Australian dollars
CB	Contingent Behaviour
CV	Contingent valuation
DERM	Department of Environment and Resource Management
ES	Ecosystem services
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
JCU	James Cook University
LGA	Local Government Area
LS	Life satisfaction
NERP	National Environmental Research Program
NOAA	National Oceanic and Atmospheric Administration
OLS	Ordinary Least Square
PCA	Principal Component Analysis
QLD	Queensland
RAP	Rainforest Aboriginal Peoples
RAPA	Rainforest Aboriginal Peoples Alliance
RRRC	Reef and Rainforest Research Centre Limited
TE	Tropical Ecosystems
UNESCO	United Nations Educational Scientific and Cultural Organisation
WTA	Willingness to accept
WTMA	Wet Tropics Management Authority
WTP	Willingness to pay
WTWHA	Wet Tropics World Heritage Area

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Executive summary

Background

- ❖ The research described herein, was supported by the Australian Government as part of its National Environmental Research Program (NERP). The NERP comprised 5 main research hubs, each with a specific focus.
- ❖ The research reported on here was undertaken as part of the Tropical Ecosystem (TE) Hub which addresses issues of concern for the management, conservation and sustainable use of the World Heritage listed Great Barrier Reef (GBR) and its catchments, tropical rainforests including the Wet Tropics World Heritage Area (WTWHA), and the terrestrial and marine assets underpinning resilient communities in the Torres Strait.
- ❖ This report focuses on issues relevant to the management and conservation of the WTWHA.

Aim, Objectives and Scope

- ❖ The overarching aim of this project was to improve our understanding of the value which residents and tourists place upon the ES of the WTWHA. To satisfy this aim, three specific objectives were devised, namely to:
 1. Improve our understanding of the relative importance or 'value' of the WTWHA's ES to residents and tourists;
 2. Make predictions about the way in which resident and tourist 'values', and thus management, conservation and marketing priorities may alter in the future as both population and tourist numbers change; and
 3. Improve methods for assessing 'values' by comparing state-of-the art non-monetary valuation techniques with more 'traditional' valuation techniques.
- ❖ This report thus provides an account of the key ES provided by the WTWHA which residents and tourists find important (or 'valuable'). In doing so, it highlights conservation, management and tourism/ marketing priorities. This information will be of immediate use to the tourism industry, to managers and policy makers in the region.

Generic methods

- ❖ We ran workshops with key stakeholders to ensure that information collected and compiled in this project was relevant to their needs. During these workshops, we asked participants to consider our 2 targeted groups of beneficiaries (residents and tourists) and then: (1) identify and prioritise regionally relevant ES (or 'values') likely to be considered important by those groups; and (2) identify and prioritise key 'changes' or 'management issues' likely to affect those 'values'. As we expected, many of the values identified for each beneficiary group were similar.
- ❖ Insights from the workshop and literature review were used to develop 2 questionnaires, designed to elicit information about both the 'total' and the 'marginal' value of key ES associated with the WTWHA. We deliberately structured questions to ensure we could use a variety of different economic valuation techniques, so that comparisons could be made between them. These included contingent valuation, contingent behaviour questions, expenditure and life/tourist satisfaction techniques. Our life/tourist satisfaction type questions sought information about the relative importance of and satisfaction with 27 different 'values' (mostly ES, but market and other social values were included for comparative purposes). We also sought respondents' reactions to potential

deteriorations in these values (our contingent behaviour –type questions) and their willingness to pay to help protect these values (contingent valuation questions).

- ❖ The questionnaires were tested in several situations to ensure clarity of questions, namely with: (1) participants from the workshops; (2) other stakeholders who had shown interest in the study; (3) colleagues; and (4) a pilot mail-out to a small sample of householders.
- ❖ Questionnaires were mailed out to a sample of residents within and adjacent to the WTWHA. We also contracted the Rainforest Aboriginal Peoples Alliance (RAPA) to collect data in Indigenous communities across the WTWHA. RAPA also helped us to ensure that culturally apposite ‘language’ was being used in the questionnaire and that we were measuring the things that ‘matter’ to the traditional owners. Tourists were approached at the lagoon in Cairns as well as at its domestic and international terminals – undertaking 2 hours of data collection activity at each location, each month for 12 months.
- ❖ We received 1167 completed questionnaires: 160 were from Indigenous residents, 386 were from non-Indigenous residents and 621 were from visitors. Data were summarised using descriptive statistics, geographical information systems (GIS), leximancer (qualitative analysis of open-ended questions), by conducting various non-parametric tests and using different types of regression analysis (ordinary least squares regression, ordinal regression, seemingly unrelated regressions, and hurdle models). The specific methods adopted, depended upon the particular research questions being addressed.

Key findings

The relative ‘value’ of ES provided by the WTWHA

- ❖ We found commonalities between respondents: all indicated that the safety of family/friends/travelling companions was the most important thing for overall quality of life &/or choice of destination. Being able to spend time with loved ones and having access to good quality schools, hospitals, roads, etc. (if necessary) were next on the list, closely followed by environmental values such as having healthy native plants and animals, undeveloped scenery and iconic species. Economic factors such as the jobs and incomes associated with mining, tourism and agriculture, or having many shops, cafes and restaurants were generally considered to be less important than these environmental and social factors.
- ❖ The protection of places with Aboriginal cultural values and being able to learn about culture and country were, unsurprisingly, very important to overall quality of life for Aboriginal respondents. These factors were ranked lower in importance by our non-Indigenous sample – instead, having some ‘control’ over what is happening in their lives was more important. Good weather (sunshine) and going to the GBRWHA were essential components of a satisfactory visitors’ trip.
- ❖ Tourists were generally satisfied with their safety and that of their travelling companions, the weather, being able to relax and reflect, and with the scenery. Similarly, residents were also satisfied with the safety of their loved ones and with the time spent with them. Indigenous residents were also satisfied with community activities.
- ❖ Importance scores were almost always less than satisfaction scores, particularly for intrinsic environmental values, signalling a potential issue of concern. Moreover, the ‘gap’ between importance and satisfaction was relatively small for tourists, larger for non-Indigenous residents, but very large for Rainforest Aboriginal residents. There are potentially many reasons for these differences, one being varying reference points / baselines.
- ❖ Using PCA with Varimax rotation and Kaiser normalisation, our 27 resident importance scores collapsed into 6 factors, labelled as: society, environment, access to nature,

culture, industry and city. Society and environment had consistently higher scores than factors linked to industry. Culture also had higher importance scores than industry.

- ❖ For tourists, our PCA yielded 5 groups of factors from the original 27 values, highlighting a clear distinction between different types of visitors. Some came to enjoy a variety of things, some are more interested in experiencing culture, for some it's the safety and quality of infrastructures that matters most, while others came for the city/community entertainment or to do business. 'Locals' (primarily aiming to visit a place close to home) also stand out as a distinct group.
- ❖ Our leximancer analysis of responses to an open ended question: "how satisfied are you? Why do you feel that way?", highlighted 10 core themes and 14 concepts. "Live" and "beautiful" were the most frequent and related concepts in the text – clearly signalling the importance of aesthetic values. "Family" had a strong connection with "work", "friends", "community", and "healthy". These concepts appeared near one another because of statements such as:
 - "I am blessed to live in such a beautiful place and climate"
 - "I am satisfied with my lifestyle and job, and having a healthy family"
 - "Healthy, great place to live, satisfying family life"
- ❖ For tourists, the leximancer analysis revealed 10 core themes and 21 concepts. Here too, aesthetic values were strongly evident: "beautiful" and "rainforest" were mentioned the most frequently and were the most strongly related concepts with others. Below are examples of tourists' views on the reasons they are satisfied with their trip:
 - "Beautiful beach and rainforest"
 - "Beautiful landscape, endless amount of activities, friendly people"
 - "Beautiful place and nice people"

Do different people 'value' different things?

- ❖ We used Ordinary Least Squares (OLS) regression to look for statistically significant relationships between the 'importance' scores people assigned to various factors and various socio-demographic and economic descriptors.
- ❖ Although there was widespread agreement across all groups of residents that family was more important to overall quality of life than the environment which, in turn, was more important than other market or economic factors, there were significant differences between different groups.
 - Those dependent upon mining, manufacturing, ports and/or agriculture consistently rated social and environmental factors as being less important than those associated with other industries. So too did males, and 'singles'. Males were also less satisfied (than females) with many different factors.
 - Indigenous respondents and those associated with retail and tourism both gave higher importance scores to environmental values; Indigenous people also rated family values as being more important than other respondents – as were those with large households.
 - Results were similar when analysing the grouped factor scores (from our PCA). Those dependent upon mining, manufacturing and/or ports for their household income perceived the environment to be relatively less important than those dependent upon other sectors. Those dependent upon agriculture felt that cultural factors were generally less important to their overall quality of life than others. Culture was deemed more important to Indigenous residents than to non-Indigenous residents, but males, those in agriculture, and those earning a high income thought that Indigenous values were relatively less important than their respective counterparts. Those born in QLD were likely to value 'social' factors more highly, and 'city entertainment' less highly than those born elsewhere.
- ❖ Patterns were also evident in the tourist data.

- Origin matters: Visitors from QLD considered safety of family and environmental factors to be relatively less important 'drawcards' than visitors from elsewhere in Australia.
- Single travellers were likely to be less satisfied than other travellers about a variety of different factors; so too, were the visitors earning relatively high incomes and those from Asia. European visitors and those from north America were generally more satisfied with various aspects of their trip than Australian domestic visitors.

'Marginal' values in the WTWHA: willingness to pay to improve

- ❖ Almost 20% of Indigenous respondents were unwilling to contribute any amount of money to protect Aboriginal culture or prevent weeds and pests from evading the native flora and fauna, despite these values being in the top five of most important contributors to their overall quality of life. The (un) willing rate was even higher amongst non-Indigenous residents: between 30% and 50% indicating that they would not be willing to pay anything at all to improve things which they themselves had indicated were vitally important to their overall quality of life. More than a quarter of tourists (31%) were not willing to pay any money towards the maintenance of undeveloped scenery and peacefulness of the area, despite earlier comments about the 'importance' of this in their decision to visit the region (note that the maintenance of undeveloped scenery and peacefulness of the area was ranked the second most important factor on this trip). Thirty-nine percent of our tourist sample was not willing to pay any amount towards the protection of Aboriginal culture. Respondents thought that the preservation of the WTWHA was a community responsibility, and the amount they were willing to pay was contingent upon 'others paying too' (respondents did not want to be the only person paying).
- ❖ We used a hurdle model (simplistically, a two-part regression) to test for statistically significant relationships between socio-demographic and economic descriptors of our respondents and their stated WTP to protect various environmental and cultural values. As expected, income was always a statistically significant factor (WTP is linked to ability to pay), but we also found evidence to suggest that industry of association matters: those dependent upon the mining and manufacturing/port sectors were generally willing to pay less for any 'value' than those associated with other industries; those in the tourism and retail industry were generally willing to pay more to protect healthy native plants and animals and scenery, but less to protect Indigenous cultural values than those associated with other industries.
- ❖ Our (hurdle) analysis of visitor responses to WTP again revealed differences. Generally, males were willing to pay less than others; as were visitors from QLD (likely because the question was framed as a per-visit payment, and they are likely to visit more often). Those from Germany were also generally willing to pay less than domestic (non QLD) visitors, and after controlling for other factors such as income.

'Marginal' values in the WTWHA: likely reaction to a 'change'

- ❖ Both residents and tourists were asked to tell us how they would respond to a series of 12 hypothetical 'changes'. Residents were asked to tell us how the change would affect their overall quality of life; tourists were asked how the change would have affected their overall decision to visit the region.
- ❖ Responses reinforce the message from the prior segments: environmental and cultural factors are important to overall quality of life, and some types of environmental degradation would have a stronger adverse impact on overall quality of life than a 20% increase in prices (compared to elsewhere in Australia). For tourists, the worst hypothetical change is having more rubbish in the rainforest and rivers. The next biggest

'turn-off' would be a decline in the undeveloped scenery and peacefulness of the area, followed by clarity of rivers. These responses clearly reinforce the importance of aesthetic values.

- ❖ We used OLS regression to look for statistically significant associations between socio-demographic and economic descriptors of respondents and their stated reaction to those hypothetical changes. Again, we found evidence to suggest that different people 'value' and are thus likely to react differently to different things. Those dependent upon mining and agriculture for household income were generally less bothered by the prospect of environmental deterioration than those associated with other industries. To a lesser extent, this was also true of males. The more education a respondent had, the less negatively did they respond to the prospect of higher prices, fewer infrastructures, or fewer cafes, shops and theatres.
- ❖ For tourists, it seems that older people were more concerned with the prospect of fewer cafes/shops, more tourists or having less time to spend with friends and family. Those from Germany were more concerned (than visitors from elsewhere) by the prospect of more rubbish; those from Asia seemed to be relatively more concerned by the prospect of degraded scenery or murkier rivers than those from elsewhere.

Conclusions

- ❖ Multiple lines of evidence all suggest that the most important thing in life (or in travel) to our group of respondents was the safety of family/friends/travelling companions. Spending time with those people is also vitally important. When those social basics are satisfied, it is the environment (and related aesthetics) that comes to the fore. Economic issues (e.g. the jobs and incomes associated with different industries, having many café's and restaurants) were considered, by respondents to our surveys, to be comparatively less important.
- ❖ The WTWHA's rich Indigenous culture is an attraction for international visitors, and having more information about it would lead to some extending their stay in the region. Indigenous residents too would be more satisfied if this was the case, i.e. if there were more awareness about country. For local visitors, however, learning more about the Aboriginal culture is not a priority.
- ❖ Despite widespread agreement on a 'core' ranking (family > environment > economy), multiple lines of evidence suggest that different people value things differently. For residents, it seems that industry of association and gender are strongly associated with values; for tourists, values differ most markedly by origin. As such, it is clear that changes to the demographic or economic composition of the community will be associated with changes to community values, preferences, and priorities.
- ❖ Cross-method comparisons suggests that non-traditional valuation methods (such as asking about the importance of different factors relative to market factors, or asking about likely reaction to hypothetical situations) highlight similar patterns to the more traditional valuation methods (such as contingent valuation, used here). Contingent valuation type questions are often rejected by respondents (with relatively high non-response rates), and there are consequent complications when analysing responses to control for such problems. This study suggests that contingent behaviour approaches may thus offer themselves as a viable, and more socially acceptable, alternative – although significant refinements to the methods used here would be required before they could become mainstream, and they are clearly not suited to all situations.
- ❖ Many of the values investigated here appear to be inherently inseparable – particularly aesthetic values: beauty was consistently linked to environmental features such as healthy native plants and animals, clear rivers and a lack of development. Those seeking to explore aesthetic values further, may thus need to recognise those relations, considering the use of holistic type approaches (e.g. scenarios), rather than attempting to value individual 'bits'.



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1 Introduction

1.1 Understanding, managing and conserving Australia's unique biodiversity and ecosystems

Australia is renowned for having some of the most unique and diverse ecosystems worldwide (e.g. the Great Barrier Reef (marine and coastal), Lake Eyre (inland aquatic) and the Wet Tropics (terrestrial)). These ecosystems support around 570,000 different species (equivalent to more than 5% of the world's plants and animals) (Chapman, 2009). Approximately 94% of Australia's amphibians, 93% of its reptiles, 87% of its mammals, 86% of its vascular plants and 45% of its birds, are endemic. Despite its high level of endemism, increasing pressures such as the clearance and fragmentation of habitats, unsustainable use of natural resources, pollution, changing fire regimes, the introduction of exotic species, declining water levels and quality, coupled with the consequences of climate change, have led to the demise and decline of many species (ABS, 2010). Cumulatively, the effects of these impacts are a major threat to Australia's biodiversity.

Both historical and contemporary decisions and actions have contributed or are contributing to the consequential loss of biodiversity (ABS, 2010). Maintaining Australia's extraordinarily biodiverse environments is thus critical. Having better information on how ecosystems function, how to monitor their health, how to maintain and build their resilience, how to use ecosystems sustainably and how to make better use of markets to protect biodiversity, will assist decision-makers in delivering effective environmental management, policies and programs both now and in the future.

The Australian Government recognised the salient role of research in this quest, and in 2010 established the National Environmental Research Program (NERP). NERP's principal aim was to:

"Improve our capacity to understand, manage and conserve Australia's unique biodiversity and ecosystems through the generation of world-class research and its delivery to Australian environment decision makers and other stakeholders"

Subsequently, up to AUS\$20m were allocated each year over the period of 2011-2014 to support applied research that:

- ❖ Has a strong public-good focus and public-good outcome;
- ❖ Is end-user focused and addresses the needs of the Australian Government and other stakeholders in developing evidence-based policy and improving management of the Australian environment;
- ❖ Is highly innovative and aims to achieve world-class research and an international standing in the chosen field of research;
- ❖ Enhances Australia's environmental research capacity;
- ❖ Is collaborative and builds critical mass by drawing on multiple disciplines from multiple research institutions to address challenging research questions;
- ❖ Provides results accessible to government, industry and the community; and
- ❖ Includes focussing on synthesis and analysis of existing knowledge.

Operationally, the NERP encompasses 5 main hubs (see the NERP website for a detailed description of each hub):

1. Tropical Ecosystems Hub
2. Environmental Decisions Hub
3. Northern Australia Hub
4. Landscapes and Policy Hub
5. Marine Biodiversity Hub

The research about which this report is written was undertaken as part of the Tropical Ecosystems (TE) Hub which addresses issues of concern for the management, conservation and sustainable use of the World Heritage listed Great Barrier Reef (GBR) and its catchments, tropical rainforests including the Wet Tropics World Heritage Area (WTWHA), and the terrestrial and marine assets underpinning resilient communities in the Torres Strait. Within this Hub alone, there are a total of 38 research projects and 2 communications and knowledge brokering projects, which are organised under 13 programs, within 3 themes as outlined in Figure 1 and Appendix 1. This report is associated with Project 12.3, theme 3, and discusses findings that will assist key decision makers in government, industry and the community in managing the WTWHA. From this point forward, the phrases ‘the region’ and ‘the area’ are used interchangeably with the acronym ‘WTWHA’, for ease of reading.

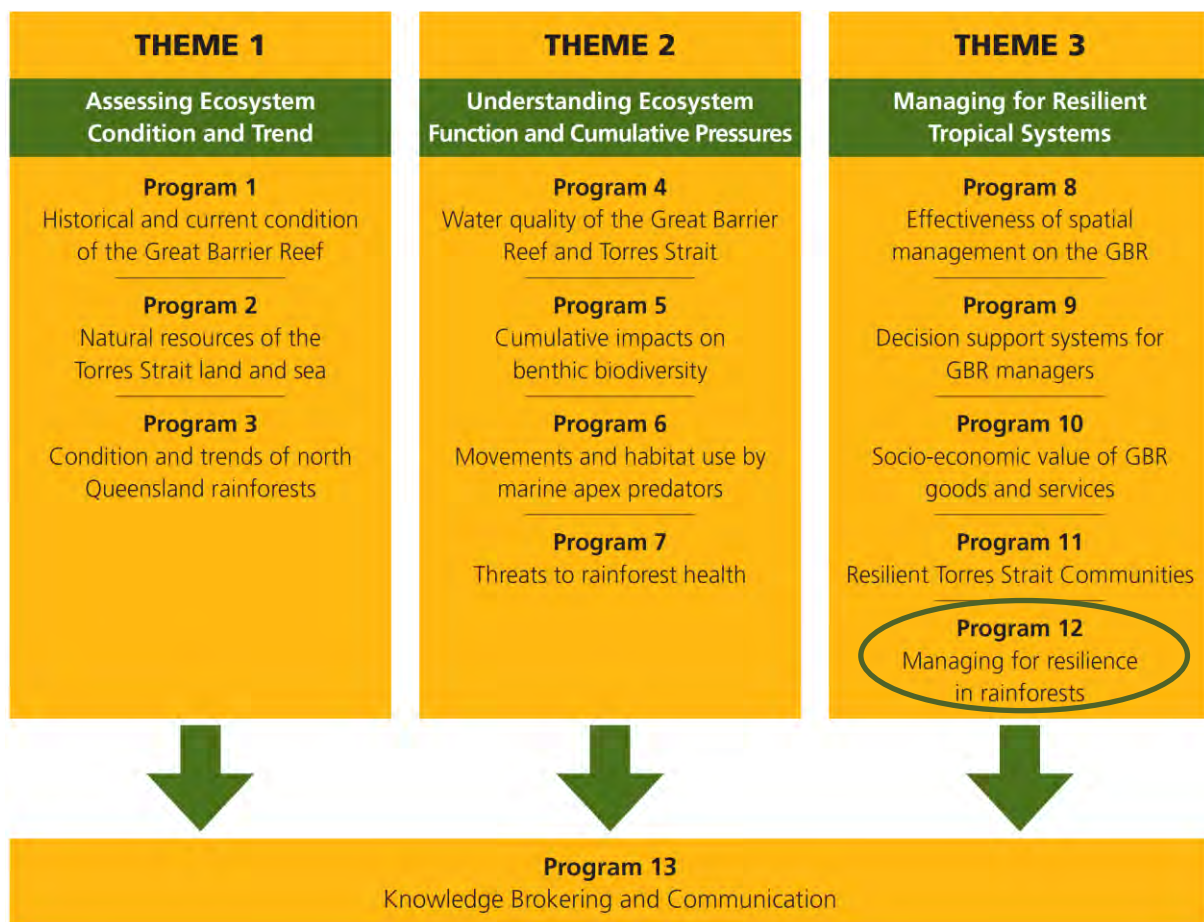


Figure 1: Themes and programs of the NERP Tropical Ecosystem Hub

1.2 Situating the research

The WTWHA is home to a rich variety of flora and fauna, and contains spectacular scenic vistas. It is also home to 20 tribal groups of Rainforest Aboriginal people. Despite the richness of the region’s natural and cultural ‘values’, relatively little is known about them. Before continuing, it is, however, important to clarify what we mean by the word ‘value’.

Although the word ‘value’ is often used synonymously with price, it means different things to different people. Social scientists for example, use the term ‘value systems’ when discussing either an individual’s or a society’s set of principles, norms and beliefs (Jackson et al. 2011).

Ecologists often refer to environmental 'values' as a concept entirely separate and disconnected to social or economic interpretations of 'value', while economists are more likely to take a utilitarian view: measuring 'value' in terms of the contribution which a particular good or service makes to the well-being (or 'utility') of an individual (Stoeckl et al. 2012). It is a slightly modified version of this last perspective that we take in this report.

Formally, we adopt an ecosystem services (ES) view of 'value'. ES are defined as the benefits people derive from ecosystems – the support of sustainable human well-being that ecosystems provide (Costanza et al. 1997; Millennium Ecosystem Assessment (MEA), 2005; Haines-Young & Potschin, 2013). We thus consider the 'value' of a particular ecosystem service (or indeed the 'value' of any good or service) to be commensurate with the contribution it makes to well-being. We use this very anthropocentrically focussed approach not because we believe that people and nature are separate or that only human (or economic) values count, but rather because it facilitates 'valuation' of those services (economic, social, aesthetic and moral) (Haines-Young & Potschin, 2013). Clearly, we do not interpret absence of price as being indicative of absence of value.

As discussed in more detail in section 3.1.2, the WTWHA provides many ES. But most studies in the region have been undertaken by biophysical scientists; only a small handful has been formally 'valued' in economic studies. To the best of our knowledge there is only one that has considered a broad range of ecosystem services (Curtis, 2002) – where the opinions of 50 'experts' (with the Delphi technique using multi-criteria analysis) were combined with property-market information that was used to generate estimates of the 'value' of numerous different ES. We are aware of no other study that has sought to estimate the 'value' of a variety of ES in the WTWHA using data collected from the population at large. As such, significant knowledge gaps remain.

1.3 Project aims and scope

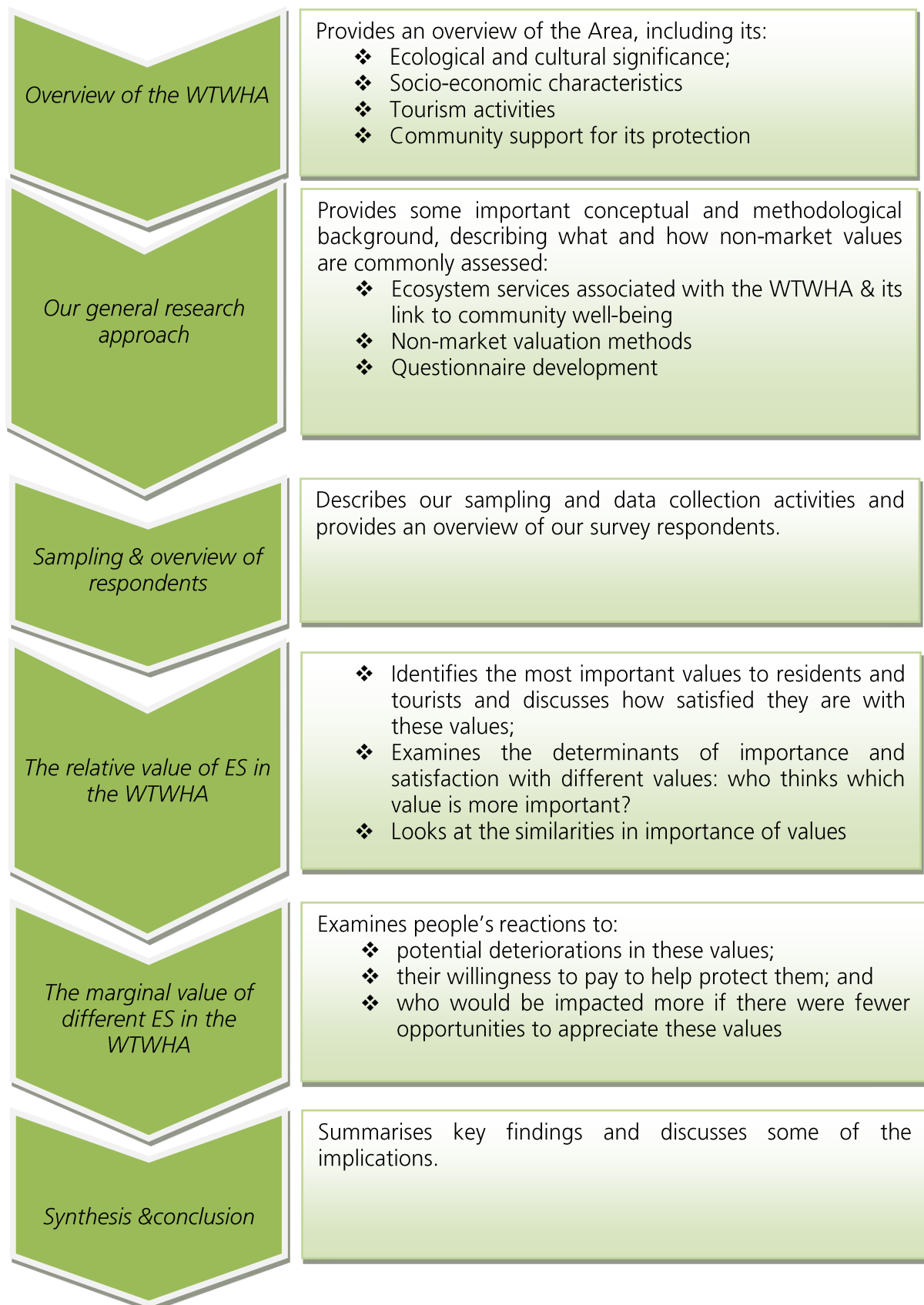
The overarching aim of this project is thus to **improve our understanding of the value which residents and tourists place upon the ecosystem services (ES) provided by the WTWHA**. By considering a broad range of ES and by assessing their importance *relative* to each other and *relative* to other social and economic goods and services, this study goes beyond mere livelihoods and consumptive values, considering the overall contribution of the WTWHA to human well-being. To satisfy this aim, 3 specific objectives were devised, namely to:

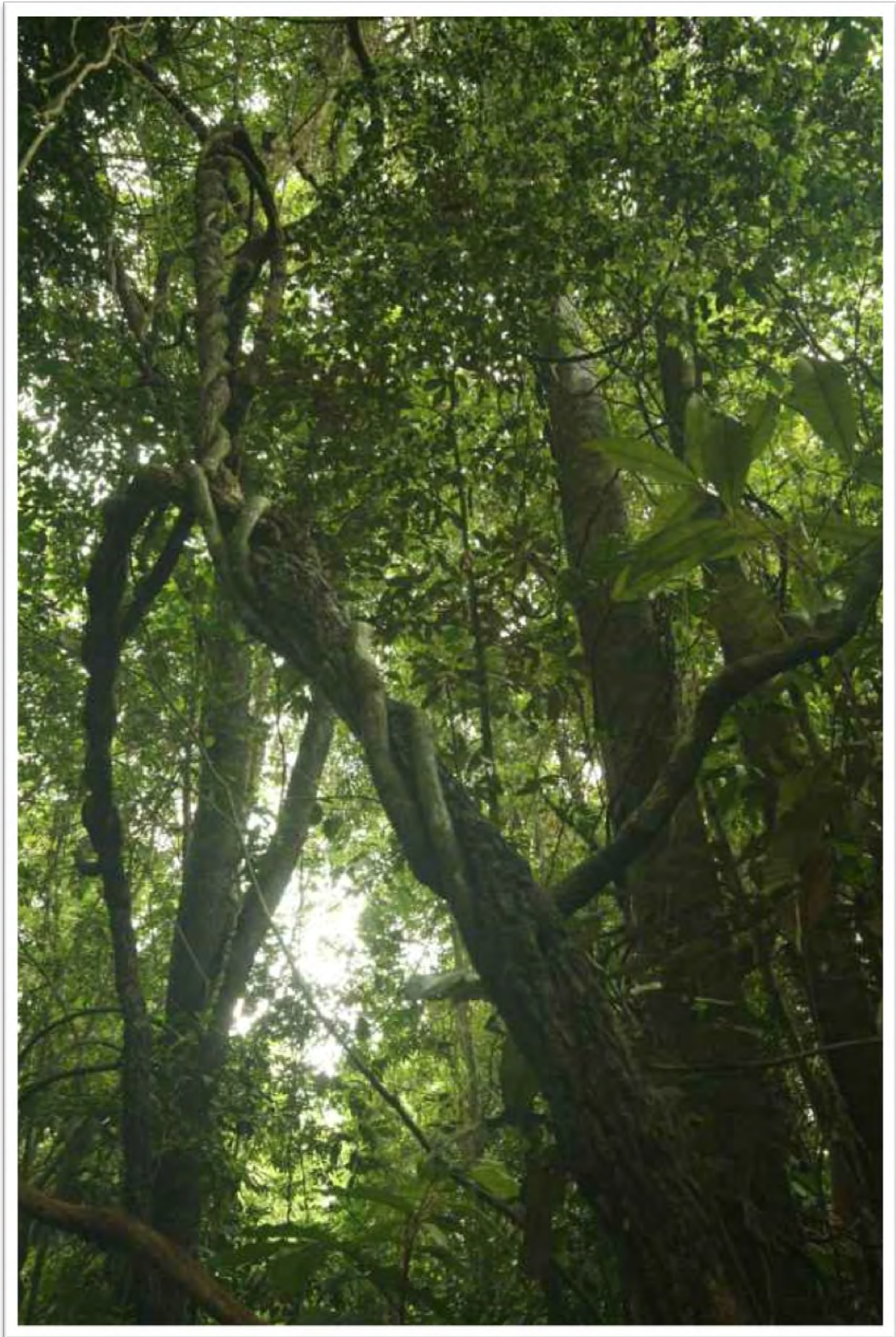
1. Improve our understanding of the relative importance ('value') of various ES provided by the WTWHA to both residents and tourists;
2. Make predictions about the way in which resident and tourist 'values', and thus management, conservation and marketing priorities may alter in the future as both population and tourist numbers change; and
3. Improve methods for assessing 'values' by comparing state-of-the art non-monetary valuation techniques with more 'traditional' valuation techniques.

We note that different people often wish to use the results from economic 'valuation' exercises in different ways. Some simply want to raise public awareness of the importance of an ecosystem (or ecosystem service). Others want to use results to help assess the way in which people and/or the economy might be impacted by particular management changes (e.g. reductions in scenic amenity, increases in weeds and pests). In economic jargon, it is as if the first group require information about the 'total' value of various ES provided by the WTWHA (*relative* to other values), while the second group could more usefully benefit from information about 'marginal' values (or trade-offs; the way in which people might be affected by change). We aimed to generate estimates of both.

1.4 Report structure

The rest of the report is organised as follows:





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2 Overview of the Wet Tropics World Heritage Area

2.1 An ecologically rich region

Recognised for its scenic panoramas of rainforest canopy, rugged gorges, wild rivers, waterfalls, giant trees and ferns and iconic species, the WTWHA is home to Australia's greatest diversity of animals and plants (WTMA, 2014). It comprises 900,000 hectares (just 0.26% of the continent) (WTMA, 2014) and extends approximately 450 km from Cooktown in the north to Townsville in the south, and west across the Atherton Tablelands to Ravenshoe (Figure 2). It is adjacent to the Great Barrier Reef World Heritage Area (GBRWHA), making this region the only one in the world where two world heritage areas exist side-by-side.



Figure 2: The Wet Tropics World Heritage Area and surrounds
(Source: WTMA, 2014; reproduced with permission)

On December 9th 1988, the Area was granted World Heritage status (Wet Tropics Management Authority, 2009b; UNESCO, 2010), having satisfied all 4 of 10 of the World Heritage Committee's 'natural' criteria (no cultural criteria were included). These 4 natural criteria were:

1. It is an outstanding example of the major stages in the earth's evolutionary history;
2. It is an outstanding example of ongoing geological processes, biological evolution and human interaction;

3. It contains superlative phenomena, formations and features; and
 4. It contains important and significant habitats where threatened species of animals or plants of outstanding universal value live.
- (See Appendix 2 for more details on how the Area justified inclusion for each criterion).

Inscription on the World Heritage Register entails the responsibility of preserving such a significant asset. Australia thus has an international duty for ensuring the protection, conservation, presentation and transmission to future generations of the Area. The Wet Tropics Management Authority (WTMA) has statutory authority for its protection and management and reports to both the Australian and Queensland Governments. One of the primary roles and responsibilities of the Authority is to present the Area so people can enjoy and appreciate its many outstanding values.

2.2 An historically and culturally rich region

The Area is culturally rich with thousands of generations of Traditional Owner heritage. Although the region's cultural values have been recently recognised nationally, they are yet to be considered as being of universal value by the World Heritage Committee. Much effort has been made since the World Heritage listing in 1988 and is ongoing, driven by the Traditional Owners of the Area with conservation and economic and civil society partners, with the hope that traditional values will also be acknowledged as core part of the Outstanding Universal Values of the Area.

The WTWHA is the traditional estate of the region's Rainforest Aboriginal peoples, whose culture has been intimately associated with the Wet Tropics landscape for thousands of years. In fact, it is the only place in Australia where Aboriginal people enduringly inhabited a rainforest prior to European arrival. Permanent habitation of the rainforest by the Aboriginal peoples is evidenced by numerous camping places and archaeological sites (Aboriginal Rainforest Council, 1997). Such strong associations with the Area means the rainforest Aboriginal peoples hold a great wealth of ecological and management knowledge about its flora and fauna, landscapes and resources. Their ability to use 14 toxic plants as food, including the diverse and complex techniques employed to process them (e.g. ground ovens to soften toxic nuts, certain streams to leach out the toxins) are clear examples of outstanding heritage values to Australia (Commonwealth of Australia, 2012). Another significant illustration of the cultural practices of the Aboriginal peoples is their ingenious and unique use of fire to manage vegetation communities of the rainforest and plant specific methods to regulate the lawyer vine (a climbing palm with spiny stems) (Commonwealth of Australia, 2012).

Around 9 language family group nations (Yalanji, Djabugay/Djabuganjdjii, Yidinji, Dyirbal/Djirbalngan, Warrgamaygan, Warrungu, Nyawaygi, Gugu Badhun and Mbabaram) constituting 20 distinct Traditional Owner Groups (Sunrise and Sunset Yalanji, Djabugay, Gunggandji, Muluridji, Mamu, Ngadjon, Yidinji, Yirrganydji, Bandjin, Djiru, Girramay, Gugu-Badhun, Gulnay, Jirrbal, Nywaigi, Warrgamay, Warungnu and Wulgurukaba peoples), over 120 warras and barras (sometimes named as clans), over 600 extended family groups (who to this day are key decision making structures), 20,000 persons, and over 80 cultural and natural resource management legal entities, embody the cultural richness of the Area with ongoing traditional spiritual and custodial connections to Country, Culture and Kin (RAPA, 2013, 2014). Each of the 24 contemporary identity groups continues to hold customary obligations for the management of their respective traditional estate under Aboriginal laws and customs (RAPA, 2013, 2014). Their traditional boundaries are identified by geographical features such as rivers or mountain ridges, which are also identified as key places of intangible heritage values (story places, stories, dances and spiritual beings) (Figure 3) (RAPA, 2013).



Figure 3: Rainforest Aboriginal people in and around the WTWHA
(Source: RAPA, 2013 – reproduced with permission)

Clearly, to the Rainforest Aboriginal peoples, Country and its natural features and resources are central to their way of life, they are key facets to their spirituality, culture, social organisation and economic use. Their ongoing protection and preservation are thus integral to their cultural survival and to managing Country across the region (RAPA, 2013).

2.3 A diversely populated region: Social and economic background

The WTWHA falls within the boundaries of 9 local government areas (LGAs) (Figure 4). Of these, 3 LGAs account for 82% of the Area: Cairns regional council (31.63%); Tablelands regional council (25.21%); and Cassowary Coast regional council (25.16%). Within the Area, there are around 100 plots of privately owned land, while an estimated 2500 properties adjoin its 3000km boundary (WTMA, 2012).

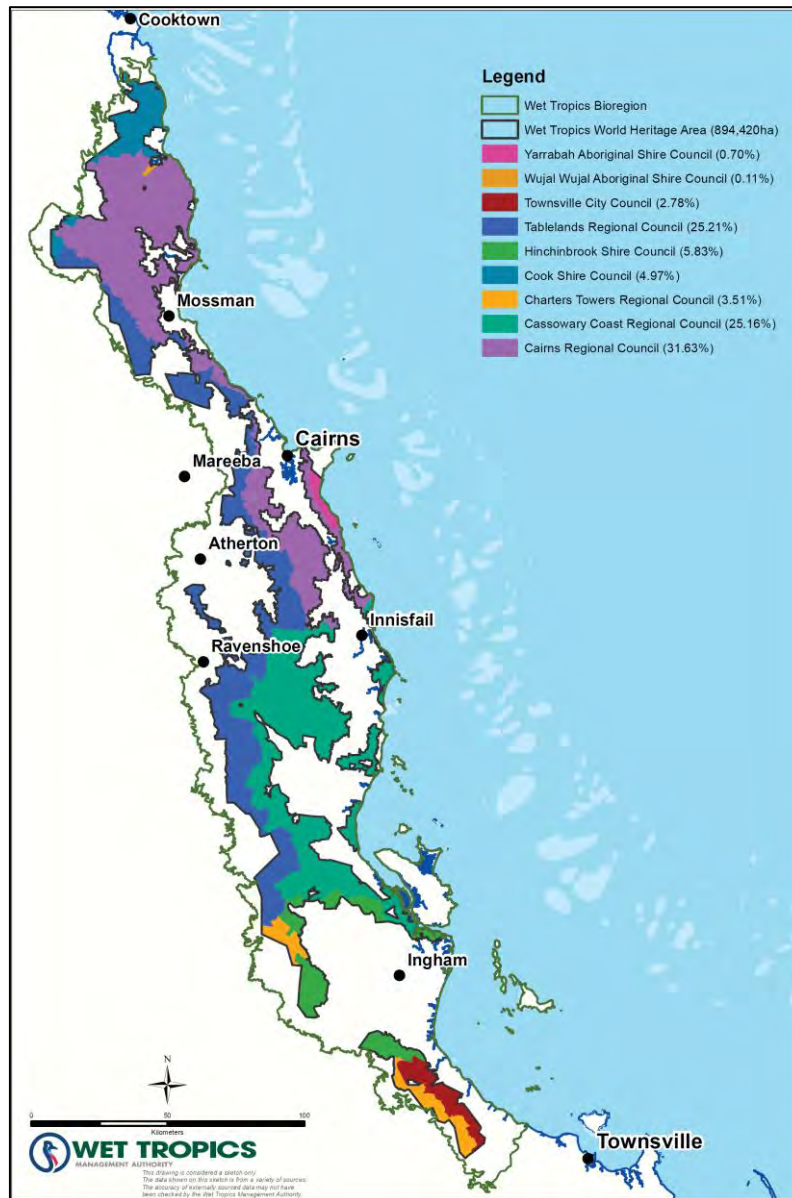


Figure 4: Shire councils in and around the WTWHA
(Source: WTMA, 2013, reproduced with permission)

Following is a description of the socio-economic profile of the 3 LGAs combined (i.e. Cairns (purple), Tablelands (blue) and Cassowary Coast (green), within which the majority of the Area is contained). At June 30th 2013, the 3 combined LGAs were estimated to contain 210,550 residents; 21.1% were aged 0-14 years, 66.3% 15-65 years and 12.6% were over 65 years old (Figure 5). The median age was 37.8 years, 2.4 years older than the median age of 35.3 at the same time in 2003.

The region is growing rapidly, with an average annual rate of 1.6% over the last 5 years. It is predicted that 270,000 people will live in the WTWHA by 2016 (WTMA 2012) and by June 2036, the population is forecast to be 304,949 people. Within the region, the Cairns regional LGA is projected to have the largest population, estimated to grow to 244,083 persons (an average annual rate of 1.9%). More than 700,000 are estimated to make up the broader population by 2031 (this includes other LGAs within and around the WTWHA) (WTMA, 2012).

Almost all of the expected future growth (in absolute terms) is likely to be contributed by those aged 40 and above. It seems there will be relatively fewer people in the 20-39 age cohorts, perhaps due to people moving away from the region for (employment) opportunities elsewhere. Lower birth rates are expected and so are lower death rates, increasing the age of the population (Figure 6) (Queensland Government Statistician's Office, 2014).

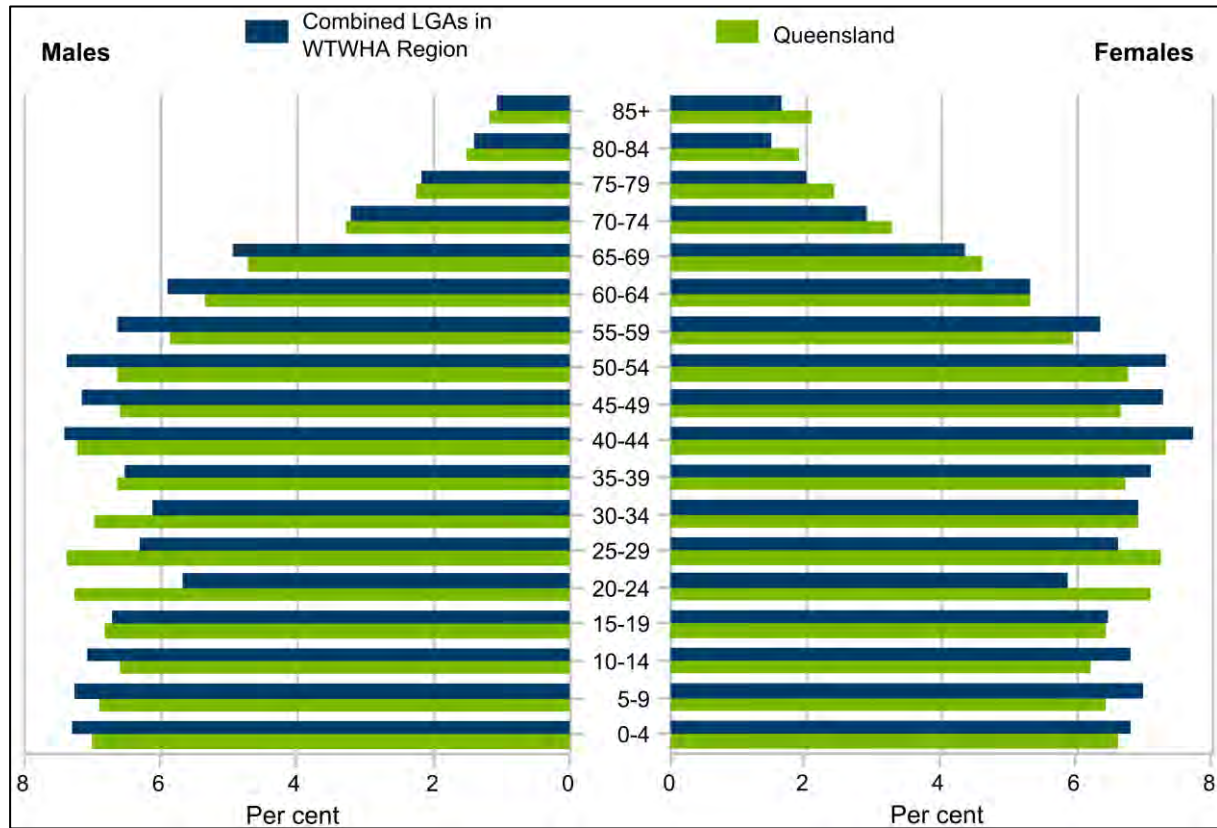


Figure 5: June 30th 2013 estimated resident population pyramid by age and gender for LGAs in and around the WTWHA compared to Queensland,
(Source: Queensland Government Statistician's Office, 2014)

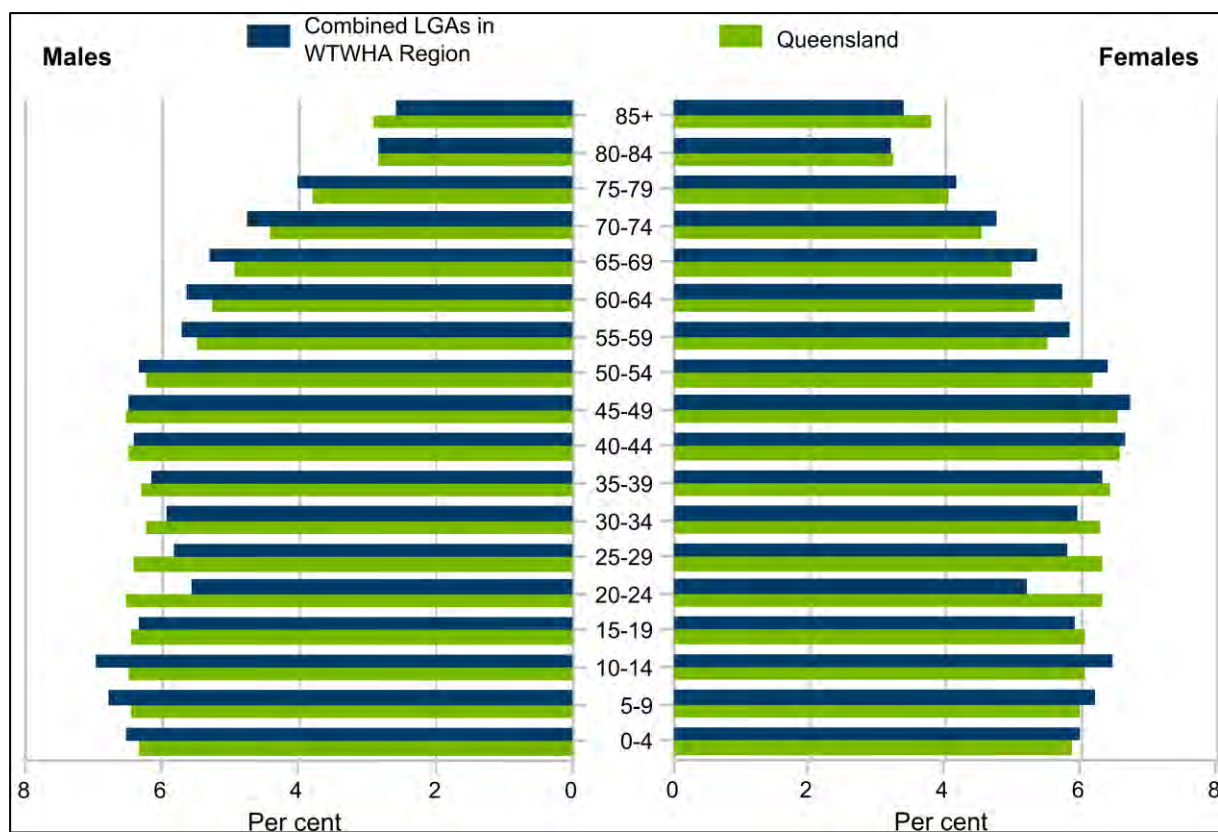


Figure 6: June 30th 2036 projected population pyramid by age and gender for LGA's in and around the WTWHA compared to QLD

(Source: Queensland Government Statistician's Office, 2014)

Migration is also a key factor contributing to the regions' population growth. In 2011, 36,534 people (18.8%) moved to these LGAs. More than 36,000 people were born overseas (18.4%). In that same year, there were more than 51,000 families: of those, around 40% were couple families with children. For 78,232 people (or 52.7%), Year 11 or 12 was their highest level of schooling. The median total personal income was \$30,167 per year while the median total family income annually was \$68,590. Around 7,407 families (14.4%) were considered low-income families (i.e. those families earning less than \$600 per week or less than \$31,200 per year). Around 12.2% of employed people worked in Health care and social assistance industry followed by 11.7% in the Retail trade industry. The Accommodation and food services industry provided 8.9% of employment (Figure 7). The highest specialisation ratio of 1.68 was in Agriculture, forestry and fishing industry. The majority of employed people worked as professionals (16.4%), followed by technicians and trades workers (15.9%) (Figure 8). The unemployment rate was 6.9% in December 2013 (Queensland Government Statistician's Office, 2014).

