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Whose Values Count? Using Choice Modelling to Assess Values Held by Indigenous People for Floodplain Development.

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Land is a map, a system of knowledge, of art, ritual and ceremonial activity. Land is a living thing (Vince Leveridge, quoted in *Our Common Future* [WCED 1987: 53])

Abstract

Considerations of equity are important components of sustainable development criteria, but remain difficult to incorporate in economic analysis. Various non-market environmental valuation techniques have been developed and refined to incorporate environmental factors into economic valuation but little consideration is given to social factors. A recent Choice Modelling (CM) study has examined issues relating to the trade offs between development and conservation in the Fitzroy River Basin. The study assessed the values and opinions of various populations selected on a geographical basis. This paper will describe a complimentary CM survey that included Aboriginal cultural heritage as an attribute of floodplain development, and assessed the values and opinions of both the Indigenous and the general community. Differences between the two groups are examined and the policy implications discussed.

Keywords: Indigenous values, Aboriginal cultural heritage, choice modelling

1. Introduction

Water is fundamental to our existence and is an integral component of the ecological system that supports our social and economic life. Water is a scarce resource in Australia and yet it has been harnessed and harvested to drive economic development, particularly in agriculture, with little consideration of the consequences. Until recently the management of water resources was focused on economic development and projects such as the Snowy Mountains Hydro-electricity Scheme, were lauded as great achievements and considered as successful examples of how “man” could conquer “nature” and reap the benefits. It is only in recent years that the full environmental impacts of such major works have become apparent. Nowadays all major developments must address environmental as well as economic outcomes, and some assessment needs to be made of the trade-offs between environmental and economic impacts. Typically, Cost Benefit Analysis (CBA) is used to make such assessments and in the last 20 years considerable advances have been made in evaluation techniques used to assess the intangible or non-market impacts of economic development. However, the focus of non-market evaluations has concentrated on environmental goods and services and little attention has been given to social impacts.

There are two aspects of water management that have had major environmental impacts – the amount of water being used and the use to which it is put. The first, the quantity of water being used, has recently been addressed by the Council of Australian Government (COAG) water reforms, and for the first time, the environmental flow or the quantity of water needed to remain in specific river systems to avoid major environmental damage, is being assessed for all river systems in Australia. Once the environmental flow has been assessed and the quantity of water currently being used is determined, a Water Allocation Management Plan (WAMP) or more recently a Water Resource Plan, can be developed that indicates the amount of unallocated water remaining in a river system. The use to which any unallocated water is put, raises issues of the trade offs between development and environmental benefits, and the social equity associated with distribution.

The second aspect of water management is water quality, which is principally influenced by the use to which our water is put. In the Fitzroy, 90% of current water allocation is used for irrigated agriculture, 9% for local industry and the remainder for urban, industrial and stock use (Loch and Rolfe 2000). The impacts of agricultural uses are well known (Hunter *et al.* 1995) residential uses and mining also have associated offsite impacts. On the other hand, water retained in the river system has environmental benefits but some economic benefits are foregone. Clearly, there are trade-offs associated with water use – water used for economic benefits may be associated with environmental losses.

This paper is based on a study that addresses some social as well as environmental issues associated with increased water allocations under the Water Allocation Management Plan (WAMP) in the Fitzroy River Basin, Central Queensland. The Fitzroy Basin WAMP was finalised in December 1999¹ and when the total water allocated for current users (35%) and for

¹ The WAMP was released before the introduction of the Water Act 2000 and only applied to water in watercourses and did not account for overland flows – it is currently under amendment. Under the new act, Water Resource Plans (WRP) will be developed to provide a framework for sustainable water allocation for domestic, agriculture,

environmental flows (50%) is counted, a water surplus of 15% remains in the system. It should be noted that this overall picture does not highlight the differences within the catchment and at a sub-catchment level only 40,000ML of mean annual diversion has been identified as unallocated water in the Comet/Nogoa and Mackenzie River systems. When overland flows are taken into consideration, little, if any, of this amount remains.

When the unallocated water in a river system is limited, additional tradeoffs need to be made that have social implications. If there is not enough water to satisfy demand, who gets the water and who does not, and how is this decided? These issues are discussed (Rolfe *et al.* 2002b) in connection with a Choice Modelling (CM) study of water allocation in the Fitzroy River Basin (Loch and Rolfe 2000; Rolfe 2000; Loch *et al.* 2001; Rolfe *et al.* 2002a.). This paper is based on a CM study that compliments that work (henceforth referred to as the Loch and Rolfe study), and which aims to better inform government policy makers by providing useful information on social and environmental values relating to water allocation in the Fitzroy River Basin

The Loch and Rolfe study asked respondents to state their preferences for four attributes associated with water allocated for irrigation development - 'vegetation' and 'water quality', (environmental attributes); 'people leaving rural areas', (an economic attribute related to employment), and the 'amount of water in reserve' (a more holistic attribute related to risk and uncertainty). Several populations were sampled in the study, participants were selected at random and a general community opinion was gathered.

Land and water management issues are of particular importance to the Indigenous community but their views are not expressed separately in a general community survey. It was the initial intention of this study to use the questionnaire from the Loch and Rolfe study and survey an Indigenous only population. However, in the early stages of development it soon became apparent that for the Indigenous community, issues of water allocation were interlinked with those of cultural heritage, and the CM attributes would need to be amended to incorporate cultural heritage values. This study is unique in its application of non-market evaluation techniques in the assessment of Aboriginal cultural heritage values, from both an Indigenous and general community perspective.

This paper will discuss Indigenous issues and the importance of cultural heritage in the next section. Section 3 examines the literature on the use of non-market valuation, in particular in relation to valuing Aboriginal cultural heritage and in surveying Indigenous people, ie, using surveys in a cross cultural context. Section 4 describes the CM case study in Central Queensland; some early findings are presented in Section 5, and conclusions are drawn in the final section.

