# Determining the community value of peri-urban land: The significance of environmental amenity and production alternatives

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## ABSTRACT

Expanding urban areas such as Queensland's Sunshine coast face growing land use conflicts among urban, agricultural and conservation uses. Private allocation decisions often exclude non-use value of environmental benefits leading to both socially undesirable and economically inefficient outcomes. We present the results of a choice modelling study in the Sunshine coast to estimate community values for peri-urban land in production and conservation. We examine the implications of the value estimates in the optimal allocation of land for sugarcane on the basis of total economic value from all land uses including the preservation of unique and threatened vegetation.

Key words: Choice modelling, non-market valuation, land allocation

# Introduction

Managing competing uses for land often involves conflict. Increasing relative scarcity in the face of a growing population has heightened these conflicts by both defining new uses and increasing the demand for traditional uses of land. Moreover, technological change has enabled wider scope for utilising land beyond its original capacity, providing opportunities to gain economic benefits. Technology affects land use by altering the cost of improving land quality to match desired uses. Demand for land is affected by complex interactions between different objectives of land use, differences in availability of land across locations, and suitability of land for various uses (Mallawaarachchi, Quiggin and Ebert 2000). Yet, land allocations have often failed to take full advantage of all the properties of land, in particular the natural resources that it supports, resulting in a suboptimal use of land. Management of land in a manner that protects production and amenity value has become a central issue for communities, elected officials and policy makers. Concern about environmental impacts of production activities has increased in importance due to the shift in 1990s in resource management philosophy from a narrow commodity based view to broader ecosystem management view. This view, echoed in *Agenda 21*, focuses on developing an integrated approach to the planning and management of land resources in a manner that is efficient in producing food and fibre while maintaining a balance between economic output and environmental values.

Markets provide useful information on the economic value of traded commodities, but fail to account for environmental values and to fully incorporate social objectives for resource conservation (Randall 1972). Changing global demand for agricultural commodities, globalisation of markets, technological change, government policies and social preferences are affecting the demand for farmland. Progressive land use change in many agricultural regions is a manifestation of how societies respond to these dynamic pressures. The *ad hoc* nature of past responses has led to severe ecosystem decline, and integrated regional planning has now become a necessity to maintain the balance between economic development and environmental quality (Clough 1996). The irreversibility of development activities requires planners to examine all uses of land in an integrated manner and to make the most efficient trade-offs between economic and environmental objectives to minimise social impacts of production externalities. Modelling land-use change for integrated regional land-use planning can minimise the serious risk of foreclosing important potential future options, and maximise the productive use of available resources.

Sustainable development is prescribed as a policy approach that maximises economic benefits while maintaining environmental quality. Implementation of this policy transcends geographic and administrative boundaries and involves decisions that implicate current and future resource use. Often there is a mismatch between policy objectives agreed at an industry level and the adoption of practices at an operational level. For instance, the Australian Sugar Industry supports ecologically sustainable development and recognises the need to protect environmental values through efficient use and management of land and associated resources. Yet, at a local level, individual canegrowers are faced with a dilemma when choosing between

practices that maximise current profits and those that benefit the environment, which is shared in common with the community. While such dilemmas are common in the management of public good assets, policy makers require methods to assess implications of policies and to implement plans to foster desired change.

Mallawaarachchi and Quiggin (1999) presented a quantitative modelling framework, CLAM (Cane Land Allocation Model), to determine the joint economic and environmental net benefits of alternative land use scenarios at a regional level. The land use system considered in Mallawaarachchi and Quiggin (1999) in the Herbert River District cane production region in north Queensland represents a dominant use regime, because sugar cane is the primary commercial land use in Herbert. Natural uses of land represented by tea-tree woodlands and wetlands, and cattle grazing are the other two significant, non-dominant land uses; both of which are potentially under threat of conversion to sugarcane. The CLAM model incorporates the full economic costs of conversion of natural land to cane production by considering both the market and non-market values of alternative uses (Mallawaarachchi et al. forthcoming). In a later application Mallawaarachchi, Morrison and Ebert (2000) extended this model to a multiple use system including environmental preservation, urban development and agriculture using land allocation for cane production as an example. In this paper, we describe the use of a choice modelling study to estimate the community values for alternative land uses included in the regional programming model CLAM-Moreton, for the Sunshine Coast region.