As regards the number of facilities, these LGAs had 42 aged care services and 1947 aged care service operational places, as at June 30th 2013. At that time, there were 93 schools and 15 hospitals. By June 2014, there were 742 approved new houses compared to the same time the previous year (\$257.3 million of building value) (Queensland Government Statistician's Office, 2014).

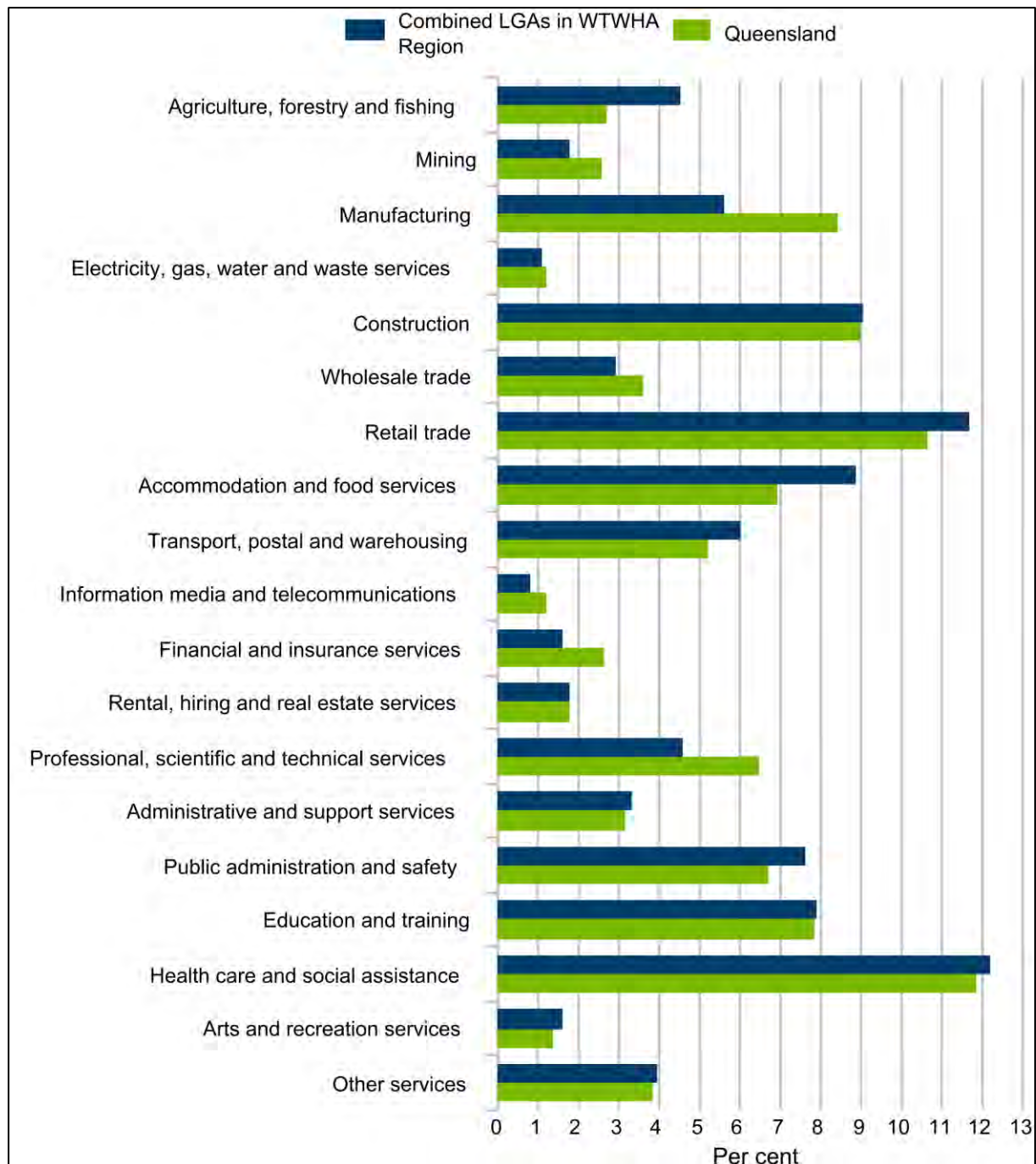


Figure 7: Percentage of workforce employed by industry – LGA's in and around the WTWHA compared to Queensland
(Source: Queensland Government Statistician's Office, 2014)

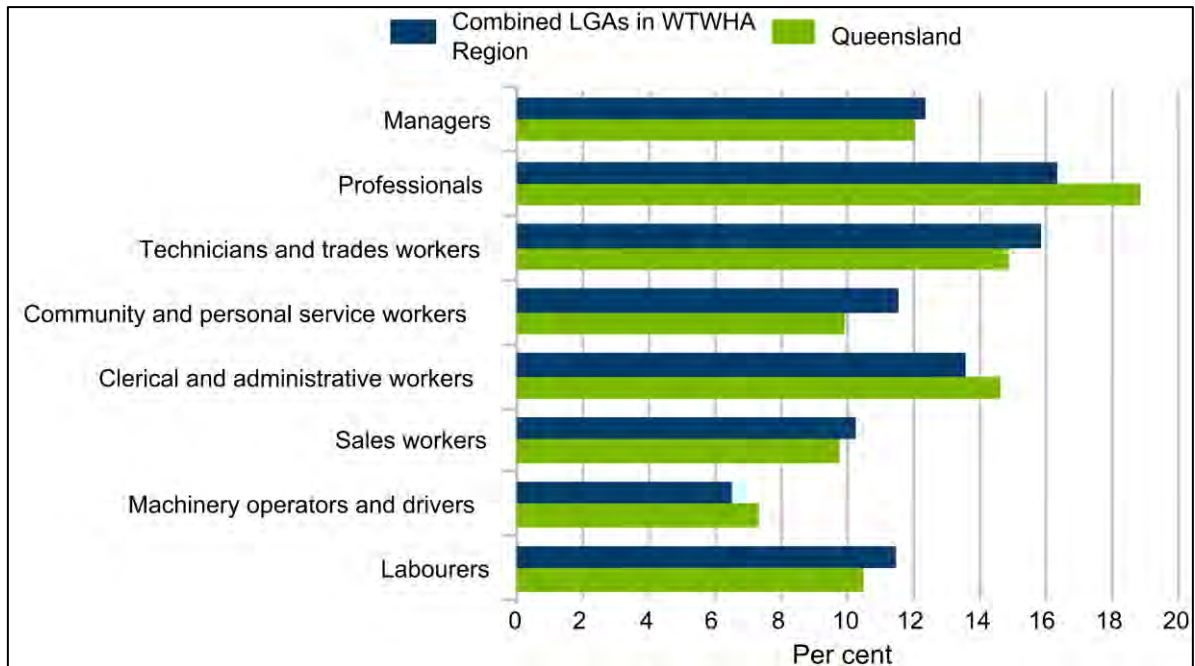


Figure 8: Percentage of workforce by occupation – LGA's in and around the WTWHA compared to Queensland

(Source: Queensland Government Statistician's Office, 2014)

2.4 Tourism in the WTWHA

The WTWHA is one of the most popular tourism attractions in Australia and is frequented by about 5 million local and international visitors annually. Long-term data collected by Prideaux and his team over the period 2007-2014, indicate that many visitors also come to the region to see the Reef; indeed the Reef is the main drawcard to the region (Prideaux et al. 2014, Figure 9). That said, the rainforest also features prominently; and having two adjacent World Heritage Areas undoubtedly helps make the region attractive to many.

Tourism is the fastest growing industry in the Wet Tropics, providing significant economic benefits, including employment opportunities (Queensland Government, 2009). Moreover, the Wet Tropics has been identified as one of the most significant money-earning World Heritage Areas in Australia (Gillespie Economics, 2008). Visitors to the WTWHA were estimated to contribute: \$2,058.0 million in annual direct and indirect output or business turnover; \$927.1 million in annual direct and indirect value added; \$606.8 million in annual direct and indirect household income; and 13,351 direct and indirect jobs (Gillespie Economics, 2008). Development of the Cairns international airport has made the region more accessible, with increases in global travel a key factor contributing to the region's growth (Queensland Government, 2009).

Most visitors to the region are domestic tourists (>80%), particularly during the Australian winter months. However, the region is becoming increasingly popular with overseas visitors as well. Day trips to the rainforest tend to be most common among visitors who arrive in Cairns – they either drive themselves to the WTWHA (in their own cars or hire cars) or participate in a commercial tour (Driml & Common, 1996).

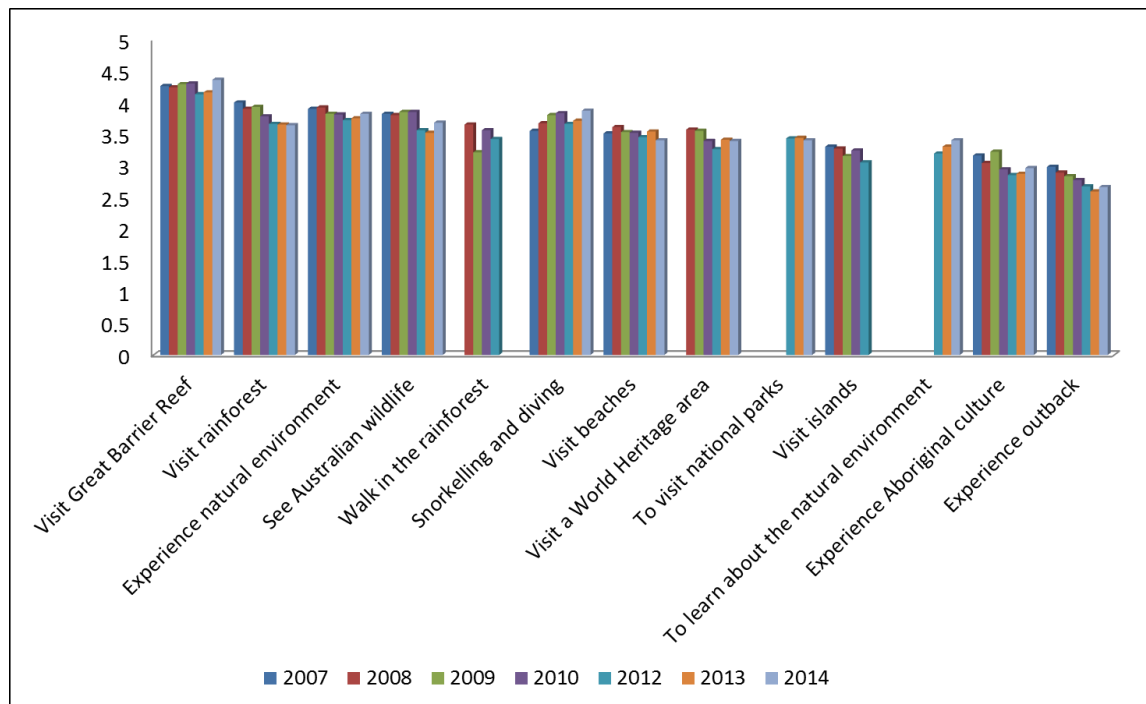


Figure 9: Primary motives for visiting region from 2007 - 2014 *

*Scale: 1 = Not at all important to 5 = Very important

(Source: Prideaux et al. 2014)

The region contains over 200 visitor sites and 150 managed walks (WTMA, 2009), and has the highest concentration of ecotourism operators in Australia and arguably in the world (Tony Carters and Associates, 2010). Businesses of different types and sizes operate in the area, offering a variety of different activities from easy guided walks in the rainforest to 4WD tours into the most secluded areas of the rainforest (tours). There are numerous accommodation options from rural farm stays to luxury resorts (accommodations) as well as award winning attractions like Skyrail, in addition to wildlife parks (attractions) (Cairns Unlimited, 2011).

As noted earlier, the Area is also culturally rich with more than 20 Aboriginal Traditional Owner groups having ongoing traditional connections to land in and near the Wet Tropics (Ignjic, 2001). These continuing affiliations with the Area provide an important resource for regional tourism and a key source of employment for the Rainforest Aboriginal people. Indigenous tourism ventures encompass storytelling, tour guiding, camping, cultural centres, traditional dance and the production and sale of arts and crafts (Ignjic, 2001; Zeppel, 2002). These tourism enterprises are not just socio-economic opportunities for the Indigenous people, but importantly, an economic pathway for sustaining the cultural heritage¹ values of the Area's cultural landscape (WTMA, 2011).

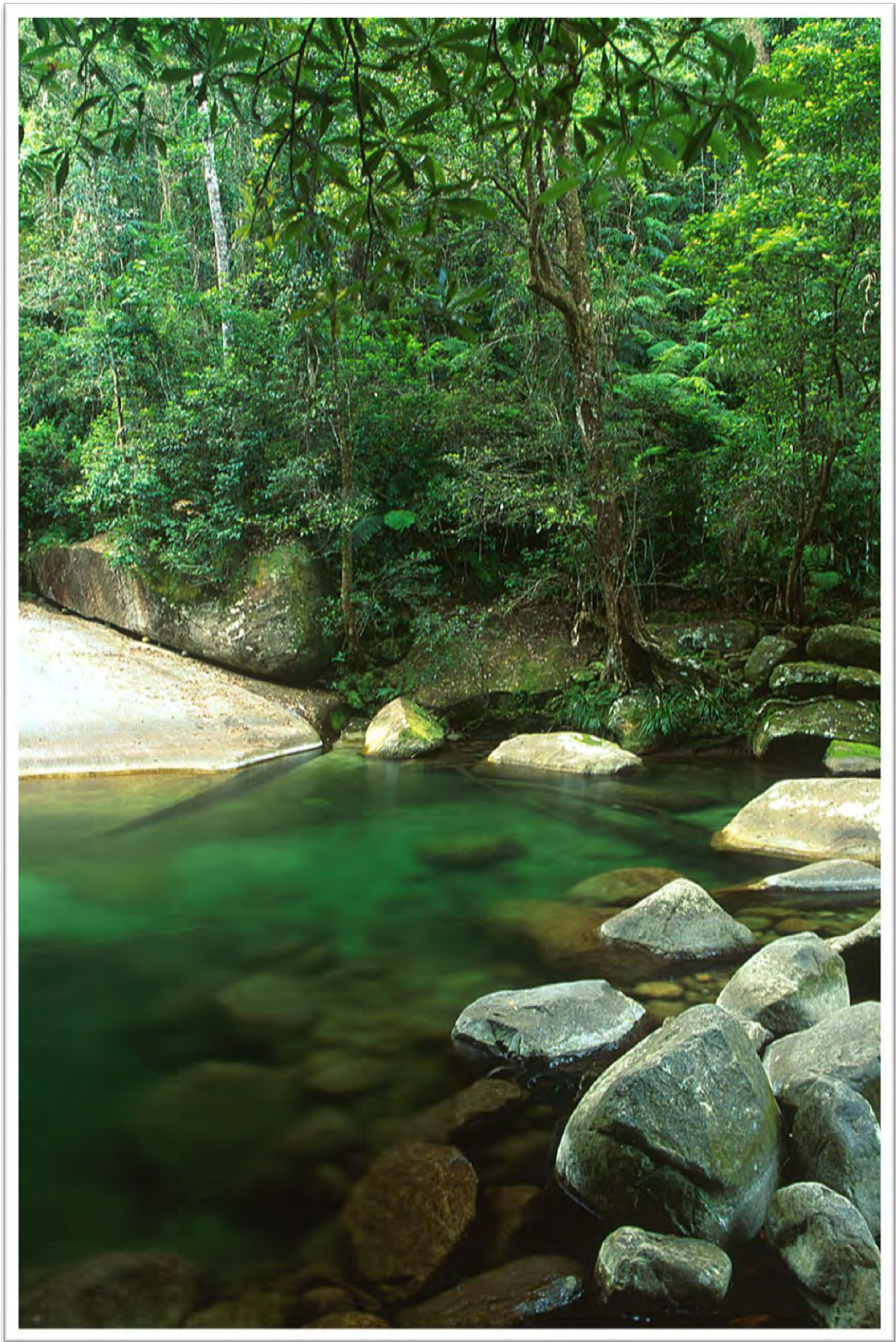
2.5 Community support for the protection of the WTWHA

The initial bid for World Heritage status was not given full support at that time – by either the then Queensland Government, or by some within the community who saw it as a threat to the

¹ Cultural heritage is defined as “the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values” (Australian Heritage Commission, 2001, p. 58).

timber industry and to livelihoods. However, surveys conducted over the last 20 years reveal increasing support and active community stewardship for the Area as well as a high level of satisfaction with its management (McNaire, 1992, 1993 1996; Nielsen, 1999; Bentrupperbäumer & Reser 2003, 2006; Carmody & Prideaux, 2008). For example, community support for its listing has grown from 50% in 1996 to over 80% in 2007. There is a high level of awareness of the importance of protecting the natural environment, particularly those areas that are refuges for endangered plants and animals (Carmody & Prideaux, 2008). A variety of locally-based community groups actively engage in conservation practices such as revegetation of degraded lands and creeks. Some of these groups have been set up through the voluntary efforts and initiatives of many private landholders whose efforts are critical towards the retainment and rehabilitation of habitat and wildlife corridors, fire management, control of weeds and pests and the maintainance of water quality and flows. As new threats emerge and financial pressures challenge management resources, such community support is increasingly desirable (WTMA, 2012).

Moreover, community surveys have shown growing support for the inclusion of Aboriginal cultural heritage in the World Heritage listing of the Wet Tropics, rising from 63% in 2002 to 72% of respondents in 2007 (Carmody & Prideaux, 2008). During that same period, support for Aboriginal co-management of the Area also increased from 58% to 66%, respectively. Evidently, the significance of having a World Heritage Area at their backdoor is embedded in the communities of this region, with the WTWHA perceived as an integral part of their quality of life and environment. There is a strong sense of place, social identity and cohesion.



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3 Our general research approach

3.1 Conceptual background and ES literature in the WTWHA

3.1.1 Ecosystem services and human well-being

As noted in section 2.1, ecosystem services (ES) are defined as the benefits people derive from ecosystems – the support of sustainable human well-being that ecosystems provide (Costanza et al. 1997; Millennium Ecosystem Assessment (MEA), 2005; Haines-Young & Potschin, 2013). Fundamentally, this means that people are connected to, depend on, and benefit from nature.

The link between people and nature is, however, complex, and these complexities are even more apparent when attempting to value (in monetary terms) an entire ecosystem, such as the WTWHA. Some researchers have attempted to do this by generating monetary estimates of the value of several ecosystem services, and then adding giving the *Total Economic Value* (TEV). However, ecosystems are intricate and multifaceted systems, composed of non-linear, inter-dependent components (Koch et al. 2009), and many ecosystems services are inter-related; they are often overlapping and thus are difficult to separate from one another (Fu et al. 2011). As such, additive approaches to estimating the 'value' of an entire ecosystem risk double-counting (Balmford et al. 2011; Fisher & Turner, 2008; Hein et al. 2006; Stoeckl et al. 2014)².

To help avoid problems such as these (at least partially), the Common International Classification of Ecosystem services (CICES) was designed. One of the key considerations for the design of CICES is its resonance with other widely used frameworks and terminologies often used in discussing ES, the highly influential Millennium Ecosystem Assessment (MEA) being its starting point (Haines-Young & Potschin, 2013). Unlike the the MEA and others, CICES is more hierarchical in structure, with the highest level (known as 'sections') being the 3 recognised categories: provisioning, regulating and maintainance, and cultural. Below these major 'sections' are nested a series of 'divisions', 'groups' and 'classes' (Figure 10 and Table 1)

² Formally, it is only valid to estimate the *total economic value* of an entire ecosystem using additive approaches if:

- the marginal utility of income is constant across all individuals, meaning that social values can be estimated by simply adding individual values (Adler and Posner, 1999);
- substitution effects and budget constraints are properly accounted for (Hoehn and Randall, 1989);
- general equilibrium effects are either minimal or are controlled for when estimating V_i^j (Carbone and Smith, 2013); and

all components, j , contribute to the utility of each individual, i , in an additively separable manner, so that total values can be estimated by adding the value of components without risk of double counting (Serafy, 1998).

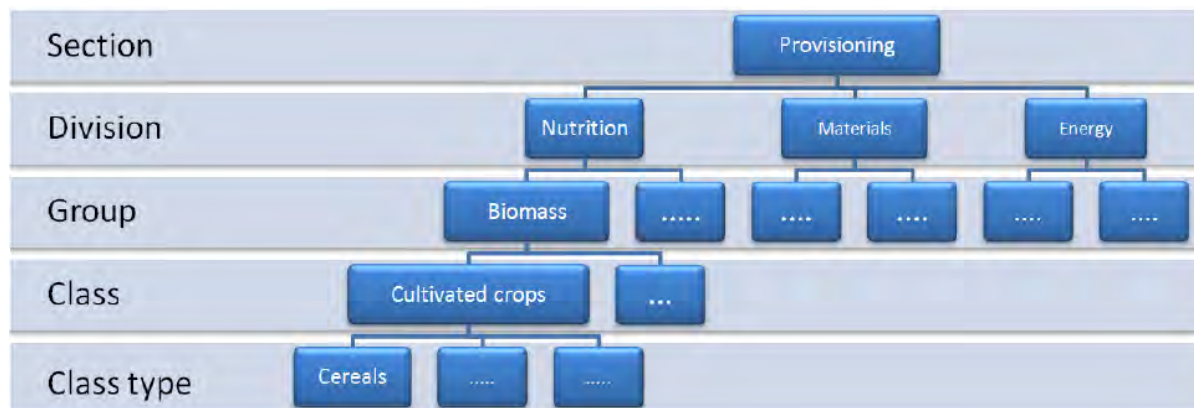


Figure 10: Hierarchical structure of Common International Classification of Ecosystem Services (CIES)
(Source: Haines-Young & Potschin, 2013)

Table 1: Sections, divisions and groups within the CICES
(Source: Adapted from Haines-Young & Potschin, 2013)

Section	Division	Group
<i>Provisioning</i> All nutritional, material and energetic outputs from living systems.	Nutrition	Biomass Water
	Materials	Biomass, Fibre Water
	Energy	Biomass-based energy sources Mechanical energy
<i>Regulation & Maintenance</i> All the ways in which living organisms can mediate or moderate the ambient environment that affects human performance.	Mediation of waste, toxics & other nuisances	Mediation by biota Mediation by ecosystems
	Mediation of flows	Mass flows Liquid flows Gaseous / air flows
	Maintenance of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection Pest and disease control Soil formation and composition Water conditions Atmospheric composition and climate regulation
<i>Cultural</i> All the non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people.	Physical and intellectual interactions with ecosystems & land-/seascapes	Physical and experiential interactions Intellectual and representative interactions
	Spiritual, symbolic & other interactions with ecosystems & land-/seascapes	Spiritual and/or emblematic Other cultural outputs

Another key distinction between CICES and other ES classification systems is the exclusion of *supporting services* (i.e. those services that are necessary for the production of all other ES, such as soil formation and nutrient cycling (MEA, 2005)). This exclusion is based on the rationale that in order for ecosystems and economic valuations to be linked, it is the 'final outputs' from

ecosystems that are essential; not the underlying (supporting) services. Focusing on only final outputs helps to reduce the risk of double counting.

In this study, we thus focus on the value of ES that are provided by the WTWHA (e.g. swimming in clear, clean rivers, enjoying the scenic beauty and peacefulness), the potential impact of their degradation, and people's willingness to pay for their protection/maintenance. Following the principals outlined in the CICES, we focus on 'final outputs', our aim being to understand the 'value' of ES to residents of, and tourists to, this region.

3.1.2 Ecosystem services in the WTWHA

The WTWHA provides many ES (Figure 1) – many of which have been studied in detail by ecologists and other biophysical scientists (Table 2). Some researchers have even provided information that allows us to carefully describe the way in which these services contribute to human well-being. For example, McJanet et al. (2008) found that cloud stripping in the high altitude rainforests of the WTWHA contributes to precipitation, which feeds stream flow and water supplies. As such, several creeks flow even in the dry season. Local rivers can thus be used for power (there are two hydro-electricity stations in the region: *Koombooloomba Dam* on the Tully River and *Barron Falls Hydro* on the Barron River (WTMA, 2012)). Tourists also use the rivers for recreation (white water rafting); and agriculturalists use the water for production. Insects that use the rainforest interact with nearby agricultural crops assisting with pollination (Cunningham & Blanche, 2008). Plantation crops such as coffee receive similar benefits from the Area's birdlife (WTMA, 2012).

That said most studies in the region have been undertaken by biophysical scientists; only a small handful have been formally 'valued' in economic studies. This is illustrated in Table 2 which presents a non-exhaustive list of studies in the WTWHA categorised by type of ecosystem examined, and by type of study (e.g. biophysical, general background, economic valuation). Most economic 'valuation' work has focused on recreational / tourism values. To the best of our knowledge there is only one that has considered a broad range of ecosystem services (Curtis, 2002) – where the opinions of 50 'experts' (with the Delphi technique using multi-criteria analysis) were combined with property-market information that was used to generate estimates of the 'value' of numerous different ES. We are aware of no other study that has sought to estimate the 'value' of a variety of ES in the WTWHA using data collected from the population at large. As such, significant knowledge gaps remain.

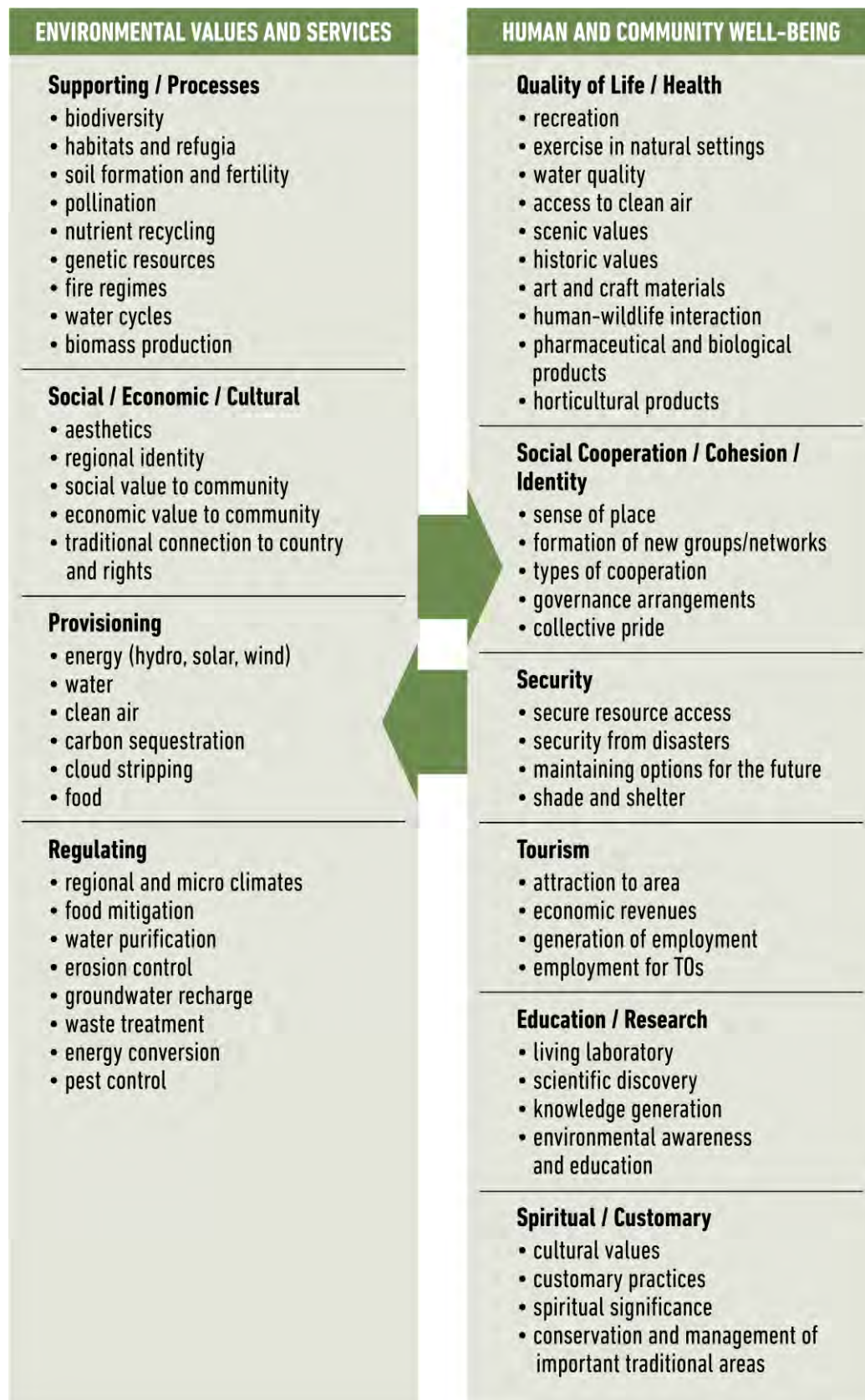


Figure 11: The link between environmental values and services and human and community well-being in the WTWHA

(Source: WTMA, 2012 – reproduced with permission)

Table 2: Significant gaps in understanding of 'values' associated with the WTWHA

Note the different colours: dark green denotes journal articles; medium green denotes books or book chapters; and light green denotes reports

	Services	Biophysical studies	Background studies	Indigenous studies	Economic/valuation studies
Cultural services	Recreation/Tourism	WTMA (2008; 2010; 2011; 2013) Pert et al. (2010)	Pearce (2008) WTMA (2009; 2010) Carmody & Prideaux (2008, 2011)		Cook & Harrison (2002) Gillespie Economics (2008) Deloitte Access Economics (2013)
	Australian icon		Carmody & Prideaux (2008, 2011)		Gillespie Economics (2008) Curtis (2004)
	Cognitive/Scientific research/education	Stork et al. (2014) WTMA (2008; 2010)		Gratani et al. (2011) WTMA (2010; 2011)	
	Aesthetics	WTMA (2008; 2013) Pert et al. (2010)	Carmody & Prideaux (2008)		Curtis (2004)
	Heritage/spirituality/customs/knowledge systems	WTMA (2008; 2013) Gratani et al. (2011) Hill et al. (1999)	Pearce (2008)	WTMA (2011) Hill et al. (2008) Knudtson & Suzuki (1992) Panell (2008) Pryor (1998)	
	Sense of place	WTMA (2008) Knudtson & Suzuki (1992)	Carmody & Prideaux (2008, 2011) McNaire (1992, 1993, 1996) Bentrupperbäumer & Reser (2002, 2003, 2006)	Hill et al. (2008) Knudtson & Suzuki (1992) Panell (2008) Pryor (1998)	
Provisioning services	Food/water	WTMA (2008; 2013)	Curtis (2004)		Curtis (2004)
	Pharmaceutical products	WTMA (2008)			
	Genetic resources	WTMA (2008)			Curtis (2004)
	Agriculture	WTMA (2008)	Curtis (2004)		
	Cloud stripping	McJanet et al. (2008)			
Regulating services	Carbon sequestration	WTMA (2008) Preece et al. (2012)	Hunt (2008)		
	Flood mitigation	WTMA (2008) Pert et al. (2010)			Curtis (2004)
	Ground water recharge	WTMA (2008)			Curtis (2004)
	Pest control	WTMA (2008)			
	Carbon /water cycles	WTMA (2008) McJanet et al. (2008) Pert et al. (2010) Richards et al. (2003) McKergow et al. (2005) Preece et al. (2012) Richards et al. (2003)			Curtis (2004)
	Climate regulation	WTMA (2008) Preece et al. (2012)			Curtis (2004)
	Erosion control	McKergow et al. (2005)			Curtis (2004)

Supporting services	Habitat & refugia	Hilbert et al. (2007) Pusey et al. (1995) Schneider & Moritz (1999) Hilbert et al. (2001)			Curtis (2004)
	Ecosystem health (resilience)	WTMA (2011) Mackay et al. (2012)			
	Pollination	Boulter et al. (2008)			Curtis (2004)
	Biodiversity	Catterall et al. (2012) Garnett et al. (2010) Kikkawa (2008) Metcalf & Ford (2008) Pusey et al. (2008) Mackay et al. (2012) Williams et al. (2008) Pert et al. (2010) Schneider & Moritz (1999) Williams & Bolitho (2003) Stork et al. (2014)	Hunt (2008)	Hill et al. (1999) Hill et al. (2008)	Curtis (2004)
	Soil creation	Rasiah et al. (2004)			Curtis (2004)
	Nutrient cycling	Rasiah et al. (2004) Richards et al. (2003) McKergow et al. (2005)			Curtis (2004)
Management of services	Conservation/ Resources	Pert et al. (2012) Waterhouse et al. (2012) WTMA (2013) Hilbert (2010) Stork et al. (2014)	Emtage & Herbohn (2012) Carmody & Prideaux (2008)		
	Cultural			Hill et al. (1999) Panell (2008)	
	Scientific (for research)	WTMA (2010; 2011) Stork et al. (2014)			
Threats to services	Land-use and its flow on impacts on the GBR (mainly agriculture's use of fertilisers, etc.)	Brodie et al. (2005) Faithful & Finalyson (2005) Shaw et al. (2010) Waterhouse et al. (2012) Rasiah et al. (2004)			
	Climate Change	Hilbert et al. (2001) Hilbert et al. (2007) Hilbert (2010) Shoo et al. (2005) WTMA (2008; 2011) Williams & Bolitho (2003)			
	Deforestation/ agriculture/grazing	Rasiah et al. (2004) Pert et al. (2012) WTMA (2013) Waterhouse et al. (2012)			
	Biodiversity loss	Catterall et al. (2012)			

3.2 Theoretical background and methodological choices

3.2.1 Determining WHOSE values to assess

Identifying whose point of view to include in any study is an important consideration, since people's perceptions of what is 'valuable' differs. Pagiola et al. (2004) cogently illustrated such differences using a forest-based ecosystem as an example: the international community was found to derive most benefits from biodiversity conservation and recreation; the national community derived most benefits from water services and the extraction of forest products; and local communities derived most benefit from the extraction of forest products. The key point to be made is that if one had conducted a study of the 'value' of the forest and included:

- a. Only 'local' residents, then one would have concluded that the forest is of value because of its (marketable) 'products'; or
- b. Only members of the international community, then one would have concluded that the forest is of most value because of its conservation and recreation uses.

As noted in sections 1.2 and 1.3, this project sought to help fill a gap in the literature regarding Indigenous and non-Indigenous residents' and tourists' perceptions of the different 'values' of the WTWHA. As such, determining whose value to consider was a relatively easy task in this instance: we needed to consider Indigenous and non-Indigenous residents of and tourists to the WTWHA. In subsequent sections, we look for similarities and differences in 'values' across these three groups.

3.2.2 Determining WHAT 'values' to assess and WHY

Having decided whose opinions/'values' to include in a valuation study, one must then decide what to 'value'. As noted in section 3.1.2, significant knowledge gaps regarding the 'value' of ES in the WTWHA exist; the key problem here being that it would have been impossible to fill all gaps, so we needed some means of identifying the most important gaps to fill. When doing this, it helps to think about WHY one wants to 'value' an ecosystem system or an ES. That is, one needs to carefully define the end use and audience for one's study (WCPA, 1998). Doing so ensures that the study is carried out efficiently and effectively, and that information generated is relevant.

Previous research has highlighted the significance of stakeholder engagement (before, during and after results are collected) if wishing to maximise research relevance (Preskill & Jones, 2009; Pomeroy & Douvère, 2008, Stokes et al. 2006). Understanding different interests and expectations from the start increases the likelihood that the outcomes will be used for learning, decision-making and taking action (Preskill & Jones, 2009). Stakeholder participation can occur at various times during the life of a project: whilst defining research questions and thus developing questionnaires; whilst collecting data; and/or whilst determining how best to analyse and present data. In this study, stakeholders were engaged at all three stages. Moreover, there are numerous organisations and individuals who have a professional and personal interest in the WTWHA; we attempted to engage with many by having open participatory workshops in the region.

To be more specific, we held three workshops for this project: the first one took place in September 2012, in Cairns, followed by another two in June (Brisbane) and August (Cairns) 2014. The September workshop was mainly used to gather ideas while the latter two workshops were mainly used to follow-up and report back results. Several presentations were also made during the course of the project to inform others about the progress being made (For a full list of these presentations see Appendix 3). More details are provided below.

The first workshop was attended by representatives from:

- ❖ Wet Tropics Management Authority
- ❖ Department of National Parks, Recreation, Sports & Racing
- ❖ Tourism Tropical North Queensland
- ❖ Alliance for Sustainable Tourism
- ❖ Tropical Tablelands Tourism
- ❖ Wildlife Tourism Australia
- ❖ Tour operators
- ❖ Centre for Rainforest Studies
- ❖ Tree Kangaroo Mammal Group
- ❖ Cairns & Far North Environment Centre
- ❖ Cairns City Council

The workshop attendees were provided with background information about the project and of the importance of their contribution in ensuring that the information collected was of relevance to both the WTWHA and their organisations. Participants were also provided with information including some preliminary findings of a parallel project which was underway at the time (*Project 10.2 Socio-economic systems and reef resilience* – also a NERP funded project we were involved in). Because these two projects were similar, this helped us illustrate, to those attending the workshops, a variety of different ways in which information about ES ‘values’ could be used and presented, thus allowing participants to select and focus on the approaches most suited to their needs.

The participants were split into 2 groups, with one group identifying and prioritising regionally relevant goods and services for assessment (task 1), and the other identifying and prioritising key ‘changes’ likely to be of interest to managers (task 2) for consideration in the surveys. To ensure that all participants had a chance to contribute to both tasks, they were asked to switch groups (and thus topics) half way through the workshops. Although many factors often overlap between visitors and residents, when discussing each task, effort was made to discuss both stakeholders separately.

As expected, several values were identified for consideration. To help narrow the list, participants were each given 5 “votes” (dotted stickers) and these votes were used to prioritise values for assessment.

For residents, key values were those associated with forest health, scenery, culture Indigenous and European (e.g. mining, cattle), opportunities for employment (a value which could potentially be compared to and/or traded off against other ‘core’ values), accessibility to the WTWHA and importantly, the quality of access, and the sense of community (i.e. social cohesion)³. For tourists, participants identified: the presence of iconic species, landscape (e.g. waterfall, scenic drives), water quality and walking tracks as the most important values for assessment⁴.

³ Other values identified as worthy of consideration in the assessment exercise (albeit receiving fewer ‘dots’ than the ones mentioned above) were: Proximity to other cultures and environments – such as PNG and the Torres Strait (i.e. the geographic value); the ‘interactive’ value of having two world heritage sites side by side (i.e. the WTWHA and the GBRWHA); Water quality; Cultural festivals; Congestion (notably for camping purposes); Amenities; Ability to participate in activities; Urban sprawl; Land clearing; Botanical gardens.

⁴ Other values for evaluation included: Therapeutic values; Opportunities for solitude; Quality of guided tours; Uniqueness of Australian rainforests; Accessibility to WHA sites; Cultural festivals; Botanical gardens; Cultural history; Healthy parks

The final lists of items selected for assessment by residents and tourists (with descriptors provided by participants) are provided in

Figure **12** and Figure 13 respectively.

Benefiting either directly or indirectly from the jobs & incomes created by:
The tourism industry
The mining industry
The agricultural industry
Other industry/sector (e.g. fishing, retail, education etc.)
Being able to access the rainforest via:
Walking tracks &/or dirt roads
Bitumen roads & bridges
Rail/Skyrail
Being able to:
Learn more about a unique & ancient Australian environment
Hear from Aboriginal people about their sense of place (culture & country)
Go on rainforest walks
Visit waterfalls &/or swim in clear, clean rivers/streams/waterholes
See iconic species in the wild (e.g. cassowary, kangaroos, rattle birds, etc.)
Relax and/or reflect in a natural environment
Enjoy uncrowded camping & picnic areas
Enjoy the scenic beauty & peacefulness of the rainforest (sights, sounds & smell)
Having:
Healthy native plants & animals (e.g. free from diseases, pests & weeds)
Beautiful undeveloped scenery to look at
Two world heritage sites side-by-side (i.e. the WTWHA and the GBRWHA)
Protecting:
Places that have Aboriginal cultural values
Places that have other cultural values (e.g. European/Asian)
The WTWHA either for its own sake or for future generations (even if you have never been there & never plan to go)
Being able to:
Spend time with friends & family
Enjoy city-entertainment (e.g. spending time at cafés, museums, etc.)
Have some 'control' over what is happening in your life
Join in community activities (e.g. attend cultural/environmental festivals)
Knowing that:
Friends & family are healthy & safe
Good quality roads, hospitals, schools, etc. are there if need be

Figure 12: List of values selected for assessment – Residents

Finding a place where the price matched my budget
Visiting a place which is close to where I live
Having good quality accommodations, shops & restaurants
Having quality guided tours &/or attraction venues
Being able to access the rainforest via:
Walking tracks &/or dirt roads
Bitumen roads & bridges
Rail/Skyrail
Being able to:
Learn more about a unique & ancient Australian environment
Hear from Aboriginal people about their sense of place (culture & country)
Go on rainforest walks
Visit waterfalls &/or swim in clear, clean rivers/streams/waterholes
See iconic species in the wild (e.g. cassowary, kangaroos, rattle birds, etc.)
Relax and/or reflect in a natural environment
Enjoy uncrowded camping & picnic areas
Enjoy the scenic beauty & peacefulness of the rainforest (sights, sounds & smell)
Go to the Great Barrier Reef World Heritage Area (GBRWHA)
See iconic marine species (e.g. whales, dugongs, turtles)
Enjoy sunshine & warmth
Having:
Healthy native plants & animals (e.g. free from diseases, pests & weeds)
Beautiful undeveloped scenery to look at
Two world heritage sites side-by-side (i.e. the WTWHA and the GBRWHA)
Protecting:
Places that have Aboriginal cultural values
Places that have other cultural values (e.g. European/Asian)
The WTWHA either for its own sake or for future generations (even if you have never been there or never plan to go)
Being able to:
Spend time with friends & family
Enjoy city-entertainment (e.g. spending time at cafés, museums, etc.)
Attend to business, go to meeting/conference
Join in local activities (e.g. attend cultural/environmental festivals)
Knowing that:
You & travelling companions are healthy & safe
Good quality roads, hospitals, etc. are there if need be

Figure 13: List of values selected for assessment - Tourists

As part of task 2, participants were asked to identify demographic, economic, development or other 'changes' &/or management issues that affect the 'core' values of the WTWHA.

The most significant 'changes' (management issues) identified for possible consideration related to: access; construction of roads and other infrastructures; iconic species; water; weeds and pests; aesthetics; and Indigenous culture. As was the case with the previous task, we asked participants to help prioritise the list of 'changes' to be assessed using coloured 'dots'. Our final list of potential changes to focus on (including a change in prices to facilitate comparisons with market-related changes) appears in Figure 14.