2. Indigenous issues - why Indigenous values count.

2.1 Sustainability and landscape management

irrigation, industry and recreational users, as well as providing water to sustain ecosystems that depend on river flow (DNRM 2001)

The new water reforms have been developed because in many catchments in Australia, water is being allocated for economic development in an unsustainable manner. These reforms are designed to address the tradeoffs between economic and environmental demands for water, and move towards more sustainable outcomes. The concept of sustainable development necessitates a more holistic and comprehensive approach to issues and more specifically, in a regional context, sustainable development should encompass all the interests of regional stakeholders (Dore and Woodhill 1999; Dovers and Mobbs 1999; Gray and Lawrence 2001). Sustainable development has particular meaning for Aboriginal people – it is fundamental to the preservation of their cultural integrity. Given the crucial role of land preservation in Aboriginal belief systems, cultural, economic and environmental sustainability amount to the same thing (WCED 1987). To be an Aboriginal person is to be defined in cultural and spiritual terms by the landscape, or country, with which they are identified. Land is their origin (Young 1998), and cultural heritage and land management are interlinked. Traditional ecological knowledge has been accrued over many thousands of years and is applied in all forms of Aboriginal land use (Young and Ross 1994).

With recognition of Indigenous rights under the *Native Title Act* (1993) there has been an increase in the involvement of Aboriginal people in land management and around the country local agreements of various kinds have been, and are being reached, (see Padgett (1999) for details) There is a growing recognition and respect for tradition Indigenous knowledge Young (1998) discusses the differences between Aboriginal and non-Aboriginal land management in the pastoral industry and outlines the benefits of incorporating Aboriginal attitudes to land use with the non-Aboriginal emphasis on commercial resource exploitation. Thackway and Brunckhorst (1998) also suggest beneficial outcomes for people, pastoralists and biodiversity conservation can be achieved if the relationship Indigenous people have with their land, and their duty of care for that land is recognised

It is the importance of the spiritual and cultural values or non-economic values that distinguishes Indigenous views from the non-Indigenous community. While many non-Indigenous people also value spiritual and cultural aspects of the landscape, the context in which these values are held is quite different.

2.2 Indigenous cultural heritage – access and protection

Understanding the importance of country to indigenous Australians involves a recognition of the centrality of particular areas of land and sea to the identity, culture and social structure of particular groups of Aboriginal peoples (Council for Aboriginal Recognition 1994). However, cultural heritage laws do not adequately address all aspects of Indigenous cultural heritage and do not recognise many rights Indigenous people believe are important for the continuation of their culture (Janke 1999). Inadequacies include:

- Ownership of cultural heritage is often vested in a government minister rather than in the appropriate indigenous community.
- The focus of cultural heritage laws is on tangible cultural heritage, such as specific areas, objects and sites.
- The focus is on past heritage rather than living heritage.

- The emphasis is for protection is scientific and/or historical value, rather than cultural and spiritual values.
- The onus is on the relevant government minister to take action to protect; Indigenous participation in decision- making is usually limited. (Janke 1999: xxiv)

Since the introduction of the Native Title Act (1993) there has been a change of focus in Indigenous cultural heritage legislation, the development of cultural heritage agreements, and the restoration of hunting, gathering and fishing rights in some States and Territories. However, the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Bill* (1998) which replaced the *Heritage Protection Act* (1984), has yet to pass through both houses of Government.

In a review of the 1984 Act, Evatt (1996) highlights the problem that definitions of heritage are not uniform and that State and Territory Laws have quite different definitions of Aboriginal cultural heritage. Some laws protect areas and sites that have traditional significance; others are more narrow and focus only on relics, or do not give weight to Aboriginal values, and others fail to recognise sites of contemporary significance. The Evatt Report recommended that the Commonwealth Act should be the basis for a minimum standard. The Aboriginal and Torres Strait Islander Commission (ATSIC) felt the new Bill did not adequately address the recommendations of the Evatt Report and their submission to the Parliamentary Joint Committee highlighted two main priorities for change:

- Retain the Commonwealth Act as a ‘last resort’ where State and Territory regimes fail, and
- Prescribe more detailed comprehensive minimum standards for the accreditation of State and Territory regimes (ATSIC 1998)

A later submission to a Senate Committee remained opposed to central aspects of the amended Bill, eg, the provision limiting the Commonwealth’s involvement to cases involving ‘national interest’ (ATSIC 1999).

In Queensland, current legislation (under review), the *Cultural Record (Landscapes Queensland and Queensland Estate) Act* (1987), predates the Native Title Act.

Clearly there are issues about the protection of Aboriginal cultural heritage, that remain unresolved, in particular, how cultural heritage is defined. Interlinked with problems associated with protection are those of access. While certain archaeological and sacred sites may be recognised, many sites are not identified or officially recognised and if located on privately owned land, access may not be possible. Aboriginal people’s desire to retain access to their traditional land for non-economic reasons (spiritual, social, historical) is paramount. In many cases the motivation for Aboriginal groups to purchase land (even when under the Bjelke-Petersen Government there was a policy of refusing to transfer pastoral leases) was as much to permit culturally relevant activities, as it was to engage in economic pursuits (Ellis 1993).

Not all Aboriginal people have maintained traditional links with their country and their culture, but in Queensland, this has principally been a separation forced upon Aboriginal people rather than part of a process detraditionalisation, which is occurring in most cultures.