## Community values for land use

Although the value of environmental resources such as rainforests, wetlands and coral reefs has been reflected in the rapid increase in demand for nature-based tourism and recreational activities, it is only recently that economists have begun to assess the economic value of environmental resources in a manner comparable with production values of agriculture or industry (Pearce 1993; Smith 1996).

While valuation studies at global (Costanza et al. 1997), regional (Menkhaus and Lober 1996) and local (White and Lovett 1999; Morrison, Bennett and Blamey 1999) levels have proved useful in highlighting the economic importance of nature conservation, such information has rarely been used directly to guide decisions to allocate resources between production and environmental uses. In particular, both planners and economists have largely ignored the extent of trade-offs between economic and environmental values in irreversible decisions to convert natural areas to agricultural and urban production. Failure to quantify environmental values in matching terms with commercial values of production often results in an implicit value of zero being placed on forgone environmental benefits. This encourages resource allocations to be biased against preserving natural areas. Many agricultural development activities have come under much criticism because of this inadequacy.

On the other hand, growing demand for urban services have fuelled developments in the urban fringe, placing pressure on farmland, and creating a range of environmental effects. In particular these developments have changed the relative abundance of different types of sites

(Clough 1996), thus altering the community's preferences for alternative forms of landscape. Although developments are driven by current or prospective market prices, if new land uses are so costly to restore to its original use, that conversion is practically irreversible and imposes an intertemporal externality on the future. Similarly, expansion of urban area, in particular replacing natural areas and agriculture, can be associated with a loss of amenity (Kelleher, Chant and Johnson 1998; Brunstad, Gaasland and Vardal 1999) and other external costs (Litman 1996). Such concerns, however, are unlikely to be accounted in current market prices, in particular when the services in question have a public good value, such as in the case of amenity, which is not traded in the market.

Urban sprawl provides significant benefits, which are mostly internal, and also imposes a variety of external costs, including habitat losses, reduced greenspace and water quality, and increased per capita public service costs (Litman 1996). All such costs are not reflected in property prices, although borne by the community.

Increasing demand for conserving natural systems, combined with a rapidly expanding urban sector, will place increasing community pressure on all sectors to adjust traditional practices of land and water use. While the precise nature of these demands, and the appropriate mix of strategies will vary across regions, economic analysis can aid in identifying appropriate strategies that balance resource allocations among competing uses. The opportunity cost of land use change, or the discounted stream of net output lost in perpetuity, forms an important part of the economic cost of conversion. Another part is the cost of servicing the new use, which may vary from one locality to another, reflecting site characteristics.

An important aspect of information required for determining opportunity costs are related to non-market values. However, their determination in a manner that is useful for land use planning is problematic. In the absence of direct market prices to estimate the values placed by consumers on non-market goods such as natural vegetation, amenity value of agriculture, and the disamenity associated with urban sprawl, willingness-to-pay can be derived using stated preference techniques. These techniques seek to establish preference revelations of individuals by observing their responses to hypothetical circumstances. Although there has been extensive development of methods for eliciting environmental values, such as the hedonic price approach, travel cost method and contingent valuation, the choice modelling approach is emerging as another suitable method in recent times (Morrison, Bennett and Blamey 1999; Blamey, Gordon and Chapman 1999; Blamey et al. 2000). In particular, choice modelling is suited to use in land management problems, since we are concerned with modelling choices varying over a range of characteristics, rather than with the estimation of willingness to pay for a single policy option, in situations where data limitations limits the application of the hedonic price approach.

## Valuing land use options

The case study reported in this paper focussed on determining the trade-offs between different land use types and the implication on such trade-offs of non-use values that the residents of the Sunshine Coast hold for the preservation of environmental amenity. The

underlying issue was that land clearing for the expansion of sugar production area in the region was believed to be associated with a loss of unique and rare vegetation containing significant amenity benefits. Furthermore, the region has lost significant areas of farmland, including caneland, for urban development, and this form of land use change is expected to have a negative impact on the visual amenity of the region. The region attracts a large flow of tourists in each year, and tourism has become an important source of income for the region, surpassing traditional sources such as cane farming and dairying. While urban expansion is related to both tourism and a general increase in local population through migration, some sections of the local communities have developed a dislike for urban sprawl, as it loses the general character of the region. The local authorities are concerned with the impact of these differences in community preferences for regional development, and are interested in quantitative measures of such influence.