If local prices rose by 20% compared to other places in Australia
If there were twice as much rubbish (e.g. bottles, plastic) in the rainforest & in the rivers
If there was half as much chance of seeing an iconic animal (e.g. cassowary, kangaroo, rifle birds, musky-rat kangaroo)
If there were fewer native plants & animals to look at & twice as many pests & weeds
If there were half as many walking tracks
If there were twice as many tourists
If the rivers changed from clear to murky
If the undeveloped scenic beauty & peacefulness of the area declined
If you could spend only half as much time with friends & family (compared to now)
If there were half as many cafés, shops, theatres, etc. in your local area
If there were half as many good quality roads, hospitals & schools in your local area
If there was more public information about Aboriginal cultural values of the area

Figure 14: List of 'changes' for assessment – Residents and Tourists

3.2.3 Determining HOW to assess 'values'

Having determined what values to assess (and why), one must next determine how to undertake the assessments. Economists have developed numerous different techniques for assessing the monetary worth of various ES (Figure 15).

1. Valuation techniques that use market prices		
(a) Changes in the value of Output	}	Most useful when valuing services that have a market value – e.g. Goods produced, Tourism
(b) Loss of Earnings		
(c) Preventive expenditures (mitigation costs)	}	Often used to value regulating services (e.g. the amount people pay to prevent beach erosion)
(d) Replacement cost		
2. Revealed preference techniques		
(a) Property or land value approach	}	Can be used to value market and <u>some</u> non-market goods and services – e.g. Recreation, Environmental quality
(b) Travel cost approach		
(c) Wage differential approach		
(d) Acceptance of compensation		
3. Stated preference techniques		
(a) Contingent valuation	}	In theory, can be used to value almost anything – depending upon how the questions are structured; doesn't always have to use \$
(b) Choice modelling / Conjoint analysis (contingent rating, contingent ranking and choice experiments)		
(c) Paired comparison		
4. Benefit Transfer		'Borrowing' estimates from other regions and using them instead

Figure 15: A range of valuation techniques
(Source: Adapted from Gregersen et al. (1987), Driml (1994) and Grey (1996))

Although economists tend to use terms such as *Total Economic Value (TEV)*, direct and indirect use-value and non-use values, there is a correspondence between those terms, and the terminology associated with the literature on ES (Stoeckl et al. 2014; Haines-Young & Potschin, 2013).

Assessing the monetary worth of ES that are exchanged in the market is relatively straightforward: one simply needs to identify markets for them, gather data about prices paid in these markets, and determine the amount of the good or service traded on the market (WCPA, 1998). The monetary worth of tourism, for example, can be quantified by looking at direct sales to tourists i.e. expenditures on accommodations, food and entrance fees, etc (although many tourism impact studies also consider the way in which that money flows through the economy, thus affecting other sectors – see, for example Deloitte Access Economics, 2013; Stoeckl et al. 2010; Driml 1999). Similarly, the monetary worth of harvests can be measured through income from sales (which may include user fees or access charges).

Where markets do not exist, other techniques are required and, as depicted in Figure 16, there are a variety of methods available. Revealed preference techniques can be used if there is at least some 'link' between the ES of interest and the market. For example, the link between house prices and scenic views can be capitalised on to estimate the monetary 'value' of a view (simplistically the difference in price between 2 houses which are similar in all respects except for the fact that one has a nice view).

If there are no market prices, and if there are also no 'links' between the ES of interest and the market, then one must construct a 'hypothetical market' using stated preference techniques⁵ such as *Contingent Valuation* and *Choice modelling*. Simplistically, it is as if researchers ask people to tell them how much they would be willing to pay for different ES, if a market for them existed. If using monetary systems such as these to generate estimates of 'value', one needs to consider the distribution of income⁶, but there is a growing body of literature on subjective well-being and overall life satisfaction (LS) which provides yet another way of looking at the 'value' of the environment – a good review of which can be found in Kristoffersen (2010). These stated preference approaches use non-monetary methods for generating quantitative assessments of the relative importance of a range of different values – some of which have been successfully trialled in and around Northern Australia (See: Larson, 2009; Delisle, 2009; and Stoeckl et al, 2012, Larson et al, 2013, 2014 and Stoeckl et al, 2014 for published examples).

It was clear that we were going to need to use one single valuation approach to assess all of the values, so that meaningful comparisons could be made. This is necessary because different types of valuation approaches (Figure 15) generate different types of 'values' that cannot always be added or compared. To explain, note that some valuation techniques generate estimates of *Price* - denoted by the dark blue line in

Figure 16. In contrast, some techniques generate estimates of *Expenditure* – represented by the blue rectangle in

Figure 16. Others generate estimates of:

- ❖ Consumer surplus - CS (the amount that a consumer would be prepared to pay for a good, over-and-above what is actually paid) – shown as the purple triangle in
- ❖ Figure 16;
- ❖ Total Willingness to pay (WTP) = expenditure plus CS (i.e. the blue rectangle plus the purple triangle);
- ❖ *Changes* in expenditures – the dark red rectangle; and/or
- ❖ *Changes* in CS – the yellow trapezoid in
- ❖ Figure 16.

⁵ Stated preference techniques are thus open to criticisms for their hypothetical nature, and choice modelling in particular, may require complex designs (from choice sets characterized by a number of attributes and attribute levels, the complexity of which increases as the number of attributes investigated increase) (Bech & Gyrd-Hansen, 2005; Kuhfeld, 2010). Contingent valuation's ability to generate high estimates of Willingness-to-pay (WTP) is considered problematic (Greiner & Rolfe, 2004) thus leading some researchers to question its reliability (e.g. Hausman, 1992; Diamond & Hausman, 1994). Nonetheless, Duffield & Patterson (1991) argue that the differences between real (i.e. observed) WTP and contingent valuation estimates are negligible and predictable enough, and a wide panel of experts associated with the National Oceanic and Atmospheric Administration (NOAA) (Arrow et al. (1993, p.3) support this conclusion.

⁶ Willingness to pay is a function of ability to pay, which depends on income/wealth. As such, valuation approaches which rely on dollars give more weight to the preferences of the wealthy than to the preferences of the poor.

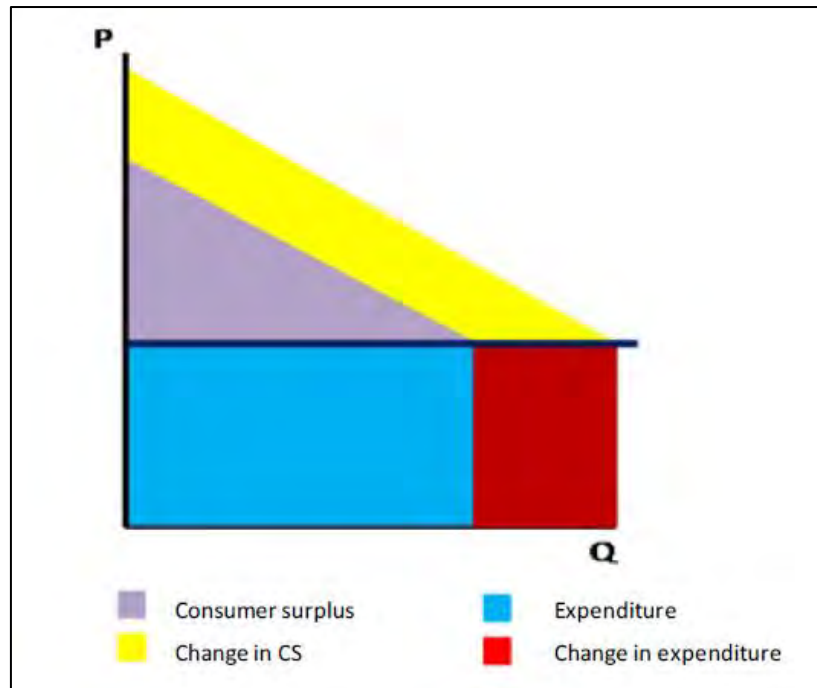


Figure 16: Stylised representation of the different types of estimates generated by various valuation techniques.

Accordingly, even though most valuation techniques generate estimates of 'value' that are denominated in dollars, this does not mean that estimates can be validly compared. One way to ensure it is valid to compare estimates, is to generate those estimates using identical methodological approaches.

Many of the values identified for assessment (

Figure **12** and Figure 13) have little or no relationship with the market. So in this project it was clearly going to be necessary to use at least some stated preference approaches. Correctly designed choice modelling and contingent valuation surveys require significant amounts of questionnaire 'space' (particularly choice modelling experiments, which can require respondents to participate in numerous choice experiments each taking several minutes). We thus decided to rely, primarily, upon the life-satisfaction approach, although we also included some contingent behaviour and contingent valuation questions which focused on a smaller subset of the 'values', so that we could look for insights by also comparing methodological approaches. All of these methods are discussed in more detail in subsequent sections of this report.

Finally, it is important to reiterate a point made in the introductory section of this report: some valuation techniques allow one to estimate the total monetary 'value' of an ecosystem or ecosystem service, others generate estimates of marginal value.

Estimates of the 'total' worth of an ecosystem or of an individual ecosystem service are particularly useful if seeking to:

- ❖ Describe the current state of affairs – for example, determining that one good or service is of more 'value' (or more important) than another;
- ❖ Highlight the importance of a value; or
- ❖ Address 'all-or-nothing' management/policy questions such as: what losses would the region suffer if the entire WTWHA region ceased to exist?

Managers are not always faced with all or nothing choices (rainforest or no rainforest). Rather, they often need to make choices 'at the margin', and may, for example, need information that helps answer questions such as:

- ❖ What losses would the region suffer if development eroded (rather than erased) some of the region's values (e.g. if new enterprises affected aesthetic or biodiversity values)?
- ❖ Would more people (tourists) come to the region if we could improve resource 'y'?
- ❖ What compensation should be sought (monetary or otherwise) if development 'x' takes place?

Discussions with key stakeholders (during workshops – see section 3.2.2) indicated that we were likely to want estimates of both 'total' and 'marginal' values, for a broad range of ecosystem services.

3.3 Questionnaire development

3.3.1 Initial drafts

We blended insights from the literature and the workshop, to identify appropriate valuation 'strategies' and to develop a structured outline for the two planned questionnaires (linking specific types of questions and 'values' to particular valuation techniques). As discussed previously, our literature review emphasised the need to understand the managerial or policy context before selecting a valuation tool. Our stakeholder workshop confirmed that we needed to explore the *total* value (or importance) of some ES to residents and tourists, and also the likely response of residents and tourists to changes in those services (i.e. *marginal* values). Moreover, the values identified for assessment (

Figure 12 and Figure 13) comprised many non-use values (e.g. existence and bequest, aesthetics). As such, it was clear that we were going to need to use at least some stated preference techniques since the other techniques cannot estimate non-use values. We were also cognisant of the significant gap between rich and poor (Stoeckl et al. 2011; Carson et al. 2009), so were keen to ensure that we used both monetary and non-monetary assessment techniques. Workshops participants, particularly those interested in tourism, also raised interests in learning more about tourists' expectations and perceptions, which ultimately links with visitors' satisfaction with the experience. We viewed that as an important theme for both tourists and residents (i.e. asking about both importance and satisfaction).

Based on the above considerations, we decided to use:

1. A variation of the life-satisfaction approach to assess
 - a. The (total) 'value' of a wide variety of ES benchmarked against some market goods and services and also some 'social'/community goods and services (
 - b.
 - c. Figure 12 and Figure 13);
 - d. The effect of changes in those ES on overall quality of life (benchmarked against market and social changes) - Figure 14;
2. The contingent valuation approach (willingness to pay (WTP)⁷ to assess *marginal changes* in four of the key issues identified in (b), namely:
 - ❖ To protect native plants and animals from pests and weeds

⁷ People reveal their value for the benefits of ecosystem goods and services through their WTP for those benefits, and they also reveal their value for these benefits through their WTA compensation for forgoing the benefits (WCPA, 1998). We concentrated on WTP.

- ❖ To maintain undeveloped scenery and peacefulness
- ❖ To improve water quality
- ❖ To protect aboriginal cultural values;

We drafted 2 questionnaires: 1 for residents and 1 for tourists. These were then sent for feedback to all stakeholders who attended the workshop, and also to those who were unable but had indicated keen interest in the project. When drafting these questionnaires, we wanted to ensure some similarity with questionnaires developed for our corresponding study in the Great Barrier Reef World Heritage Area (*Project 10.2: Socio-economic systems and reef resilience*), so as to be able to make comparisons between marine/reef and terrestrial/rainforest 'values'.

The key inputs requested were on issues of appropriateness, relevance of the data and clarity of the questions. Examples of the sorts of feedback received include: the need to consider values beyond just those of the visual/aesthetics (e.g. sounds and smell), well-being benefits, and inclusion of whether respondents actually engage in volunteering activities as this is a good indicator of their altruistic tendencies.

3.3.2 Input from the Rainforest Aboriginal Peoples Alliance (RAPA)

Given the cultural richness of the area, we felt it was important to ensure that we did not just seek the views of people who are visiting the region, but also the views of those who have lived in the region for tens of thousands of years. This would allow us to make comparisons between the views of tourists, non-Indigenous and Indigenous residents. As such, we sent copies of the questionnaires to RAPA so as to ensure that culturally apposite 'language' was being used in the questionnaire and that we were measuring the things that 'matter' to the Traditional Owners.

Briefly, RAPA is the regional leadership group across Rainforest Aboriginal peoples (RAP) within the Wet Tropics region. Its philosophy is focused on actively supporting the on-ground Traditional Owner networks on matters such as culture, native title and natural resource management legislation related matters alongside community development and governance. As the peak body for the Rainforest Peoples, RAPA carries out distinct functions:

1. Providing support to Rainforest Aboriginal corporations, companies, organisations and networks;
2. Developing policy positions on matters relevant to RAP, country and culture;
3. Being the collective voice of the RAP;
4. Advocating on behalf of the RAP; and
5. Engaging with all levels of government, non-government organisations, the private and community sectors to promote the interests of Rainforest Aboriginal people, culture and heritage, and the lands and waters of the Wet Tropics region (RAPA, 2013).

Examples of feedback received from RAPA include:

- ❖ Change "Traditional / Indigenous cultural values" to "Aboriginal cultural values";
- ❖ Add an Aboriginal cultural element to question 5 - e.g. "Spend time with Traditional Owners learning about culture and country"; and
- ❖ "Are you or any of the people who normally live with you, Rainforest Aboriginal persons or other Aboriginal and/or Torres Strait Islander persons"?

RAPA was also keen to learn more about how important it was for residents and tourists to:

- ❖ "Hear from Aboriginal people about their sense of place (culture and country);
 - ❖ "Protect places that have Aboriginal cultural values"; and
 - ❖ "If there was more public information about Aboriginal cultural values of the area".
- Related to this, information on people's WTP to protect such places was also sought.

3.3.3 Final questionnaires

Appendix 4 and Appendix 5 contain copies of the resident and tourist surveys respectively. As noted earlier, we designed the survey in a way that was deliberately similar to the GBRWHA surveys to facilitate comparisons of values between the two ecosystems. That said, the WTWHA surveys were more focused on aesthetic values and Indigenous cultural values. Another point of difference between the two was that in this current study, we included 'social' values (e.g. safety of family/friends/travelling companions, quality of infrastructures such as hospitals and schools). As such, we are able to assess the importance of the environment, aesthetics and Indigenous values *relative* to 'social' values as well as to market values (e.g. employment).

Core sections of our resident questionnaire thus included questions about:

- ❖ The socio-demographic background of respondents (age, income, etc.);
- ❖ How often residents go to the WTWHA, and what they do while there;
- ❖ The importance of various goods and services provided by the WTWHA to overall quality of life and satisfaction with those goods and services;
- ❖ Satisfaction with life overall;
- ❖ People's perceptions about the way in which their overall quality of life would be affected by changes in various environmental, cultural and market factors (e.g. higher prices, reduced water clarity); and
- ❖ Willingness to pay (WTP) for improvements in various environmental and cultural attributes in the WTWHA.

When developing the tourist questionnaire, we sought to keep questions similar (to enable comparisons) but altered the wording of some segments. As such, core segments of this questionnaire included questions about:

- ❖ The socio-demographic background of respondents PLUS background about travel party and origin;
- ❖ How often visitors had been to the WTWHA in the past and what they did (or planned to do) while on this particular trip;
- ❖ Questions about the importance of various goods and services to their overall decision to come to the region (in contrast to the resident survey which asked about importance to overall quality of life);
- ❖ Their satisfaction with the trip overall (in contrast to the resident survey which asked about satisfaction with life overall);
- ❖ The way in which their decision to come to the region would have been affected by changes in various environmental, cultural and market factors (in contrast to the resident survey which asked about the way these things would affect overall quality of life);
- ❖ Expenditure while in the area; and
- ❖ WTP for improvements in various environmental and cultural attributes.

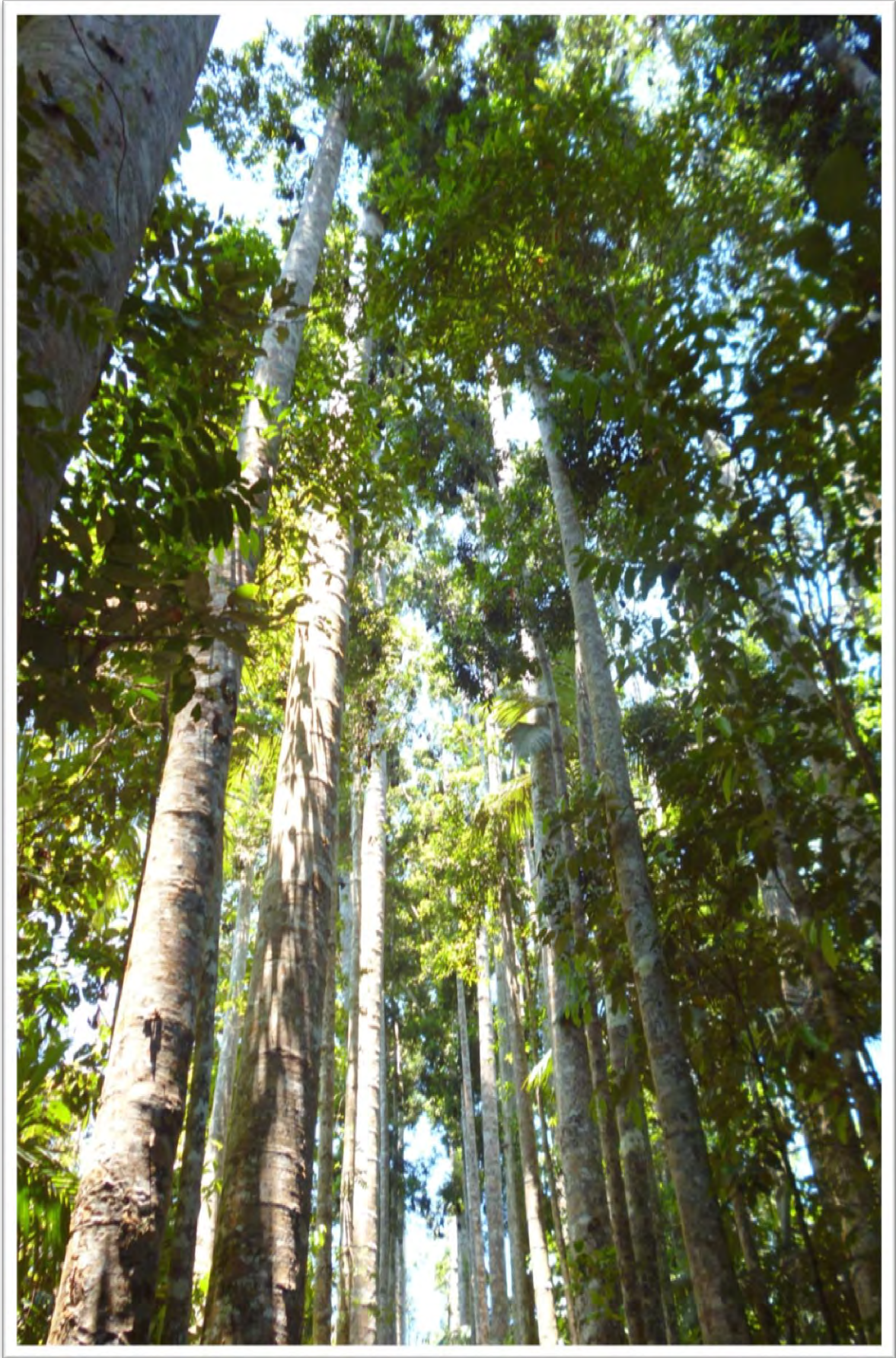
Importantly, we randomised the order of items presented to respondents for assessment. We did this, given evidence from literature that respondents are highly sensitive to the order in which questions are presented (especially if asked to evaluate a long list of items) (Cai et al. 2011, Lasorsa, 2003). We thus produced 24 different versions of the resident surveys and 24 different versions of the tourists surveys: all surveys contained exactly the same set of 'values' (those listed in

Figure 12 and Figure 13), but the order in which the 'values' being assessed (on page 2 of the questionnaires) varied. We also varied the bid-range presented to respondents on the WTP questions (some had \$500 as the highest value, some had \$750, some had \$1000 and some had \$2000), since respondents can be sensitive to this (Farr, et al. 2013).

Subsequent sections of this report provide much more detail about the various methods used, including information about the specific framing of questions, and the analysis of data.

3.3.4 Pre-tests

First we pre-tested the questionnaires with colleagues and then with some of the stakeholders who had attended workshops to ensure coherence and relevance. We then mailed-out 100 surveys to a sample of residents, within and adjacent our study area. There were no major issues with understanding of the questions being asked, so this provided us with confidence for the main mail-out. We made minor adjustments to the design and layout for clarity, the final version being that which is displayed in the Appendices.



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4 Sampling, response rates & overview of respondents

Mindful that different people are likely to 'value' the environment in different ways, we set out to include a broad variety of respondents to be able to highlight how 'different' and how 'similar' the values of different types of people are. Specific details about the data collection process are provided below.

4.1 Residential data collection activities

We categorised our targeted residents according to Indigeneity, using different sampling and data collection strategies for each group.

First, our previous experience from working in Indigenous communities showed us that Indigenous people rarely complete mail-out surveys. Hence, we contracted RAPA to manage data collection in the Indigenous communities and to also advise us on how best to report-back results. We aimed to collect around 150 surveys. RAPA engaged 3 Indigenous researchers across the north (Robyn Bellaquih), centre (Sandra Levers) and south (Phil Rist).

Second, aiming for a geographically stratified random sample, we selected postcodes that lay adjacent to, partially or entirely within the WTWHA, using the Australian Bureau of Statistics (ABS) 2006 Census data by location. Thirty-three postcodes satisfied this criterion. We purchased a database with the names and addresses of more than 6.5 million people, of which 1.2 million records were for Queensland. The database is updated biannually, with a major update at the start of the year and a maintenance update mid year. The database was purchased after the mid year update in 2012. Households with addresses that were clearly outside the scope of our study were deleted. From these, the names and addresses of residents who had been sent surveys from two earlier research projects were deleted. This helped to reduce the risk of the same respondent being given several questionnaires (thus minimising respondent burden), giving the current project a good chance of achieving good response rates.

Two thousand households were randomly selected from that customised list – spread evenly across the 33 identified postcodes. Since there were 24 different versions of the survey, addresses were randomly allocated across each: versions 1-8 comprised 84 households each, while versions 9-24 included 83 households each. Distribution of the resident surveys followed Dillman's (2007) *Total Design Method* (TDM), with the first mail-out taking place in early August 2013. More precisely, residents were first sent a detailed information sheet, explaining what the project was about, its objectives and why their response was important. This information sheet was accompanied with a copy of the questionnaire and a prepaid pre-addressed envelope to return the completed questionnaire. The database was updated as completed surveys (and return-to sender envelopes) were received. Six weeks later, we sent a second follow-up letter with a replacement questionnaire – the aim being to remind those that had not yet completed the survey to do so. This was followed 6 weeks later with a third mail-out – this was the final chance for residents to be able to have their say.

Overall, we received 447 'return to senders'. Accordingly, from our initial 2000 surveys sent out, we estimate that 1553 reached our targeted households. We received 386 completed surveys from our mail-out, giving an estimated response rate of 24.8% (a relatively good response rate for mail-outs, particularly in northern Australia). We received an additional 160 completed surveys from Indigenous residents (through RAPA's data collection activities). Figure 17 illustrates the distribution of all responses received (Indigenous and mail-out), by postcodes.

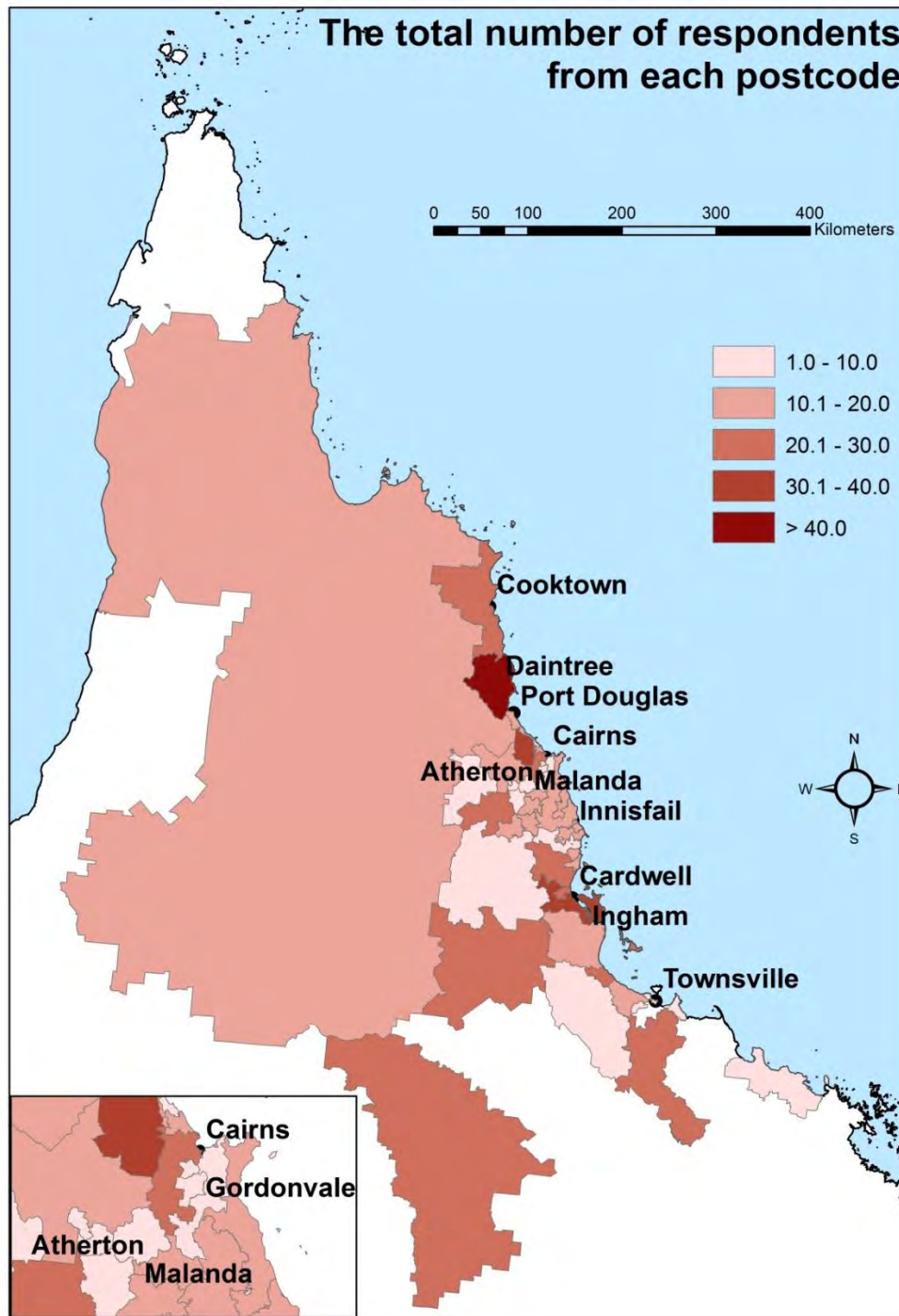


Figure 17: Number of resident responses to survey, by postcode.
Map produced by Diane Jarvis, JCU

Note the inland areas which lay well outside the WTWHA, but appear to have a large number of respondents. This is because postcodes in this part of Australia are geographically large. The database was 'filtered' by both location name and postcode, so only residents who lived closer to the WTWHA were sent questionnaires – the location in which respondents live within postcodes is thus closer to the WTWHA than appears from this map.

4.2 Tourist data collection activities

We identified 3 data-collection locations in Cairns (the lagoon and both the domestic and international airport terminals), obtaining permission to distribute questionnaires at each. They were selected as collection points because (a) the majority of visitors to the region depart by air and (b) the lagoon is a key attraction – even for those who travel to and from the region by car or bus. Moreover, the lagoon was found to be very successful during data collection for the GBRWHA-related study. Data collection began in August 2013 and continued until the end of June 2014, guaranteeing that the views of a broad range of tourists were captured across the different tourists' seasons. Two hours of data collection were allocated each month at each location. In total, we received 621 visitor surveys.

NOTE: The majority of visitors to this region come from China, Japan, the United Kingdom, the USA, New Zealand and Germany (in that order) (Tourism Research Australia, 2012, Stoeckl et al, 2013, Chandler et al, 2014). We lacked the resources to translate visitor surveys into Japanese and Chinese, hence missed the views of these two key visitor segments to the region (notably those with limited English). Our results thus encapsulate the views of only the English speaking visitors.

4.3 Residential and Tourist Responses summarised

Table 3 summarises responses across all survey respondents.

Table 3: Summary of responses

		Frequency	Estimated response rate	Percent of total sample
Residents	Non-Indigenous	386	24.8%	33.1
	Indigenous	160		13.7
Tourists	Lagoon	208	N/A	17.8
	Domestic terminal	309	N/A	26.5
	International terminal	104	N/A	8.9
Total		1167		100

4.4 Overview of respondents

4.4.1 Demographic characteristics

Females made up the majority of respondents: 61% and 60% across Indigenous and non-Indigenous residents respectively, and 60% across the tourist samples.

The majority of tourists and Indigenous residents surveyed (62% and 50% respectively) were aged between 20-40 years old while 51% of non-Indigenous residents surveyed were aged between 40-60 years old.

The majority of tourists (61%) and non-Indigenous residents (33%) who answered the survey had completed a university degree. Most Aboriginal respondents had completed high school level, although 18% had completed a university degree (Figure 18).

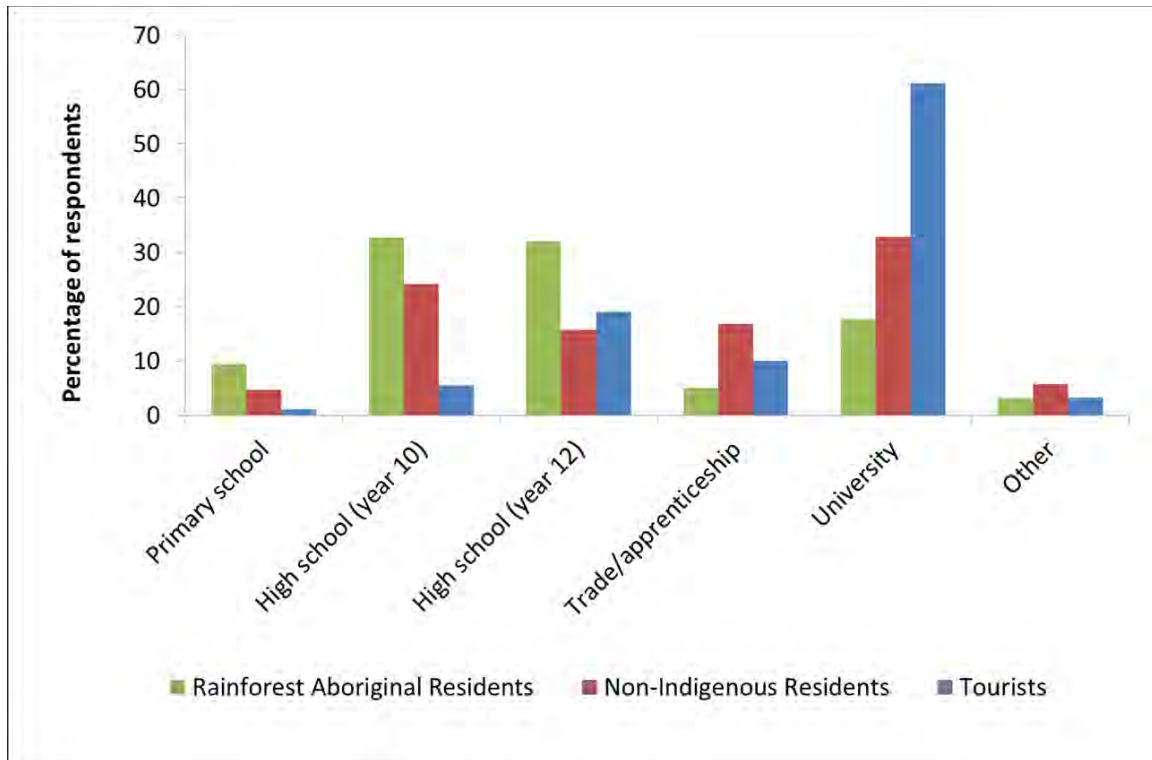


Figure 18: Highest level of education completed by type of respondent

Our combined Government-provided services sector, which also includes health and education, was the main source of income for over a quarter of our resident sample (47% and 31% of Indigenous and non-Indigenous residents, respectively) (Figure 19). Relatively few residential respondents were dependent on Tourism and Accommodation, cafes, and restaurants for their household income.

There was a clear difference between the incomes of Indigenous and non-Indigenous households, with the former being generally poorer than the latter (Figure 20). This result is not surprising with Indigenous households often being more dis-advantaged than their non-Indigenous counterparts (Stoeckl et al, 2011; Larson & Alexandridis, 2009; Carson et al, 2009). A slightly larger percentage of tourists were in the highest income bracket than were the non-Indigenous residents.

An overwhelming majority of respondents surveyed do not volunteer nor contribute financially to conservation organisations (notably tourists (81%). Of those who did participate in these activities, most did so on a national or local scale, except for the Indigenous residents (29%) who made contributions to or volunteered to local organisations (e.g. promoting/advancing their cultural values through the Rainforest Peoples Aboriginal organisation) (Figure 21).

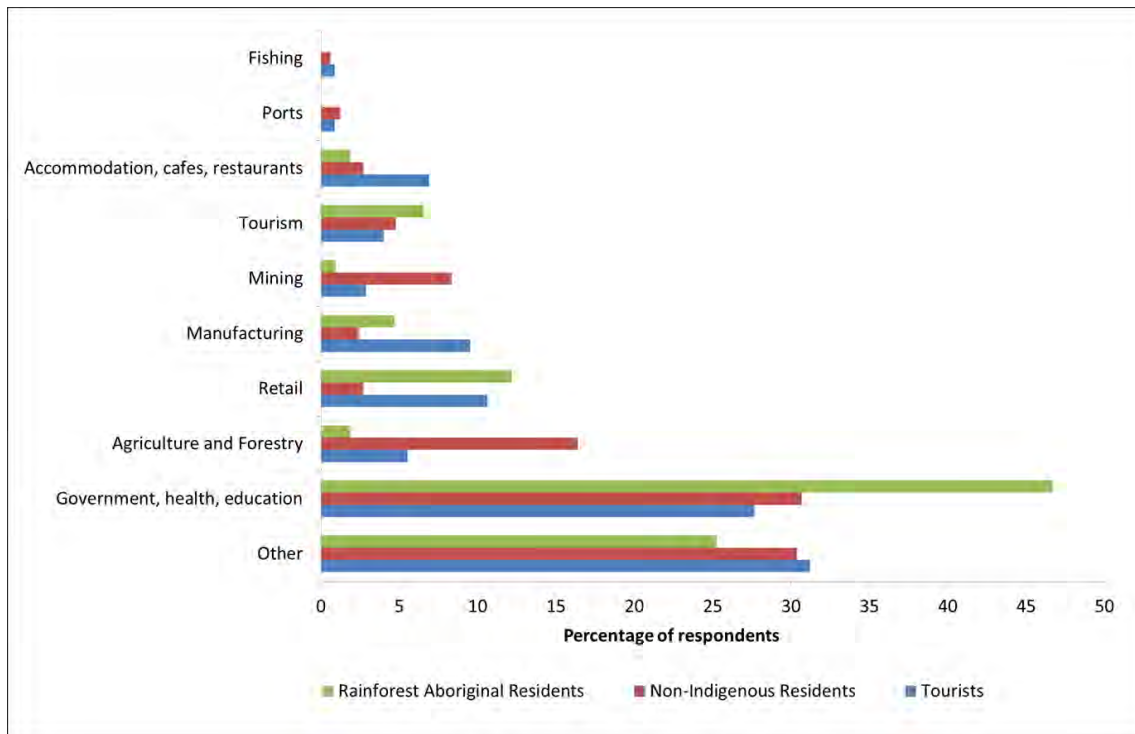


Figure 19: Main source of household income by type of respondent

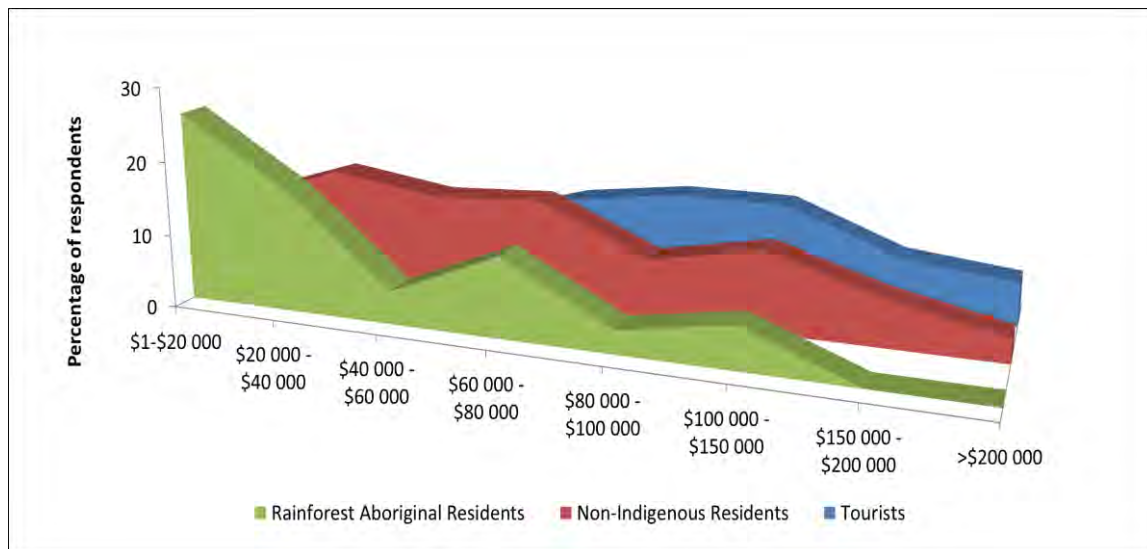


Figure 20: Pre-tax household income by type of respondent

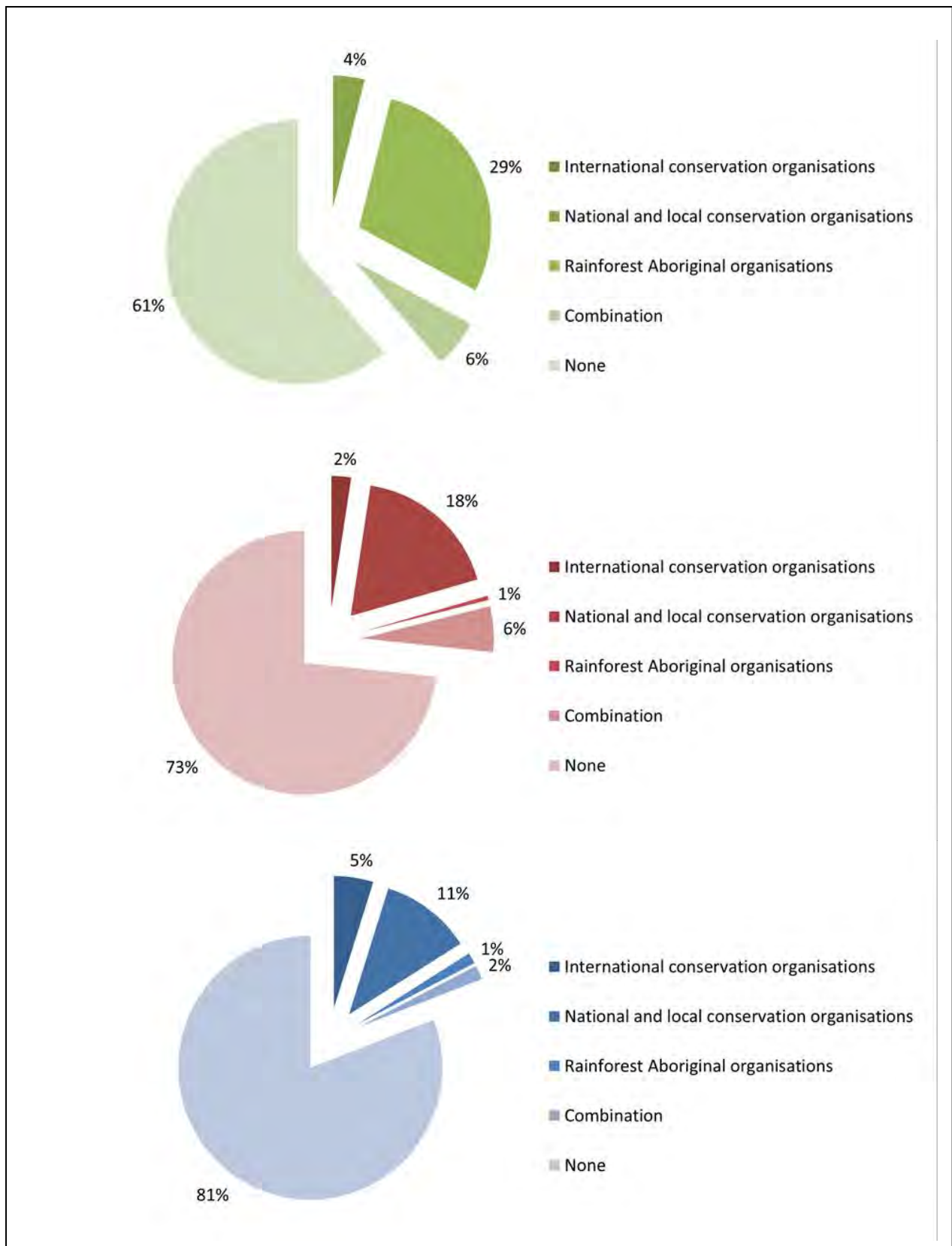


Figure 21: Volunteering and contributions to conservation organisations by type of respondent (Green: Rainforest Aboriginal residents; Red: non-Indigenous residents; and Blue: Tourists)

4.4.2 Activities undertaken in and around the WTWHA

We provided residents and tourists with a list of activities known to be undertaken in the WTWHA, and asked how often they participated in these activities. As anticipated, our sample of Rainforest Aboriginal residents engaged in learning about their culture and country daily (Figure 22). Enjoying the scenic beauty and peacefulness of the Area, and driving along the scenic routes were the next most common activities. These activities were most popular with our non-Indigenous resident and tourist samples (Figure 23 and Figure 24). All respondents also indicated that they spent time visiting waterfalls and swimming in the clear clean rivers/waterholes of the Area. Residents rarely paid to go on a tour.