The plight of the “stolen generations” of children who have been removed from their families, country and culture, has only recently been recognised and was officially acknowledged in 1997 in the “Bringing them Home” Report of the National Inquiry into the Separation of Aboriginal and Torres Strait Islander Children from Their Families. What is not well recognised, is that successive governments in Queensland enforced a policy to separate Aboriginal people from their country, customs and culture. Under a series of Aboriginal Protection Acts beginning in 1897, governments pursued a policy of creating and maintaining Aboriginal Reserves upon which people from differing tribal cultures and customs were forcibly detained and made to live together. Under provisions of the *Aborigines Preservation and Protection Act* (1939), in order to leave the reserve, written permission from the manager was required. However, even more devastating, under Section 21 of the Act, the carrying-out of tribal customs and culture was forbidden under threat of imprisonment.

Nonetheless, the concept of country retains its importance for Aboriginal people and still remains part of the cultural construct of their Aboriginality. Many people would like the option of one day being able to visit their country. As the respect for Aboriginal culture grows within the Australian community as part of the Reconciliation process, so too will the values for Aboriginal cultural heritage grow. In this respect, the ‘existence’ and ‘option’ values’ (see Section 3 below) or non-use values, are as important as direct use values.

2.3 Changing property rights

The High Court’s Mabo decision in 1992 precipitated a major change in the recognition of Indigenous rights in Australia. The notion of *terra nullius* was rescinded and Indigenous people were recognised as the ‘first nation’, with rights of native title being legally established under the *Native Title Act* (1993). Since then, the High Court’s Wik decision in 1996 recognised the coexistence of native title rights on pastoral leases, and the Croker Island decision in 1998 verified the existence of native title rights to the foreshore and marine environment.

Under the new water reforms, rights of ownership in water are undergoing a major change. Common law has traditionally rejected the concept of exclusive private property interests in flowing water. Given water’s nature, and the universal dependence of all life on water, the universal response has been to remove it from the sphere of private ownership and as regards flowing water, the basic common law principle as stated in Halsbury’s Laws of England “is not, at common law, the subject of property or capable of being granted to anybody” (quoted in Hiley 2000). In complete contrast, the new water reforms promote the expansion of private property rights in water. Allen (2001) discusses the disjuncture between these two sets of principles and their implications in relation to native title and the extinguishment of rights in New South Wales. Native title legislation includes a non-extinguishment principle and if future acts effect an extinguishment of rights, then titleholders will be entitled to compensation. Ultimately this will be tested in the courts, but Graham Hiley QC argues that native title rights of an exclusive kind will not be recognised by the common law of Australia in respect of flowing waters, because of its nature as a public good (Hiley 2000).

2.4 Water allocation and social losses

Under the water reform process estimates are made of the amount of water or environmental flow a river system requires to avoid major environmental impacts. This water remains a public good. Another objective of the reforms is to specify resource entitlements and property rights, and to allow and facilitate exchange or trading of water entitlements. This strengthens private property rights. The specification and trade of property rights over water allows water to flow to the highest value use (Cruse et al 2000; Rolfe *et al* 2002b) - a good economic outcome, but there is a social loss as the public good is reduced. This social loss is greater for Indigenous people than other sectors of the community as it potentially impacts on their native title rights; it has implication for the protection of their cultural heritage and may jeopardise their ability to access cultural heritage places.

Different sectors of the community have different opinions on how any unallocated water should be distributed and different values associated with any particular distribution. Conservationists may want any unallocated water to remain in the river system for environmental reasons; farmers may want the water allocated to irrigation development for economic reasons; other people may want some development but also to leave some water in reserve to avoid risk and uncertainty. These issues and others relating to how surplus water should be allocated and the social losses associated with water being allocated to the highest value use are discussed in Rolfe *et al* (2002b).

Tradeoffs between environment and development have a different meaning for Aboriginal people and they are likely to have a lower value for economic development, as they are less likely to participate in its benefits. The Ecologically Sustainable Development Working Group Chairs (1992) identified Aborigines as the most disadvantaged group within the Australian community, in most cases overwhelming so. On the other hand, Aboriginal people are most likely to want any unallocated water retained in the river system for social and cultural as well as environmental reasons.

In summary, this section discusses the importance of the landscape to Aboriginal people and while the general community may have significant social values for our land and water environments, such values do not have the cultural significance associated with Indigenous values. Similarly, the diminishing status of water as a public good and the strengthening of private property rights, has an implied social loss, but one that is greater in magnitude for Aboriginal people than other sectors of the community.

3. Non-market valuation

Environmental degradation has been the cause of much concern in recent years and is now a major policy issue. That environmental goods and services have a value is no longer disputed but the challenge remains to assess that value in the absence of a market. Economics has assessed the value of goods and services through the market, where people demonstrate their “willingness to pay”(WTP), and thus the value they place on a good or service, by accepting or rejecting the market price. Environmental goods and services frequently do not have a market value and

therefore tend to be underpriced and overused. There is a need to value environmental goods and services to help guide policy makers in decisions affecting the environment.

CBA has become a standard tool for assessing public investment projects. However, conventionally, only values of market goods are analysed. While increased awareness of the ecological and social costs of environmental damage has led to their recognition in CBA, they are generally treated as intangibles and as such, are frequently mentioned but not quantified. Increasingly, attempts are being made to measure the value of such non-market goods and a number of techniques are available. These can generally be grouped as surrogate market or 'revealed preference' approaches (travel cost, hedonic pricing, property value techniques etc) and simulated/hypothetical market or 'stated preference' approaches (contingent valuation, choice modelling, contingent ranking etc).

Ciriacy-Wantrup (1952) is credited as being the first economist to suggest valuation of non-market environmental goods (Anderson and Bishop, 1986; Cummings *et al.*, 1986), and the first person to implement his suggestion was Davis (1963). Since then the Contingent Valuation Method (CVM) has been widely used and reviewed in the United States of America, with two extensive assessments of the method being made by Cummings *et al.* (1986), and Mitchell and Carson (1989). This method became, and remains popular because it is often the only method available for use (surrogate markets do not always exist); it directly measures WTP; and as it elicits the maximum amount an individual is willing to pay, it measures total economic value, that is use, option, existence and bequest values (Pearce and Turner 1990). In other words, it measures the value individual places on using the good; on the option of being able to use the good if they wish; on the existence of the good and on the benefit for future generations (though the values future generation themselves hold, can never be measured).