Benefits of environmental services are not usually available for comparison with production benefits. However, planners need to make such comparisons to set priorities for resource allocation. The concept of total economic value, that includes the use and non-use components of value, offers a useful guide to measure the benefits an individual derives from a natural resource (Randall and Stoll 1983; Pearce and Turner 1990). Use values are those that individuals derive from directly using the natural resource. Non-use values represent those values that relate to the existence of the resource as a reserve, although it is not currently used.

Many approaches are available to determine the use values of environmental resources. They rely on market behaviour such as averting expenditures and changes in production costs. For instance, individuals reveal their preferences when they choose between recreational sites for visitation. The Choice Modelling is an approach that uses responses from surveys to elicit monetary values by asking respondents to choose scenarios involving varying price and levels of environmental attributes. This method has become popular in recent times for eliciting values for environmental assets with multiple attributes {Adamowicz et al 1998}{Blamey et al 1999}.

In this study we used CM to estimate the utility associated with the change in amenity resulting in a change in the area of three land use types, namely urban area, cane area, and the area of unique or rare vegetation. Choice modelling has been successfully used in situations where trade-offs between several attributes are being investigated (Bullock, Elston and Chalmers 1998; Morrison, Bennett and Blamey 1999; Blamey, Gordon and Chapman 1999; Blamey et al. 2000). It conforms to the economic notion that the value placed on a good is a reflection of its attributes (Lancaster 1966), thereby permitting the estimation of part-worths (the value of changes in attributes). The focus on attributes in the CM method makes it suitable for estimating both the values of attributes as well as situational changes. An important feature that favours the use of CM in environmental valuation is the ability to determine the relative importance of commercial, social and environmental factors in the make-up of non-use values. A detailed description of the CM approach is given in Blamey et al (2000) and Morrison, Bennett and Blamey (2000).

# Sunshine Coast Case Study

The Sunshine Coast is one of the fastest growing regions in Australia, and is situated along the south east coast of Australia (Figure 1). Over the last ten years the region's population has almost doubled. Similar growth is expected over the next decade. Because of this, land use planning has become a priority in the region. In this respect, the problem in the Sunshine Coast is different to that of Herbert, which has no significant urban sector. The economic base in Sunshine Coast is the service sector, which contributes nearly 80% of the income. Tourism holds a major share of this income. The share of agriculture is falling and the sugar industry, once a prominent industry in the region has come under increasing pressure to remain viable.

Figure 1: The Sunshine Coast Region

The current sugar cane area is about 9000 ha and the industry performance is affected by


intense competition between agriculture, urban development and natural uses for available land. The Moreton mill, which processes the cane in the region, needs to double the current supply of around 400,000 tonnes of cane to be viable. The competition for land is less severe further away from the mill, but transport costs will limit profitability particularly on poor quality land. Local planning regulations limit expansion into natural areas with rare and unique vegetation, and the social preference for such restrictions is likely to be high because of the tourism demand. While

the expansion of the urban area follows the natural demand for people to move into the area, the local communities resent urban sprawl because of the associated social costs. In this respect, cane fields are likely to be preferred because of its visual amenity.

The survey asked residents of the Sunshine Coast region to choose between alternative development options including different outcomes in terms of preservation of areas under rare or unique vegetation, urban development and cane farming. The survey elicited the community willingness to pay to support each scenario by considering hypothetical changes to land rates to provide the revenue needed to fund policies to achieve each scenario, as presented in TTable 1). These estimates of willingness to pay for environmental protection can be used for social ranking of development alternatives and help guide investments in social infrastructure.

## Survey Design

### The sample

To estimate, statistically, willingness-to-pay as a function of attributes of the land use types, data pertaining to choice responses and socio-economic and attitudinal variables were collected for a sample of Sunshine Coast residents by means of a mail survey. Using the electoral register as a sampling frame, 1650 respondents were selected following a systematic sampling procedure. The survey included an experimental setting with a two-way split to test a design improvement pertaining to hypothetical bias. Results of this split test are presented separately {Morrison, et al. 2001 #10470}.

### Questionnaires

The development of the questionnaire used in the study followed two focus groups conducted in Nambour and Mudjimba. These meetings, attended by a group that represented a cross section of the Sunshine Coast community provided the means to incorporate the diversity of views of the target population at the planning stage. Interactions at the focus group meetings were used to determine attributes included in the choice sets, and to refine a draft questionnaire.