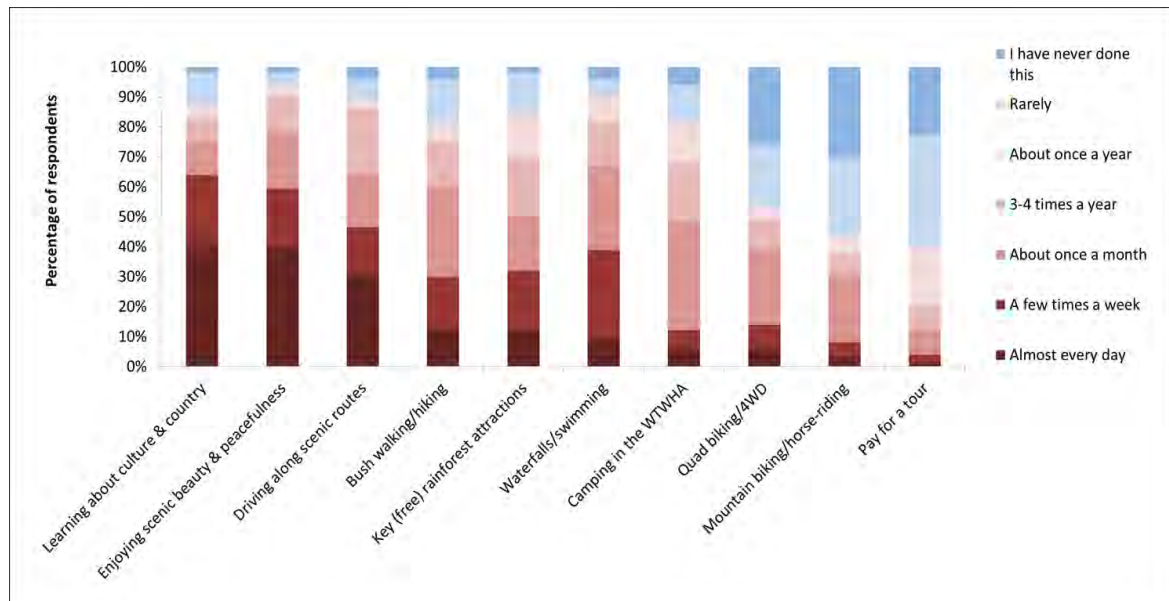


Figure 22: Frequency with which various WT-based activities are undertaken - Rainforest Aboriginal residents

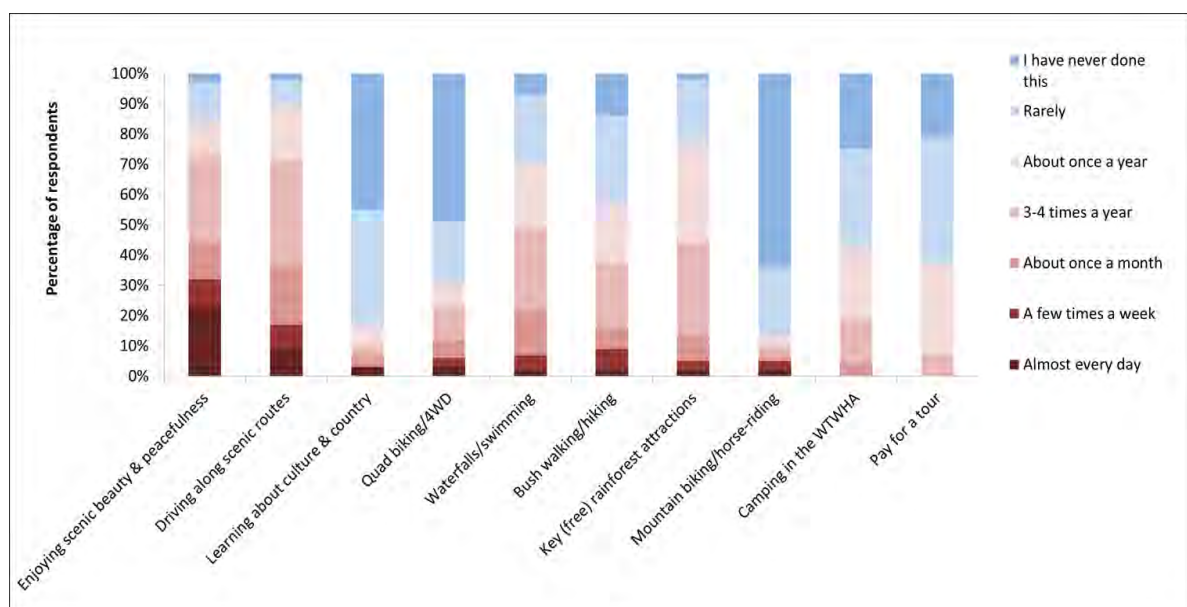


Figure 23: Frequency with which various WT-based activities are undertaken - Non-Indigenous residents

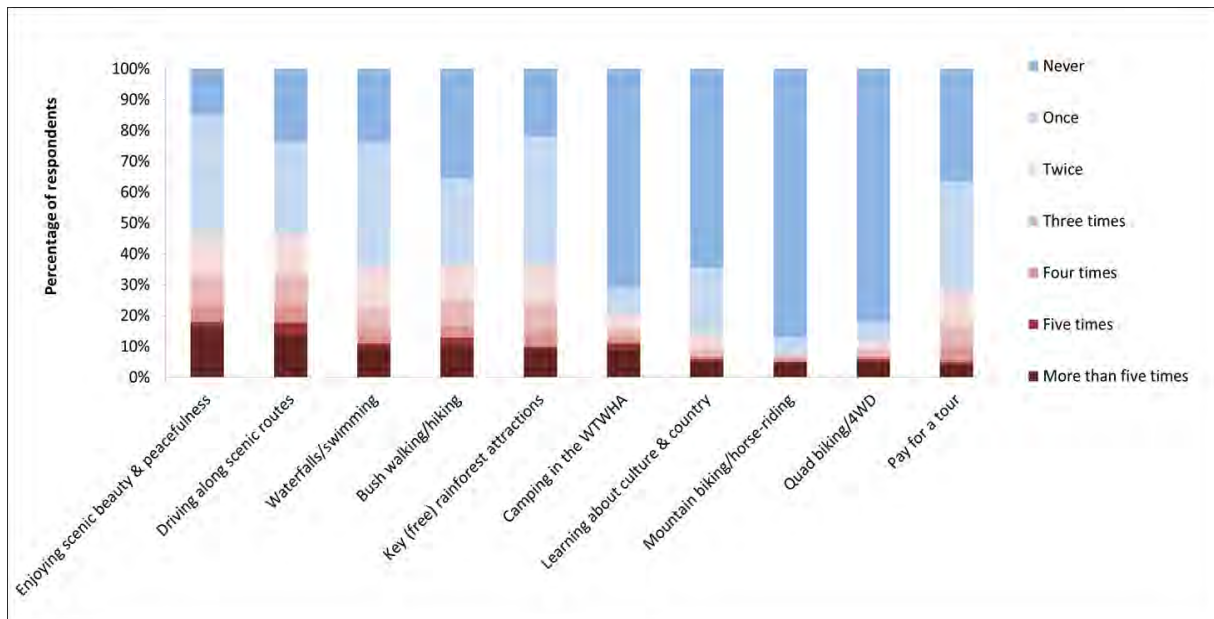


Figure 24: Frequency with which various WT-based activities were undertaken - Tourists

4.4.3 Resident specific questions

More than half of our Indigenous respondents (63% of the 132 who answered this particular question) said they would not move away from the region even if it 'deteriorated'. Their non-Indigenous counterparts shared the same opinion: 59% were unwilling to relocate (n=338). These results highlight the locals' strong sense of place.

Overall, non-Indigenous residents were much more satisfied than the Indigenous residents (Figure 25).

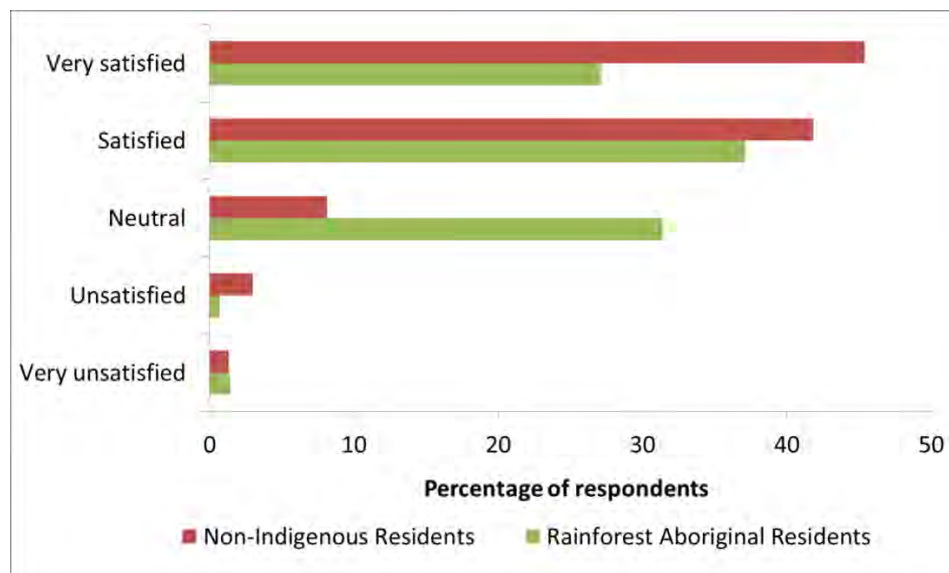


Figure 25: Resident satisfaction with life overall

As shown in Figure 26 and Figure 27, however, there is some variation in responses across postcode and Indigeneity. For example, in the Daintree, Rainforest Aboriginal respondents

were more satisfied with life than their non-Indigenous counterparts. The opposite is true in Ingham.

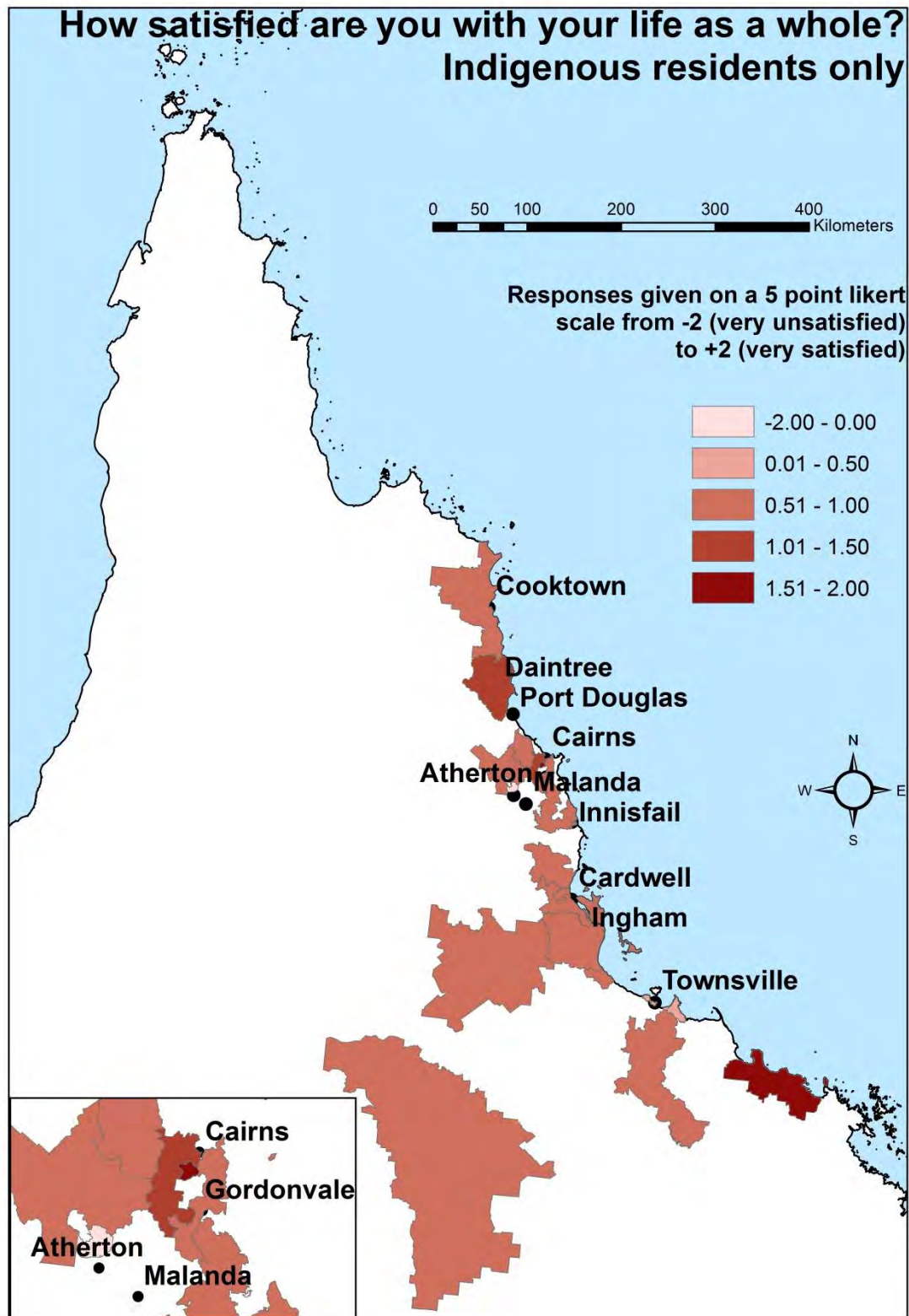


Figure 26: Rainforest Aboriginal residents' satisfaction with life overall - by postcode

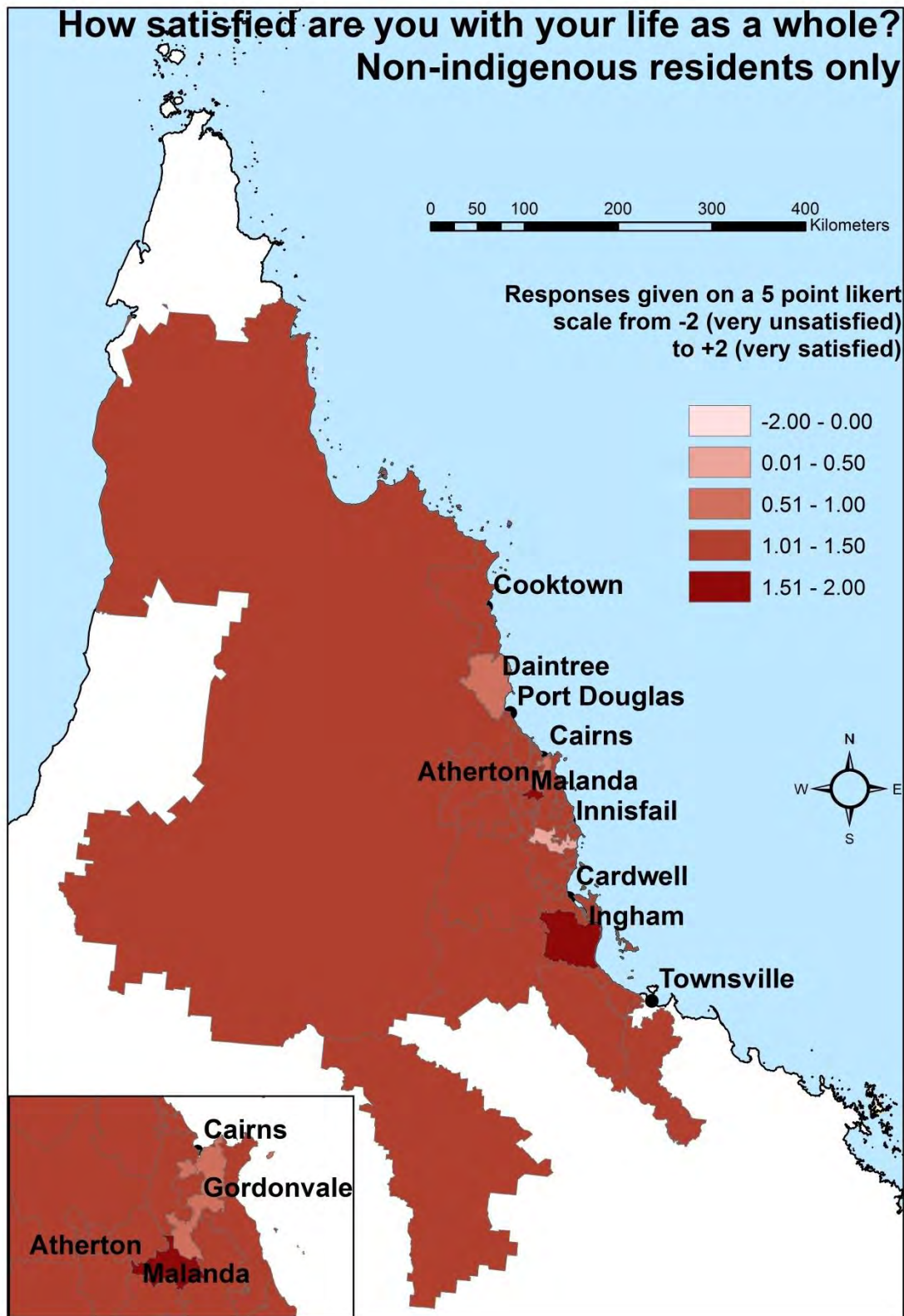


Figure 27: Non-Indigenous residents' satisfaction with life overall - by postcode

Note the inland areas which lay well outside the WTWHA, but appear to have a large number of respondents. This is because postcodes in this part of Australia are geographically large. The database was 'filtered' by both location name and postcode, so only residents who lived closer to the WTWHA were sent questionnaires – the location in which respondents live within postcodes is thus closer to the WTWHA than appears from this map.

4.4.4 Tourist specific questions

The majority of respondents were international (64%, n=385). Of the international visitors, most originated from Europe (44%). Of these, 18% were from the UK, followed by Germany (9%) (Figure 28).

Of the domestic tourists (n=220), 21% were from interstate, mainly New South Wales (10%), while the majority (79%) were from intrastate.

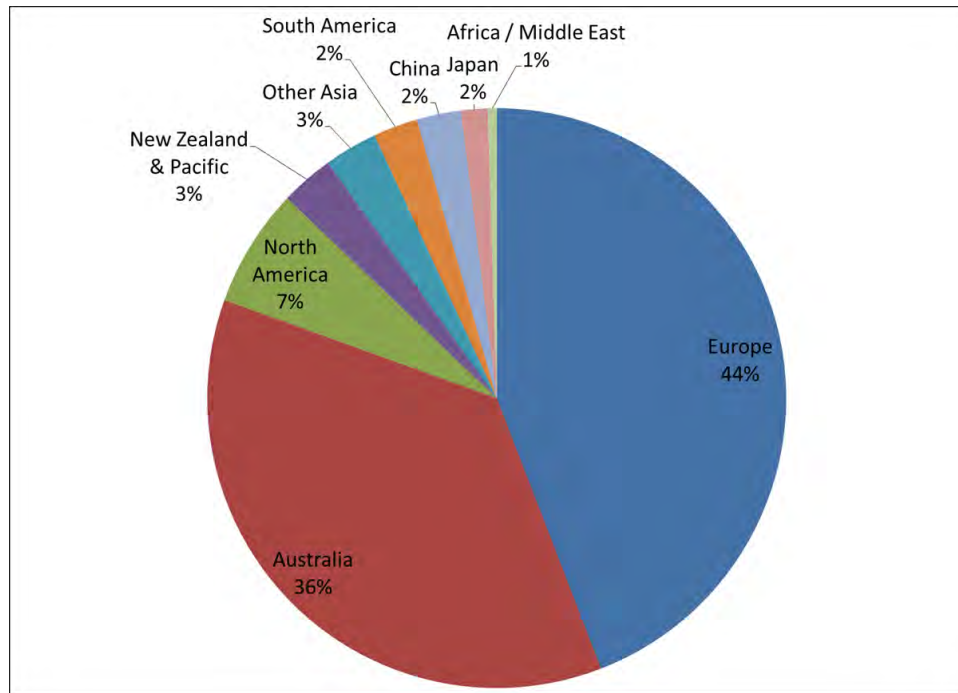


Figure 28: Country/region of origin

Couples made up 38% of the sample, while 22% were travelling with friends. Only 19% came here alone (Figure 29).

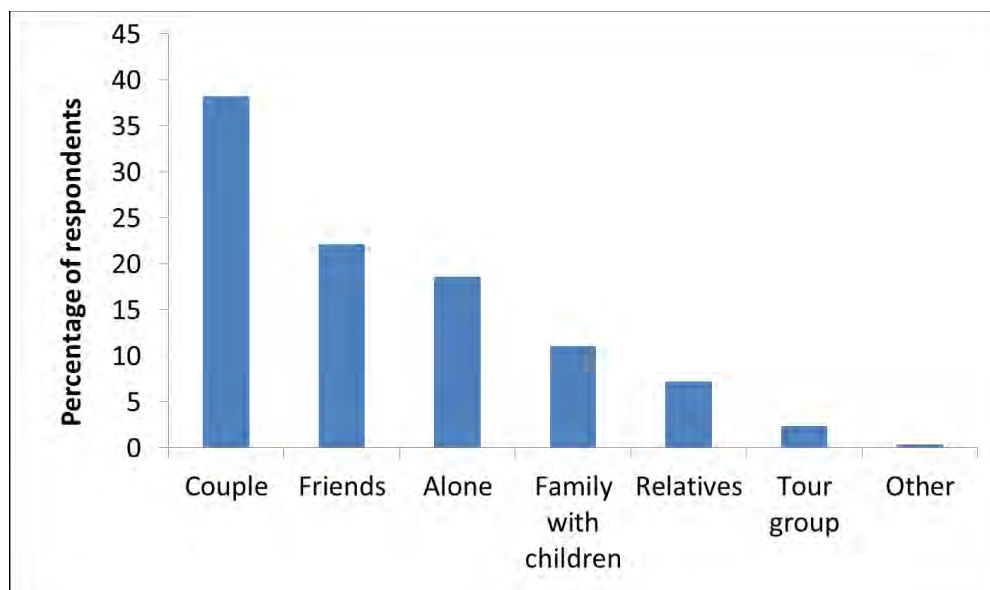


Figure 29: Travel party

More than one half of the tourists we approached at the airport terminals or lagoon (68%) had visited the WTWHA, and this did not vary substantially by origin of visitor (Figure 30).

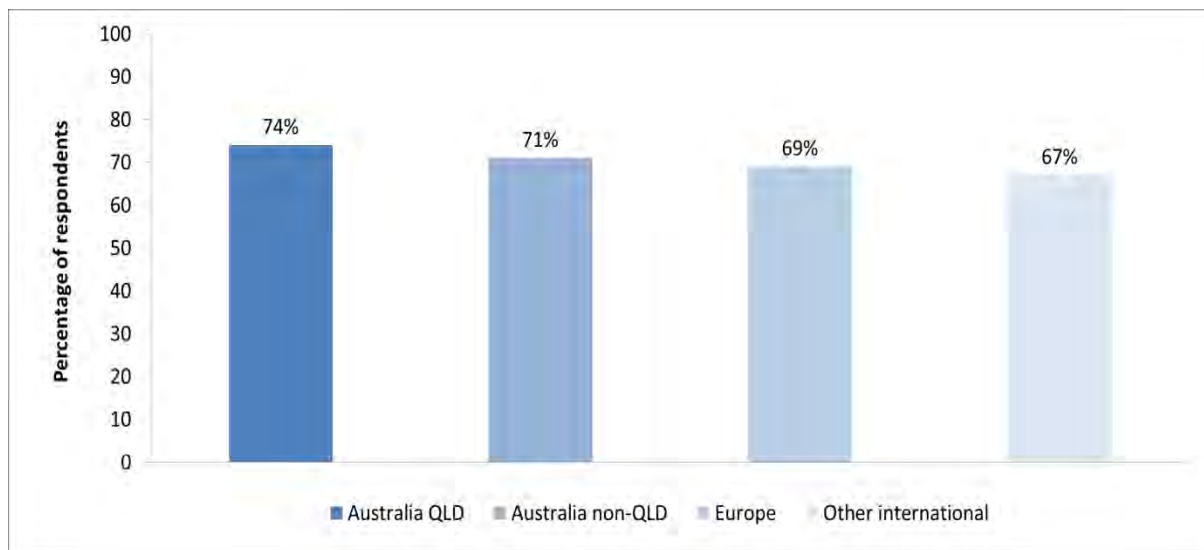


Figure 30: Percentage of tourists who had been to the WTWHA

Of the 68% who had been to the WTWHA, most visitors had spent 4 nights or more in or near the area (Figure 31).

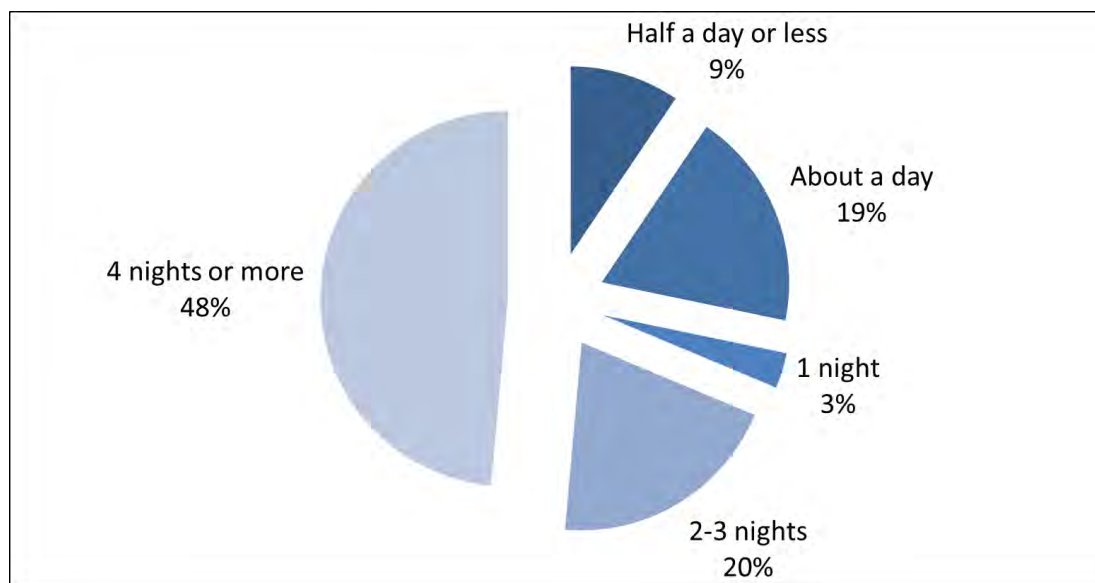


Figure 31: Length of time spent in or near the WTWHA (of the 68% who visited it)

An overwhelming majority of visitors surveyed (86%) expressed satisfaction with their experience as a whole (42% were very satisfied while 44% were satisfied). Similar levels of satisfaction were observed by visitors from different origins (Figure 32).

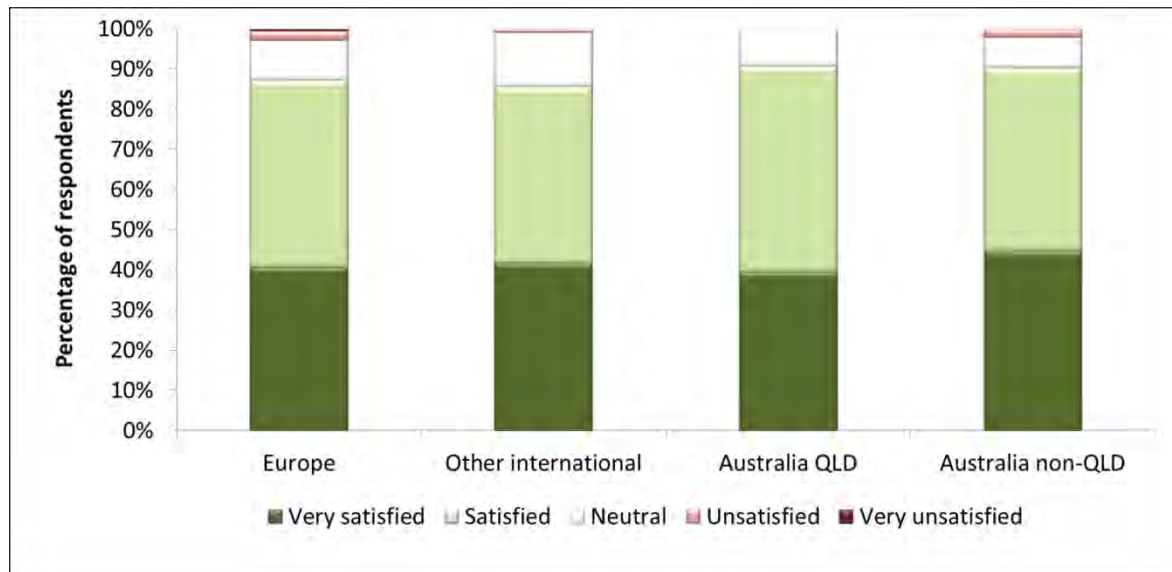


Figure 32: Tourist satisfaction with overall experience - by origin

For 85% of respondents, the trip was, overall, either above or well-above their expectations (54% and 31% respectively). A larger share of international visitors thought their trip was well above expectations than domestic visitors (Figure 33).

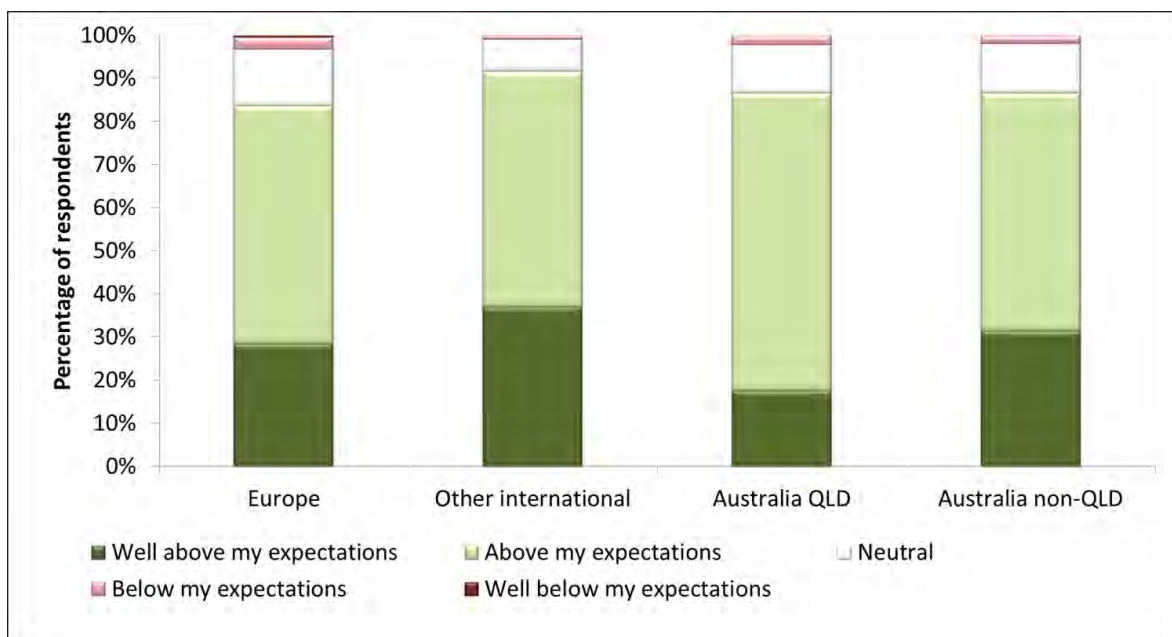


Figure 33: How well has this trip met your expectations? - by origin

More than one-half of all visitors (64%) said they were likely to return to the region in the future (37% of respondents indicated they would definitely return (Figure 34).

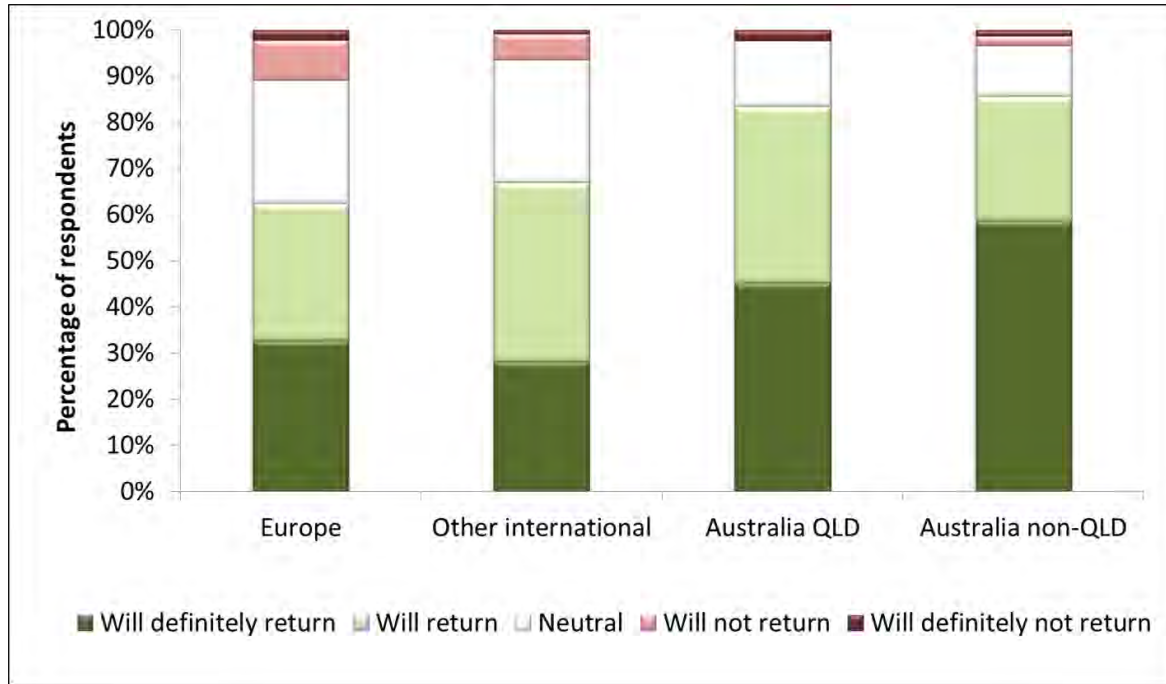


Figure 34: How likely is it that you will return to this region in the future? - by place of origin

Visitors from New Zealand and other Pacific Islands spent the most money per person per day, followed by those from America. The Germans and other Europeans spent the least amount of money per person daily (most probably the backpackers, given the lower spending on these three categories of expenditures (Figure 35)).

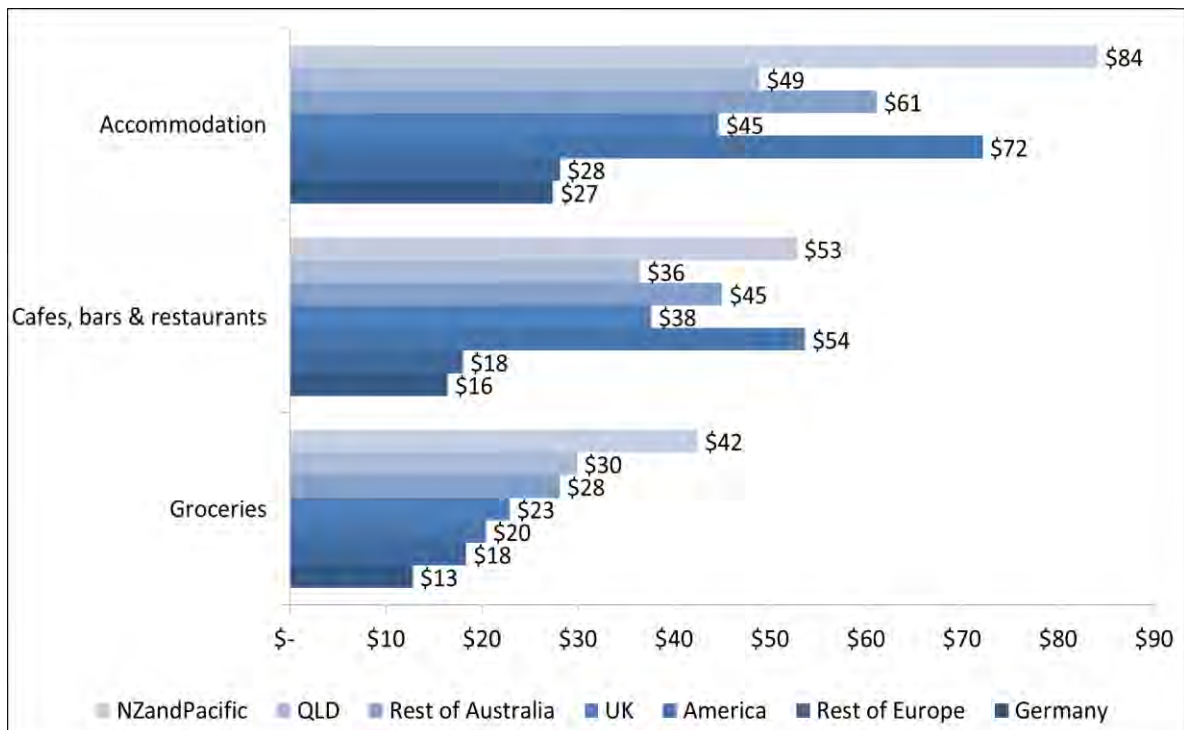


Figure 35: Average expenditure per person per day on different types of products - by origin of visitor



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5 The relative 'value' of ecosystem services provided by the WTWHA

5.1 Some more methodological background

5.1.1 The 'importance' of various goods and services

Dollar denominated valuation techniques (such as willingness to pay - WTP) are commonly used for their ability to generate estimates of non-market 'values' which can be compared to other 'values'. As discussed in section 0, we chose to use a variant of the life satisfaction (LS) approach, which does not directly elicit values from respondents in dollar amounts. Instead, we asked residents to tell us how important various ecosystem services (ES) were to their overall quality of life, and we asked tourists how important those ES were to them when deciding to come to the region. The lists of values (

Figure 12 and Figure 13) did not include only ES provided by the WTWHA. We deliberately set out to assess both non-market values (ES and other things such as spending time with family and friends) and market values (such as the quality of accommodations, and the importance of earning income from various industries) using the same methodological approach. This ensures that it is possible to make comparisons, and to consider the value of different ES services *relative* to each other, and to other social and market goods.

Specifically, for each of the values listed in

Figure 12 and Figure 13, we asked residents and tourists, respectively:

- ❖ *How important are each of the following to your overall quality of life?*
- ❖ *How important were each of the following factors when you made your decision to come to this part of Australia on this trip?*

These items were presented in a different order on different questionnaires to ensure that we did not create a situation in which items presented at the top of the page were given a consistently higher (or lower) score than those at the bottom. All values were rated on a 5-point likert scale ranging from 2 being *Very important* to -2 being *Not very important at all*.

5.1.2 People's satisfaction with various goods and services

Having information about satisfaction provides one with a more comprehensive understanding of resident and visitor perspectives and experiences, enabling those tasked with the management and preservation of the Area to better understand and address the concerns of its users. It is particularly important to understand the perspectives of the local community given their deep sense of ownership and attachment (McIntyre-Tamwoy, 2004; Carmody & Prideaux, 2008). From a tourism perspective, information about satisfaction is necessary in formulating an appropriate strategy to attract more tourists. Satisfaction or dissatisfaction with one of the values will lead to satisfaction or dissatisfaction with the overall destination (Pizam et al. 1978). In the context of the WTWHA, as a protected area, satisfaction scores are an important component in assessing its success, or failure, to deliver a high quality visitor experience (Coghlan, 2012; Esparon et al, forthcoming). If travellers to the WTWHA are satisfied with the experience, then they are more likely to extend their stay, visit again or make recommendations to friends and family (Kozak, 2003, Vetitnev et al. 2013, Saltzer, 2002). In the case of the latter, Angelova and Zekiri (2011) note that endorsement of a product (or sharing of information about the experience) to others is in the order of five or six people for (satisfied customers). However, dissatisfied customers are more likely to tell another 10 people of their experience.

Hence, without visitors, without satisfied visitors in particular, tourism in the WTWHA may cease to exist.

For each value, we thus asked residents and tourists how satisfied they were with each. As with importance, values were rated on a 5-point likert scale ranging from 2 being *Very satisfied* to -2 being *Not very satisfied at all*. See page 2 of Appendix 4 and Appendix 5 respectively

5.1.3 Comparing importance and satisfaction

Looking at importance and satisfaction separately does not allow one to answer questions such as: Is the marketing/management effort given to different values mirroring the importance attached to each? Are people satisfied with the things they feel are most important? By simultaneously looking at both importance and satisfaction, policy makers and tourism marketers can identify which values require the most attention and rectify them accordingly - the aim being to improve those values deemed highly important but with low satisfaction, while maintaining or enhancing values of high importance and high satisfaction (Esparon et al. 2014; Angelova & Zekiri, 2011).

Comparisons between importance and satisfaction were done by mimicking the popular importance-performance analysis (IPA) – a method originally developed in the marketing literature to identify areas of over-performance or under-performance so to guide the best use of limited resources. Results are normally analysed and presented on a two dimensional grid format (Figure 36).

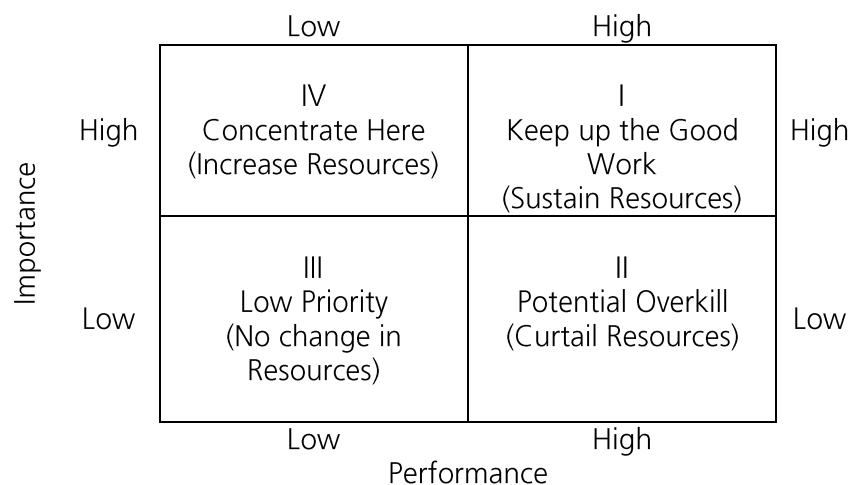


Figure 36: The original IPA framework
(Source: Adapted from Martilla and James, 1977)

Since its inception in marketing research in the late 1970s, the technique has become a prominent managerial tool largely applied to identify the strengths and limitations of brands, products and services in various domains such as: banking (Yeo, 2003); dentistry (Nitse & Bush, 1993); health care (Dolinsky & Caputo, 1991); information systems (Ainin & Hisham, 2008); organisational change (Graf et al. 1992); and education (O'Neill & Palmer, 2004). In tourism specifically, there have been numerous studies related to destination image (Edward & George, 2008); hotels (Chu & Choi, 2000); escorted tours (Duke & Persia, 1996); visitor centers (Mengak et al. 1986) tourist shopping villages (Murphy et al. 2011); national parks (Tonge & Moore, 2007), and certification scheme (Esparon et al. 2014) to name a few.

Yet, despite its popularity, the IPA continues to be surrounded by conceptual, methodological and measurement ambiguities. Oh (2001) provided a good overview of these inconsistencies, but what is of most interest to this research is the definitional ambiguity between performance and satisfaction which has resulted in them being used interchangeably (Tonge & Moore, 2007, Oliver, 1997). Baker and Crompton (2001) cogently distinguish the two, defining performance as a measure of provider output and satisfaction as a measure of visitor outcome. An importance-satisfaction approach, which is therefore outcome-based, is necessary in the context of the Wet Tropics and will provide better information to those tasked with the provision of desired outcomes for visitors (Tonge & Moore, 2007). Since respondents in this study were asked about satisfaction with the condition and health of the Rainforest (e.g. water clarity, healthy native plants and animals, etc.), then this information is equally beneficial to its protection and management. Identification of discrepancies between importance and satisfaction from the resident's point of view is equally important for the conservation and maintenance of the Area. To the best of our knowledge, no previous studies have considered the two simultaneously.

That said, given the number of concerns over the positioning of the gridlines in an IPA resulting in different managerial implications, we chose to present the results differently using a radar plot instead of the normal grid format. We also used the Wilcoxon signed-rank test to consider whether differences in perception between importance and satisfaction were statistically significant. This latter point not only addresses the lack of statistical analysis rigor limitation of the original IPA (Hammit et al. 1996; Bacon, 2003), but importantly, provides researchers with confidence in prioritising values for improvement. For example, in the traditional IPA model, an attribute in the 'Concentrate Here' quadrant may be interpreted as requiring urgent attention, however, the use of statistical analysis validates whether this is really the case or not (i.e. if there is a significant difference between importance and satisfaction scores). This is especially important when there are limited resources (e.g. lack of funds) – instead, scarce resources can be diverted to where it is needed most.

5.1.4 Identifying overlapping values

As noted earlier, ecosystems are intricate and multi-faceted systems, composed of non-linear, inter-dependent components (Koch et al. 2009). Most ES interact with one another in complex dynamic ways, thus separating each is challenging (Fu et al. 2011). Given the evidence of the connections amongst these services, still, little is known in regards to the significance and variability of such inter-connectedness. Bennet et al. 2009 argues that when relationships between ES are examined, researchers typically address only 2 services at a time. As a consequence, not much is known about how to minimise trade-offs or enhance synergies (Bennet et al. 2009). Importantly, there is limited information about how similar or different the beneficiaries of these services perceive them to be. Parallel research in the GBRWHA revealed that many of the values are inter-related or similar in importance (Larson et al. 2014, Stoeckl et al. 2014; Esparon et al. forthcoming). At a more practical level, researchers are cognisant of the fact that asking respondents to rate a large number of different ES will likely generate questionnaire fatigue, thus reducing the reliability of results. Having better information about which ES 'group' together, and which do not, can thus help inform the design of future studies which seek to assess either total or marginal values. We thus extended our analysis of importance in this study to see how well the values grouped.

Several data reduction techniques can be used, one being, *Principal Component Analysis* (PCA). Briefly, the goals of the PCA are to: (1) extract the most important information from the data table; (2) compress the size of the data set by keeping only this important information; (3) simplify the description of the data set; and (4) analyse the structure of the observations and the variables. In order to achieve these goals, PCA computes new variables called principal

components which are obtained as linear combinations of the original variables (Abdi & Williams, 2010).

Since our list of values used in this study was refined during the initial stages of the study, we did not need to use PCA for this purpose. Instead, we used the PCA to examine how similar in importance the values were perceived (i.e. how well the values grouped).

As an additional tool to exploring how the values grouped, we used *Leximancer*. Briefly, Leximancer is a text-mining (analytics) tool which uses word-association information to elicit key concepts and themes from the text and how they are related to each other (Figure 37). The relationships of these groups of concepts to each other are plotted on a *concept map*. Concepts that appear together frequently in the text or in similar circumstances will be close together on the map. The darker a concept label, the more frequently that concept appeared in the text. The size of the point (or shape) underlying the concept label defines the strength of the relationship between that concept and others (i.e. the bigger the point, the more related are the concepts). The grey network of pathways illustrates the most shared connections between concepts, although other direct inter-connections exist (Leximancer, 2011; Cretchley et al. 2010; Penn-Edwards, 2010; Smith & Humphreys, 2006).

To gain a better understanding of the significance of the WTWHA and the opportunities it presents to their quality of life (or trip experience), we thus used Leximancer to examine the open-ended questions about 'satisfaction'. To be more specific, we asked residents to think about their own life and personal circumstances, and how satisfied they were with their life as a whole (rated on a 5-point likert scale – as discussed earlier). They were then asked the reason they felt that way. Similarly, visitors were asked to rate their satisfaction with their experience as a whole (on a 5-point likert scale) and the reason they felt that way. Although not strictly about importance of values (instead about satisfaction), the ability of Leximancer to 'pick up' concepts/themes and displays the connectivity (i.e. how related they are to each other) proved useful in the context of this part of the analysis (i.e. inter-relationships about values).

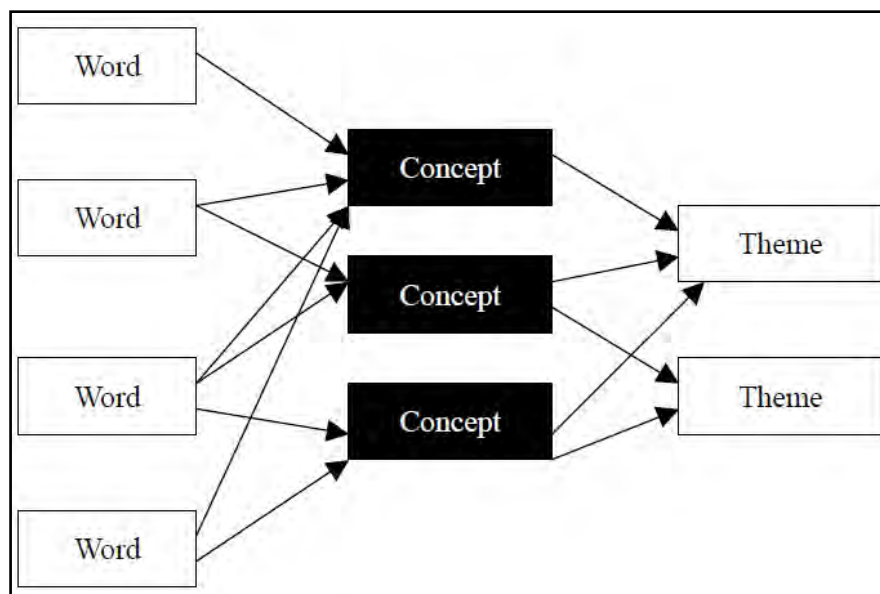


Figure 37: Simplified model of semantic pattern of extraction in Leximancer
(Source: Crofts & Bisman, 2010)

5.1.5 Determining if different people 'value' different things

Previous research has shown that different people 'value' and are motivated by different things (Bushell et al. 2007, Larson et al. 2014; Blocker & Eckberg 1997; Farr et al. 2014, Esparon et al.

forthcoming). Since different people have different priorities, knowledge of which values are important to whom will help tourism organisations design suitable marketing strategies, and managers/politicians prioritise regional activities. Thus, we looked at the way in which residents' and tourists' perceptions about the contribution that various ES make to well-being or trip decision relate to socio-demographics. We did this in two ways: (1) by looking for statistically significant relationships between various socio-economic and demographic characteristics and each factor score; and (2) by looking for statistically significant relationships between various socio-economic and demographic descriptors of people and the importance and satisfaction scores they assigned to each of the top 10 values.