CVM has never been widely accepted in Australia, but was used increasingly since 1982 and three notable applications have been those of the Resource Assessment Commission (RAC) in the Kakadu Conservation Zone Inquiry (Imber, Stevenson and Wilks 1991), the Forest and Timber Inquiry (Carter 1992; RAC 1992), and that of the Queensland Department of Environment and Heritage as part of their submission to the Fraser Island Inquiry (Hundloe *et al.*, 1990). A two-day workshop focusing exclusively on the method was held in 1992 (Lockwood and DeLacy 1992). However, the method came under increasing scrutiny and was the subject of considerable criticism and doubt (Bennett 1992).

In response to continuing criticism other hypothetical market valuation methods other techniques were explored and compared with CVM (Morrison *et al* 1996). As a result, the use of Choice Modelling (CM) has increased and in recent years, the technique has become popular for eliciting values for environmental goods with multiple attributes (Adamowicz *et al* 1998}; Blamey *et al* 1999). CM, a technique in which respondents are asked to state their preference, or choice, when presented with a series of resource use options, has several advantages over CVM ((Morrison *et al* 1996; Adamowicz *et al* 1998; Hanley *et al.* 1998; Rolfe and Bennett 2000).

One of the main advantages of CM is its ability to distinguish between different attributes of a particular good which overcomes the problem in CVM of embedding when a WTP for a good varies depending on whether it is evaluated on its own or as part of a more inclusive category

(Kahneman and Knetsch 1992). For example, one CVM study measured the value of preserving, upgrading and maintaining an area of bushland in an urban location (Windle and Cramb 1993). The value of a “bundle of goods” was measured and no separation could be made of the “part worth” of the good, ie, the value of preservation, upgrading or maintenance separately. In addition, by presenting different attributes CM also allows respondents to consider complementary and substitution effects in the choice process ((Rolfe and Bennett 2000).

CM also:

- avoids compliance bias or yea saying (Hanley *et al.* 1998) and allows some identification of the ways in which people frame choices (Rolfe and Bennett 2000).
- has built in tests of sensitivity to scope (Hanley *et al.* 1998).
- allows a variety of tradeoffs to occur simultaneously (Rolfe and Bennett 2000).

3.1 Assessing Aboriginal cultural heritage values

The literature on assessment of Aboriginal cultural heritage values provides little guidance for the study described in this paper, although some recent publications are improving the situation (Worboys *et al.* 2000; Australian Heritage Commission 2001; Navrud and Ready 2002). Issues of valuation tend to concentrate more on tangible assets and market values rather than the intangible non-market aspects. Janke (1998) discusses the commercial value of Indigenous cultural property in terms of its contribution to various industries such as arts and crafts, tourism, film, music etc. Campbell (1999) discusses some of the theoretical and legal issues relating to a valuation of Indigenous fisheries, eg, compensation payments under the extinguishment rule in the Native Title Act. One of the few studies to assess the non-market value of cultural heritage values (Lockwood *et al.* 1996) used the CVM, but as these values were described in association with cattle grazing in the High Plains, the WTP amounts may have reflected a range of values beyond those described. (Lockwood *et al.* 1996). However, the study highlights the issue of value conflict, which is further discussed with reference to Indigenous cultural heritage in (Lockwood and Spennemann 2001)

An examination of all recent literature on CVM applications on the University of California, Los Angeles website <http://www.sscnet.ucla.edu/ssc/labs/cameron/nrs98/cvinv.htm>, (updated 16th March 2001) has no mention of other studies on cultural heritage values

3.2 Cross cultural surveys

While there is a paucity of literature on non-market valuation of cultural heritage values, the literature on cross cultural non-market valuation is more revealing and is focused on studies in developing countries.

A major problem with CVM studies in developing countries is finding a plausible payment vehicle, particularly in rural areas, where taxes are not generally collected and many households survive largely outside the monetary economy. In such situations, asking for a cash payment would be quite inappropriate and some studies have used commodities other than cash, to assess values. Shyamsindar and Kramer (1993) have estimated welfare losses in Madagascar using baskets of rice as the CVM payment vehicle. Swallow and Wouldyalow (1994) and Eschessah *et*

al. (1997) found that more respondents were willing to contribute labour than money in their studies in Ethiopia and Kenya. In a “Willingness to Accept” survey relating to communal woodlands in Zimbabwe Adamowicz *et al.* (1997) found problems associated with the compensation payment vehicle and credibility of the CVM scenario.

Whittington *et al.* (1990) discuss the problems of CVM surveys in very poor and illiterate communities, but conclude that while considerable time needs to be taken to explain the CVM scenario, realistic responses can be collected. Whittington *et al.* (1992) found that answers to the valuation question were affected by the time given to respondents to think about their answer. Respondents may need more time to think about their response or they may need to discuss the issue with other people. Whittington (1998) reports that 30% of “No” responses in an Indonesian study were due to respondents needing to know what other people thought. Whittington (1998) provides some useful insights, based on his experience with CVM surveys in developing countries. He discusses problems of interpreting answers in a cross cultural context; of ethical issues such as, respondents believing the hypothetical scenario is real; explaining a CVM study; setting the referendum prices, and constructing joint public- private CVM scenarios.