The meetings offered an effective way to finalise the choice of a payment vehicle, to determine the number of environmental attributes best suited for inclusion in the survey, and to gauge the level of support for the proposed payment vehicle used in the questionnaire. It also provided an opportunity to test alternative ways of formatting the choice sets.

### Choice attributes and the payment vehicle

The selection of attributes, and the design of specific labels were assisted by deliberations at focus group meetings, and consultation with relevant authorities with regard to correct usage of terms. The final choice of the attributes used in the study was influenced by considerations including the nature of estimates to be produced from the survey, resources available and the

complexity of the survey. The levels for the environmental attributes were chosen with reference to land-use change studies in the region conducted by CSIRO Tropical Agriculture. The objective was to incorporate a set of attributes that are internally consistent, and fall within an acceptable range based on available evidence.

Table 1: Attributes and levels used in the choice and ratings questions

| Urban area in 2010 | Area of sugar cane in 2010 | Area of rare or unique vegetation in 2010 | Change in land rates |
|---|---|---|---|
| 19,000 ha | 5000 ha | 15,000 ha | No change |
| 12,000 ha | 10,000 ha | 17,000 ha | $50 |
| 15,000 ha | 15,000 ha | 20,000 ha | $100 |
| 18,000 ha | 20,000 ha | 23,000 ha | $200 |
| 22,000 ha | | 26,000 ha | |

The questionnaire was contained in a 20-page booklet and was titled 'Land Use Options for the Sunshine Coast: A Community Survey 1999'. It accompanied a brochure inserted as a fold-out. In the questionnaire, respondents were told that there were three main ways of using land on the Sunshine Coast (urban areas, sugar production, and for rare or unique vegetation). The three land use attributes were described in the questionnaire and the accompanying insert. The insert described the land use patterns in the region and their implications on the local region. The information provided a picture of the costs and benefits associated with the three land-use types. The extent and the rate of decline of unique and rare vegetation, sugarcane, and urban area were presented along with income in the region derived from cane growing. All scenarios were projected to 2010. The fold out insert laid out with the information including graphical and tabular presentations provided an easy reference to respondents when working through the choice sets to understand trade-offs.

Land rates were used as the payment vehicle, because it is a general instrument used by the local shire to collect revenue to finance local services. The insert indicated that the land rates provide the revenue that is needed to fund public works by local governments and that land rates could increase if extra money were needed to purchase areas of unique vegetation or to compensate farmers for not clearing; or because policies leading to urban expansion may require extra funding for infrastructure. The inclusion of this financial attribute makes it possible to estimate respondents' willingness to pay for changes in land uses.

**The choice sets**

The questionnaire contained five types of questions: at the outset, respondents were asked several Likert scale questions to determine their attitudes towards the three land uses. Next they were pointed to the foldout insert, which contained an introduction to the choice sets. **Table 2:** A sample choice set

**Question 8**: Suppose the following three options were the only ones available, which **ONE** would you choose?

## Option A: Continue existing policies

| Urban Area in 2010 | Area of sugar cane in 2010 | Area of rare or unique vegetation in 2010 | Change in land rates |
|---|---|---|---|
| 19,000 hectares | 5000 hectares | 15,000 hectares | No change |

## Option B: New option

| Urban Area in 2010 | Area of sugar cane in 2010 | Area of rare or unique vegetation in 2010 | Change in land rates |
|---|---|---|---|
| 22,000 hectares | 5000 hectares | 26,000 hectares | $200 increase |

## Option C: New option

| Urban Area in 2010 | Area of sugar cane in 2010 | Area of rare or unique vegetation in 2010 | Change in land rates |
|---|---|---|---|
| 12,000 hectares | 5000 hectares | 17,000 hectares | $50 increase |

I would choose *tick one box only*

- ☐ Option A: Continue existing policies
- ☐ Option B
- ☐ Option C
- ☐ Not sure

Respondents were then presented with four single alternatives where they rated their preferences. The purpose of collecting this data was to "warm up" respondents for the choice sets that came next, and to provide an additional data set to validate the choice modelling data. The attributes used in the ratings and choice questions, and their levels are shown in Table 1.

Then the respondents were asked to answer six choice modelling questionnaires, similar to one displayed in Table 2. After answering the choice sets, respondents were asked several attitudinal debrief questions, where they were asked to indicate their agreement or otherwise with a statement by choosing a number in a row corresponding to the level of agreement. The final sets of questions asked respondents to indicate their sociodemographic status using a set of close-ended questions. Respondents were encouraged to include any comments in space provided at the end of the questionnaire.