In regards to the former, we regressed the scores of each of the 6 (residents) and 5 (tourists) factors identified by the PCA against variables measuring the socio-demographic characteristics of the respondents using stepwise ordinary least square (OLS) regression.

Table 4: Variables used in regression analyses – descriptors and abbreviations

Variable of interest	Description	Abbreviations used in this report
Age	Respondent's age	Age
Gender	=1 if respondent is male, 0 otherwise	Male
Marital status	=1 if respondent is single, 0 otherwise	Single
Indigeneity	=1 if respondent i is Indigenous, 0 otherwise	Indigenous
Education	Respondent's highest level of education completed in five different levels ranging from primary school to higher education at university	Education
Household size	Number of people in respondent's household	HH size
Household Income	Respondent's household annual pre-tax income ranging from \$6,500 to \$285,500	HH Income
Dependence on various sectors for household income		
Tourism	=1 if the main source of respondent's household income is Retail, Accommodation, cafes & restaurants, and Tourism, 0 otherwise	Retail & Tourism
Commercial fishing	=1 if the main source of respondent's household income is Fishing, 0 otherwise	Fishing
Mining, manufacturing &/or ports	=1 if the main source of respondent's household income is Mining, Manufacturing and Ports, 0 otherwise	Mining & ports
Government, Health or Education	=1 if the main source of respondent's household income is Government, Health and Education, 0 otherwise	Government
Agriculture	=1 if the main source of respondent's household income is Agriculture and Forestry, 0 otherwise	Agriculture
Place of birth	=1 if resident born in QLD, 0 otherwise	QLD Born
Additional variables for tourists		
Origin of visitors		
QLD	=1 if visitor from QLD, 0 otherwise	QLD
Elsewhere in Australia	=1 if visitor from the rest of Australia, 0 otherwise	AUS (not QLD)
Asia	=1 if visitor from Asia, 0 otherwise	Asia
Germany	=1 of visitor from Germany, 0 otherwise	Germany
UK	=1 of visitor from UK, 0 otherwise	UK
Other European	=1 of visitor from other European country, 0 otherwise	Other European
North America	=1 if visitor from North America, 0 otherwise	North America
Type of travel party		
Couple	=1 if travelling as a couple, 0 otherwise	Couple
Family with children	=1 if travelling as a family with children, 0 otherwise	Family with children
Friends	=1 if travelling with friends, 0 otherwise	Friends
Tour group	=1 if travelling with a tour group, 0 otherwise	Tour group

As regards our analysis of importance and satisfaction scores, it is, strictly speaking, incorrect to use OLS regression since OLS assumes dependent variables are continuous and normally distributed, whereas both importance and satisfaction scores were elicited using a Likert scale (indicating that it would be more statistically appropriate to use ordinal regression instead). That said, many researchers have compared models using ordinal and continuous regression

techniques, the overwhelming conclusion being that choice of technique is more important in theory than in practice, since both approaches produce similar results (Ferrer-i-Carbonell & Frijters, 2004; Helliwell, 2003; MacKerron & Mourato, 2009). We therefore used stepwise OLS regression, since it is a particularly powerful way of simply highlighting statistically significant relationship.

Having identified 'core' socio-demographic variables that influence values, we then used (non stepwise) OLS regression to develop a consistent set of models (with the same variables) describing each value. Coefficients from those models were then used to compare (predicted values of the) 'average' importance scores which different groups of people ascribed to 4 key values, whilst controlling for other socio-demographic factors such as income and gender.

The different groups compared were:

- ❖ Indigenous and Non-Indigenous residents;
- ❖ Residents who were dependent upon different industries for their household incomes.

And the different values compared were:

- ❖ Having healthy native plants and animals;
- ❖ Having beautiful undeveloped scenery;
- ❖ Being able to visit waterfalls and/or swim in clear clean rivers;
- ❖ Protecting places that have aboriginal cultural values.

5.2 Results and discussion

5.2.1 How 'important' are the ES provided by the WTWHA?

Although it is not, strictly speaking, 'kosher' to summarise likert data using means, doing so makes it easy to compare responses visually. Tourists, Indigenous and non-Indigenous residents all indicated that safety is the most important factor, be it safety of family and friends (residents) or safety of self and that of travelling companions (tourists) (Figure 38, Figure 39 and

Figure 40). This was generally followed by time spent with the loved ones and the quality of infrastructure to support family and friends - such as schools, hospitals, roads, etc. Environmental values such as having healthy native plants and animals, undeveloped scenery and iconic species were also ranked highly – much more so than economic factors such as the jobs and incomes associated with mining, tourism and agriculture. Specific factors innate to our Indigenous sample such as the protection of places with Aboriginal cultural values and being able to learn about culture and country were, unsurprisingly, very important. It is widely acknowledged that Indigenous people have deep connections to 'country'. As per the quote below, such connection is rooted in caring for country, maintaining cultural life, identity, individual autonomy and Indigenous sovereignty (Garnett & Sithole, 2007, Ganesharajah, 2009).

"Country is multi-dimensional – it consists of people, animals, plants, dreamings; underground, earth, soils, minerals and waters, air... People talk about country in the same way that they would talk about a person: they speak to country, sing to country, visit country, worry about country, feel sorry for country, and long for country...Country knows, hears, smells, takes notice, takes care, is sorry or happy." (Rose, 1996, p.7-8).

These cultural factors were ranked lower in importance by our non-Indigenous sample – instead, having some 'control' over what is happening in their lives was more vital. Good weather (sunshine) and going to the GBRWHA were essential components of visitors' trip.

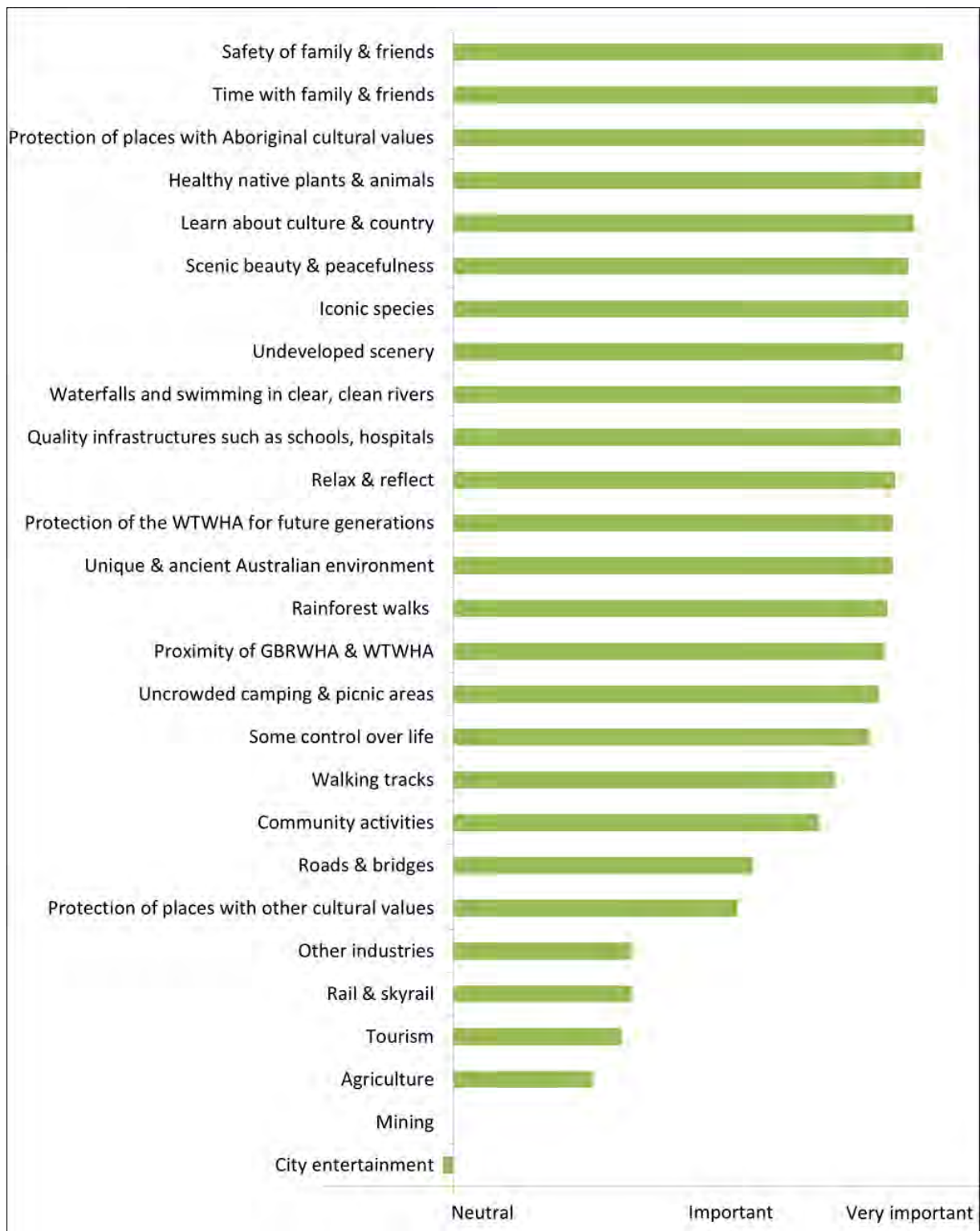


Figure 38: Importance to overall quality of life - Rainforest Aboriginal residents

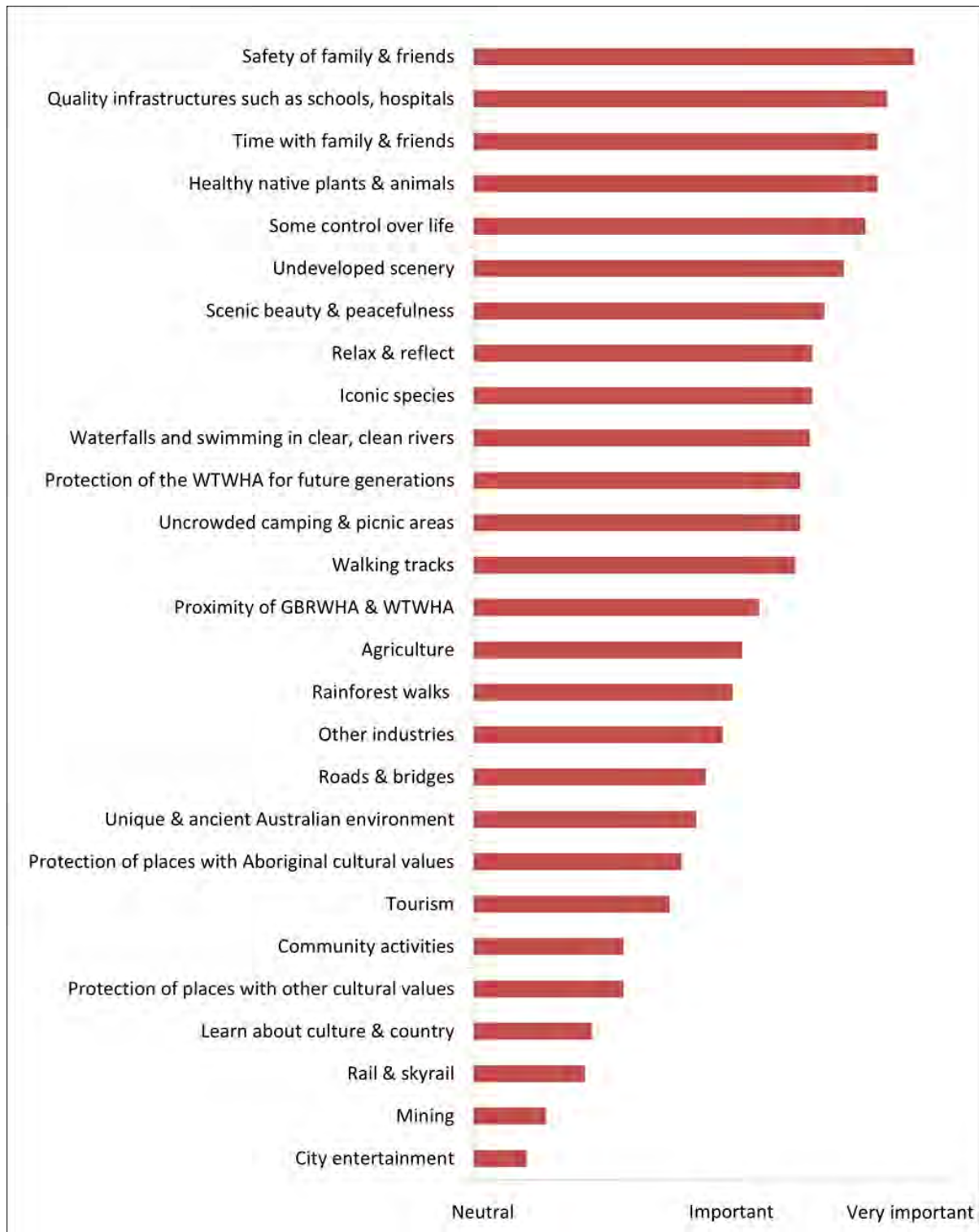


Figure 39: Importance to overall quality of life - Non-Indigenous residents

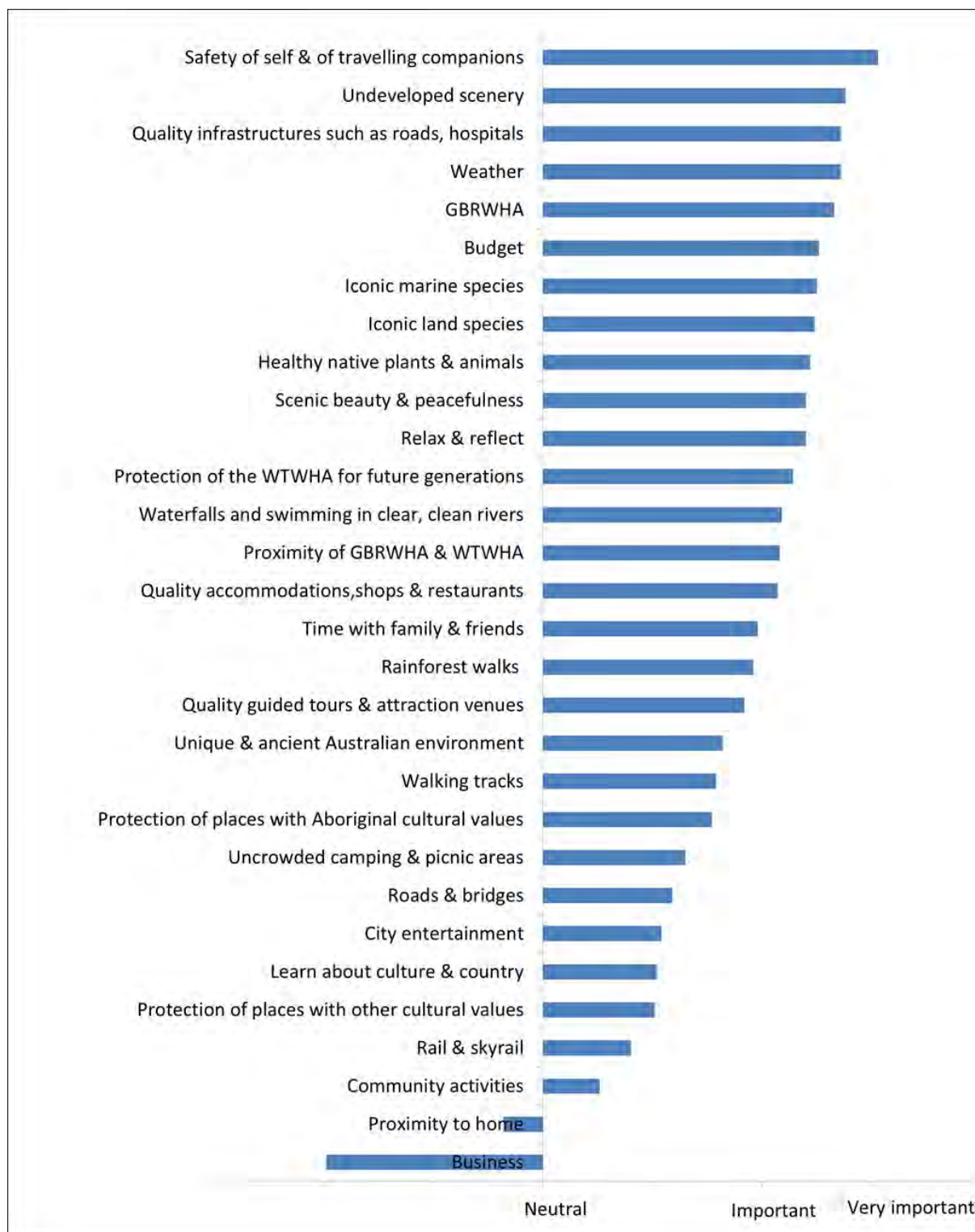


Figure 40: Importance as a reason for coming to this part of Australia

Focusing on the top 10 most important factors, we found that Indigenous residents were of the opinion that family-related and environmental values are more important to overall quality of life than their non-Indigenous counterparts. There was little difference in the importance scores which these two groups ascribed to infrastructures and having some control over life (Figure 41).

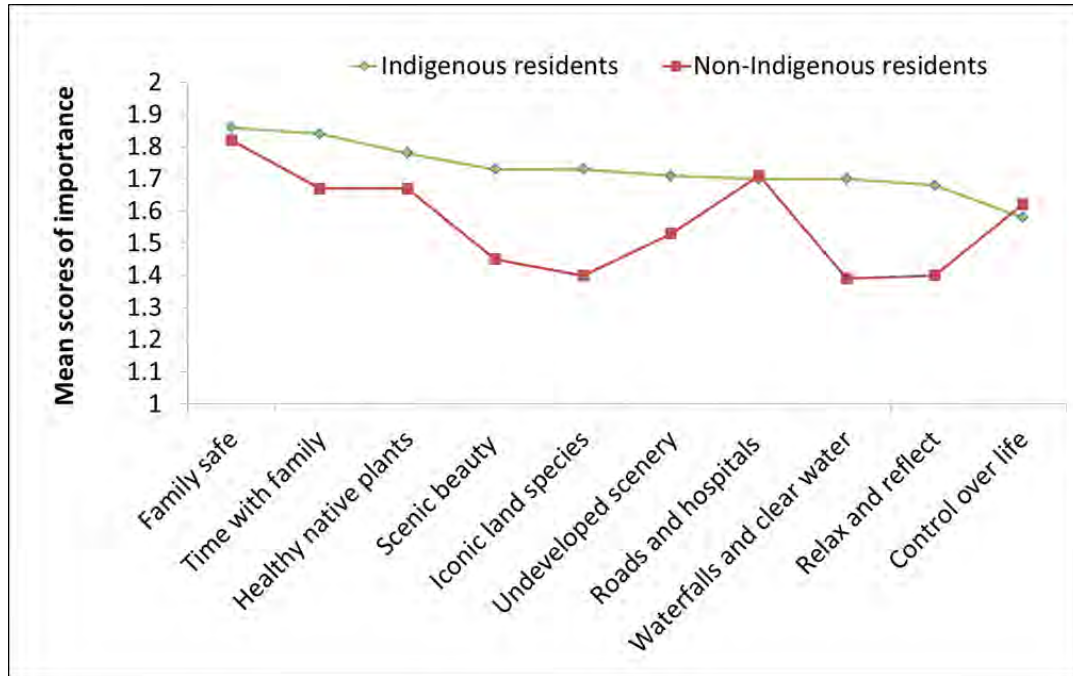


Figure 41: Mean importance scores for 'top 10' values – Indigenous and non-Indigenous residents compared

In our parallel study in the GBRWHA, environmental factors such as having healthy coral reefs and reef fish, no visible rubbish, iconic marine species, clear ocean water, and mangroves and wetlands were deemed more important to overall quality of life than economic factors (Stoeckl et al. 2014; Larson et al. 2014; Farr et al. 2014, Esparon et al. forthcoming). In that study, respondents were not asked to rate social factors such as culture and family. The key point to be made here, is once social/family factors are included, these are rated as being the most important contributors to overall quality of life or trip motivation. After that, our results are consistent with those from the GBRWHA: environmental factors are generally considered to be more important than economic factors.

5.2.2 How satisfied are people with the ES that the WTWHA provides?

Tourists were generally satisfied with their safety and that of their travelling companions, the weather, being able to relax and reflect, and with the scenery (all received more than 1 point, where 1 = satisfied). Similarly, residents were satisfied with the safety of their loved ones and with the time spent with them. Indigenous residents were also satisfied with community activities (Figure 42).

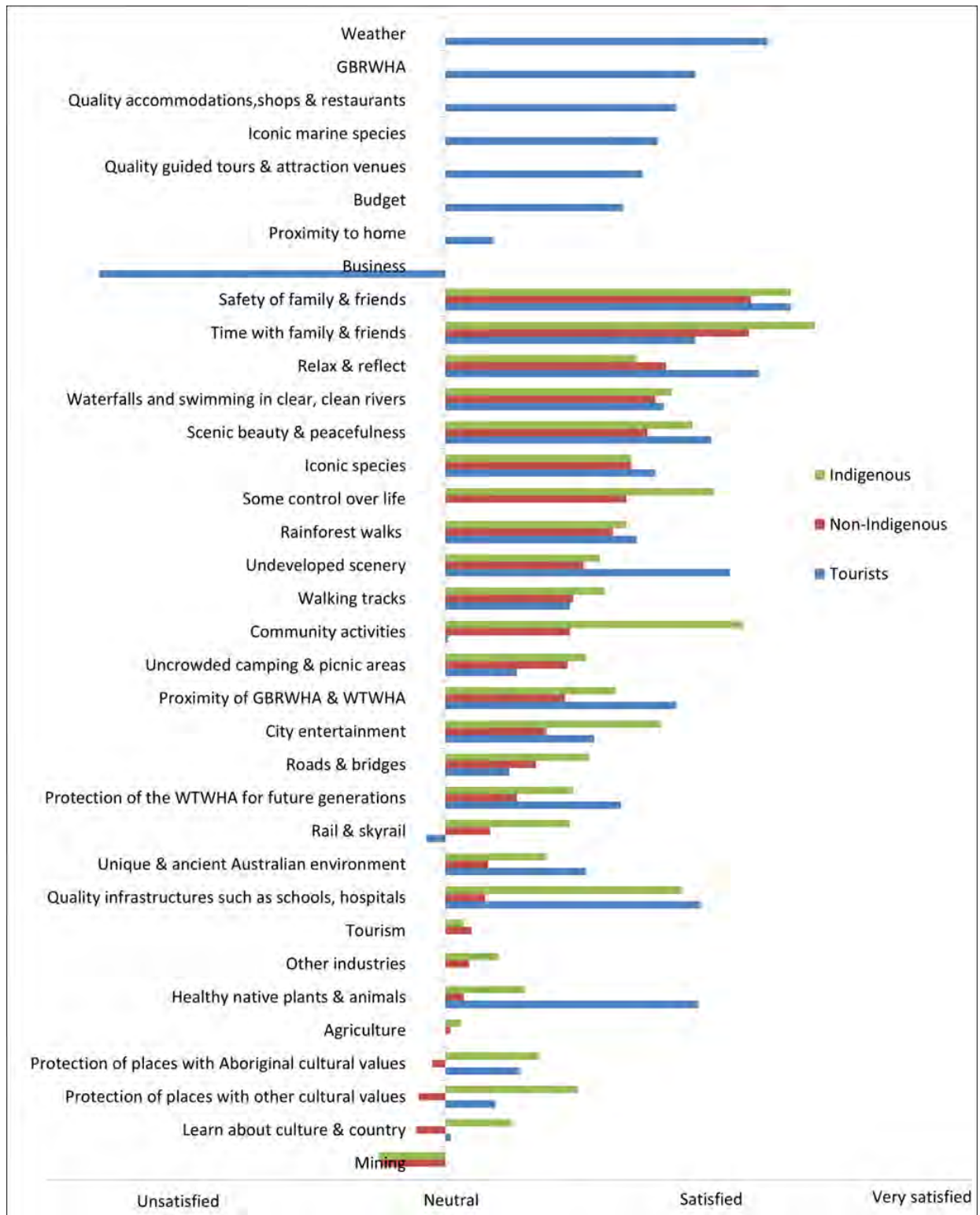


Figure 42: Satisfaction with various ecosystem services – by type of respondent

5.2.3 Are people satisfied with the things that matter most?

The following diagrams depict responses from those who answered both the importance of and satisfaction with the different values. The most notable observation is that importance is, for the majority of values, higher than satisfaction. This is the case, irrespective of the group of respondents (

Figure 43, Figure 44 and Figure 45). However, the gap between importance and satisfaction is not necessarily an issue, unless the gap is statistically significant. The Wilcoxon signed rank test revealed that differences between importance and satisfaction were statistically significant for most items (indicated with a * on those figures). Moreover, many of the largest 'gaps' between importance and satisfaction relate to the Area's environmental values, signaling potential problems for the intrinsic values of the region.

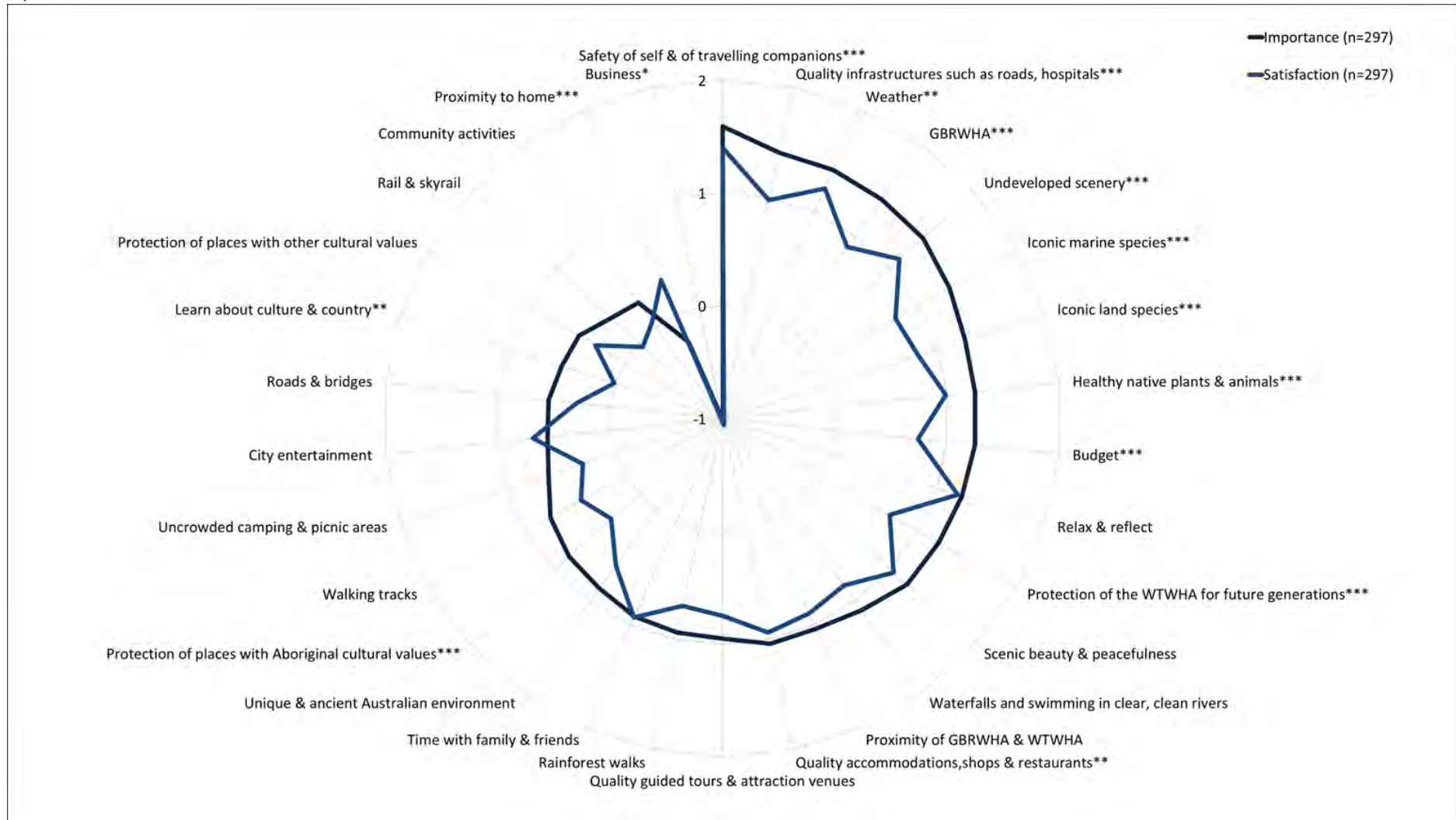


Figure 43: Mean importance and satisfaction scores – Tourists

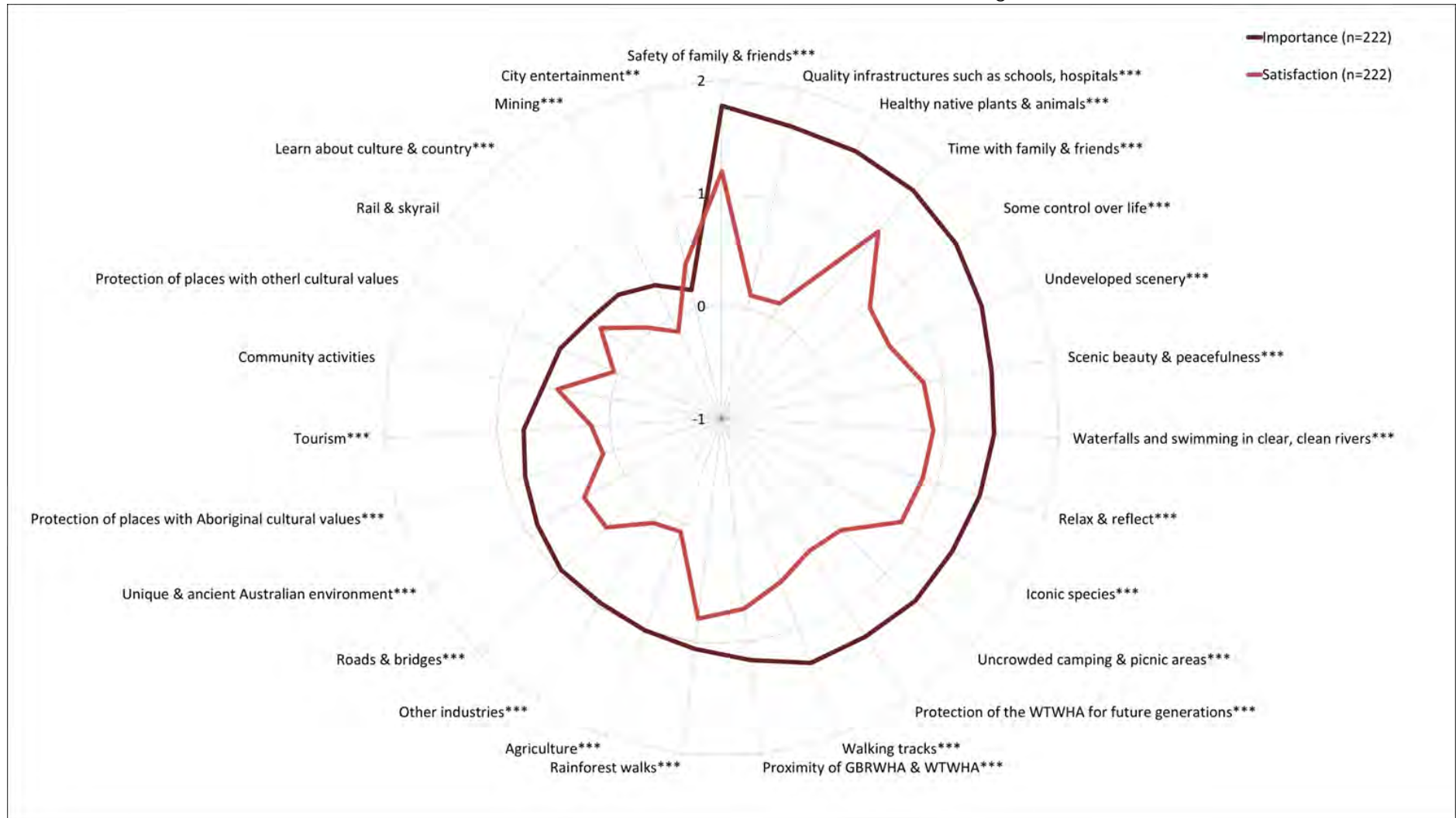


Figure 44: Mean importance and satisfaction scores - Non-Indigenous residents

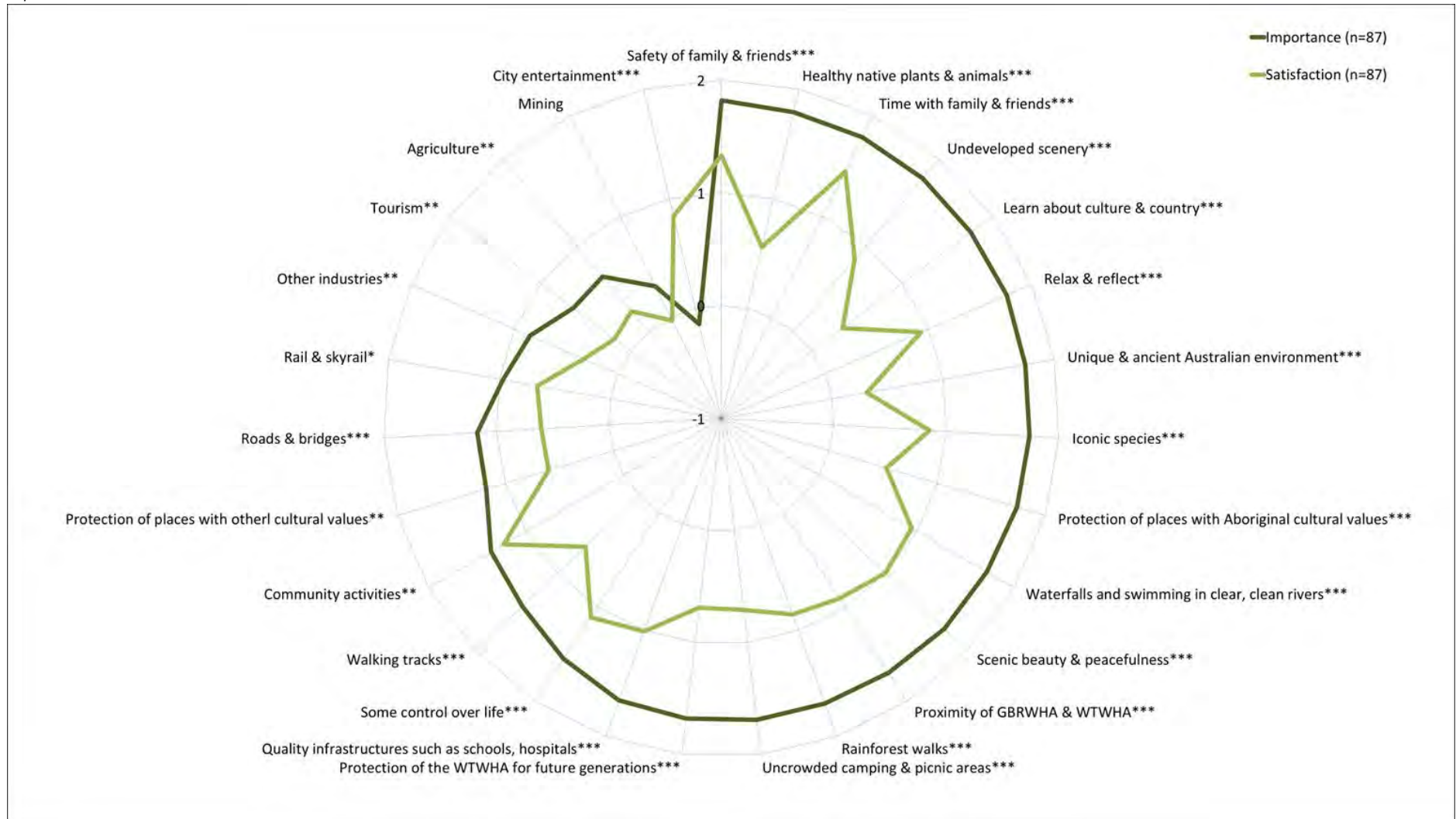


Figure 45: Mean importance and satisfaction scores - Rainforest Aboriginal residents

Of note, is the size of the gaps, being smaller for tourists, larger for non-indigenous residents and largest for the Rainforest Aboriginal residents (Figure 43, Figure 44 and Figure 45). There are potentially many reasons for these differences, one being varying reference points. In other words, perceptions of importance and satisfaction are highly reference dependent, which implies that people make judgements about satisfaction in terms of losses and gains compared to some reference point. The basis of evaluations is, *compared to what?* So when asked to evaluate something, most people will search for a reference point for comparison in order to ease the mental task. In the case of tourists, for example, those coming from countries where the environment is not as pristine as the WTWHA will likely be very satisfied.

For residents, however, the gaps may be bigger because they have been here longer (especially the Rainforest Aboriginals), and as such, are able to more cogently assess these values. Previous research has shown that local communities often have a deep sense of ownership and sense of place (McIntyre-Tamwoy, 2004; Carmody & Prideaux, 2008). For the Indigenous residents in particular, the Rainforest is intimately linked to their sense of identity. As highlighted by McIntyre-Tamwoy (2004), long term residents have recollections of an area based on experiential engagement of the landscape, not just on appreciation of scientific value or resource use.

Linked to the idea of reference point, and a key issue for conservation, is the concept of 'shifting baselines'. This term first came to prominence in fisheries management. It was argued that each new generation of fisheries scientists accepts a baseline (e.g. stock size, species composition) that occurred at the beginning of their careers, and uses this to evaluate changes (Pauly, 1995; Bunce et al. 2008; Ainsworth et al. 2008). Each generation the stocks decline further, however, when the careers of the next generation of scientists begin, it is the current stock that is used as the new baseline (often referred to as generational amnesia, where knowledge extinction occurs because younger generations are not aware of past biological conditions). Hence, with every new generation, the baseline 'shifts', giving rise to a gradual accommodation of the creeping disappearance of resource species and inappropriate reference points for evaluating economic losses from overfishing, or for identifying targets for rehabilitation measures (Pauly, 1995). This phenomenon not only occurs with every generation but also in individuals (referred to as personal amnesia, where knowledge extinction occurs as individuals forget their own experience) (Papworth et al. 2009). Essentially, what is viewed as 'pristine nature' by this current generation would likely be seen by the previous as 'degraded' and 'natural' by the generation to follow.

One of the biggest challenges in assessing the implications of shifting baselines is the lack of empirical evidence. Images of past (pristine) and contemporary (degraded) environments are useful tools to help illustrate the changing environments, and the addition of historical data can also prove powerful. In this study, people's perceptions of changes were not compared with actual changes taking place in the environment, nor were they compared with historical data. Although this was not of specific interest in this study, we recognise the potential need for such information in future studies. This is particularly important for the region given the likely changes in value systems as the population changes.

5.2.4 How are the different values related?

The results of our PCA with Varimax rotation and Kaiser normalisation are presented in Table 3. Our 27 resident importance scores collapsed into 6 factors: the most 'important' being that associated with society; the next most important being those associated with the environment (closely associated with what economists would likely term 'non-use' values). Culture also had higher importance scores than industry. Enjoying city entertainment (city) remained separate. The order of groups values (from most to least important) generally corroborate findings from the

related study (project 10.2) of the GBRWHA; i.e. environmental 'values' are rated as being more important than industry-related values.

Our PCA analysis of the tourist data yielded 5 groups from the original 27 values (Table 6). They suggest a clear distinction between different types of visitors: some came to enjoy a very wide variety of things, some are primarily interested in experiencing culture, for some it's the safety and quality of infrastructures that matters most, while others came for the city/community entertainment or to do business. 'Local' visitors also seem to stand as a separate group.

The initial list of themes and concepts produced from the Leximancer analysis of the resident data was examined further. Similar terms used by respondents such as *job* and *work* were merged, and so were *community* and *people*; and *live*, *Live* and *living*. Others which we considered not to be concepts related to the phenomenon in question (i.e. satisfaction with overall quality of life) were not included in any further steps of the analysis (e.g. *able*, *plus*, *I'm*, *things*, *need*). The final output is illustrated in

Figure 46, highlighting 10 themes and 14 concepts. As depicted, *live* and *beautiful* were the most frequent and related concepts in the text. *Family* (represented by the bigger size of the point) had a strong connection with *work*, *friends*, *community*, and *healthy*. They appear near one another because of statements such as the following:

"I am satisfied with my lifestyle and job, and having a healthy family"

"Great family, great area to live, fantastic friends, great school"

"Healthy, great place to live, satisfying family life"

"....to enjoy the pristine environment. I live in a rainforest environment, have beautiful clear water to me all the time, enjoy a beautiful natural garden..."

"I have access to my land and live with my elders. I learn, walk, eat culturally everyday and I love it"

"I like where I live, I have good family support and have an opportunity to hunt and gather as I like to do for bush tucker and medicinal plants"

"Live in a great community"

"I love the area we live in, the lifestyle it offers and the variety of wildlife in the area"

"We live in a little piece of paradise"

"I live in one of the world's most scenic areas"

Table 5: Factors created using PCA on importance scores, with factor loadings – All residents

Society	Environment	Access to nature	Culture	Industry	City
<i>Average Importance score for the group:</i>					
1.72	1.47	0.97	0.95	0.71	0.15
Friends and family being safe (.857)	Undeveloped scenery to look at (.842)	Bitumen roads (.796)	Hearing from Aboriginals about their culture (.855)	Tourism industry (.783)	Enjoying city entertainment (.655)
Good quality roads and hospitals (.743)	Healthy native plants and animals (.784)	Walking tracks (.664)	Preserving Indigenous culture (.784)	Importance of the mining industry (.737)	
Spending time with family and friends (.744)	Enjoying the scenic beauty and peacefulness (.699)	Rail and skyrail (.580)	Learning about a unique environment (.726)	Importance of agricultural industry (.858)	
Having 'some' control of one's life (.588)	Preserving for future generations (.720)		Protecting other cultures (.562)	Importance of other industries (.829)	
	Two WHAs side by side (.725)		Participating in community activities (.595)		
	Being able to relax and reflect (.666)				
	Iconic land species (.634)				
	Rainforest walks (.601)				
	Waterfalls and clear clean rivers (.538)				
	Uncrowded camping and picnic areas (.508)				

(in brackets) = Factor loading

Table 6: Factors created using PCA on importance scores, with factor loadings – Tourists

Safety	All else	Culture	City/business/ communiy	Proximity
<i>Average importance score for the group</i>				
1.40	1.04	0.70	0.01	-0.13
Travelling companion being safe (.988)	Being able to relax & reflect (.839)	Indigenous culture (.601)	Enjoying city entertainment (.551)	Visiting a place that is close to where I live (.459)
Good quality roads & hospitals (.777)	Enjoying the scenic beauty & peacefulness (.780)	Protecting other cultures (.539)	Importance of business (.435)	
	Waterfalls & clear clean rivers (.758)		Participating in community activities (.412)	
	Iconic marine species (.741)			
	Iconic land species (.731)			
	Uncrowded camping & picnic areas (.684)			
	Good quality accommodation shops & restaurants (.681)			
	Healthy native plants & animals (.670)			
	Rainforest walks (.653)			
	Sunshine & warmth (.645)			
	Undeveloped scenery to look at (.638)			
	Two WHAs side by side (.633)			
	Importance of matching my budget (.614)			
	Good quality tours & attractions (.605)			
	Preserving for future generations (.593)			
	Importance of the GBRWhA (.567)			
	Learning about a unique environment (.557)			
	Walking tracks (.555)			
	Bitumen roads (.553)			
	Spending time with family & friends (.528)			
	Rail and skyrail (.502)			
	Hearing from Aboriginals about their culture (.480)			

(in brackets) = Factor loading

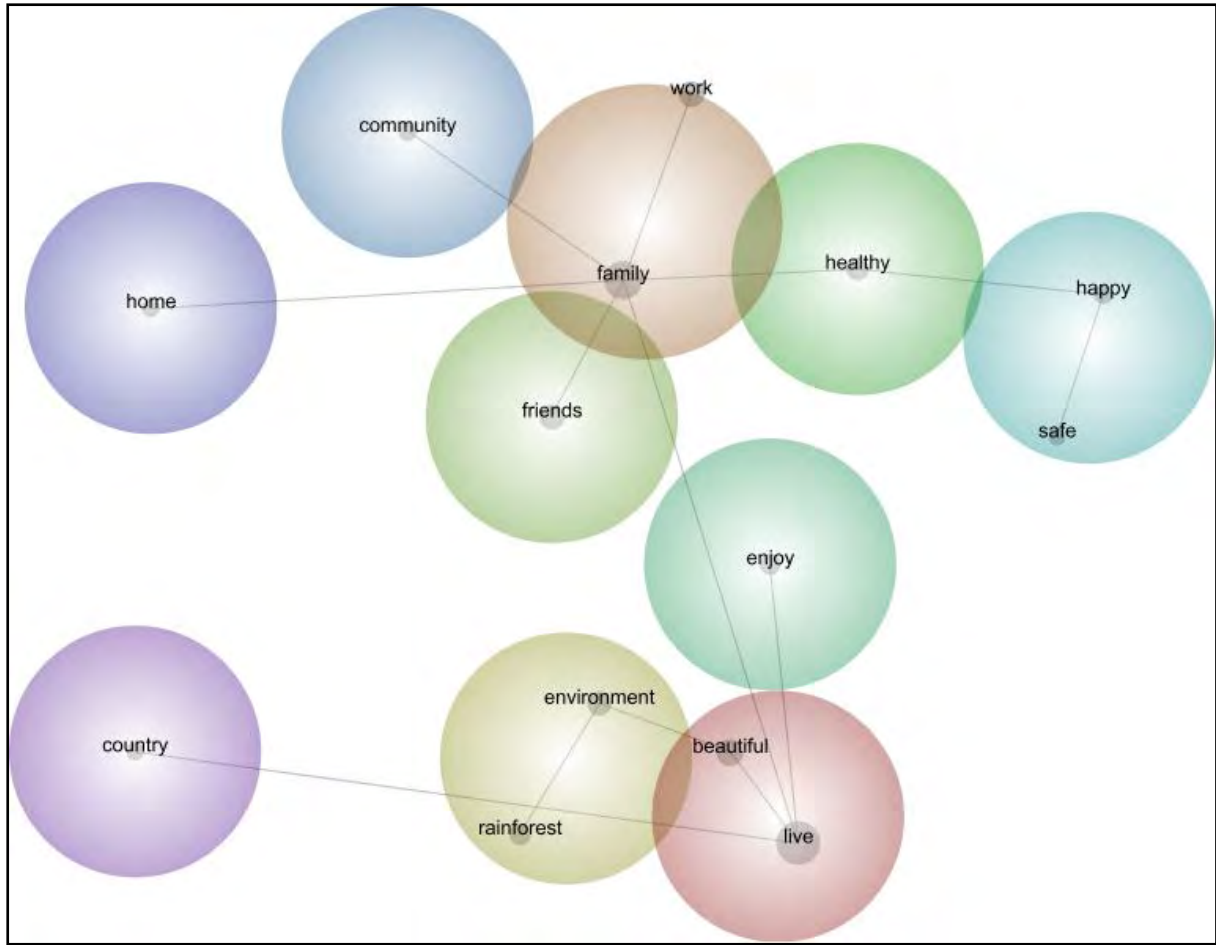


Figure 46: Concept map – Residents⁸

Other examples of the content expressed by residents which shows the links between concepts are provided below:

"I am blessed to live in such a beautiful place and climate"

"Unique, special and clean environment to live in"

"I live in a beautiful area"

"We enjoy the place we live. We have fairly stable employment and are able to live comfortably, and have reasonable access to service"

"Work and family life are going well"

"I live in the community minded and inclusive area and they pull together after cyclones"

"I live in a very pristine environment with pure air and water, with privacy and peaceful environment"

"I love where I live, I have a good job, I am able to control my life"

"Very good area to live and bring up a family"

"I get to live and work in an unspoilt natural environment"

⁸ Themes and connectivity: live 100%; family 84%; environment 38%; friends 25%; healthy 20%; enjoy 14%; happy 14%; community 08%; home 07%; country 06%.