In summary, considerable advances have been made in the use of non-market valuation techniques in the last 20 years. The CVM remains a popular choice, particularly in the United States of America, but criticism of the method in Australia has led to advances in the use of CM techniques. While the literature on cross cultural studies in developing countries provide useful insights that guided the development of the CM case study discussed below, there has been no studies on non-market valuation of Aboriginal cultural heritage.

4. Water management in the Fitzroy River Basin –A CM study of Indigenous values²

This CM study was designed to compliment the Loch and Rolfe study by seeking responses from the Indigenous community. Much of the preparatory work in developing the survey had been completed, and could be adapted for an Indigenous audience in a cost effective manner³ Guidance from the literature suggested that the following issues would need to be addressed:

- presentation of background information - it must be realistic, comprehensive and not confounding.
- adult literacy - levels in rural communities are generally low, particularly in the Indigenous community.
- the CM scenario had to be presented in a realistic policy context.
- a suitable payment vehicle needed to be considered.

² As respondents both in focus groups and in the general survey were only providing their views and opinions, it was considered that there were no Indigenous Intellectual Property implications. Information about the number and location of cultural heritage places was provided by Central Queensland Cultural Heritage Management (L’Oste-Brown 2001).

³ The final survey followed many design features developed by Adam Loch in the first survey.

In addition:

- a new cultural heritage attribute needed to be developed.
- the unallocated water attribute needed to include reference to native title rights.

4.1 Survey development and design⁴

A series of four focus groups were held; three with Aboriginal participants only, and one with a selection from the general community. As both the Aboriginal and general community were being sampled, it was important that the information provided would be acceptable to both communities and not induce any ‘non-response’ bias. Any discussion of cultural heritage would need to include reference to native title, an issue that sparks an emotional response from many people in the community. Considerable effort was made to provide sufficient, factual information that would avoid generating any emotional response.

The focus groups were particularly useful and enjoyable, and were notably a shared learning experience. As much of the survey design had been developed in previous focus groups, these groups could focus on key issues, such as development of the cultural heritage attribute. In addition, some important suggestions were made to improve the design and layout of the survey questionnaire.

The Loch and Rolfe survey had developed four attributes associated with the tradeoffs connected with irrigation development. The first two attributes, “Healthy vegetation left in the floodplains” and “Kilometres of waterways in good health”, were retained in their original form (ie, description, information provided and attribute levels). They had already been developed through a series of focus groups, were relevant to both the Indigenous and non-Indigenous communities, and were cause for little discussion in the new round of focus groups.

The unallocated water or “Amount of water in reserve” attribute was modified to include references to Indigenous rights and interests. One of the most important issues raised by Aboriginal people in connection with the WAMP process, was their concern that the new provisions may jeopardise their native title rights. There was much discussion in the first round of focus groups (Loch and Rolfe survey) about naming and explaining this attribute, as the concepts involved are quite complex. In the new round of focus groups (this survey), the name was changed to “Unallocated water”. Attribute levels were also changed and included negative values and one value higher than the level currently identified in the WAMP – ie, more water could be classified as unallocated or put in reserve, possibly through increased water use efficiencies. The notion of negative values, or of putting more water back into the system, were not of concern to focus group participants, although small changes (less than a factor of five) were considered too difficult to discern differences.

Attribute levels for the survey are outlined in Table 1 below

⁴ Copies of the survey will be provided by the lead author on request.

Table 1: WTP Base and Attribute levels for the CM Survey

Attribute	Base Levels	Choice Set Levels
Payment (\$)	0	10, 20, 50, 100
Healthy vegetation in the floodplain (%)	20	20, 30, 40, 50
Kilometres of waterways in good health	1500	1500, 1800, 2100, 2400
Protection of Aboriginal cultural sites (%)	25	25, 35, 45, 55
Unallocated water (%)	0	-15, -10, -5, 0, 5, 10, 15, 20

As it was concluded in the first round of focus groups that no more than four different attributes should be included in a CM study, the economic attribute “People leaving country areas every year”, was removed to allow for the inclusion of the cultural heritage attribute (discussed in detail below).

In the Loch and Rolfe survey, base attribute levels were estimated for a 20-year time effect. In focus groups with Indigenous people, it was suggested that this time horizon should be reduced to better reflect the lower life expectancy of Aboriginal people. Initially base levels were reduced to reflect a 10-year effect, but this proved too short for the general community focus group and some Aboriginal participants. A period of 15 years was used.

There was considerable discussion over the use of a payment vehicle. The Loch and Rolfe study, after discussion and verification in focus groups, had used a levy on rates, which would transfer through to an additional rent payment for non-home owners. Indigenous participants had problems with the payment vehicle in all focus groups. Generally, they believed the hypothetical situation and became concerned with the thought of paying money, when their budgets were already tight. It appeared this was principally a financial constraint as concerns about paying for the preservation of a public good, and for their cultural heritage were expressed at different times. Several changes were made to the payment vehicle, but when tested at the next focus group, it always sparked concern, and it was decided to retain the initial payment vehicle, but to include the possibility of arrangements to make payments in instalments.

The aim of conducting this CM survey is to better inform government policy makers by providing useful information on social issues relating to water allocation in the Fitzroy River Basin. Consequently, the CM scenario was presented within a realistic policy framework and concern over the payment vehicle highlights the realistic nature of the information provided. While the WTP was elicited in a hypothetical format, the CM scenario was completely realistic.

Further aspects of survey design in relation to concerns about adult literacy skills are discussed in Section 4.3 below.

4.2 The Aboriginal cultural heritage attribute

The following is an extract from the survey providing background information on the impacts of increased water use on Aboriginal cultural heritage places and values, before the survey attributes are described.