An orthogonal experimental design was used to assign attribute levels to options. This ensured that the attributes varied independently of one another and that their effects on respondents' preferences could be isolated. The questionnaire booklet, the accompanying pamphlet, a covering letter and a postage paid envelope were dispatched by mail to the 1650 respondents in November 1999. Initail dispatch was followed up with two reminders. A 40.7% response rate was achieved (625 valid responses, 56 undeliverables).

## Results

The response data was tabulated in Excel and analysed using LIMDEP software. A multinomial logit model was used to analyse the data following tests to verify the absence of significant IIA violations (Hausman and McFadden 1984)[1]. The split-sample test revealed that the two types of questionnaire format used for the experiment did not affect value estimates (Morrison, Blamey and Mallawaarachchi 2001), and the model reported in this paper is based on the full sample. In the model estimation, the sociodemographic and attitudinal variables were interacted with the choice set attributes rather than the alternative specific constants (see Morrison, Bennett and Blamey 1999). Likelihood ratio tests and examination of explanatory power indicated that this was the most appropriate model specification.

The variables included in the models, and their expected signs, are presented in Table 3. Given the aim of the study was to investigate the significance of environmental amenity and production alternatives, several variables were created to represent aesthetic value and existence value, as components of value representing total economic value. The variable "sugaesth" indicates whether there is amenity value attached to viewing sugar cane areas; if yes this variable should have a negative sign. The variable "vegexis" indicates the extent to which there is existence value attached to the preservation of areas of rare or unique vegetation, compared to use values. The statistical model is presented in Table 4

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[1] This test involves a comparison of the coefficients of a full MNL model with a restricted model from which one alternative has been removed. If the IIA property holds—so that the probability of choosing one alternative over a second alternative is independent of the attributes of a third alternative—then consistent parameter estimates should be found in the full and restricted models.

**Table 3:** Variable descriptions and expected signs

| Variables | Description | Expected sign |
|---|---|---|
| Urban | Urban area in 2010 | – |
| Urbchar | Interaction between Urban and Likert scale for "A slower rate of urban development is needed to maintain the character of the region" (1-strongly agree) | + |
| Urbprob | Interaction between Urban and Likert scale for "Urban development results in social and environmental problems" (1-strongly agree) | + |
| Urbhd | Interaction between Urban and Likert scale for "Local governments should encourage high density residential developments" (1-strongly agree) | + |
| Sugar | Area of sugar cane in 2010 | ?* |
| Sugind | Interaction between Sugar and association with the sugar industry | + |
| Sugviab | Interaction between Sugar and Likert scale for "It is important to retain the viability of the Moreton Sugar Mill in Nambour" (1-strongly agree) | – |
| Sugaesth | Interaction between Sugar and Likert scale for "Cane fields are pleasing to look at" (1-strongly agree) | – |
| Veg | Area of rare or unique vegetation in 2010 | + |
| Vegexis | Interaction between Veg and Likert scale for "Rare or unqiue vegetation should be preserved even if most people will never visit those areas" (1-strongly agree) | – |
| Vegenvgp | Interaction between Veg and membership of an environmental group | + |
| Rates | Increase in land rates | – |
| Rateinc | Interaction between Rates and income | + |
| Rateincdum | Interaction between Rates and a dummy variable set to one when respondents did not report their income | ? |
| Rateage | Interaction between Rates and age | – |
| ASC | Alternative specific constant | ? |

* indeterminate

**Table 4:** Multinomial Logit Results for the Sunshine Coast Survey

| Variables | Coefficient | Rel. Std.Error |
|---|---|---|
| Urban | -0.229[b] | -6.891 |
| Urbchar | 0.065[b] | 7.157 |
| Urbprob | 0.045[b] | 5.317 |
| Urbhd | -0.013[b] | -2.062 |
| Sugar | 0.107[b] | 9.688 |
| Sugind | 0.038[b] | 2.325 |
| Sugviab | -1.901[b] | -8.112 |
| Sugaesth | -0.017[b] | -4.108 |
| Veg | 0.234[b] | 16.947 |
| Vegexis | -0.078[b] | -13.686 |
| Rates | -0.009[b] | -11.127 |
| Rateinc | 0.621E-07[b] | 5.143 |
| Rateincdum | 0.002 | -1.627 |
| Rateage | 0.218E-04[b] | 2.596 |
| ASC | 0.034 | 0.401 |
| N | 3116 | |
| Log likelihood | -2922.06 | |
| Adj. Rho-square(%) | 0.144 | |

Notes: [a] denotes significance at the 5 per cent level, [b] denotes significance at the 1 per cent level.