"Life is ok. I am healthy, my children and grandchildren are healthy"

"Healthy and happy"

We followed the same procedure for tourists. Similar concepts were merged (e.g. *beautiful, Beautiful, nice, amazing; WTWHA, rainforest, nature and environment; animals and wildlife*), and those not related to the phenomenon in question (i.e. satisfaction with overall trip) deleted (e.g. *lots, everything, trip, time, place*). The final output, as shown in Figure 47 consisted of 10 themes and 21 concepts. *Beautiful* and *rainforest* were mentioned the most frequently and were the most strongly related concepts with others. Below are examples of tourists' views on the reasons they are satisfied with their trip, which helps explain the linkages between the different concepts.

"Beautiful beach and rainforest"

"Beautiful landscape, endless amount of activities, friendly people"

"Beautiful nature and wildlife"

"It was an amazing trip"

"Beautiful place, nature is amazing"

"Beautiful place and nice people"

"Nice weather, good tours"

"Nice weather, beautiful beaches and nature"

"Good weather, nice rainforest trip and diving"

"I was satisfied with the services, accommodations and sights, facilities and tours. They measured up to the standards and expectations"

"It is always nice to see the environment the way it is meant to be seen all the time"

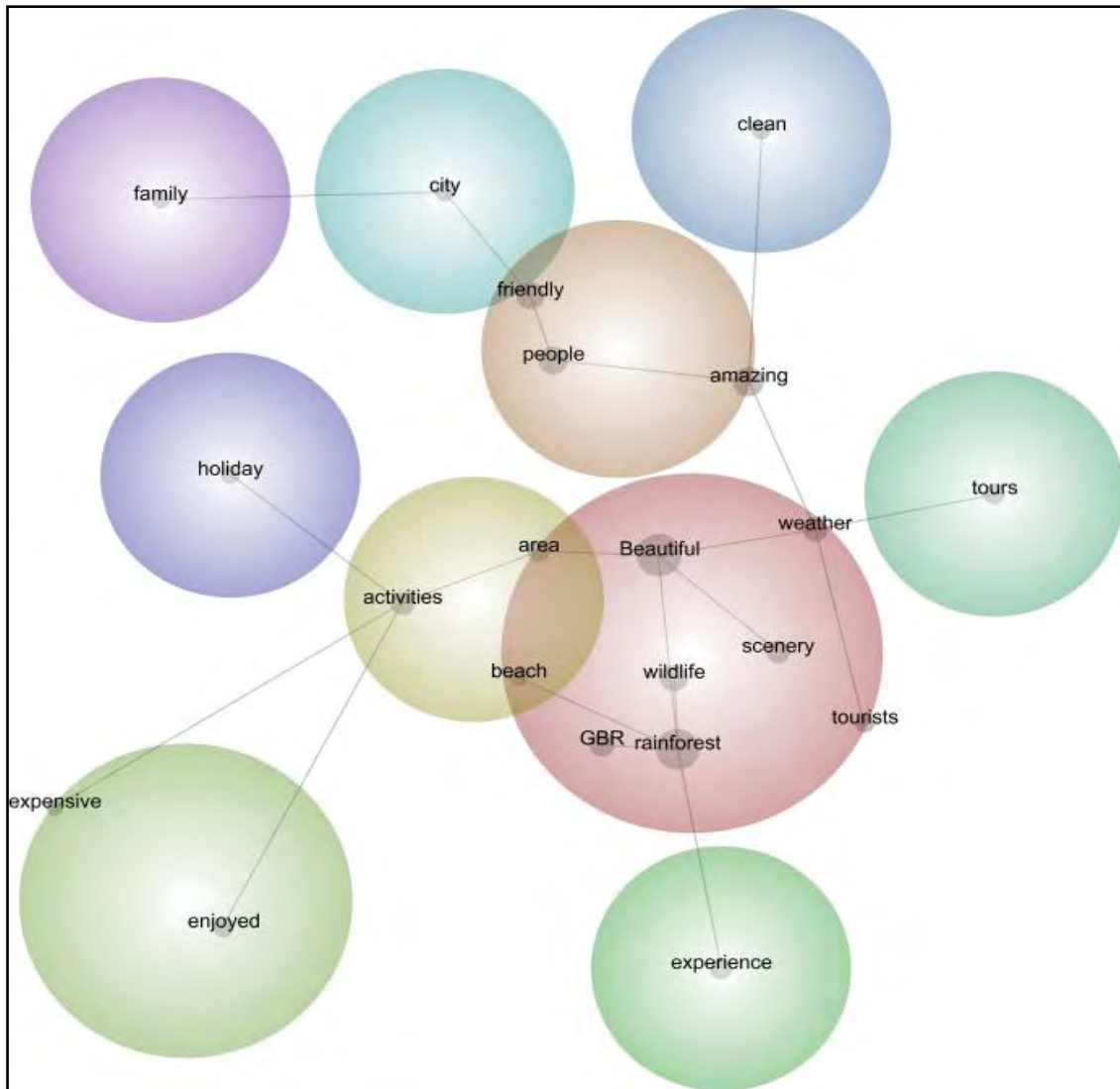


Figure 47: Concept map - Tourists⁹

5.2.5 Do different people 'value' different things?

Regressing the factor scores against various socio-demographic variables revealed that different people do, as expected, consider different things to be important. Table 7 and Table 8 summarise the results. Only significant determinants are presented.

Although there was widespread agreement amongst residents that the environment is more important than industry to overall quality of life (as per the importance scores in Table 5), those employed in the mining and ports sector perceived the environment to be relatively less important than those employed in other sectors. Most socio-demographic variables were significantly correlated with scores assigned to culture: as anticipated, culture was deemed more important to Indigenous residents than to non-Indigenous residents, but males, those dependent upon agriculture for their household income, and those earning a high income

⁹ Themes and connectivity: beautiful 100%; amazing 42%; activities 20%; enjoyed 06%; experience 06%; tours 06%; city 05%; clean 04%; holiday 03%; family 02%.

thought that Indigenous values were relatively less important than their respective counterparts (Table 7).

As regards tourists, there were far fewer statistically significant links between socio-demographic variables and importance scores than there were for residents (Table 8). Visitors from Queensland and males felt that safety was relatively more important as a regional draw-card than visitors from elsewhere or females. Those visiting from Germany thought that visiting somewhere close was not as important as others originating from closer to the WTWHA. Males were inclined to rate culture as less important than females.

Table 7: Determinants of importance of each factor – All residents

	Society	Environment	Access to nature	Culture	Industry	City
	<i>Average importance score</i>					
	1.72	1.47	0.97	0.95	0.71	0.15
<i>Industry:</i>						
Mining & Ports		(-)				
Agriculture				(-)		
Other industry					(-)	
<i>Demographics:</i>						
Single					(-)	
Indigenous				(+)		
Male				(-)		
QLD born	(+)					(-)
HH Income			(-)	(-)		
Age			(-)			
HH size						(-)

Table 8: Determinants of importance of each factor – Tourists

	Safety	All else	Culture	City/business/communiy	Proximity
	<i>Average importance score</i>				
	1.40	1.04	0.70	0.01	-0.13
<i>Origin:</i>					
QLD	(+)				
Germany					(-)
<i>Demographics:</i>					
Male	(+)		(-)		

We also regressed scores of the top 10 most important values and scores of the top 10 values residents and tourists were most satisfied with, against the socio-demographic variables (Table 9 and Table 10). Males (residents and tourists) were consistently less satisfied than their female counterparts, and the male residents attached less importance to environmental and safety values than females did. Those dependent upon the mining and agriculture industries generally perceived environmental values to be less important than others did, while those dependent upon tourism and retail, felt the environment was relatively more important than others. Visitors from Queensland (QLD) generally thought all of these top 10 values were less important than their international counterparts, and international visitors were generally more satisfied than domestic visitors.

Table 9: Characteristics of respondents found to have a statistically significant relationship with the 'importance' scores given to top ten benefits – Residents

Top 10 scores	Male	Single	Age	Education	QLD born	Indigenous	HH size	Government	Agriculture	Mining & Ports	Retail & Tourism
<i>Importance of:</i>											
friends & family being safe						(+)		(-)	(-)	(-)	
spending time with family & friends	(-)			(-)					(-)	(-)	
good quality roads & hospitals		(-)		(-)							
healthy native plants & animals		(-)				(+)		(-)	(-)	(-)	
having 'some' control of one's life									(-)	(-)	
undeveloped scenery to look at	(-)	(-)							(-)	(-)	(+)
enjoying the scenic beauty & peacefulness						(+)			(-)	(-)	(+)
iconic land species	(-)					(+)			(-)	(-)	
waterfalls & clear clean rivers	(-)	(-)	(-)		(+)				(-)		(+)
being able to relax & reflect	(-)	(-)							(-)	(-)	(+)
<i>Satisfaction with:</i>											
spending time with family & friends	(-)						(-)		(-)		(-)
the safety of family & friends										(-)	
scenic beauty & peacefulness							(-)			(-)	
waterfalls & clear clean rivers								(+)			(+)
relaxation & reflection	(-)						(-)				
having 'some' control of one's life											
iconic land species			(+)								
rainforest walks	(-)						(-)				
community											
undeveloped scenery to look at		(-)	(+)					(+)			

Table 10: Characteristics of respondents found to have a statistically significant relationship with the ‘importance’ scores given to top ten benefits – Tourists

Top 10 scores	Single	Age	Education	HH Income	QLD	HH size	Asia	Germany	UK	Rest of Europe	North America
<i>Importance of:</i>											
travelling companions being safe					(-)					(-)	
undeveloped scenery to look at					(-)		(-)				
weather				(-)	(-)		(-)	(+)			
good quality roads & hospitals					(-)					(-)	
the GBRWHA				(-)				(+)	(+)	(+)	(+)
matching my budget		(-)			(-)						
iconic marine species				(-)	(-)				(+)		(+)
iconic land species		(-)		(-)				(+)	(+)	(+)	
healthy native plants & animals		(+)			(-)						
being able to relax & reflect				(-)							
<i>Satisfaction with:</i>											
the safety of travelling companions	(-)										(+)
weather								(+)			
relaxation & reflection	(-)			(-)							
undeveloped scenery				(-)			(-)				
overall experience in GBRWHA							(-)				
scenery	(-)										(+)
quality of roads & hospitals	(-)				(-)						(+)
native flora & fauna	(-)			(-)			(-)				
the GBRWHA	(-)		(-)	(-)					(+)		(+)
friends & family	(-)	(-)		(-)			(-)	(-)	(-)		

We then focused on the importance of the 4 values linked to the key management priorities for the Area: having healthy native plants and animals; visiting waterfalls &/or swimming in clear, clean rivers, streams & waterholes; having beautiful undeveloped scenery to look at; and protecting places that have aboriginal cultural values. The complete sets of results from the OLS regressions for all 4 values are provided in Appendix 6. Column 2 of Table 11 shows coefficients from the model that looked at the importance of 'having healthy native plants and animals' to illustrate how coefficients were used to generate predicted values for different groups of people. Column 3 of Table 11 shows the 'mean' value of each variable from the model (e.g. the mean age of respondents in this model was 50.65 years. To generate a (mean) predicted importance score across all respondents (in this case, 1.75) we simply multiplied each coefficient, by each respective mean and added. To generate different predicted importance scores for Indigenous residents, we did not use the 'mean' value of Indigenous (0.32); instead setting that variable to 1. For non-Indigenous residents, it was set to 0. Similar approaches were taken to generate predicted importance scores for residents associated with different industries.

Table 11: Results from the OLS regression – the importance of having healthy native plants and animals

Having healthy native plants and animals			
	Coefficient from OLS regression	Mean of variable	Coefficient multiplied by mean of variable
Male	-0.10	0.40	-0.04
Single	-0.14*	0.25	-0.04
Born QLD	-0.02	0.63	-0.01
Education	0.00	3.37	-0.01
Ln(HHIncome)	-0.03	10.73	-0.30
Age	0.00	50.65	0.05
HH size	0.00	2.79	-0.01
Retail & Tourism	0.10	0.12	0.01
Government	-0.12*	0.32	-0.04
Agriculture	-0.31***	0.12	-0.04
Mining & Ports	-0.47***	0.07	-0.03
Indigenous	0.15*	0.32	0.05
Constant	2.13	1.00	2.13
Overall predicted value			1.73

significant at 10% level, ** significant at 5% level, and * significant at 1% level*

Figure 48 presents these different 'predicted values' for different groups of residents, and for the 4 different values. It clearly highlights the fact that different groups of people do have different 'values', the implication being that changes to the demographic composition of the resident population will likely be associated with changes in value. It is, for example, evident that environmental and cultural values are more important to the overall quality of life of Indigenous residents than they are to non-Indigenous residents; and that those dependent upon mining, manufacturing or agriculture, feel that environmental and cultural values are less important than those dependent upon tourism.

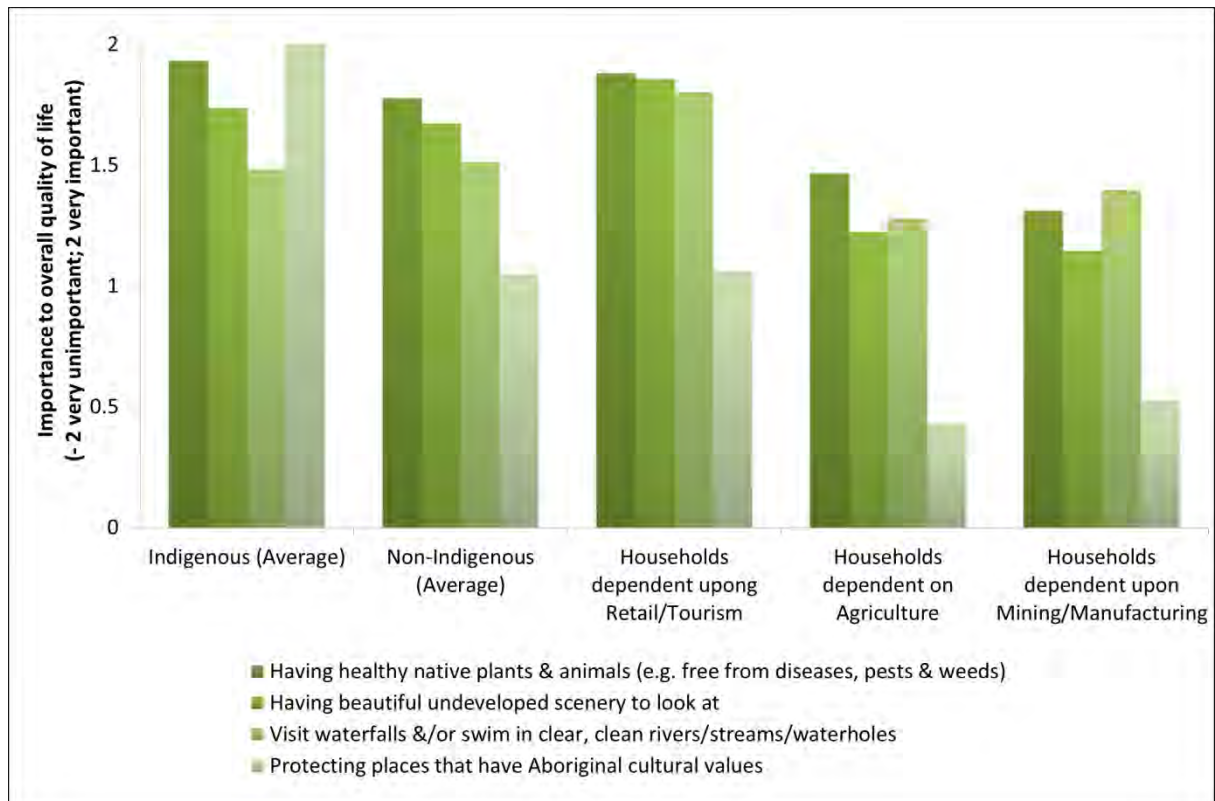


Figure 48: Predicted values for the importance of key ES to the overall quality of life of residents – differentiated by Indigeneity, and by Industry of association (Controlling for other demographic differences such as income and gender)



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6 The ‘marginal’ value of various ecosystem services in the WTWHA

6.1 Some more methodological background

As noted in section 3.2.3, we also decided to assess marginal values by asking about (a) people’s willingness to pay (WTP) to help improve various ecosystem services (ES); and about (b) their likely reaction to changes in various ES. Further details are given below.

6.1.1 People’s WTP to help improve various ES (contingent valuation)

Contingent Valuation (CV) studies often ask people to indicate how much they are willing to pay to prevent/minimise a change; although sometimes respondents are asked about their willingness to accept (WTA) compensation for forgoing the benefits (WCPA, 1998). These approaches rely on ‘individual responses to contingent circumstances’ rather than inferring them from observed behaviours in the marketplace (Dharmaratne & Brathwaite, 1998; Greiner & Rolfe, 2003). They are thus considered to be a type of stated preference valuation method (Figure 15). Since stated preference methods create an hypothetical marketplace in which no actual transactions are made, they can be used to assess the ‘value’ of goods and services which are not regularly exchanged in markets, or for which it is difficult to observe market transactions under desired conditions (Bateman et al. 2002; Esparon et al. 2013; Farr et al. 2014). As such, stated preference approaches are ideally suited to this study, where the values being impacted by the change (i.e. environment and culture) are not associated with the market. We chose to ask about WTP, rather than WTA.

Like all valuation techniques, CV is imperfect. Of note, is its ability to generate inflated estimates of ‘value’ (Greiner & Rolfe, 2004) thus leading some researchers to question its reliability (e.g. Hausman, 1992; Diamond & Hausman, 1994). Nonetheless, Duffield & Patterson (1991) argue that the differences between real (i.e. observed) WTP and stated WTP estimates are negligible and predictable enough and a wide panel of experts associated with the National Oceanic and Atmospheric Administration (NOAA) support this conclusion (Arrow et al. 1993, p.3). That said, it is clearly important to remember, and where possible control for, issues such as hypothetical response bias.

When conducting a CV study, valuation questions can be constructed in several ways, the most common being: the open-ended (OE) (basically asking people how much they are willing to pay); dichotomous choice (DC) (e.g. referendums, asking respondents to say yes or no to a question about whether they would be willing to pay \$x); and payment card (PC) approaches (where respondents are provided a list of dollar values and asked to select their maximum WTP). Many researchers – e.g. Kealy and Turner (1993) and Ready et al. (1995) – have found that the different question formats generate different WTP estimates.

In the OE approach, participants are essentially being asked to put dollar values on environmental goods or services. But this method has been subject to criticism in its ability to deliver reliable and accurate estimates of WTP. This is because it may be very difficult for respondents to come up with their true maximum WTP ‘out of the blue’ for a change they are unfamiliar with or have never thought about valuing before (Bateman et al. 2002, p. 138). Hence, OE studies often have large non-response rates and protest answers.

The DC format is simple for respondents hence minimising strategic responses (Hoehn & Randall, 1989) but it can induce anchoring effects (Halvorsen & Soelensminde, 1998) and starting point bias (Holmes & Kramer, 1995, Herriges & Shogren, 1996, McFadden, 1994).

Moreover, empirical investigations need large samples to generate robust models which can be statistically complicated (Cooper & Loomis, 1992; Hanemann, 1989; Cameron & Huppert, 1989). However, the format has been endorsed by NOAA and found to be superior to the OE approach (Arrow et al, 1993; McCollum & Boyle, 2005). That said, there is evidence to suggest that the DC approach can, in some instances, over-estimate WTP variance (Boyle et al, 1996; Hanley et al, 1998), and also mean and median WTP estimates (Boyle et al, 1996; Kristrom, 1997; Welsh & Poe, 1998) – partially because of 'yah-saying' tendencies on the part of respondents.

The payment card (PC) question format gets around the problem of 'yah-saying' by providing respondents with an ordered range of threshold values starting at \$0. Participants are asked to circle the highest amount they are willing to pay (Campbell & Luckert, 2002; Loomis & Ekstrand, 1997), and their true valuation point is assumed to lie 'somewhere in the interval between the circled value and the next option' (Hakansson, 2008, pg 176). The PC approach avoids the starting point bias that can occur in traditional bidding applications (Mitchell & Carson, 1989) and allows participants to consider a range of possible WTP bids that represent the participants maximum WTP. As such it lowers effort on the part of the respondent, since even a fairly detailed set of thresholds can be visually scanned quite quickly, and there is no need for prompting by an interviewer (Cameron & Huppert, 1989). As such, the PC approach avoids the high rate of non-response often observed in empirical DC and OE studies. Reaves et al. (1999), for example, found that the rate of protest responses for the PC format was significantly lower than in a DC format. It can, however, suffer from both interval and anchoring effects (Farr et al, 2013; Green et al, 1998).

Based on the above, the PC approach was adopted in this study and care was taken to minimise both the interval and anchoring effects. Specifically, we varied the bid-range presented to respondents - ranging from \$500 as the highest value, to \$750, \$1000 and \$2000 (and thus larger interval sizes):

- A: \$0 \$2 \$5 \$10 \$25 \$30 \$50 \$75 \$100 \$250 \$500
- B: \$0 \$5 \$10 \$20 \$30 \$50 \$75 \$100 \$250 \$500 \$750
- C: \$0 \$5 \$10 \$20 \$30 \$50 \$75 \$100 \$250 \$500 \$1000
- D: \$0 \$5 \$10 \$25 \$50 \$75 \$100 \$250 \$500 \$1000 \$2000

Both residents and tourists were asked to indicate how much they would be willing to pay to help 'fix' various threats to the rainforest. Residents were asked how much they would be willing to donate annually (Figure 49); tourists were asked on a per-trip basis. All four 'issues' presented to respondents were those identified as key priority issues for the management of the Area by key stakeholders during the initial stages of the study.

8. The rainforests of the Wet Tropics faces many threats. Some of these are beyond our control (e.g. cyclones), but not all. For example, we could choose to spend more money controlling pests and less on something else. If a fund was set up to help solve the problems listed below, what is the maximum amount (out of your total household income) you would be willing to donate each and every year to that fund? (You could ask for the money to be deducted from your wages/salary/pension, or pay it as a lump sum once a year.)

When answering, please consider your household's current financial situation and also consider how much all your donations add up to if donating to more than one problem. (Tick one box in each row)

	Money willing to donate EACH YEAR											
	\$0	\$2	\$5	\$10	\$25	\$30	\$50	\$75	\$100	\$250	\$500	More than \$500
Protecting native plants and animals from weeds & pests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining undeveloped scenic beauty & peacefulness of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining quality & clarity of rivers & streams	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Protecting the Aboriginal cultural values of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----

Figure 49: Excerpt of survey question to determine response to WTP – Resident survey

Previous research highlights the fact that the way in which people respond to questions such as these can be 'clouded' by the fact that we are asking about WTP for public goods (i.e. goods which, once made available by just one person, is freely available to all). As such, respondents are being asked to pay not only for something that will benefit them personally, but for something that will benefit others (who might have refused to pay). Consequently, the amount of money elicited in CV surveys reflects not only the benefit respondents attribute to the good or service being assessed, but also the degree to which they find it just, that they should pay for someone's benefit, and the perceived fairness of the payment (Ajzen et al. 2000; Schroder & Mieg, 2008; Farr et al. 2014). People who believe that they are not the only ones required to pay for a public good 'are more likely to be willing to pay, as compared to individuals who do not believe in other people's payments' (Liebe et al. 2011, p 110; Ostrom, 2000).

To capture these types of effects, we thus also asked respondents to indicate the extent to which they agreed/disagreed with each of the following statements (assessed on a 5-point Likert scale):

- 1) I am not prepared to pay unless all WTWHA users pay too;
- 2) Only people who live near or visit the WTWHA should care for it; and
- 3) I am not prepared to pay unless all Australians pay too.

Along with the statements above, we also added others to further understand the altruistic nature of respondents:

- 4) I am willing to volunteer my time to care for the WTWHA;
- 5) The WTWHA should be preserved for its own sake; and
- 6) Efforts are a waste of time in the face of natural disasters and climate change.

Previous research has also highlighted that different people are willing to pay different amounts for environmental goods and services. For the most part, studies find that females are likely to be willing to pay more than males due to their stronger environmental attitudes and behaviour (e.g. Diamantopoulos et al. 2003; Vaske et al. 2001, Esparon et al. 2013, Farr et al. 2014). Other demographic characteristics that have been identified as determinants of WTP include income, education, age, and origin. Of these, income seems to be the most prominent – afterall, WTP is underpinned by the ability to pay, and ability to pay is a function of income. We thus used the hurdle model to look at determinants of WTP. The hurdle model is appropriate because analysis is done in two steps. First it simply divides respondents into two groups, those who are not willing to pay anything at all, and those who are willing to pay something. It

identifies characteristics of respondents that are most/least likely to fall in to one of those two categories. Second, it focuses on only those who are willing to pay something, and identifies characteristics of those willing to pay most/least. We then used the coefficients from those models to generate estimates of the predicted value of WTP for tourists of different origin, the aim being to determine just how significant such differences were.

6.1.2 *People's stated response to various hypothetical scenarios (contingent behaviour)*

The relative importance of key WTWHA-based values can also be understood by examining how people might be impacted by a particular change or management decisions. In an ideal situation, one would investigate these changes by collecting data before and after a change occurs, measuring how that change impacted values. Such a process, however, is 'data-hungry' and time consuming, requiring that data be collected over a long time period and across different regions. Such data were unavailable, so we have instead used insights from the contingent behaviour (CB) literature to develop questions that supplement those elsewhere in the survey, and which test the likely reaction of respondents to a series of hypothetical scenarios.

CB studies are closely related to CV studies. Simplistically, CV studies ask people how much they are willing to pay for a (hypothetical) good or service (or for a hypothetical change in the quality or availability of a good or service). In contrast, CB studies ask people how much they would be willing to buy (i.e. how their behaviour would change) following a (hypothetical) change in the price, quality or availability of a good or service (Morton et al. 1995; Englin & Cameron 1996; Grijalva et al. 2002). Some researchers feel that CB studies are more reliable than CV studies because people are better able to predict what they would do in a particular situation, than to predict how much they would pay (Morton et al. 1995; Englin & Cameron 1996; Grijalva et al. 2002). In short, CB questions more closely mimic actual shopping decisions in most western worlds, whereby consumers are presented with a product and its price, and then choose how much to buy (if at all).

We designed 12 hypothetical scenarios based on the items listed in Figure 14 (those focusing on 'changes' and issues confronting regional managers and decision makers). For each scenario, we asked residents how each change would affect their overall quality of life using a 5-point Likert scale (Figure 50). We asked tourists how each change would have affected their decision to visit the WTWHA (Figure 51). Importantly, we included a question about the way in which a 20% increase in local prices would affect people, providing us with a 'market' based change with which to compare / benchmark other responses. This has proven to be an effective way of providing extra information to facilitate meaningful interpretation of responses to hypothetical questions such as these (Mustika et al. forthcoming).

	I would be much more satisfied I would be much less satisfied 					I do not know
If local prices rose by 20% compared to other places in Australia	☐	☐	☐	☐	☐	☐
If there were twice as much rubbish (e.g. bottles, plastic) in the rainforest & in the rivers	☐	☐	☐	☐	☐	☐
If there was half as much chance of seeing an iconic animal (e.g. cassowary, kangaroo, rifle birds, musky-rat kangaroo)	☐	☐	☐	☐	☐	☐

Figure 50: Excerpt of survey question to determine response to 'changes' in values – Resident survey

	POSITIVE IMPACT I may have stayed longer	ALMOST NO IMPACT This would not have affected my decision at all	SOME IMPACT I would have still visited but reduced the length of my stay by about			HUGE NEGATIVE IMPACT I would not have come at all	I do not know
			25%	50%	75%		
If local prices rose by 20% compared to other places in Australia	☐	☐	☐	☐	☐	☐	☐
If there were twice as much rubbish (e.g. bottles, plastic) in the rainforest & in the rivers	☐	☐	☐	☐	☐	☐	☐
If there was half as much chance of seeing an iconic animal (e.g. cassowary, kangaroo, rifle birds)	☐	☐	☐	☐	☐	☐	☐

Figure 51: Excerpt of survey question to determine response to ‘changes’ in values – Tourist survey

Here too, we used regression to look for statistically significant relationships between various socio-economic and demographic descriptors of people and their stated responses to these hypothetical scenarios, looking also, at which residents would be most impacted and which visitors will the region lose, if there were deteriorations in these values.

6.2 Results and analysis

6.2.1 Are people willing to pay to help improve the things they value most?

Our previous results have shown that people perceive environmental and cultural values as vital contributors to their overall quality of life and as a reason for coming to this region. The question asked here, is whether people are willing to pay to help protect the things they claim to value most.

The answer, for a relatively large % of respondents is “No”. Almost 20% of Indigenous respondents were unwilling to contribute any amount of money to protect Aboriginal culture or prevent weeds and pests from evading the native flora and fauna (Figure 52), despite these values being in the top 5 of most important contributors to their overall quality of life. The (un)willing rate was even higher amongst non-Indigenous residents: between 30% and 50% indicating that they would not be willing to pay anything at all to improve things which they themselves had indicated were vitally important to their overall quality of life (Figure 53).

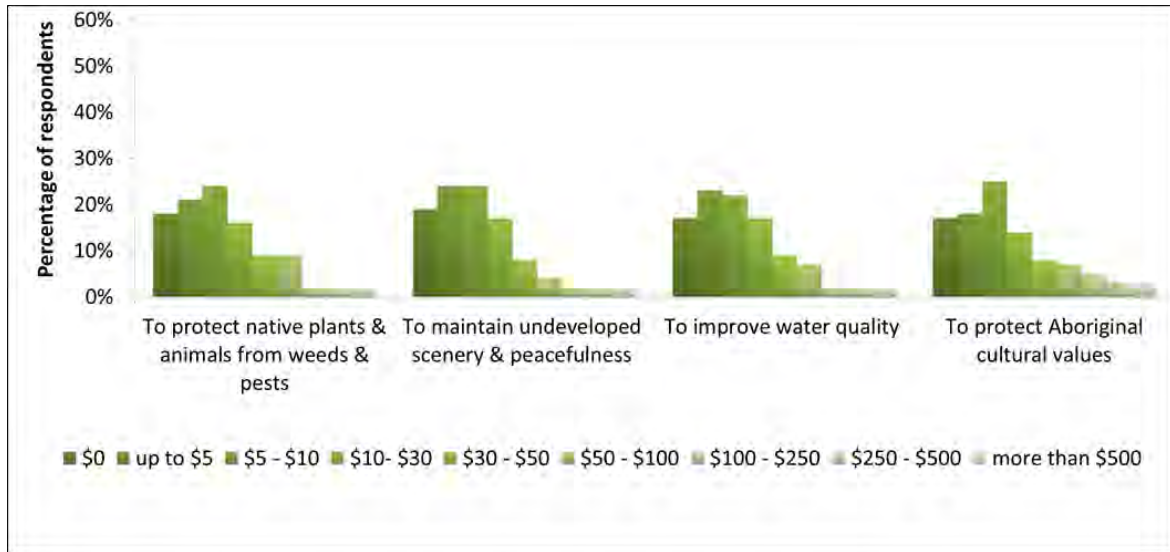


Figure 52: Distribution of Indigenous resident to questions about WTP (per annum) to improve various environmental and cultural values

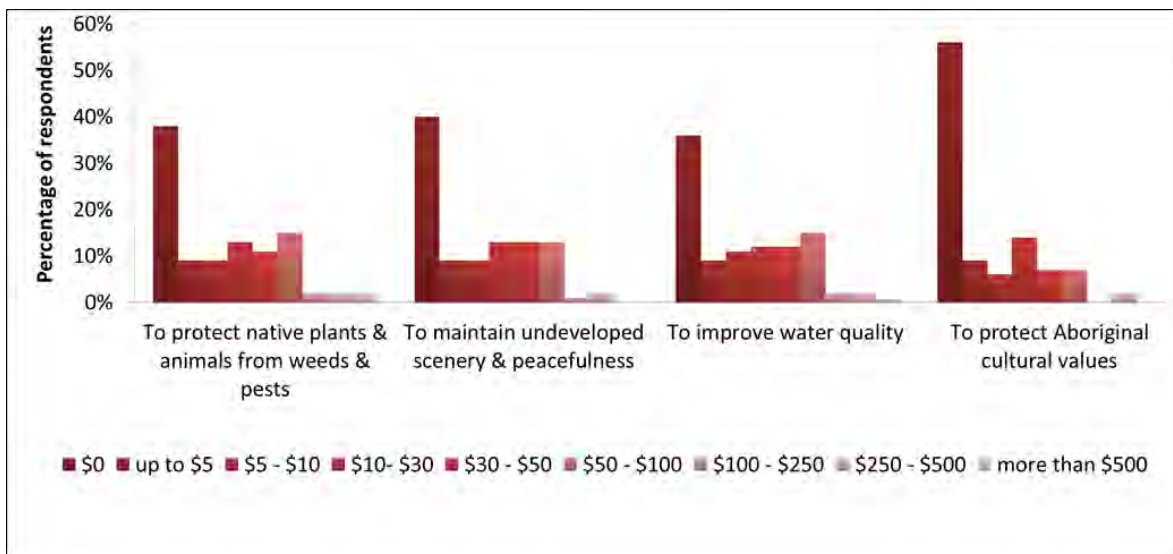


Figure 53: Distribution of non-Indigenous resident responses to questions about WTP (per annum) to improve various environmental and cultural values

More than a quarter of tourists (31%) were not willing to pay any money towards the maintenance of undeveloped scenery and peacefulness of the area, despite earlier comments about the 'importance' of this in their decision to visit the region (note that the maintenance of undeveloped scenery and peacefulness of the area was ranked the second most important factor on this trip). Thirty-nine percent of our tourist sample was not willing to pay any amount towards the protection of Aboriginal culture (Figure 54).

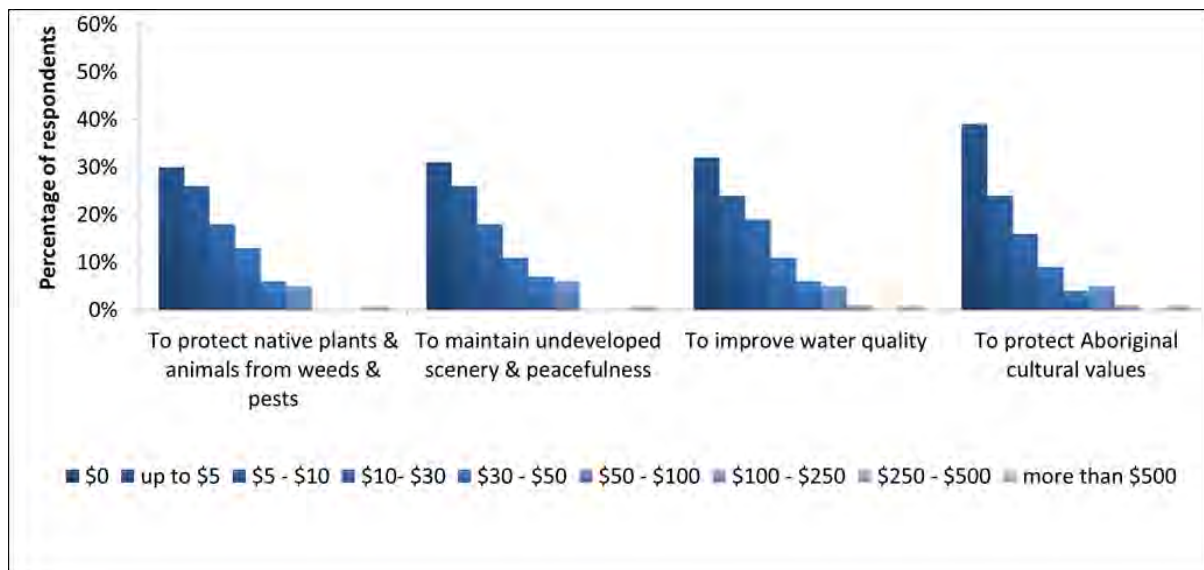


Figure 54: Distribution of tourist responses to questions about WTP (per trip) to improve various environmental and cultural values

Although many respondents were not willing to pay anything, there were some who would be willing to pay something. Indigenous residents were willing to pay most for the protection of their cultural values, non-Indigenous were willing to pay most to protect the native plants and animals from weeds and pests, and tourists were willing to pay the most for improvements in water clarity (Figure 55).

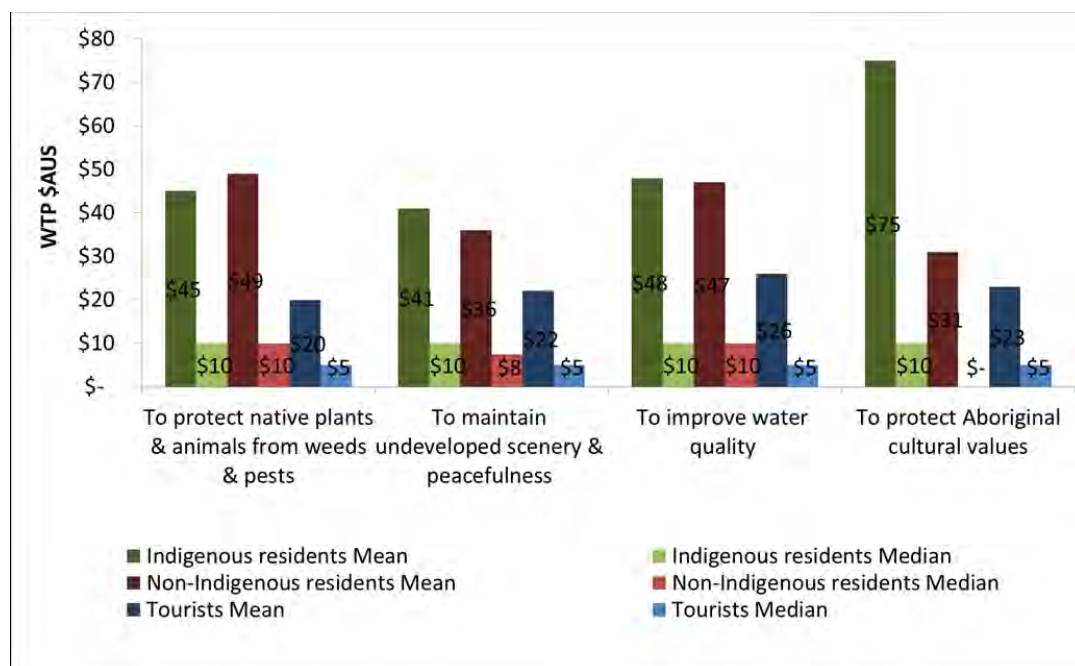


Figure 55: Mean AND median WTP - Residents & Tourists

NB: residents estimates relate to \$ per annum, Tourist estimates relate to \$ per visit

An interesting observation is that those on a lower income, largely the Indigenous residents (see Figure 20), are generally those willing to pay most.

We examined the level of agreement to several statements about who should be responsible for preserving the WTWHA. Across our whole sample of residents and tourists, we found that although most people disagreed with the statement *"only people who live near or visit the WTWHA have a responsibility to care for it"* most agreed with the statement that *"I am not prepared to pay unless all users of the WTWHA (tourists) - or all users throughout Australia (residents) pay too"*. Indigenous residents were, however, more likely to volunteer to help protect the Area (31%) than their non-Indigenous counterparts (13%) or tourists (12%) (Figure 56, Figure 57 and Figure 58).

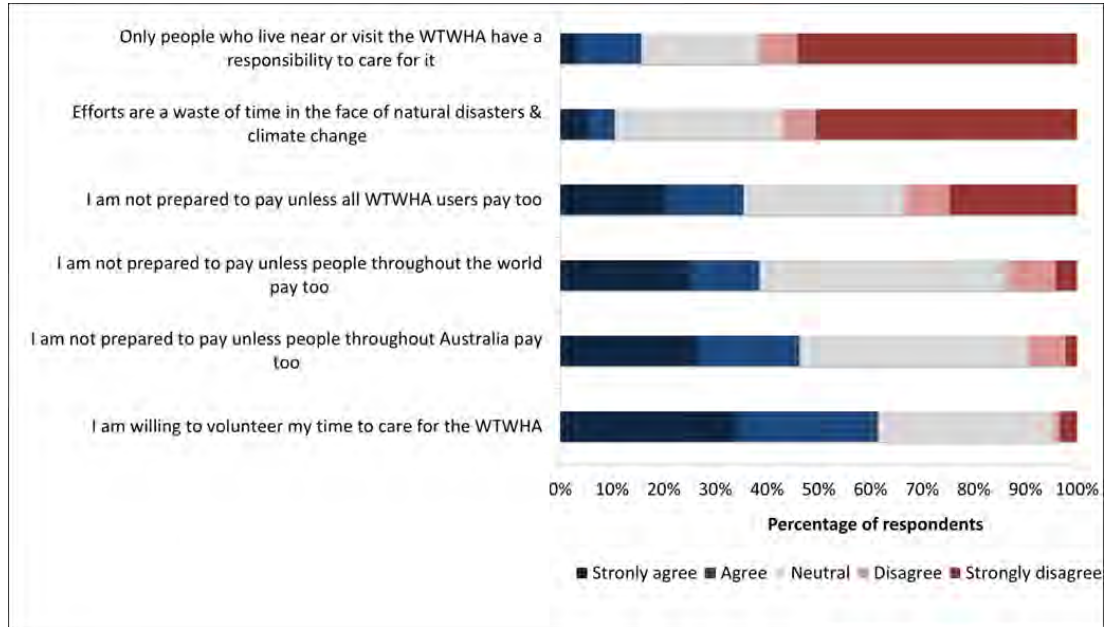


Figure 56: Attitudes towards preservation of the WTWHA - Rainforest Aboriginal residents

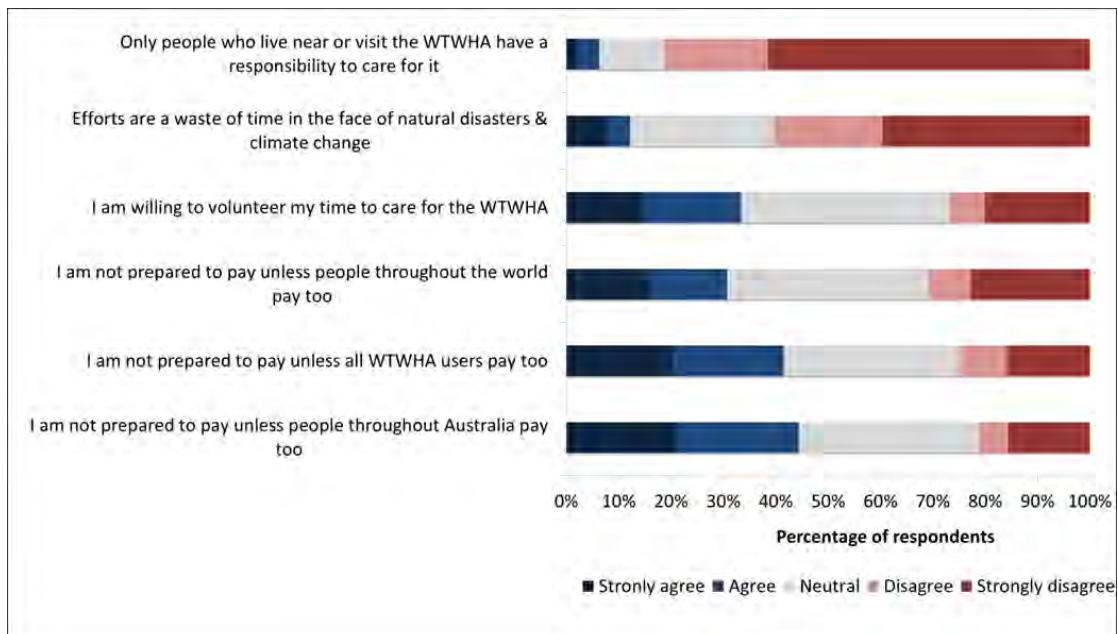


Figure 57: Attitudes towards preservation of the WTWHA - Non-Indigenous residents

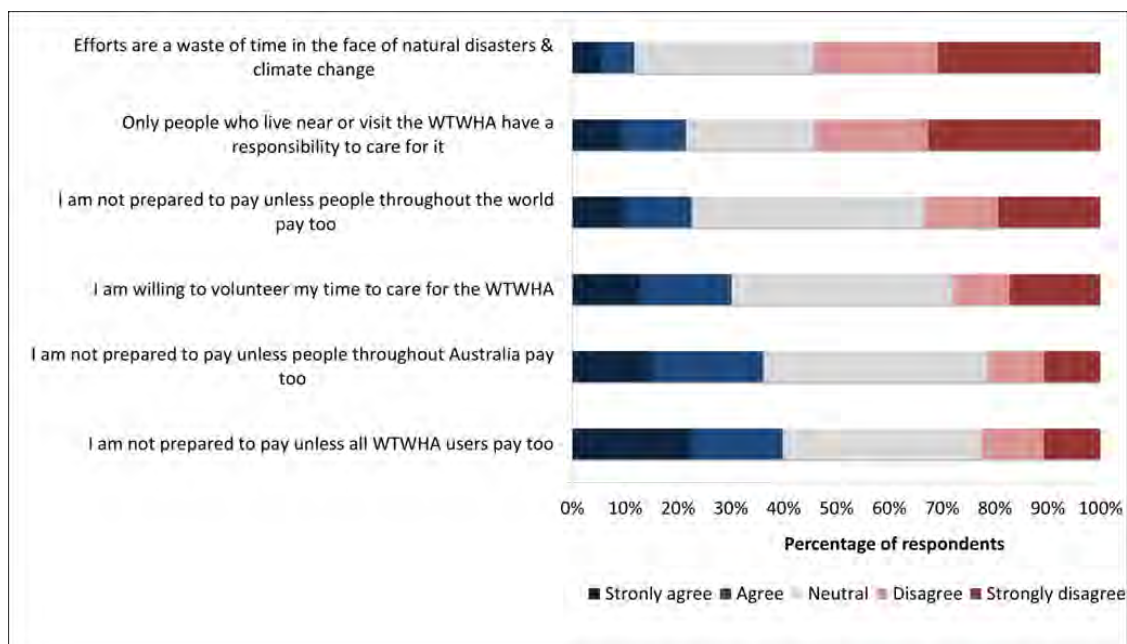


Figure 58: Attitudes towards preservation of the WTWHA - Tourists

Table 12 summarises residents' results from our hurdle models, looking at determinants of WTP, as well as the determinants of WTP/Income. We used Stata's probit and tobit specifications with robust standard errors and have thus controlled for heteroskedasticity (Pits et al, 2012). We found that many factors influenced 'participation' (i.e. whether or not a respondent was willing to pay something greater than zero), with the exception of education and whether or not one thinks that only those who live near or visit the WTWHA should care about it.