“Indigenous people are the traditional custodians of our land and water, and they have a strong physical and spiritual connection with the environment. There are approximately 20 different Aboriginal clan groups within the Fitzroy Basin and a wide range of important cultural sites eg rock art sites, ceremonial places, burial sites, sacred trees, waterholes, wells and many more. Increased water use may affect these sites in a number of ways. Sites in rivers such as waterholes, wells and spiritual places are affected by both water quality and quantity. Land developed for irrigated agriculture can adversely affect land-based sites. In addition, increased private use of water means less for public use and this directly impacts on the role of Aboriginal people as traditional custodians of land and water. It is important that Aboriginal cultural and spiritual sites, both land and water based, are protected from damage caused by people, cattle, and agricultural and industrial development. It is also important that sites have varying degrees of spiritual and physical access to Aborigines and the whole community. Cultural sites located in protected areas such as National Parks are more likely to be protected and are more accessible to everyone in the community, than sites located on private property. Sites on private land could be better protected and could be more accessible”.

While issues of both protection of, and access to cultural places are important, the attribute was finally titled “Protection of Aboriginal cultural sites”. This was principally to avoid confusion about the concept of access. Indigenous cultural places located on public land are accessible to both the Indigenous and non-Indigenous community. However, those on private land may become accessible to Indigenous people under native title laws, which do not extend to the non-indigenous community. To avoid any confusion about what access actually meant, the attribute was quantified in terms of protection. Information on the distribution of cultural heritage places was provided by L’Oste-Brown (2001) and derives largely from work undertaken as part of the Bowen Basin Aboriginal Cultural Heritage Project (<http://rsu2.cqu.edu.au/BowenBasin2/index.html>).

A total of 2,724 places containing Aboriginal heritage values were identified (Table2), including places and values spanning periods prior to European contact to more recent times.

Table 2: No of Aboriginal Cultural Heritage Place Types in the Fitzroy Basin

Cultural Heritage Place Type	No	Cultural Heritage Place Type	No
Aboriginal wells	4	Rock art associated with stone artefacts:	38
Aboriginal well (historic)	1	Rock art associated with stone artefacts & axe grinding grooves	10
Axe grinding grooves	21	Rock art places	312
Bird trap (historic):	1	Rockshelters containing rock art:	35
Burials	60	Rockshelters containing rock art & stone artefacts	13
Burials (historic)	12	Rockshelters containing stone artefacts	12
Burial with associated axe grinding grooves	1	Scarred trees	177
Burial with associated cached material:	1	Scarred tree (historic):	1
Burials with associated rock art	13	Shell Middens	4
Earthen circles	2	Spiritual places:	4

Hearths	20	Spiritual/Story places	12
Historic camps/Yumbas	36	Stone arrangements:	8
Isolated stone artefact/s	807	Stone artefact scatters	938
Isolated stone artefacts with associated source stone	18	Stone artefact scatters containing knapping floors	5
Massacre Places	4	Stone artefact scatters with associated quarried stone	35
Ochre sources:	3	Stone artefact scatters with associated source stone	37
Other unidentified/unknown cultural places	16	Stone sources:	6
Place associated with the Native Mounted Police	1	Story places	26
Resource Place	1	Story places associated with rock art	5
Rock Art associated with axe grinding grooves:	23	Travel route	1

Source: L'Oste-Brown 2001

These figures must be treated with reservation as they are derived from the Bowen Basin study and do not include all places in the Fitzroy catchment. In addition:

- the information principally regards archaeological sites, and very little information exists on places of historical and/or contemporary importance.
- the majority of the catchment has not been systematically examined.
- in many areas that have been systematically examined, substantial amounts of the recorded Aboriginal cultural heritage no longer exists due to subsequent development activities (L'Oste-Brown 2001).

So the figure of 2724 is a best available estimate and this was explained in the survey. 15.5% of these sites are located in National Parks (7.7%) and State Forests and Timber Reserves (7.8%), and have some form of protection. It was assumed that an unknown, small percentage of the remaining sites, located on private land, are well protected and accessible to traditional owners, but that most Aboriginal cultural heritage sites are located on private property and are not well protected.

4.3 Conducting the survey - surveying Indigenous respondents

Initially, it was intended to survey only the Indigenous community, and concerns about adult literacy were prevalent from the outset. It is believed that low literacy levels associated with the general community in rural areas is also of concern, and yet, is rarely addressed in non-market valuation studies. Often complex information is presented with little regard to this issue.

Three aspects were considered important in designing and conducting the survey:

- The option of face-to-face interviews was necessary when a respondent had difficulties reading the survey.
- Respondents with low literacy levels should not feel inadequate or intimidated in any way.

- The survey needed to be written in a large, clear, well spaced and laid out manner to improve readability for people with poor literacy skills and/or eyesight.

At first it was decided to undertake face-to-face interviews with all the Indigenous respondents although it would prove very expensive. However, to allow more flexibility, particularly for respondents without literacy problems, and to reduce the survey costs, respondents were offered the option of a face-to-face interview if they wished. If not required then a drop off/pick up method of collection would be applied. As the survey was not to be sent in the mail the size did not matter and a well-spaced A4 format was used. The possibility of a face-to-face interview meant that the survey had to be designed to be read aloud and no information could be provided in a separate booklet. Considerable care was taken to present information in a clear and logical manner, which meant that there was much more control over the framing effect for all respondents than if additional information was provided in a separate format that respondents may or may not read.

Once it was decided to develop the Aboriginal cultural heritage attribute, it soon became clear that not only the values of the Indigenous community needed to be assessed, but equally important was to know how the general community valued the attribute. Finally in late 2001, the survey was delivered to samples of the Indigenous community in Rockhampton; the general community in Rockhampton and the general community in Brisbane. All three surveys were conducted in a drop off/pick up format with Indigenous respondents being offered the option of a face-to-face interview if they wished.