**Table 5:** Implicit prices estimated using multinomial logit model

| Implicit Price (per hectare) | $A (per household) |
|---|---|
| Sugar area | -0.35 |
| Urban area | -5.13 |
| Rare or unique vegetation | 9.23 |

All model parameters except 'Rateincdum' representing the dummy inserted to examine the effects of undisclosed income were significant and carried the expected sign. The estimated implicit prices represent marginal trade-offs between the three land use types. The model estimates indicate that the Sunshine Coast community places a high value for preserving rare and unique vegetation. While the community attaches a high negative utility for the expansion of urban area, expansion of area under sugar cane is also not seen as utility improving. However, the model coefficient for aesthetic value 'Sugaesth' indicates that caneland has positive aesthetic value. Similarly unique or rare vegetation is associated with significant existence value, as denoted by parameter 'Vegexis'.

Estimates of opportunity costs can be determined by estimating the total utility derived by the regional population. These estimates reported in Table 6 indicate that, in the light of this study, planning restrictions may be strengthened by not developing any areas under unique or rare vegetation. This is comparable to the situation in Herbert with regard to wetlands and riparian areas, with an estimated value of $2100 per ha per year (Mallawaarachchi et al forthcoming} Development of land for sugar production may not be socially desirable unless significant economic benefits can be gained to make cane farming economically feasible and to fully offset the negative social values associated with its land use. Similar observation can be made for the urban area; however, more detailed studies are required to understand interactions between variables more fully. This lower value reflects the much larger area available for protection on the Sunshine coast, and the dispersed nature of the population with diverse interests, compared to Herbert residents who are more closely knit.

Table 6: Estimates of willingness to pay for land use management in the Sunshine Coast region

| Option | Total Willingness to Pay* $/ha/year |
|---|---|
| Urban area expansion | -719 |
| Expansion of the area of sugarcane | -49 |
| Protection the area of unique or rare vegetation | 1292 |

Source: Choice modelling study.
* The region has an estimated 140,000 households

Mallawaarachchi, Morrison and Ebert (2000) used these value estimates in a regional land allocation model to determine socially optimal land allocation strategies that meet biophysical, social and economic constraints for the region. Similar to the Herbert study, GIS map overlay techniques and spatial analysis tools were used to generate information to identify unique mapping units to provide spatial representation within the regional optimisation algorithm. They investigated the effect on farm profits of distance to mill location by classifying potential land available under different distance classes. A simple cost function was used to incorporate transport costs in the model.

The model optimisation suggested that under the prevailing cost structure, expansion of cane area is unlikely to be achieved, because rents from growing cane will dissipate as cane areas move away from the mill due to transport costs, and because most of the land available in close proximity to the mill is less suitable for cane. Transporting cane over 50 km distances is unlikely to be profitable under sugar prices of A$340, that prevailed in 1998. In the light of this result, more detailed studies are required to examine opportunities to improve profitability of cane and to reduce externality costs as the local community places a negative preference for cane area expansion. Part values estimated in the choice model suggest that cane fields have a positive aesthetic value, but the overall negative value for willingness to pay arises because of the negative externalities from sugar cane burning such as smoke and soot.

## Conclusion

In this paper we have presented the results of a choice modelling study that estimated the community values for changes in land use in a peri-urban catchment. The results of this study indicate that the community places a high value on preserving unique or rare vegetation, which is indicated by positive existence values. While cane area expansion is not preferred, cane land is also associated with visual amenity. A high level of disutility associated with urban area expansion indicates the nature of the trade-offs faced by planners in these regions in meeting conflicting demands for urban services. If the high level of WTP for rare or unique vegetation is to be taken as a guide, the case for landscape preservation is likely to grow in the future, as the relative scarcity of such areas is likely to increase. The study also indicates that expanding the area of sugar industry in this region is likely to be more difficult because the industry needs to meet both the high costs of land as well as negative community values to make their operations socially desirable.

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