Looking at the determinants of WTP first, people who were most likely to pay a positive amount (mostly for environmental values and not for culture) were those employed in tourism-related industries and retail compared to those employed in other industries. Indigenous residents were willing to contribute to culture. People with relatively low household incomes were more likely to pay to improve water quality and promote Indigenous culture. For those who were willing to pay an amount greater than zero, the amount actually offered was associated with relatively few factors: gender, income and employment sector. It was those who were earning relatively less than their counterparts who were willing to pay more than zero for all items. In contrast those in mining and ports were less willing to pay an amount greater than zero. These findings are consistent with our earlier findings that those in the mining sector perceive the environmental and cultural values to be relatively less important than those employed in other sectors. It also suggests that those on a low income yield most 'utility' (satisfaction) from non-market factors, and are WTP to improve them.

Table 13 summarises the tourists' results: males were less likely to pay a positive amount than their female counterparts, and visitors from the UK were more likely to pay a positive amount for more culture than visitors from other origins. Visitors from QLD and from Germany were less willing to pay more than zero for all items. The fact that visitors from QLD (the 'locals') were less likely to pay is consistent with Richardson et al's study (2006) who found that in the USA local visitors were willing to pay less than half as much for recreational experiences in the Rocky Mountain National Park than long-distance visitors (although here, visitors from Germany shared similar views with the locals). Visitors who held the view that those who visit the WTWHA should care for it, were more likely to pay an amount greater than zero towards its protection.

Table 12: **Characteristics of respondents found to have a statistically significant relationship with WTP – all Residents**

	Male	Single	Age	Education	QLD born	HH Income	Indigenous	HH size	Government	Agriculture	Mining & Ports	Retail & Tourism	Only people who live or visit should care	Not prepared to pay unless all users pay too	Not prepared to pay unless all Australia pay too
WTP	To pay or not to pay amount >\$0, How much to pay (if agreed to pay >\$0)														
Healthy native plants & animals						,+			,-	,-	,-	+,			
Undeveloped scenery & peacefulness					,-	,+					,-	+,			
Water Quality	,-					+,+					,-				
Indigenous culture						+,+	+,		,-	-,-	,-	,-		-,	,+
WTP/Income	To pay or not to pay amount >\$0*, How much to pay (if agreed to pay >\$0)														
Healthy native plants & animals															
Undeveloped scenery & peacefulness					,-										
Water Quality		,-		,+				,-	,-	,-	,-				
Indigenous culture							,+		,-	,-	,-	,-			

Note: * participation decision model is the same for WTP/Income model

Table 13: Characteristics of respondents found to have a statistically significant relationship with WTP – Tourists

	Male	Single	Age	Education	QLD	HH Income	UK	Germany	Rest of Europe	North America	Asia	Only people who live or visit should care	Not prepared to pay unless all users pay too	Not prepared to pay unless all Australia pay too
WTP	To pay or not to pay amount >\$0, How much to pay (if agreed to pay >\$0)													
Healthy native plants & animals	- ,				, -			, -	, -			, +		
Undeveloped scenery & peacefulness	- ,				, -			, -	, -			- , +	+	
Water Quality	- ,							, -				, +		
Indigenous culture	- ,				, -		+	, -						
WTP/Income	To pay or not to pay amount >\$0, How much to pay (if agreed to pay >\$0)													
Healthy native plants & animals						, -								
Undeveloped scenery & peacefulness						, -		, -						
Water Quality						, -						, +		, -
Indigenous culture														

Note: * participation decision model is the same for WTP/Income model

As we did for residents, we extended the analysis by using the coefficients from the regressions to be able to generate predicted scores – for tourists however, we were interested in WTP by origin. The complete sets of results from the OLS regressions for all 4 values tested are provided in Appendix 7. Column 2 of Table 14 shows coefficients from the model that looked at the WTP for 'having healthy native plants and animals' to illustrate how coefficients were used to generate predicted values for different groups of visitors. Column 3 of Table 14 shows the 'mean' value of each variable from the model (e.g. the mean age of respondents in this model was 34.18 years). To generate a (mean) predicted WTP score across all respondents we simply multiplied each coefficient, by each respective mean and added (in this case, 2.50, but please note that the dependent variable was $\ln(\text{WTP})$, so actual WTP is $e^{2.5} = 12.18$). Similar approaches were taken to generate predicted importance scores for residents associated with different industries.

Table 14: Results from the OLS regression – WTP to protect native plants & animals from weeds & pests

	Coefficient from regression.	Mean of variable	Coefficient multiplied by mean of variable
Male	0.14	0.40	0.05
Single	-0.04	0.40	-0.01
HH Income	0.00	96483.05	0.16
Age	0.00	34.18	0.13
Germany	-0.62	0.09	-0.05
Uk	-0.26	0.18	-0.05
Rest of Europe	-0.38	0.17	-0.06
Morth America	-0.01	0.06	0.00
QLD visitor	-0.69	0.09	-0.06
Asia	0.32	0.07	0.02
Constant	2.05	1.00	2.05
Overall predicted value			2.50

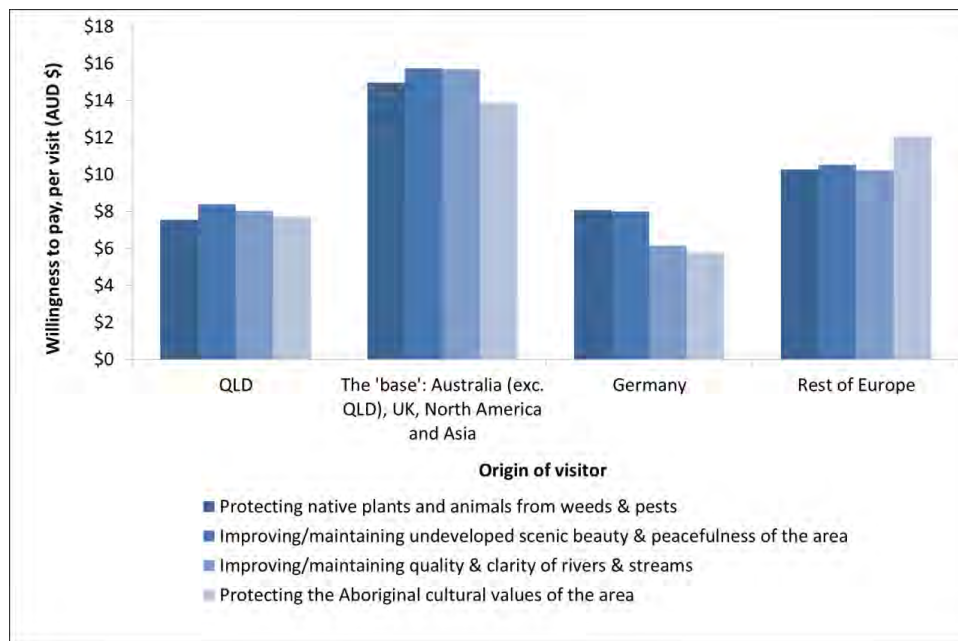


Figure 59: Predicted values of mean WTP to help improve aspects of the environment - by origin

Figure 59 presents these different ‘predicted values’ for different groups of tourists. It clearly highlights the fact that the biggest difference is not what visitors are willing to pay for the different values, since they are more or less grouped together (the difference being just a couple of \$ more). Instead, the biggest difference is that the visitors from QLD and Germany were generally willing to contribute less than visitors from elsewhere.

6.2.2 How would people react if the things they ‘value’ deteriorated?

The preceding results have focused on whether people are willing to pay to help improve things. But how might people react, if the things they value deteriorated? As noted earlier, we mimicked a contingent behaviour type study, asking both residents and tourists to tell us how they would respond to a series of 12 hypothetical ‘changes’. Residents were asked to tell us how the change would affect their overall quality of life; tourists were asked how the change would have affected their overall decision to visit the region.

Responses reinforce the message from the prior segments: environmental and cultural factors are more important to overall quality of life than economic factors, and some types of environmental degradation would have a stronger adverse impact on overall quality of life than a 20% increase in prices (compared to elsewhere in Australia) (Figure 60 and Figure 61). More than 80% of residents stated that they would be much less satisfied if: there was twice as much rubbish in the rainforest and rivers; the rivers changed from clear to murky; and if there were fewer native plants and animals and twice as many pests and diseases. Whilst there were many commonalities, some changes would have greater impacts on different residents: higher prices would affect the overall quality of life of the Indigenous residents more than it would the non-Indigenous residents (intuitively sensible given the much lower incomes of Indigenous residents), but more information about culture would lead to a more substantive increase in satisfaction for the former group, than would for the latter.

The same set of hypothetical ‘changes’ were presented to tourists. The results corroborate those of the resident sample: the worst hypothetical change would be to have more rubbish in the rainforest and rivers – with 44% of respondents saying they would not have come to this region at all in this situation. The next biggest ‘turn-off’ would be a decline in the undeveloped scenery and peacefulness of the area (31%), followed by clarity of rivers (24%) (i.e. if the rivers were to become murkier) (Figure 62).

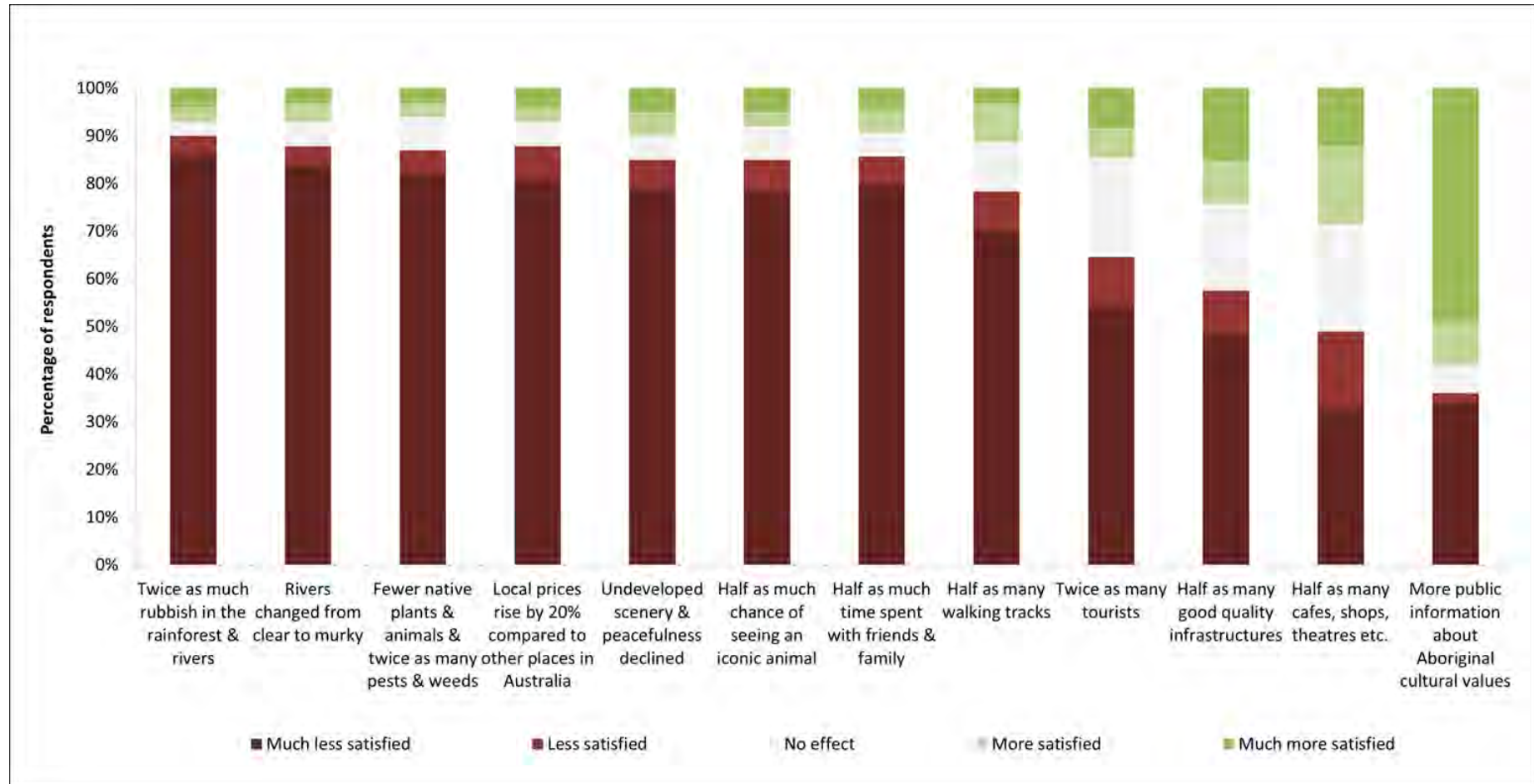


Figure 60: Impact of hypothetical changes to overall quality of life - Rainforest Aboriginal residents

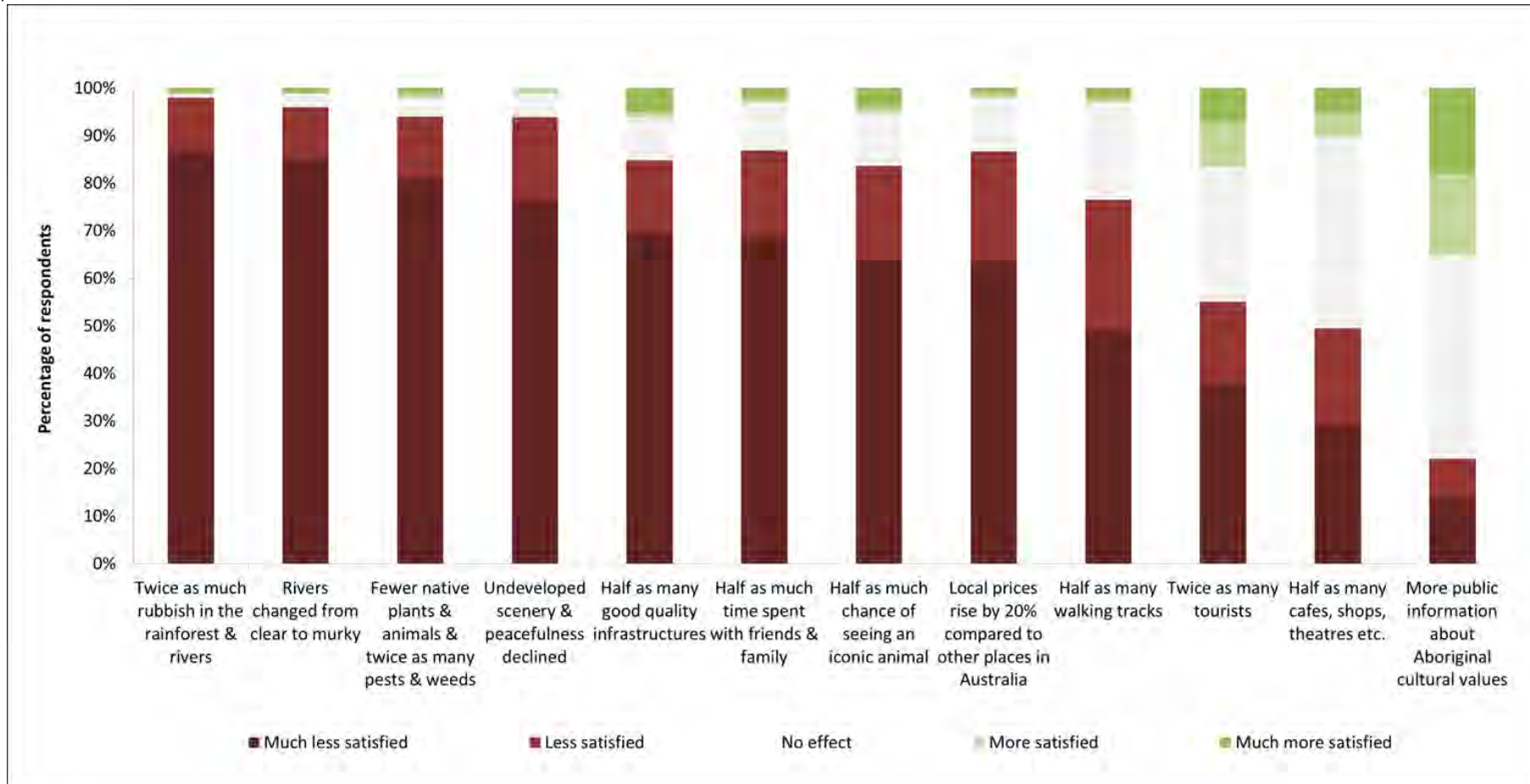


Figure 61: Impact of hypothetical changes to overall quality of life - Non-Indigenous residents

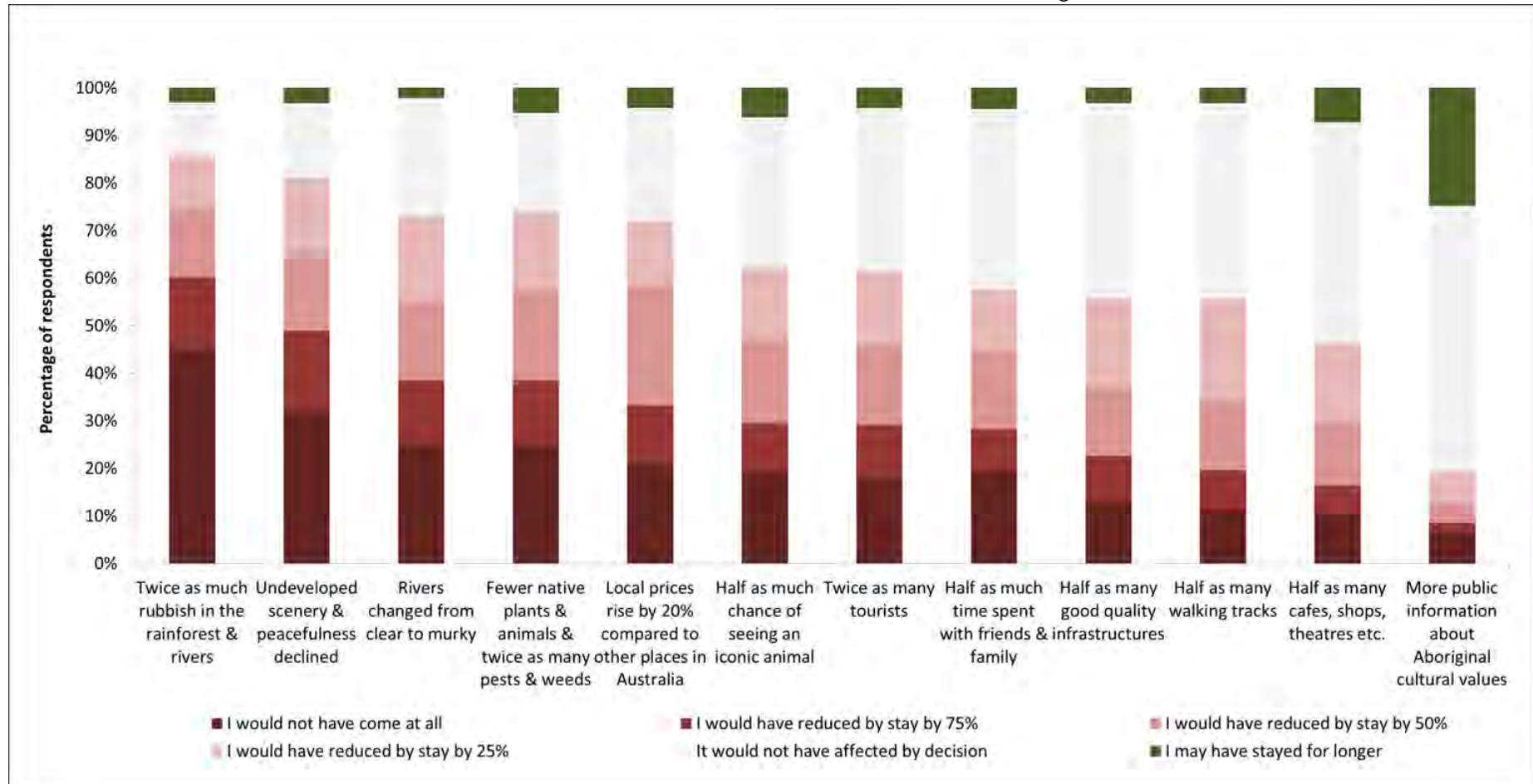


Figure 62: Impact of hypothetical changes on decision to come to the region – Tourists

Interestingly, about a quarter of visitors stated they would have stayed longer if there was more information about Aboriginal culture. Despite the region's richness of its Aboriginal heritage, it seems that some visitors were not particularly satisfied with the exposure to culture, thus supporting the need for more Indigenous cultural experiences, as highlighted by the following quote: *"Beautiful landscape and nature, but missing of Aboriginal heritage"*.

We looked at the importance of culture as a drawcard for coming to this region: here we aggregated the values *'being able to hear from Aboriginal people about their sense of place (culture and country)'* and *'protecting places that have Aboriginal cultural values'*. For 50% of visitors, culture was indeed an important pull factor for their visit here, mostly for the international visitors (Figure 63).

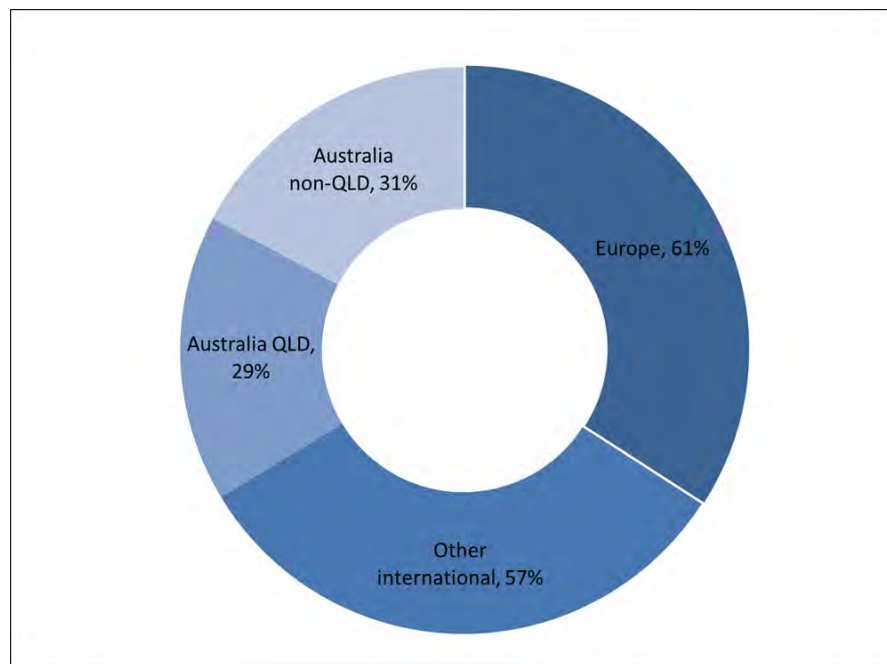


Figure 63: Visitors identifying Indigenous Culture as an important regional drawcard - by country/region of origin

Indeed 31% of Europeans, 24% other internationals, and 12% of Australians say that they may have stayed for longer in this region if there were more information about Aboriginal culture (Figure 64). We examined further the importance of having more information about culture, testing to see if there were significant differences between visitors of different origins. We found that visitors from Europe and other international visitors were significantly more interested in Aboriginal culture than Australians.

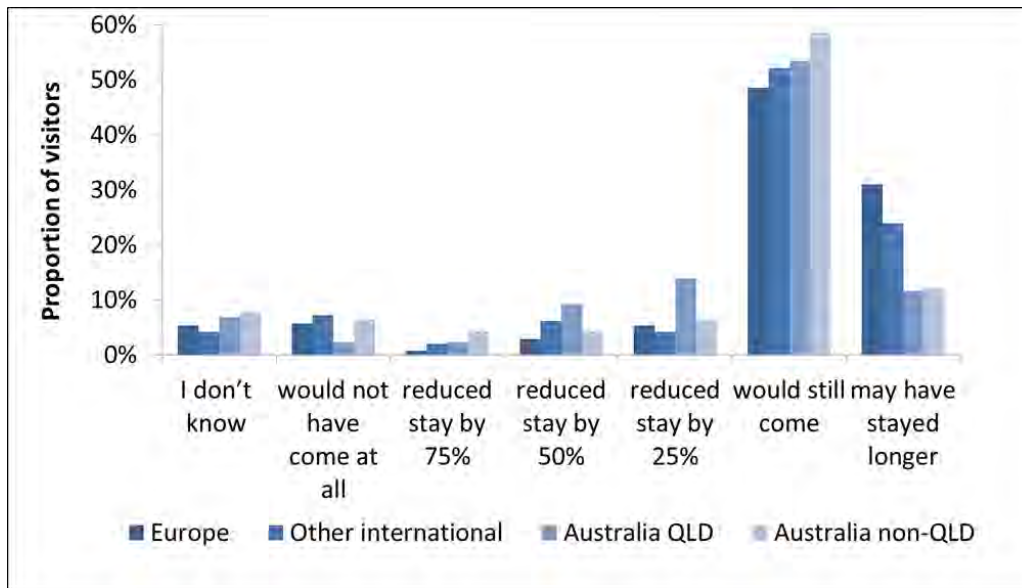


Figure 64: Distribution of responses to question about the way in which having more information about Aboriginal Cultural heritage would have affected trip duration decision – by country/region of origin

6.2.3 Which residents would be most impacted and which visitors will the region lose, if there were deteriorations in these values?

We regressed scores of the 12 hypothetical changes against the socio-demographic variables of residents and tourists (Table 15 and Table 16). In these tables, a '-' sign indicates that respondents are not particularly bothered by the hypothetical scenario (i.e. less concerned than others), a '+' sign indicates that they are more concerned than others. There are numerous '-' signs in the column associated with those dependent upon mining/ports, for the scenarios relating to the environment and Indigenous culture. Evidently, this group of people feel that such changes would have a less detrimental impact on their overall quality of life than people associated with other industries. Those with more education indicate that they would be relatively less 'bothered' by higher prices, less infrastructure, or fewer café's and shops.

As regards tourists (Table 16), here again, a - sign indicates that this particular group of people are not particularly concerned by the scenario, a + sign indicates they are more concerned than others. Males were relatively unconcerned by the prospect of seeing fewer iconic animals, and were less enthused by the thought of having more information about Aboriginal cultural values than females. Single travellers were more concerned at the prospect of murkier rivers, and more enthused by Indigenous culture. Elderly travellers, were more concerned at the thought of less infrastructure, or having less time with family. The Germans were relatively more concerned by the prospect of more rubbish, and liked the idea of having more Indigenous culture; other Europeans seemed to be more focused on family/friends and cafes. Those from Asia appear to be relatively more concerned by the prospect of reduced scenic values.

Table 15: Statistically significant determinants of responses to our question about likely reaction to hypothetical changes – Residents

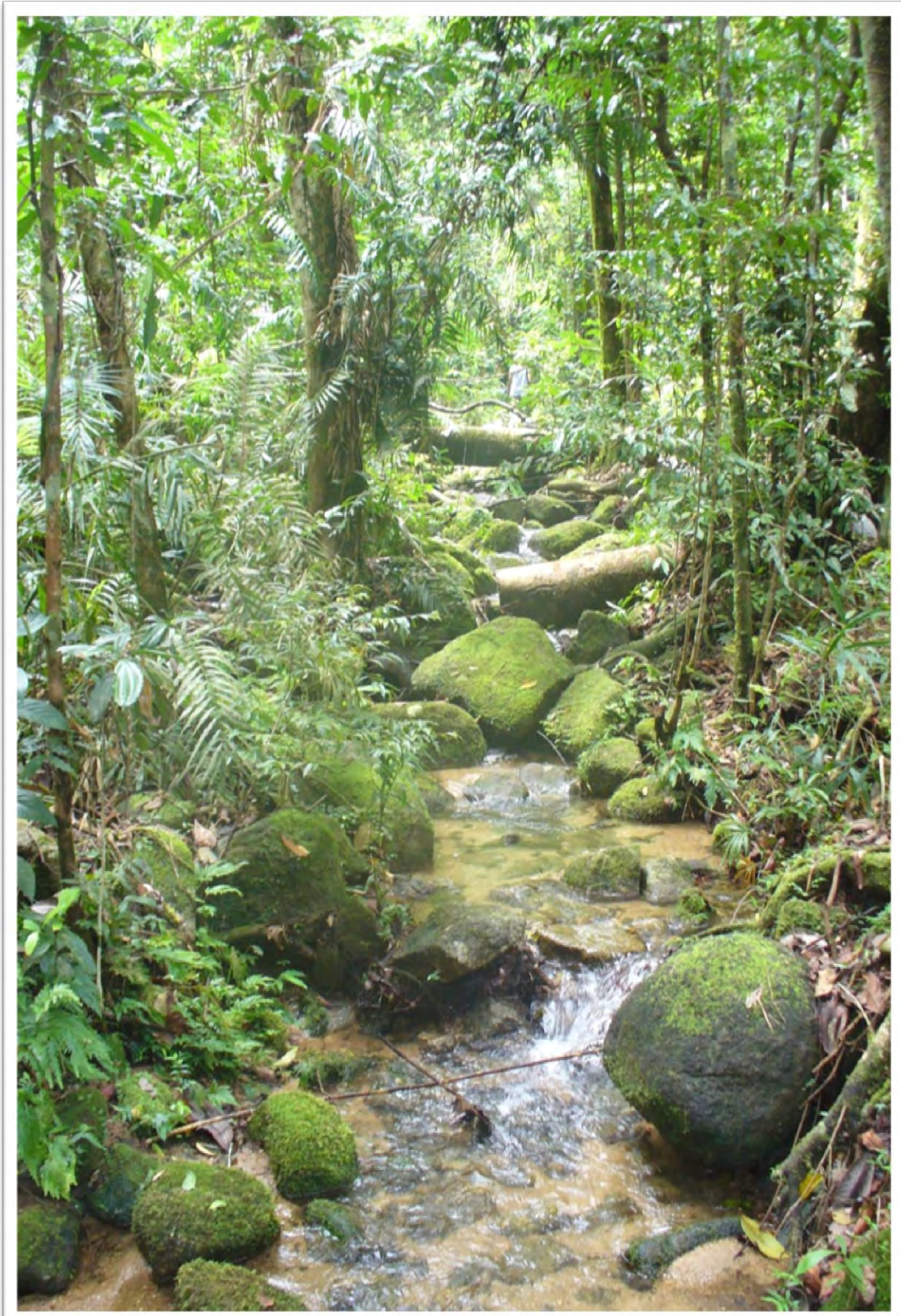
A ‘-’ sign indicates that these people are not particularly concerned by the change (relative to others); a ‘+’ sign indicates that they more concerned than others by the change

Change	Male	Single	Age	Education	QLD born	HH Income	Indigenous	HH size	Government	Agriculture	Mining & Ports	Retail & Tourism
Twice as much rubbish in the rainforest & rivers												
Undeveloped scenery & peacefulness declined											(-)	
Rivers changed from clear to murky	(-)										(-)	
Fewer native plants & animals & twice as many pests & weeds												(+)
Local prices rise by 20% compared to other places in Australia				(-)								(+)
Half as much chance of seeing an iconic animal	(-)								(-)		(-)	
Twice as many tourists												
Half as much time spent with friends & family			(-)							(+)		
Half as many good quality infrastructures				(-)						(+)		
Half as many walking tracks		(-)									(-)	
Half as many cafes, shops, theatres etc.				(-)					(+)			
More public information about Aboriginal cultural values	(-)				(+)						(+)	

Table 16: Statistically significant determinants of responses to our question about likely reaction to hypothetical changes – Tourists

A '-' sign indicates that these people are not particularly concerned by the change (relative to others); a '+' sign indicate that they more concerned than others by the change

Change	Male	Single	Age	Education	QLD	Income	UK	Germany	Rest of Europe	North America	Asia
Twice as much rubbish in the rainforest & rivers								(+)			
Undeveloped scenery & peacefulness declined											(+)
Rivers changed from clear to murky		(+)									(+)
Fewer native plants & animals & twice as many pests & weeds											
Local prices rise by 20% compared to other places in Australia											
Half as much chance of seeing an iconic animal	(-)									(-)	
Twice as many tourists										(+)	
Half as much time spent with friends & family			(+)				(+)	(+)	(+)		(+)
Half as many good quality infrastructures			(+)								
Half as many walking tracks											
Half as many cafes, shops, theatres etc.			(+)						(+)		
More public information about Aboriginal cultural values	(-)	(+)						(+)			



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7 Synthesis and conclusions

The overarching aim of this project was to **improve our understanding of the value which residents and tourists place upon the ecosystem services (ES) provided by the WTWHA**. By considering a broad range of ES and by assessing their importance *relative* to each other and *relative* to other social and economic goods and services, using several different methodological approaches, this study went beyond mere livelihoods and consumptive values, considering the overall contribution of the WTWHA to human well-being. To satisfy the overarching aim, three specific objectives were devised, namely to:

1. Improve our understanding of the relative importance ('value') of various ES provided by the WTWHA to both residents and tourists;
2. Make predictions about the way in which resident and tourist 'values', and thus management, conservation and marketing priorities may alter in the future as both population and tourist numbers change; and
3. Improve methods for assessing 'values' by comparing state-of-the art non-monetary valuation techniques with more 'traditional' valuation techniques.

Addressing *objective 1* first, we found that:

- ❖ Many of the ES provided by the WTWHA (e.g. having healthy native plants and animals, having beautiful undeveloped scenery to look at, being able to go on forest walks, or relax and reflect in a natural setting) are considered, by residents of the catchment, to be more important to their overall quality of life than the jobs and incomes associated with different industries (Section 5.2.1). These ES are not, however, more important than the safety of, and ability to spend time with family and friends;
- ❖ Environmental and recreational values of the WTWHA (particularly undeveloped scenery, and healthy native plants and animals) were also considered, by tourists, to have been more important in their decision to visit the region than other market-related 'values' such as good quality accommodation, quality guided tours and attractions, and/or city entertainment (Section 5.2.1).
- ❖ People are relatively dissatisfied with many of the things they value most (sections 5.2.2 and 5.2.3). The 'gap' between importance and satisfaction is relatively small for tourists, larger for non-Indigenous residents and largest for Indigenous residents – perhaps indicative of the very different reference points used when thinking about 'satisfaction'.
- ❖ Many of the ES provided by the WTWHA are related – perhaps even inextricably linked (section 5.2.4). Most notable is the link between aesthetic values (beauty, peacefulness, ability to relax and reflect), and intrinsic environmental values, such as having healthy native plants and animals, undeveloped regions without rubbish, and beautiful clear streams.
- ❖ Residents and tourists react more negatively to the prospect of environmental degradation (e.g. more pests and weeds, murkier rivers, more rubbish) than to the prospect of a 20% increase in prices. Residents note they would be much less satisfied; tourists note that such changes would mean they would not come to the region at all, or they would stay for a much shorter period of time (section 6.2.2).
- ❖ Almost 20% of Indigenous respondents were unwilling to contribute any amount of money to protect Aboriginal culture or prevent weeds and pests from evading the native flora and fauna, despite these values being in the top five of most important contributors

to their overall quality of life. The (un) willing rate was even higher amongst non-Indigenous residents: between 30% and 50% indicating that they would not be willing to pay anything at all to improve things which they themselves had indicated were vitally important to their overall quality of life. More than a quarter of tourists (31%) were not willing to pay any money towards the maintenance of undeveloped scenery and peacefulness of the area, despite earlier comments about the 'importance' of this in their decision to visit the region (note that the maintenance of undeveloped scenery and peacefulness of the area was ranked the second most important factor on this trip) (section 6.2.1).

As regards *objective 2*, multiple lines of evidence found statistically significant relationships between socio-demographic and economic descriptors of our respondents and their 'values' (expressed in terms of importance or the 'gap' between importance and satisfaction (section 5.2.5), WTP to improve values (section 6.2.1), or stated reaction to a deterioration in those values (section 6.2.3). For example:

- ❖ Gender matters: both male and female residents agree that environmental values are more important to their overall quality of life than other values. However, males seem to attach less 'value' to non-use environmental values and Indigenous cultural values than females. This is true for different 'valuation' approaches, e.g. for 'importance' scores (Table 7, Table 8, Table 9 and Table 10), WTP (Table 12) and Table 13) and stated responses to various hypothetical scenarios (Table 15 and Table 16).
- ❖ Income (and to a lesser extent, education) matters: The higher a resident's income, the less important they felt Indigenous culture and having 'access' to nature were, to their overall quality of life (Table 7). The higher the income of tourists, the less important was sunshine/warmth, the Great Barrier Reef, and being able to see iconic marine and land species (Table 10). Wealthier tourists were also generally less satisfied with a range of different things than the poorer tourists (Table 10). The positive link between income and WTP is not surprising, although it is interesting to note that tourists on high incomes were willing to pay a smaller proportion of their income to protect various environmental and cultural values in the WTWHA than their poorer counterparts.
- ❖ Place of birth / place of origin matters: residents who were born in QLD were likely to feel that family was more important, and city entertainment was less important to their overall quality of life than those born elsewhere (Table 7). The 'values' of tourists originating from QLD were also statistically different from the 'values' of tourists originating from elsewhere in Australia, or from overseas. Environmental and cultural factors were much less important to this group, than to their non-QLD counterparts. In contrast, visitors from Europe felt environmental and cultural values to be more important than other tourists (Table 10).
- ❖ Industry of association matters: Residents who were dependent upon the mining, and ports, or agricultural sectors for their household incomes, generally felt that environmental and cultural values were less important to their overall quality of life (Table 7 and Table 9) (and were willing to pay less to protect them – Table 12) than residents dependent upon other industries. Those associated with mining and ports were also less bothered by the prospect of environmental deterioration than those dependent upon other industries (Table 15).

As such, it is clear that changes in the demographic or economic composition of the residents of, or tourists to, the region will lead to changes in 'values'. An increase in the mining/ports sector, for example, could be associated with a reduction in the community support for protection of intrinsic, aesthetic or Aboriginal cultural values, *relative* to other values. Likewise, a

change in the composition of tourists to the region, with more 'locals' (specifically, visitors from QLD) compared to visitors from elsewhere in Australia, could mean a lesser appreciation of those same values.

As regards *objective 3*:

- ❖ We assessed 'values' using a variety of different methods. We asked people to tell us how important various factors are to their overall quality of life, how satisfied they are with those things, how much they were WTP to help improve those things and how they would react to a deterioration in them. Although specifics vary across methods, the general message, that family is more important than the environment which is more important than the economy is consistent. So too, are the findings that 'values' differ across individual, key determinants being gender, income, industry of association and origin.
- ❖ There is often considerable resistance, by respondents, to questions about WTP. Recent decades has seen a substantive growth in the literature about ways to deal with 'protest votes', and (in the related choice modelling literature) 'non-attendance to attributes'. Our research suggests that a parallel line of enquiry may prove fruitful – that which focuses on importance/satisfaction and contingent behaviour/responses (rather than contingent valuation) – since final results are remarkably similar, and these types of valuation approaches are met with much less resistance by respondents.
- ❖ We also note that our analysis of the relationships between values, suggests that many individual values are related, and may be inextricably linked. We demonstrated two different methods of identifying those linkages, but note that other useful lines of enquiry may be to assess 'values' at a fairly broad level, rather than conducting detailed 'micro-level' studies of individual values. Specifically, instead of attempting to assess the 'value' of long lists of factors or the 'value' of specific things such as a forest track, without context, one could, for example, assess a broad group of non-consumptive environmental values (including aesthetics, and non-use values), a broad group of recreational values, &/or a broad group of productive values.
- ❖ Context and relationships matter; valuation methods that abstract from that, may lead one to believe that final estimates are much more precise than they in fact are. It is having information about the importance (or 'value') of things relative to each other that is likely to be most useful to decision and policy makers. Absolute 'values' (e.g. precise measures of WTP) will, like other prices and exchange rates, fluctuate, perhaps markedly, over time and space. Information about specific 'values' may therefore be somewhat less useful than relative measures of broad trends in related values over time.