5. Results and analysis

5.1 Social demographics

112 surveys were hand delivered to an Indigenous sample of the Rockhampton. 47 responses were collected, yielding a response rate of 42%⁵, compared with a response rate of 83% for the general community sample in Rockhampton - 120 surveys were hand delivered and 100 were collected. Results from the general community survey in Brisbane have yet to be collated.

The socio-economic characteristics indicated that both samples were similar and included a broad cross section of the population (Table 3). However, it would appear that more Indigenous respondents are in higher income categories than might be expected. Ecologically Sustainable Development Working Group Chairs (1992) report that mean income levels are about two thirds those of other Australians. As there was some difficulty in collecting completed surveys from some households, it is possible these were from lower income groups, and might indicate a non-response bias, which needs further investigation.

In general, the attitudes of the two groups were similar and neither group displayed particular bias in favour of the environment, and the Indigenous group. More people in the general community (46%) thought that the state of the environment had declined in the last 15 years,

⁵ Some difficulty was encountered in collecting completed surveys, and even though respondents were offered the option of a face-to face interview, few took up this option. Surveys are still being returned.

than in the Indigenous community (32%), while more Indigenous respondents were members of conservation groups (17%) compared with the general community (10%). Neither group rated their concern for environmental problems highly (Table 3), with Education and Health being of most concern, and Crime and Unemployment being rated more highly.

Table 3 – Social Demographics of the Survey Respondents

Variable	Rockhampton Indigenous	Rockhampton General Community	State Average*
Average Age (> 17 years)	39 years	45 years	42 years
Gender (% Female)	58%	48%	50%
Education (%>year 12)	58%	58%	58%
Income (household)	\$43,154	\$39,593	\$27,500
% that agree environ. Declined	32%	46%	42%
Ranked (1-5) Concern for enviro. probs - average (median)	3.78 (4)	3.52 (4)	n/a
% environmental group member	17%	10%	n/a
% favour development + environment equally	60%	53%	n/a
Associated with farming industry	22%	22%	n/a

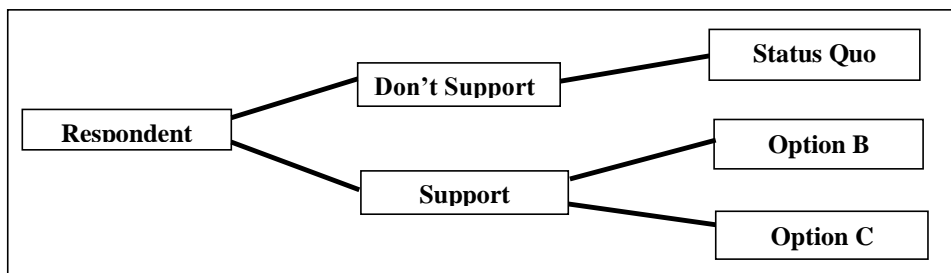
* Figures taken from Rolfe *et al* 2002a:Table 4

Choice modelling results

Each respondent was presented with eight choice sets and the survey comprised eight different variations of sets.

The choice data were analysed and modelled using the LIMDEP program. To minimise potential violations of the IIA/IID conditions associated with linear regression models, a two level (nested) choice model was estimated. Respondents were assumed to firstly make a choice about whether they would support increased protection measures against continuation of the current trends. This choice was modelled against the socio-economic characteristics of respondents. In the second stage, respondents were assumed to choose between the alternatives presented according to the levels of each attribute. The choice model is depicted in Figure 1.

Figure 1. Nested Choice Structure



Generating nested models involved three different types of variables. The branch choice equation (explaining the support/don't support choice) involves attributes that represent the socio-demographic characteristics of the survey respondents. The utility functions that predict choices between different protection alternatives involve the choice set attributes. The third variable is an inclusive value parameter which specifies the link between the two levels of the model. Each of the variables used in the nested model are specified in Table 4 below.

Table 4: Variables Used in the CM Application

Attributes of branch choice equations	<i>Indicates why people choose between the support/no support branches in the models</i>
ASC	Constant value – reflects the influence of all other factors on choice between support/no support branches of the model.
Environment	Concern about “Environmental problems” were ranked 1 st or 2 nd List included Crime prevention, Education, Health, Interest rates Unemployment
Misunderstood	Asked if understood survey 1= strong agree to 5=strongly disagree
Information	Asked in needed more information 1= strong agree to 5=strongly disagree
Age	Age of respondent (in years)
Gender	Male or female
Children	Respondent has children, Yes or No
Environ Org	Respondent is a member of an organisation associated with environmental conservation
Education	Education (ranges from 1=never went to school to 6=tertiary degree)
Income	Income of household in dollar terms
Attributes in the utility functions	<i>Indicates why people choose between the two alternatives</i>
Cost	Amount that households would pay in extra rates (or rent) each year to fund improvements
Vegetation	% of healthy vegetation remaining in floodplains
Waterways	Kilometers of waterways in catchment remaining in good health
Indigenous	% of Aboriginal cultural sites protected
Reserve	% of water resources in catchment not committed to the environment or allocated to industry/urban/irrigation uses
ASC_1	Alternate specific constant which reflects the influence of all other factors on choice between different choice profiles.
IV Parameter	<i>Provides statistical link between the two levels of the nested model</i>

Model results for the two data sets are shown in Table 5 below. The models appear robust, with most attributes significant and signed as expected.

Table 5: Results of Nested Multinomial Logit Models for Rockhampton Indigenous and General Community

Variables	Indigenous Community		General Community	
	Coeff.	St. Error	Coeff.	St. Error
Utility Variables				
Cost	-0.0107***	0.0027	-0.0132***	0.0020
Vegetation	0.0067	0.0087	0.0318***	0.0068
Waterways	0.0006	0.0004	0.0007***	0.0003
Indigenous	0.0358***	0.0092	-0.0298***	0.0065
Reserve	0.0541***	0.0102	0.0415***	0.0068
Branch Choice Equations				
ASC	0.2783	1.8387	-4.4905***	1.2688
Environment	0.8226	0.4424	-0.2705	0.2234
Misunderstood	-0.4585	0.4749	1.9597***	0.3249
Information	-1.1876***	0.4624	-0.0945	0.2104
Age	0.0083	0.0174	0.0166**	0.0080
Gender	-1.1401***	0.3326	0.5641***	0.1893
Children	-2.4876***	0.5990	0.7213***	0.2783
Env Ogranisation	1.3792***	0.4688	1.3196***	0.3777
Education	0.3068*	0.1605	-0.2934***	0.0848
Income	0.0000***	0.0000	0.0000	0.0000
Inclusive Value Parameters				
Pay	0.3150	0.2579	0.6655***	0.1736
No Pay (Fixed Para.)	1	0	1	0
Model Statistics				
N (Choice Sets)	368	(16 skipped)	768	(Skipped 72)
Log L	-307.20		-632.66	
Adj. rho-square	.271		.205	
Chi-square (DoF = 17)	249.26		346.94	

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

The key difference in results between the models is that the *indigenous* attribute is positive for the indigenous sample (indicating that probability of choice increased with the increased number of sites that would be protected), but negative for the general community (indicating that the probability of choice decreased with the increased number of sites that would be protected).

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For the indigenous sample, females were more likely than males to support the protection options. Higher levels of income, higher levels of education, and membership of an environmental organisation were all positively associated with increased protection choices. Respondents who understood the information and were happy with the level of information

provided were more likely to choose a protection option, while those who wanted more information were more likely to choose the status quo option. Contrary to expectations though, respondents with children were less likely to choose a protection alternative⁶.

For the general population, older people, males, respondents with children, those who were members of environmental organisations, and respondents who felt that they did not understand very well the information provided, were more likely to pick protection options. Respondents with higher levels of education, or were less likely to choose a protection option⁷.

To test whether there was a significant difference between the values held by the two sample groups, part-worths and confidence intervals have been calculated from the two models (Table 6). The confidence intervals for the indigenous attribute do not cross over, demonstrating that there is a significant difference between the two community groups.

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Table 6: Part Worth (P/W) & Confidence Interval (CI) Estimates for the Indigenous and General Communities

	P/W Vegetation	P/W Water	P/W Indigenous	P/W Reserve	P/W Asc1
Indigenous community					
Expected value	0.63	0.05	3.34	5.06	27.92
Lower CI	-1.04	-0.02	1.91	3.11	-4.25
Upper CI	2.49	0.13	6.82	10.47	57.38
	Not Signif	Not Signif			
General community					
Expected value	2.41	0.06	-2.26	3.15	11.70
Lower CI	1.30	0.01	-3.51	1.86	-1.59
Upper CI	3.51	0.11	-1.26	4.73	28.93

There are two other significant conclusions that can be drawn from the models. The first is that the IV parameter is not significant for the indigenous sample, indicating that the decision tree depicted in Figure 1 does not adequately explain the choice pattern for this group. It is possible that the low sample size is driving this insignificance, and that the decision tree is accurate. It is also possible that the indigenous sample has a very different choice structure that varies substantially from that held by the general population. For example, the initial choice between options may depend on the levels of the indigenous attribute rather than other factors. This is an issue for further research.

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The second conclusion to be drawn from the model for the indigenous sample is that the indigenous and reserve attributes were far more important to respondents than the environmental attributes. It appears that preserving cultural heritage and minimising risks of development are more important for this group than protecting specific environmental attributes. It is also

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⁶ There may be some interaction with other variables such as income, which might explain this result.

⁷ Increased education levels are often positively associated with increased protection choices. There may be an interaction that is influencing results.

possible though that the respondents viewed environmental factors as inter-related with cultural heritage sites and reserve options. If this were the case, the attributes may not have been viewed independently, and the model may be inaccurate. Further research is needed to explore these possibilities.

6. Conclusion

The choice model is a very good fit, and clearly indicates that people are able to make tradeoffs between issues, including ones that involve a cost. It also indicates that with careful development and design, CM can be a useful tool in the assessment of these tradeoffs.

The study indicates that the general community have significantly different values about water management from those of the Indigenous community. It is perhaps not surprising that the general community did not display an absolute preference for Aboriginal cultural heritage - in the Loch and Rolfe study, it was not mentioned in focus groups held in the same community (Loch *et al* 2001). This does not mean that Aboriginal cultural heritage is not valued by the general community, but in terms of the tradeoffs between economic development, the general community are more concerned about environmental issues and consider current levels of protection of Aboriginal cultural sites to be adequate.

It is also not surprising that different sectors of society have different views and values about certain issues - the challenge to government is to ensure that all values are counted in their policy formation. It is particularly important that Indigenous views and values are counted because of their traditional native rights and the importance of their traditional knowledge. It also needs to be recognised that the social losses associated with irrigation development are greater for the Indigenous community than the general community.

Economics is an effective tool in decisions relating to the allocation of scarce resources, and the extension of CBA to include the valuation of non-market values has meant the discipline continues to make a useful contribution to the management of our natural resources. Any comprehensive evaluation of floodplain development will have to balance the economic benefits against the associated environmental and social costs. The CM technique can certainly assist in such evaluation. However, economic valuation cannot resolve conflicts over cultural differences and these matters must be negotiated through other processes (Lochwood and Spennemann 2001).

Finally, considerable attention was paid to the sensitivities associated with a cross-cultural survey, but early results suggest that there are some issues relating to the surveying of Indigenous respondents that will need to be explored. There is also some early evidence to suggest that the context in which they make decisions about social and environmental trade-offs differs from that of the rest of the community. Alternative methods to assess their views may be needed.

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