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Appendix 1: The Tropical Ecosystems Hub research

Theme 1: Assessing Ecosystem Condition and Trend

Program 1 — Historical and current condition of the Great Barrier Reef (GBR)

- 1.1 Monitoring status and trends of coral reefs of the GBR
- 1.2 Marine wildlife management in the Great Barrier Reef World Heritage Area
- 1.3 Characterising the cumulative impacts of global, regional and local stressors on the present and past biodiversity of the GBR

Program 2 — Natural Resources of the Torres Strait land and sea

- 2.1 Marine turtles and dugongs of the Torres Strait
- 2.2 Mangrove and freshwater habitat status of Torres Strait Islands
- 2.3 Monitoring the health of Torres Strait coral reefs

Program 3 — Condition and trends of North Queensland rainforests

- 3.1 Rainforest biodiversity
- 3.2 Rainforest refugia and hotspots of plant genetic diversity in the Wet Tropics and Cape York Peninsula
- 3.3 Targeted surveys for missing and critically endangered rainforest frogs in ecotonal areas, and assessment of whether populations are recovering from disease
- 3.4 Monitoring of key vertebrate species

Theme 2: Understanding Ecosystem Function and Cumulative Pressures

Program 4 — Water quality of the Great Barrier Reef and Torres Strait

- 4.1 Tracking coastal turbidity over time and demonstrating the effects of river discharge events on regional turbidity
- 4.2 The chronic effects of pesticides and their persistence in tropical waters
- 4.3 Ecological risk assessment for water quality of the GBR
- 4.4 Hazard assessment for water quality threats to Torres Strait marine waters, ecosystems and public health

Program 5 — Cumulative impacts on benthic biodiversity

- 5.1 Understanding GBR diversity: spatial and temporal dynamics and environmental drivers
- 5.2 Combined water quality–climate effects on coral and other reef organisms
- 5.3 Vulnerability of seagrass habitats in the GBR to changing coastal environments

Program 6 — Movements and habitat use by marine apex predators

- 6.1 Maximising the benefits of mobile predators to GBR ecosystems: the importance of movement, habitat and environment
- 6.2 Drivers of juvenile shark biodiversity and abundance in inshore ecosystems of the GBR
- 6.3 Critical seabird foraging locations and trophic relationships for the GBR

Program 7 — Threats to rainforest health

- 7.1 Fire & rainforests
- 7.2 Invasive species risks and responses in the Wet Tropics
- 7.3 Climate change and the impacts of extreme events on Australia's Wet Tropics biodiversity

Theme 3: Managing for Resilient Tropical Systems

Program 8 — Effectiveness of spatial management on the GBR

- 8.1 Monitoring the ecological effects of GBR zoning plan on mid and outer shelf reefs
- 8.2 Assessing the long-term effects of management zoning on inshore reef of the GBR
- 8.3 Significance of no-take marine protected areas to regional recruitment and population

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- persistence on the GBR
 - Program 9 — Decision support systems for GBR managers
 - 9.1 Decision support tools to identify (and map) bleaching resistant areas within the GBRMP
 - 9.2 Design and implementation of management strategy evaluation for the GBR
 - 9.3 Prioritising management actions for GBR islands
 - 9.4 Spatial planning for coastal development in the GBR region
 - Program 10 — Socio-economic value of GBR goods and services
 - 10.1 Social and economic long-term monitoring program
 - 10.2 Socio-economic system and reef resilience
 - Program 11 — Resilient Torres Strait communities
 - 11.1 Building resilient communities for Torres Strait futures
 - 11.2 Improved approaches for the detection and prevention of wildlife diseases in the Torres Strait
 - Program 12 — Managing for resilience in rainforests
 - 12.1 Indigenous peoples and protected areas
 - 12.2 Harnessing natural regeneration for cost-effective rainforest restoration
 - 12.3 Relative social and economic values of residents and tourists in the WTWHA
 - 12.4 Governance, planning and the effective application of emerging ecosystem service markets: climate change adaptation and landscape resilience
 - Program 13 — Australia's Tropical Land and Seas (e-ATLAS)
 - 13.1 e-Atlas (GBR)
 - 13.2 Torres Strait e-atlas — a data platform for resource managers, researchers and the Torres Strait community
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Appendix 2: Natural criteria for World Heritage listing and how the WTWHA satisfies each

Criteria	Description
<i>Criterion (vii):</i> to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	The Wet Tropics exhibit exceptional natural beauty, with superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery. This is particularly apparent between the Daintree River and Cedar Bay, where exceptional coastal scenery combines tropical rainforest and white sandy beaches with fringing offshore coral reefs. The winding channels of the Hinchinbrook Channel contain the most extensive mangroves in the region, providing a rich visual mosaic of rainforest and mangroves, and a terrestrial continuum with the Great Barrier Reef.
<i>Criterion (viii):</i> to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features	The Wet Tropics contains one of the most complete and diverse living records of the major stages in the evolution of land plants, from the very first pteridophytes more than 200 million years ago to the evolution of seed-producing plants including the cone-bearing cycads and southern conifers (gymnosperms), followed by the flowering plants (angiosperms). As the Wet Tropics is the largest part of the entire Australasian region where rainforests have persisted continuously since Gondwanan times, its living flora, with the highest concentration of primitive, archaic and relict taxa known, is the closest modern-day counterpart for Gondwanan forests. In addition, all of Australia's unique marsupials and most of its other animals originated in rainforest ecosystems, and the Wet Tropics still contains many of their closest surviving members. This makes it one of the most important living records of the history of marsupials as well as of songbirds.
<i>Criterion (ix):</i> to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	The Wet Tropics provides outstanding examples of significant ongoing ecological processes and biological evolution. As a centre of endemism for the region (second only to New Caledonia in the number of endemic genera per unit area), the Wet Tropics provides fundamental insights into evolutionary patterns both in isolation from and in interaction with other rainforests. Its tall, open forests on the drier western margins of the rainforest are also significant as part of an evolutionary continuum of rainforest and sclerophyll forests. Eucalypts, that now dominate the Australian landscape, are considered to have evolved from such rainforest stock and radiated into drier environments from the margins of closed forests. The area supports an exceptionally high level of diversity of both flora and fauna, with over 3,000 vascular plant species in 224 families, of which 576 species and 44 genera are endemic, including two endemic plant families. Vertebrate diversity and endemism are also very high, with 107 mammal species including 11 endemic species and two monotypic endemic genera. In terms of avifauna, there are 368 bird species, of which 11 species are endemic. For reptiles, there are 113 species of which 24 species are endemic, including three monotypic endemic genera. The diversity of amphibians includes 51 species of which 22 are endemic.
<i>Criterion (x):</i> to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The Wet Tropics holds a largely intact flora and fauna with hundreds of endemic species restricted to the property, of which many are classified as threatened. The majority of plant species have restricted distributions, and many monotypic plant genera and several species of marsupials, frogs and reptiles have very restricted distributions either as isolated or disjunct populations, reflecting the refugial nature of the rainforests found in several locations. The diversity of the plant communities and animal habitats of the Wet Tropics is recognised as being the most floristically and structurally diverse in Australia and is also outstanding on a global scale. Among many emblematic species occurring in the property is the flightless Australian cassowary, one of the largest birds in the world. In an Australian context, the Wet Tropics covers less than 0.2% of Australia, but contains 30% of the marsupial species, 60% of bat species, 25% of rodent species, 40% of bird species, 30% of frog species, 20% of reptile species, 60% of butterfly species, 65% of fern species, 21% of cycad species, 37% of conifer species, 30% of orchid species and 18% of Australia's vascular plant species. It is therefore of great scientific interest and of fundamental importance to conservation. Although the Wet Tropics is predominantly wet tropical rainforest, it is fringed and in a few places dissected by sclerophyll forests, woodlands, swamps and mangrove forests, adding to its diversity.

Source: <http://whc.unesco.org/en/criteria/>

Appendix 3: List of presentations related to this project

Event and location	Presenter/s
Rainforest Implementation group meeting August 2012, Cairns	Natalie Stoeckl
Rainforest Implementation group meeting January 2013, Cairns	Michelle Esparon
NERP & RRRC conference May 2013, Cairns	Natalie Stoeckl & Michelle Esparon
Rainforest Researchers & Traditional Owners - Knowledge Translation April 2013, Cairns	Natalie Stoeckl
SEWPAC Engagement Day June 2013, Canberra	Natalie Stoeckl
Rainforest Implementation group meeting August 2013, Cairns	Michelle Esparon
Youth Leadership Dialogue August, Townsville	Natalie Stoeckl
Regional Development Australia – North Queensland & Torres Strait August, Cairns	Natalie Stoeckl
NERP On-country Day November, Genazzano Lake Tinaroo Conference Centre	Natalie Stoeckl & Michelle Esparon
Wet Tropics Tour Guides Field School December 2013, Tully	Michelle Esparon
Guest Lecture – JCU January, 2014	Michelle Esparon
Rainforest Implementation group meeting February 2014, Cairns	Michelle Esparon
TEH RIP April, Canberra	Natalie Stoeckl
JCU weekly seminar April 2014, Townsville	Natalie Stoeckl
GBRMPA weekly seminar May 2014, Townsville	Natalie Stoeckl
Stakeholder meetings June 2014, Brisbane	Natalie Stoeckl, Michelle Esparon, Marina Farr & Renae Tobin
State of the Region Forum July 2014, Cairns	Natalie Stoeckl
Rainforest Implementation group meeting August 2014, Cairns	Michelle Esparon
CSIRO & JCU weekly seminar August 2014, Townsville	Natalie Stoeckl
Stakeholder meetings September 2014, Cairns	Natalie Stoeckl, Michelle Esparon, Michelle Thompson & Bruce Prideaux
Conservation planning group retreat September 2014, Townsville	Natalie Stoeckl, Michelle Esparon, Marina Farr, Diane Jarvis & Putu Mustika
JCU Early Career Researcher Conference September 2014, Townsville	Michelle Esparon
TEDx Cairns Institute October 2014, Cairns	Natalie Stoeckl
NERP & RRRC conference November 2014, Cairns	Natalie Stoeckl & Michelle Esparon

Appendix 4: Resident survey



What do YOU like most about the Wet Tropics World Heritage Area?



Address



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Dear ...,

My name is Natalie. I am a researcher at James Cook University, and I am working on a project (funded by the *National Environmental Research Program*) which seeks to learn more about what people think is most (and least) important about the Wet Tropics World Heritage Area (WTWHA).

Managers (in both the private and public sector) often have to make choices about development or conservation in this region. But managers do not always know what people think is important when making those choices. This research project hopes to help fix that. **This is your chance to be heard.** Specifically, we hope to find out:

- ❖ What you do in the WTWHA – visiting waterfalls, swimming, camping ...?
- ❖ What you think is important about the WTWHA – the scenery, the uniqueness of the rainforest, and/or the tourism jobs associated with the region ...?
- ❖ How satisfied you are with your chances to enjoy the things you think are 'important'?
- ❖ How you would feel if things changed – e.g. if prices rose, if more tourists came to the region, if water quality got worse?
- ❖ If you think it is worth 'paying' to protect the WTWHA (or whether you would prefer to spend your money on other things).

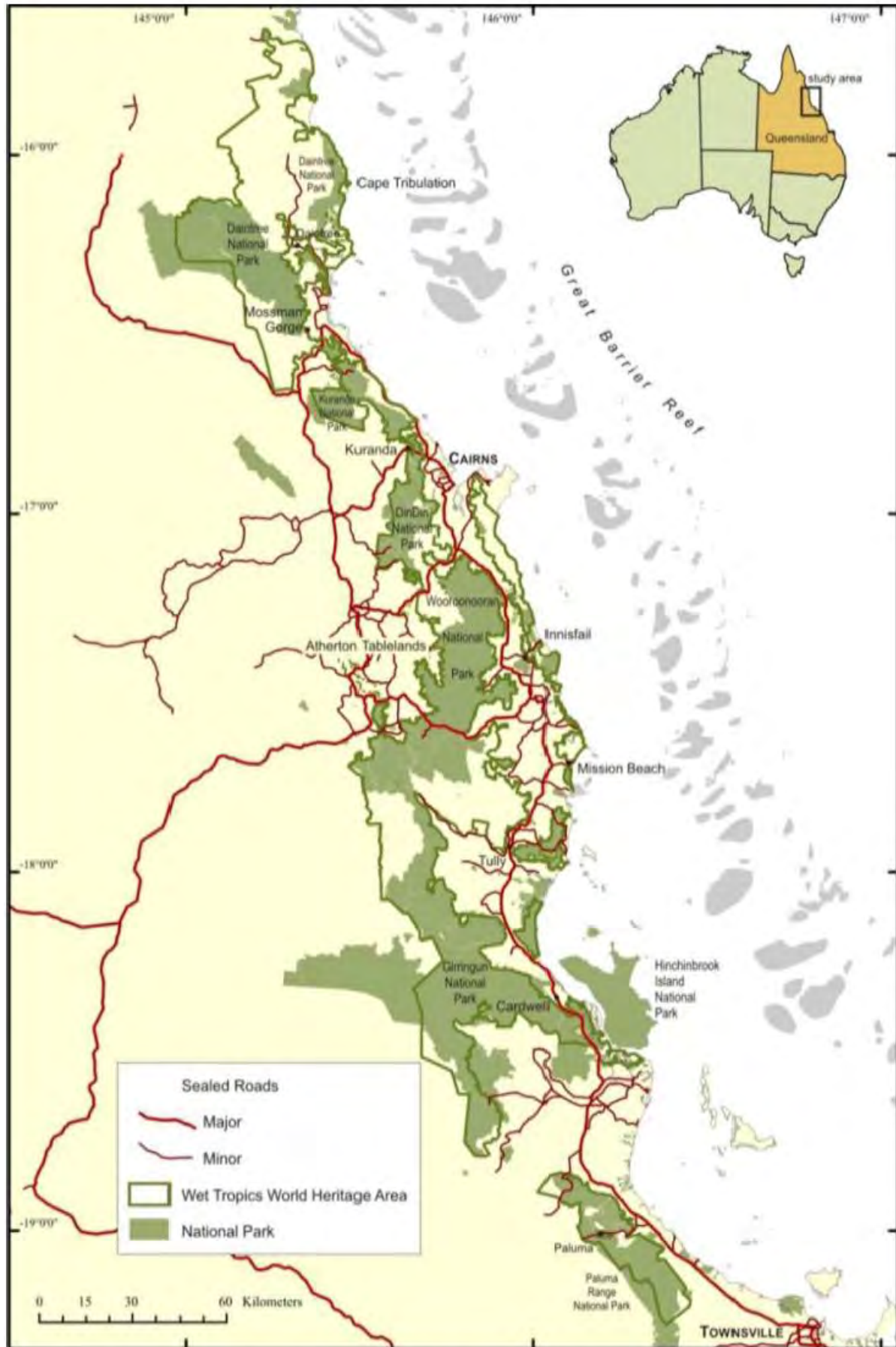
We are asking about 500 people who live within and around the WTWHA the same set of questions (all randomly selected from a large database). When finished, we should have some good information that will help managers make decisions about this area.

We would be very grateful if one person in your house could complete the questionnaire, and then mail it back to us in the enclosed reply-paid envelope. But please remove this letter before posting – it has your name and address on it and we **don't want anyone to be able to link those details to your answers**. It should take no more than 15-20 minutes to complete.

All of the information we collect will be kept **strictly confidential**. Results will only be released in summary form (e.g. saying that 25% of residents think that fishing is important), and answers will be stored separately from names and addresses, so no one can ever find out 'who said what'.

Should you have any questions about the project, or if you are interested in seeing the results please contact me: **Phone: 07 4781 4868 or email: Natalie.Stoeckl@jcu.edu.au**.

I thank you in advance for your help.



The Wet Tropics World Heritage Area (WTWHA) and surrounding areas

WET TROPICS WORLD HERITAGE AREA - Resident Survey A1

13

The Wet Tropics World Heritage Area (WTWHA) extends from near Cooktown in the north to near Townsville in the south and borders the Great Barrier Reef World Heritage Area (GBRWHA). It contains almost 900,000 hectares of tropical rainforest with a distinctive and diverse collection of plants and animals ([see map on the preceding page](#)). The area is famous for its exceptional natural beauty, comprising of spectacular landscapes and landforms such as waterfalls, rugged gorges, and crater lakes. It is also the traditional estate of 20 Tribal Groups and its cultural values have been recently added to the National Heritage Listing. This survey seeks the views of residents living within and around the WTWHA ...

1. Where do you usually live? ☐ Australia, which postcode? _____

2. The table below lists some regions within the WTWHA. Please indicate which area you have been to or would really like to go to.

Regions of the WTWHA		Have been to this area	Have not been, but would really like to go
Cooktown		☐	☐
Bloomfield		☐	☐
Cape Tribulation		☐	☐
Tablelands	North (e.g. Mareeba)	☐	☐
	Central (e.g. Atherton, Yungaburra)	☐	☐
	South (e.g. Ravenshoe, Mt Garnett)	☐	☐
	West (Herberton)	☐	☐
Daintree		☐	☐
Kuranda		☐	☐
Mossman Gorge		☐	☐
Innisfail/Wooroonooran/Palmerston		☐	☐
Mission Beach/Tully/Cardwell		☐	☐
Paluma		☐	☐
If you have been to these areas, which one was your favourite?			
.....			

3. Please tell us how often you do each of the following in the WTWHA. (Tick one box in each row)

	Almost every day	About once a week	About once a month	3-4 times a year	About once a year	Rarely	I have never done this
Spend time visiting key (free) rainforest attractions (e.g. crater lakes, curtain fig tree)	☐	☐	☐	☐	☐	☐	☐
Spend time visiting waterfalls, swimming and/or participating in river-based activities (e.g. white water rafting, canoeing, kayaking)	☐	☐	☐	☐	☐	☐	☐
Spend time camping in the WTWHA	☐	☐	☐	☐	☐	☐	☐
Spend time driving along the scenic routes	☐	☐	☐	☐	☐	☐	☐
Spend time enjoying the scenic beauty & peacefulness of the rainforest (sights, sounds & smell)	☐	☐	☐	☐	☐	☐	☐
Spend time with Aboriginal Traditional Owners learning about culture and country	☐	☐	☐	☐	☐	☐	☐
Spend time bush walking/hiking	☐	☐	☐	☐	☐	☐	☐
Spend time mountain biking/horse-riding	☐	☐	☐	☐	☐	☐	☐
Spend time quad biking or four-wheel driving	☐	☐	☐	☐	☐	☐	☐
Pay for a tour or to visit an attraction within the WTWHA (e.g. zoos, jungle surfing, skyrail)	☐	☐	☐	☐	☐	☐	☐
Spend time doing other activities not listed here. Please specify below	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐

1 | Page

4. The following question comprises two parts. First, please tell us how IMPORTANT are each of the following items to YOUR OVERALL QUALITY OF LIFE? (Tick one box in each row – from very important to very unimportant). Second, tell us how SATISFIED are you with each of the item? (Tick one box in each row – from very satisfied to very unsatisfied).

[illegible]

5. Are any of the items or groups of items in the table so important to you that you would move away from the region if it were not here or if it deteriorated? ☐ No ☐ Yes, please tell us what it is

6. To provide us with some background context, please think about your own life and personal circumstances. How satisfied are you with your life as a whole? (Tick one box)

Very satisfied	Neutral				Very unsatisfied	I do not know
☐	☐	☐	☐	☐	☐	☐

What is the reason you feel this way?

7. How would each of the following affect your overall quality of life / satisfaction? (Tick one box in each row)

	I would be much more satisfied	I would be much less satisfied	I do not know
	☐	☐	☐
If local prices rose by 20% compared to other places in Australia	☐	☐	☐
If there were twice as much rubbish (e.g. bottles, plastic) in the rainforest & in the rivers	☐	☐	☐
If there was half as much chance of seeing an iconic animal (e.g. cassowary, kangaroo, rifle birds, musky-rat kangaroo)	☐	☐	☐
If there were fewer native plants & animals to look at & twice as many pests & weeds	☐	☐	☐
If there were half as many walking tracks	☐	☐	☐
If there were twice as many tourists	☐	☐	☐
If the rivers changed from clear to murky	☐	☐	☐
If the undeveloped scenic beauty & peacefulness of the area declined	☐	☐	☐
If you could spend only half as much time with friends & family (compared to now)	☐	☐	☐
If there were half as many cafés, shops, theatres, etc. in your local area	☐	☐	☐
If there were half as many good quality roads, hospitals & schools in your local area	☐	☐	☐
If there was more public information about Aboriginal cultural values of the area	☐	☐	☐

8. The rainforests of the Wet Tropics faces many threats. Some of these are beyond our control (e.g. cyclones), but not all. For example, we could choose to spend more money controlling pests and less on something else. If a fund was set up to help solve the problems listed below, what is the maximum amount (out of your total household income) you would be willing to donate each and every year to that fund? (You could ask for the money to be deducted from your wages/salary/pension, or pay it as a lump sum once a year.)

When answering, please consider your household's current financial situation and also consider how much all your donations add up to if donating to more than one problem. (Tick one box in each row)

	Money willing to donate EACH YEAR											
	\$0	\$2	\$5	\$10	\$25	\$30	\$50	\$75	\$100	\$250	\$500	More than \$500
Protecting native plants and animals from weeds & pests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining undeveloped scenic beauty & peacefulness of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining quality & clarity of rivers & streams	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Protecting the Aboriginal cultural values of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----

9. How much do you agree or disagree with each of the following statements? (Tick one box in each row)

	Strongly agree		Neutral		Strongly disagree	I do not know
I am willing to volunteer my time to care for the WTWHA	☐	☐	☐	☐	☐	☐
Only people who live near or visit the WTWHA have a responsibility to care for it	☐	☐	☐	☐	☐	☐
I am not prepared to pay money to protect the WTWHA unless	☐	☐	☐	☐	☐	☐
All WTWHA users pay too	☐	☐	☐	☐	☐	☐
People throughout Australia pay too	☐	☐	☐	☐	☐	☐
People throughout the world pay too	☐	☐	☐	☐	☐	☐
I am not prepared to take costly steps to protect the WTWHA – those efforts are a waste of time in the face of natural disasters and climate change	☐	☐	☐	☐	☐	☐

Finally, we would like to collect background information that is used to test if different people (e.g. males, those on high incomes, etc.) feel differently about the WTWHA.

10. What gender are you? ☐ Male ☐ Female
11. What is your marital status ☐ Single ☐ Married or in partnership ☐ Other
12. In what year were you born? (Write the year) 19_____
13. Where were you born? ☐ Australia, which town? _____ and state? _____ ☐ Overseas, which country _____
14. How many people, including yourself, normally live in your household? Adults _____ Children (16 and younger) _____
15. Are you or any of the people who normally live with you Rainforest Aboriginal persons or other Aboriginal and/or Torres Strait persons? (Tick as many boxes as apply)
☐ Yes - Rainforest Aboriginal ☐ Yes - Other Aboriginal &/or Torres Strait Islander ☐ No
16. What is the highest level of education that you have completed? (Tick one box)
☐ Primary school ☐ High school (year 12) ☐ University or higher
☐ High school (year 10) ☐ Trade / apprenticeship ☐ Other (please specify) _____
17. Do you make contributions to, or volunteer for any conservation organizations? (Tick all that apply)
☐ Yes, International Conservation Organizations ☐ Yes, National & Local Conservation Organizations
☐ Yes, Rainforest Aboriginal Organizations ☐ No
18. Please indicate which of the industries listed below is the main source (i.e. most important source) of your household's income? (Tick one box)
☐ Retail (e.g. shops) ☐ Agriculture and Forestry ☐ Fishing
☐ Accommodation, cafes and restaurants ☐ Manufacturing ☐ Mining
☐ Government, Health and Education ☐ Tourism industry (other than above) ☐ Ports
☐ None - our household earns most of its money from other sources ☐ I do not know
19. On average, how much pre-tax income does your household earn each year? (Tick one box)
☐ \$1 to \$20 000 ☐ \$60 000 to \$80 000 ☐ \$150 000 to \$200 000
☐ \$20 000 to \$40 000 ☐ \$80 000 to \$100 000 ☐ above \$200 000
☐ \$40 000 to \$60 000 ☐ \$100 000 to \$150 000 ☐ prefer not to specify ☐ I do not know

Thank you for your help 😊

Appendix 5: Tourist survey



What do YOU like most about the Wet Tropics World Heritage Area?



The Wet Tropics World Heritage Area (WTWHA) extends from near Cooktown in the north to near Townsville in the south and borders the Great Barrier Reef World Heritage Area (GBRWHA). It contains almost 900,000 hectares of tropical rainforest with a distinctive and diverse collection of plants and animals. The area is famous for its exceptional natural beauty, comprising of spectacular landscapes and landforms such as waterfalls, rugged gorges, and crater lakes. It is also the traditional estate of 20 Tribal Groups and its cultural values have been recently added to the National Heritage Listing.



Tourism operators, local governments, park managers and others have to make decisions about how to use or manage the region. But they have a problem: it is difficult for them to know what is 'right' without having good information about the area, and about the likes and dislikes of the people who live near it, or who visit it.



A team of researchers from James Cook University are helping to fix that problem by conducting a large study about the likes and dislikes of residents and tourists in the Wet Tropics.



We hope you will agree to be part in this study by answering some questions about:

- ❖ Where you have been and what you did while in this area;
- ❖ What you enjoyed most whilst here; and
- ❖ What made you decide to come here



We would also like you to tell us a little bit about yourself and the people you are travelling with (e.g. what country/town you are from, how many people you are travelling with, etc.), and how much you spent on different things while here.

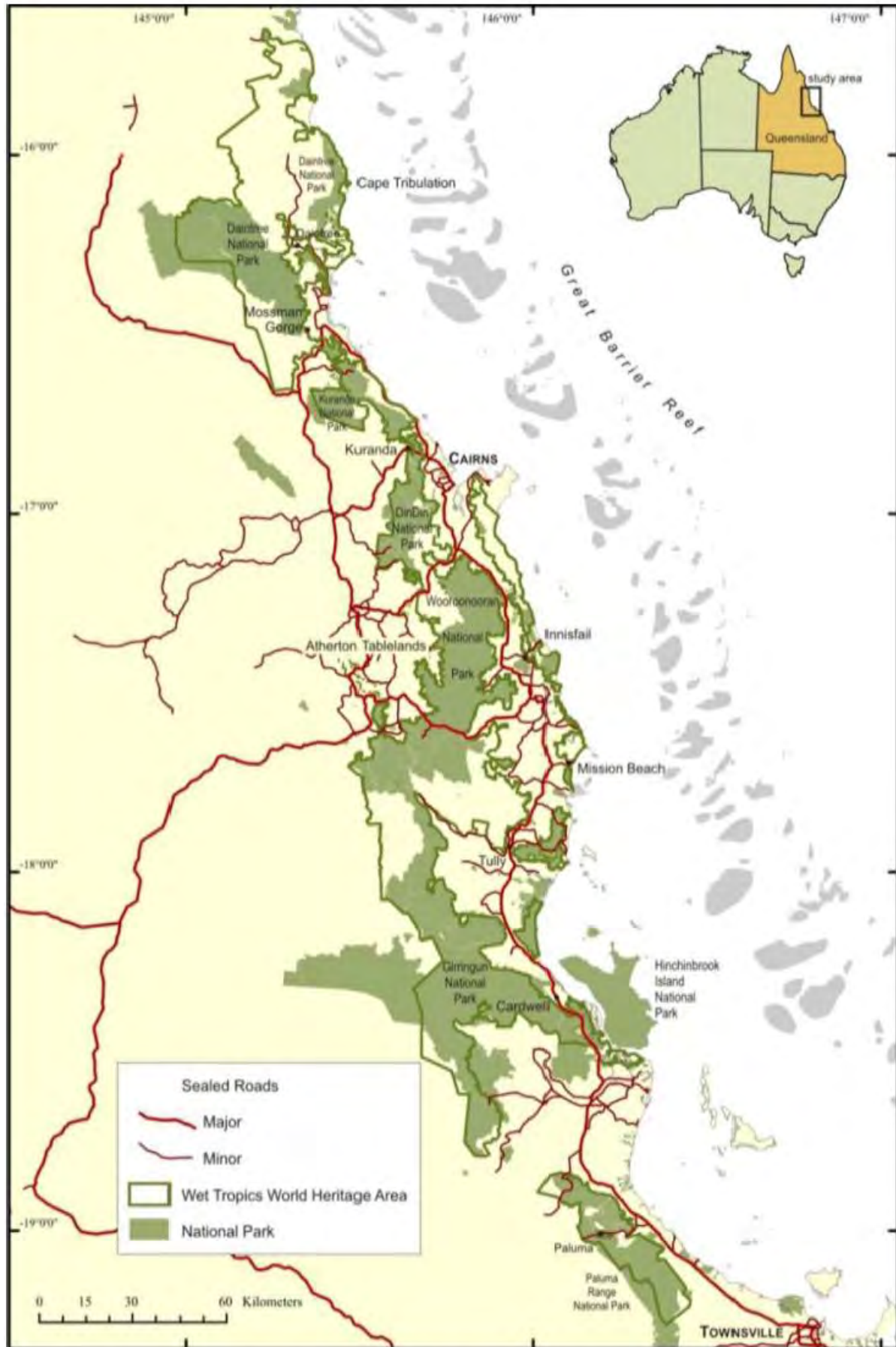
*Note: we DO NOT ask your name or addresses – so all information is **anonymous**.*



We plan to collect this information from at least 500 visitors, and will also ask similar questions from about 500 residents. We will provide a summary of that information to tourism operators, government officials, park managers and others. This will help them look after the area, its residents and its visitors, in the best possible way.

For more information, or if you are interested in seeing the results please contact Natalie Stoeckl on 07 4781 4868 or email: Natalie.Stoeckl@jcu.edu.au.

Should you have any concerns about the ethical conduct of this survey, please contact: Helen Griffiths, Ethics Officer, Research Office, James Cook University, Townsville, QLD 4811, Tel: 07 4781 6575; Email: Helen.griffiths@jcu.edu.au
Photos courtesy: Wet Tropics Management Authority, Mike Trener, Skyrail Rainforest Cableway, Tourism Queensland, Environment Protection Authority



The Wet Tropics World Heritage Area (WTWHA) and surrounding areas

LOCATION:

Date:

WTWHA TOURISM - AB1

1. Where do you usually live?
☐ Australia, which postcode? _____ ☐ Overseas, which country? _____
2. Have you ever visited the WTWHA?
☐ No (go to question 6, page 2) ☐ Yes
3. How long did you spend in the WTWHA on your most recent trip?
☐ Half a day or less ☐ About a day ☐ 1 night
☐ 2-3 nights ☐ 4 nights or more ☐ Do not remember
4. The table below lists some regions within the WTWHA. Please indicate which ones you have visited or intend to visit during your trip to the region. If you have visited these regions, please indicate if it was a day trip only, and if you spent some nights there, how many?

Regions of the WTWHA	Have visited	Intend to visit	How long was your visit or how long do you intend to visit	
			Day visit only	At least some nights. If so, how many?
Cooktown	☐	☐	☐	
Bloomfield	☐	☐	☐	
Cape Tribulation	☐	☐	☐	
Tablelands	North (e.g. Mareeba)	☐	☐	
	Central (e.g. Atherton, Yungaburra)	☐	☐	
	South (e.g. Ravenshoe, Mt Garnett)	☐	☐	
	West (Herberton)	☐	☐	
Daintree	☐	☐	☐	
Kuranda	☐	☐	☐	
Mossman Gorge	☐	☐	☐	
Innisfail/Wooroonooran/Palmerston	☐	☐	☐	
Mission Beach/Tully/Cardwell	☐	☐	☐	
Paluma	☐	☐	☐	

5. In total, about how often did you do each of the following ON THIS TRIP? (Tick one in each row).
 If you have not finished your trip, please tell us how often you THINK you will end up doing them.

	Never	Once	Twice	3 times	4 times	5 times	More than 5 times
Spend time visiting key (free) rainforest attractions (e.g. crater lakes, curtain fig tree)	☐	☐	☐	☐	☐	☐	☐
Spend time visiting waterfalls, swimming and/or participating in river-based activities (e.g. white water rafting, canoeing, kayaking)	☐	☐	☐	☐	☐	☐	☐
Spend time camping in the WTWHA	☐	☐	☐	☐	☐	☐	☐
Spend time driving along the scenic routes	☐	☐	☐	☐	☐	☐	☐
Spend time enjoying the scenic beauty & peacefulness of the rainforest (sights, sounds & smell)	☐	☐	☐	☐	☐	☐	☐
Spend time with Aboriginal Traditional Owners learning about culture and country	☐	☐	☐	☐	☐	☐	☐
Spend time bush walking/hiking	☐	☐	☐	☐	☐	☐	☐
Spend time mountain biking/horse-riding	☐	☐	☐	☐	☐	☐	☐
Spend time quad biking or four-wheel driving	☐	☐	☐	☐	☐	☐	☐
Pay for a tour or to visit an attraction within the WTWHA (e.g. zoos, jungle surfing, skyrail)	☐	☐	☐	☐	☐	☐	☐
Spend time doing other activities not listed here. Please specify below	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐	☐

6. The following question comprises two parts. First, please tell us how IMPORTANT were each of the following factors when you made your decision to come to this part of Australia **ON THIS TRIP?** (Tick one box in each row – from very important to very unimportant). Second, tell us how SATISFIED have you been with each item below **ON THIS TRIP?** (Tick one box in each row – from very satisfied to very unsatisfied).

		IMPORTANCE			SATISFACTION			
		Very important	Neutral	Very unimportant	Very satisfied	Neutral	Very unsatisfied	I do not know
 	Finding a place where the price matched my budget	☐	☐	☐	☐	☐	☐	☐
	Visiting a place which is close to where I live	☐	☐	☐	☐	☐	☐	☐
	Having good quality accommodations, shops & restaurants	☐	☐	☐	☐	☐	☐	☐
	Having quality guided tours &/or attraction venues	☐	☐	☐	☐	☐	☐	☐
	Being able to access the rainforest via:							
	Walking tracks &/or dirt roads	☐	☐	☐	☐	☐	☐	☐
	Bitumen roads & bridges	☐	☐	☐	☐	☐	☐	☐
	Rail/Skyrail	☐	☐	☐	☐	☐	☐	☐
 	Being able to:							
	Learn more about a unique & ancient Australian environment	☐	☐	☐	☐	☐	☐	☐
	Hear from Aboriginal people about their sense of place (culture & country)	☐	☐	☐	☐	☐	☐	☐
	Go on rainforest walks	☐	☐	☐	☐	☐	☐	☐
	Visit waterfalls &/or swim in clear, clean rivers/streams/waterholes	☐	☐	☐	☐	☐	☐	☐
	See iconic species in the wild (e.g. cassowary, kangaroos, rattle birds, etc.)	☐	☐	☐	☐	☐	☐	☐
	Relax and/or reflect in a natural environment	☐	☐	☐	☐	☐	☐	☐
	Enjoy uncrowded camping & picnic areas	☐	☐	☐	☐	☐	☐	☐
	Enjoy the scenic beauty & peacefulness of the rainforest (sights, sounds & smell)	☐	☐	☐	☐	☐	☐	☐
	Go to the Great Barrier Reef World Heritage Area (GBRWHA)	☐	☐	☐	☐	☐	☐	☐
	See iconic marine species (e.g. whales, dugongs, turtles)	☐	☐	☐	☐	☐	☐	
	Enjoy sunshine & warmth	☐	☐	☐	☐	☐	☐	
 	Having:							
	Healthy native plants & animals (e.g. free from diseases, pests & weeds)	☐	☐	☐	☐	☐	☐	☐
	Beautiful undeveloped scenery to look at	☐	☐	☐	☐	☐	☐	☐
	Two world heritage sites side-by-side (i.e. the WTHA and the GBRWHA)	☐	☐	☐	☐	☐	☐	☐
	Protecting:							
	Places that have Aboriginal cultural values	☐	☐	☐	☐	☐	☐	☐
	Places that have other cultural values (e.g. European/Asian)	☐	☐	☐	☐	☐	☐	☐
	The WTHA either for its own sake or for future generations (even if you have never been there or never plan to go)	☐	☐	☐	☐	☐	☐	
 	Being able to:							
	Spend time with friends & family	☐	☐	☐	☐	☐	☐	☐
	Enjoy city-entertainment (e.g. spending time at cafés, museums, etc.)	☐	☐	☐	☐	☐	☐	☐
	Attend to business, go to meeting/conference	☐	☐	☐	☐	☐	☐	☐
	Join in local activities (e.g. attend cultural/environmental festivals)	☐	☐	☐	☐	☐	☐	☐
	Knowing that:							
	You & travelling companions are healthy & safe	☐	☐	☐	☐	☐	☐	☐
	Good quality roads, hospitals, etc. are there if need be	☐	☐	☐	☐	☐	☐	

7. To provide us with some background context, please think about the time you have spent in/near the WTWHA ON THIS TRIP. How satisfied are you with your experience as a whole? (Tick one box)

Very satisfied	Neutral			Very unsatisfied	I do not know
☐	☐	☐	☐	☐	☐

What is the reason you feel this way?

.....

8. So far, how well has this trip met your expectations? (Tick one box)

Well above my expectations	Neutral			Well below my expectations	I do not know
☐	☐	☐	☐	☐	☐

9. How likely is it that you will return to visit the region in the future? (Tick one box)

Will definitely return	Neutral			Will definitely NOT return	I do not know
☐	☐	☐	☐	☐	☐

If you returned, what is something you would like to do that you missed out this time?

.....

10. How would the following hypothetical change have affected your decisions to visit this part of Australia (i.e. near the WTWHA)?

	POSITIVE IMPACT I may have stayed longer	ALMOST NO IMPACT This would not have affected my decision at all	SOME IMPACT I would have still visited but reduced the length of my stay by about			HUGE NEGATIVE IMPACT I would not have come at all	I do not know
			25%	50%	75%		
If local prices rose by 20% compared to other places in Australia	☐	☐	☐	☐	☐	☐	☐
If there were twice as much rubbish (e.g. bottles, plastic) in the rainforest & in the rivers	☐	☐	☐	☐	☐	☐	☐
If there was half as much chance of seeing an iconic animal (e.g. cassowary, kangaroo, rifle birds)	☐	☐	☐	☐	☐	☐	☐
If there were fewer native plants & animals to look at & twice as many pests & weeds	☐	☐	☐	☐	☐	☐	☐
If there were half as many walking tracks	☐	☐	☐	☐	☐	☐	☐
If there were twice as many tourists	☐	☐	☐	☐	☐	☐	☐
If the rivers changed from clear to murky	☐	☐	☐	☐	☐	☐	☐
If the undeveloped scenic beauty & peacefulness of the area declined	☐	☐	☐	☐	☐	☐	☐
If you could spend only half as much time with friends & family (compared to now)	☐	☐	☐	☐	☐	☐	☐
If there were half as many cafés, shops, theatres, etc. in this area	☐	☐	☐	☐	☐	☐	☐
If there were half as many good quality roads & hospitals in this area	☐	☐	☐	☐	☐	☐	☐
If there was more public information about Aboriginal cultural values of the area	☐	☐	☐	☐	☐	☐	☐

We would like to learn more about the money that you spent in and around the WTWHA while on this trip.

11. On average, how much have you and your travel party (e.g. family) spent PER DAY (in and around the WTWHA) on each of the following items while ON THIS TRIP? (Tick one box for each row).

If you are not at the end of your trip, please just tell us approximately how much you THINK you will spend on each item, each day you are here.

SPENDING <u>PER DAY</u> (AU\$) while in/near the WTWHA region	\$0	\$1-20	\$21-50	\$51-100	\$101-151	\$151-200	\$201-300	More than \$300
Food and drinks bought at the grocery and convenience stores	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Food and drinks bought at cafés, restaurants, bars, etc. (including takeaways)	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Accommodation	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----

12. What is the approximate TOTAL AMOUNT that you and your travel party (e.g. family) have spent (in and around the WTWHA) on these items? (Tick one box in each row).

If you are not at the end of your trip, please just tell us approximately how much you THINK you will spend on each item IN TOTAL while here.

SPENDING PER DAY (AU\$) while in/near the WTWHA region	\$0	\$1-20	\$21-50	\$51-100	\$101-200	\$201-400	\$401-600	More than \$600
Hire cars	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Fuel	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Rainforest tours	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Botanical gardens	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Boat/reef/island tours	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Entry into other local attractions, tours not covered above	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Souvenirs	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Other (please specify)	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----

13. How many people does this expenditure cover? Adults Children (16 and younger)

14. For YOUR ENTIRE TRIP AWAY FROM HOME, what was (or will be) your TOTAL EXPENDITURE for all people you told us about in question 13? Include airfares, train travel or other costs getting to this region, accommodation, tours and other expenses.

Total expenditure AU\$

If you do not know how much using Australian dollars, please tell us how much in your own currency.

Amount

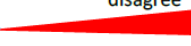
Currency

15. The rainforests of the Wet Tropics faces many threats. Some of these are beyond our control (e.g. cyclones), but not all. For example, we could choose to spend more money controlling pests and less on something else. If a fund was set up to help solve the problems listed below, what is the maximum amount you would be willing to donate each time you visit the WTWHA? (Donations would be collected from each visitor to the region – e.g. like an accommodation charge).

When answering, please consider your current financial situation and also consider how much all your donations add up to if donating to more than one problem. (Tick one box in each row)

	Money donated PER VISIT to the region											
	\$0	\$2	\$5	\$10	\$20	\$30	\$50	\$75	\$100	\$250	\$500	More than \$500
Protecting native plants and animals from weeds & pests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining undeveloped scenic beauty & peacefulness of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Improving/maintaining quality & clarity of rivers & streams	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----
Protecting the Aboriginal cultural values of the area	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ How much? \$-----

16. How much do you agree or disagree with each of the following statements? (Tick one box in each row)

	Strongly agree	Neutral			Strongly disagree	I do not know
						
I am willing to volunteer my time to care for the WTWHA	☐	☐	☐	☐	☐	☐
Only people who live near or visit the WTWHA have a responsibility to care for it	☐	☐	☐	☐	☐	☐
I am not prepared to pay money to protect the WTWHA unless	☐	☐	☐	☐	☐	☐
All WTWHA users pay too	☐	☐	☐	☐	☐	☐
People throughout Australia pay too	☐	☐	☐	☐	☐	☐
People throughout the world pay too	☐	☐	☐	☐	☐	☐
I am not prepared to take costly steps to protect the WTWHA – those efforts are a waste of time in the face of natural disasters and climate change	☐	☐	☐	☐	☐	☐

Finally, we would like to collect background information that is used to test if different people (e.g. males, those on high incomes, etc.) feel differently about the WTWHA.

17. How did you travel from your home to this survey location? (Tick all that apply)

- ☐ Bus ☐ Boat ☐ Rail ☐ Air
☐ Privately owned car ☐ Rented car ☐ Other (please specify) _____

18. Which of these best describes your travel party (i.e. the group you are travelling with)? (Tick one box)

- ☐ Single ☐ Couple ☐ Family with children ☐ Relatives ☐ Friends ☐ Club ☐ Tour group
☐ Other (please specify) _____

19. What gender are you? ☐ Male ☐ Female

20. What is your marital status ☐ Single ☐ Married or in partnership ☐ Other

21. In what year were you born? (Write the year) 19_____

22. Where were you born?

- ☐ Australia, which town? _____ and state? _____ ☐ Overseas, which country _____

23. How many people, including yourself, normally live in your household?

Adults _____ Children (16 and younger) _____

24. Are you or any of the people who normally live with you Rainforest Aboriginal persons or other Aboriginal/Torres Strait persons? (Tick as many boxes as apply)

☐ Yes - Rainforest Aboriginal ☐ Yes - Other Aboriginal &/or Torres Strait Islander ☐ No

25. What is the highest level of education that you have completed? (tick one box)

☐ Primary school ☐ High school (year 12) ☐ University or higher
☐ High school (year 10) ☐ Trade / apprenticeship ☐ Other (please specify) _____

26. Do you make contributions to, or volunteer for any conservation organizations? (Tick all that apply)

☐ Yes, International Conservation Organizations ☐ Yes, National & Local Conservation Organizations
☐ Yes, Rainforest Aboriginal Organizations ☐ No

27. Please indicate which of the industries listed below is the main source (i.e. most important source) of your household's income? (Tick one box)

☐ Retail (e.g. shops) ☐ Agriculture and Forestry ☐ Fishing
☐ Accommodation, cafes and restaurants ☐ Manufacturing ☐ Mining
☐ Government, Health and Education ☐ Tourism industry (other than above) ☐ Ports
☐ None - our household earns most of its money from other sources ☐ I do not know

28. On average, how much pre-tax income does your household earn each year? (Tick one box)

☐ \$1 to \$20 000 ☐ \$60 000 to \$80 000 ☐ \$150 000 to \$200 000
☐ \$20 000 to \$40 000 ☐ \$80 000 to \$100 000 ☐ above \$200 000
☐ \$40 000 to \$60 000 ☐ \$100 000 to \$150 000 ☐ prefer not to specify ☐ I do not know

Thank you for your help ☺

Appendix 6: Results from the OLS regression for all residents – The importance of ...

	Having healthy native plants and animals			Visiting waterfalls and/or swim in clear, clean rivers, streams and waterholes		
	Coefficient from OLS regression	Mean of variable	Coefficient multiplied by mean of variable	Coefficient from OLS regression	Mean of variable	Coefficient multiplied by mean of variable
Male	-0.10	0.40	-0.04	-0.19**	0.40	-0.07
Single	-0.14*	0.25	-0.04	-0.25*	0.25	-0.06
Born QLD	-0.02	0.63	-0.01	0.17*	0.63	0.10
Education	0.00	3.37	-0.01	-0.01	3.37	-0.04
Income	-0.03	10.73	-0.30	-0.04	10.73	-0.46
Age	0.00	50.65	0.05	-0.01**	50.65	-0.43
Household size	0.00	2.79	-0.01	0.01	2.79	0.03
Retail & Tourism	0.10	0.12	0.01	0.29**	0.12	0.03
Government	-0.12*	0.32	-0.04	0.01	0.32	0.00
Agriculture	-0.31***	0.12	-0.04	-0.23*	0.12	-0.03
Mining & Ports	-0.47***	0.07	-0.03	-0.11	0.07	-0.01
Indigenous	0.15*	0.32	0.05	-0.03	0.32	-0.01
Constant	2.13	1.00	2.13	2.45	1.00	2.45
Overall predicted value			1.73			1.50
	Having beautiful undeveloped scenery to look at			Protecting places that have Aboriginal cultural values		
Male	-0.24***	0.40	-0.10	-0.28**	0.40	-0.11
Single	-0.22*	0.25	-0.06	-0.03	0.25	-0.01
Born QLD	-0.04	0.63	-0.03	-0.11	0.63	-0.07
Education	-0.04	3.37	-0.13	-0.04	3.37	-0.12
Income	0.03	10.73	0.35	0.04	10.73	0.39
Age	0.00	50.65	0.03	0.00	50.65	0.04
Household size	0.00	2.79	0.01	0.01	2.79	0.02
Retail & Tourism	0.18**	0.12	0.02	0.01	0.12	0.00
Government	-0.10	0.32	-0.03	-0.12	0.32	-0.04
Agriculture	-0.45***	0.12	-0.05	-0.62***	0.12	-0.07
Mining & Ports	-0.53***	0.07	-0.04	-0.52**	0.07	-0.04
Indigenous	0.07	0.32	0.02	0.96***	0.32	0.31
Constant	1.59	1.00	1.59	0.91	1.00	0.91
Overall predicted value			1.59			1.21

Appendix 7: Results from the OLS regression for tourists – WTP for...

	Protecting native plants and animals			Improving/maintaining quality & clarity of rivers & streams		
	Coefficient from OLS regression	Mean of variable	Coefficient multiplied by mean of variable	Coefficient from OLS regression	Mean of variable	Coefficient multiplied by mean of variable
Male	0.14	0.40	0.05	0.09	0.40	0.04
Single	-0.04	0.40	-0.01	-0.10	0.40	-0.04
Education	0.07	4.28	0.31	0.10	4.28	0.44
Income midpoint	0.00	96483.05	0.16	0.00	96483.05	0.04
Age	0.00	34.18	0.13	0.00	34.18	-0.02
Germany	-0.62	0.09	-0.05	-0.94	0.09	-0.08
Uk	-0.26	0.18	-0.05	-0.28	0.18	-0.05
Rest of Europe	-0.38	0.17	-0.06	-0.43	0.17	-0.07
North America	-0.01	0.06	0.00	-0.12	0.06	-0.01
QLD visitor	-0.69	0.09	-0.06	-0.67	0.09	-0.06
Asia	0.32	0.07	0.02	0.27	0.07	0.02
Constant	2.05	1.00	2.05	2.30	1.00	2.30
Overall predicted value			2.50			2.50
	Maintaining undeveloped scenery & preacefulness of the Area			Protecting places that have Aboriginal cultural values		
Male	0.14	0.40	0.06	-0.12	0.40	-0.05
Single	-0.10	0.40	-0.04	-0.18	0.40	-0.07
Education	0.08	4.28	0.33	0.08	4.28	0.34
Income midpoint	0.00	96483.05	0.07	0.00	96483.05	-0.14
Age	0.00	34.18	-0.04	0.00	34.18	0.00
Germany	-0.68	0.09	-0.06	-0.88	0.09	-0.07
Uk	-0.21	0.18	-0.04	-0.22	0.18	-0.04
Rest of Europe	-0.40	0.17	-0.07	-0.14	0.17	-0.02
North America	-0.01	0.06	0.00	0.13	0.06	0.01
QLD visitor	-0.63	0.09	-0.06	-0.59	0.09	-0.05
Asia	0.24	0.07	0.02	0.41	0.07	0.03
Constant	2.38	1.00	2.38	2.54	1.00	2.54
Overall predicted value			2.55			2.48