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Socioeconomic Systems and Reef Resilience

Project 10.2



National Environmental Research Program

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Our conceptualisation ... and focus

Economic and environmental systems interrelated ...



What did we hope to learn and why?

• The influence of socioeconomic variables (e.g. price, cattle numbers) on <u>water</u> <u>quality/sediment</u>

Tells us about what the economy does to the GBRWHA

(also provides an indication of whether market based policies are likely to achieve environmental goals)

 The relative 'value' (benefit) of the goods and services provided by the Great Barrier Reef World Heritage Area (GBRWHA) to <u>residents</u> and <u>visitors</u>

> Tells us about what the GBRWHA does to/for the economy (also provides indication of likely environment/economy trade-offs)

- Plus some 'geeky' science exploring new ways of estimating the 'value' of non market goods and services
- A continuation of the long-term monitoring of tourists as they leave Cairns airport (which Bruce Prideaux has been undertaking since 2007)

Gives an indication of trends over time

(program also provides opportunity for investigation of 'pressing' issues for industry)

Overview of Project data



Overview of project outputs

• 7 published journal articles

(with 1 more just accepted 'subject to minor changes'; 4 more under review and 2 almost ready for submission)

- 1 book chapter
- 2 conference papers
- 1 'interim' report (summarising methods, questionnaires and data collected)
- Numerous factsheets
- (Summarised) data available on e-atlas
- Numerous 'maps' (summarising variables by postcode) available on e-atlas
- Final report almost complete

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(also provides an indication of whether market based policies are likely to achieve environmental goals)



Annual sediment loads, rainfall, extreme events, cattle numbers, price and wage data from 1938 +

Insights and implications

- 1. Extreme events and rainfall the most significant determinants of sediment loads but cattle prices, gold prices and wages also matter (with lags).
- 2. Prices and wages (i.e. economic factors) matter more today, then in the mid 1900's

Environment

Broader economy + development priorities and choices

Policy implications

- Prices matter, so keep an eye on them!
 - Increased cattle prices could put pressure on sediment loads
- Possible policy lever
 - Market-based policies could reduce pressure on sediment loads (but don't know if more/less effective than other strategies)

What did we hope to learn and why?



 A continuation of the long-term monitoring of tourists as they leave Cairns airport (which Bruce Prideaux has been undertaking since 2007)

Gives an indication of trends over time

(program also provides opportunity for investigation of 'pressing' issues for industry)

LONG-TERM MONITORING AT CAIRNS AIRPORT



Data

KEY TRENDS FROM LONG-TERM MONITORING AT CAIRNS AIRPORT





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Key sections of the resident survey (co-developed with stakeholders)

- Background demographics, activities in the GBRWHA
- Importance of and satisfaction with 18 different goods and services (randomised order)
- Satisfaction with life overall
- Impact of 8 different hypothetical "changes" to different goods and services on overall quality of life:
- WTP (a) for improvements in water quality; (b) to protect top predators; (c) to reduce risk of shipping accidents , plus questions to help contextualise:

Tourism survey similar; included extra questions to assess expenditure and 'consumer surplus'

- Residents feel that environmental 'values' are more important to overall quality of life than the jobs and incomes from a range of different industries.
- General finding confirmed with other methods



How important are each of the following to your overall quality of life?

- Many (GBR) ecosystem services 'inseparable'
- Collective value of ecosystem services provided by the GBRWHA at least \$16b probably in excess of \$20b per annum



Insights and implications

 The environment very important to residents of the GBR catchment; not just for income/livelihoods (minor) but for lifestyle (moderate) and simply 'for being' (major)



 Residents react more negatively to prospect of environmental degradation than to higher prices.



Much less satisfied Less satisfied No affect More satisfied Much more satisfied

- People living in different places, have different 'values'
- And feel differently about life in general





• The contribution which environmental 'values' make to overall quality of life

varies spatially



Preserving the GBRWHA relatively more important contributor to quality of life for residents

Income relatively more important contributor to quality of life for residents

Insights and implications

'Values' of current residents of the catchment, likely to differ from those of people elsewhere



'Simulated' finding - residents

• Households dependent upon different industries for their income have different

'values'. So change in economic structure => change in 'values'



Key findings - Tourists

- Tourism contributes more than \$4b to regional economy (Deloitte Access Economics, 2013)
- Tourists spend most money on accommodation and food
- Business visitors spend less than others (mainly because they don't stay as long)



Key findings - tourists

- Tourists feel that environmental factors are more important regional 'draw-cards' than a range of other factors.
- Importance of the environment confirmed with other methods



How important were each of the following as a reason for coming to this region?

Key findings - Tourists

Changes to the environment likely to influence choices about whether to return

Satisfied tourists more likely to return

Amongst other things, satisfaction depends on:

- Rainfall: negative
- Water Turbidity: negative

Could potentially 'lose' up to \$400k per annum in tourist revenues (across entire GBR catchment) if a 10% increase in turbidity

Satisfaction also depends on

Temperature



Insights and implications

 (Perceptions of) environmental quality affects tourist satisfaction and decisions to visit, or return

People's decisions about whether to move to (or stay in) the north

Environment

Values and priorities of residents

Values and priorities of visitors

People's decisions about whether to visit the north

Northern development priorities and choices

> 'Development' impacts tourism directly, and indirectly, through the environment

Key findings - Tourists

• Like residents, visitors in different regions 'value' the environment and are likely

to respond to changes in the environment in different ways



Environmental degradation relatively more concerning for tourists in the north

Reduced number of fish for catching relatively more concerning for tourists further_south

Key findings - Tourists

Moreover, different types of visitors (even within the same region) respond

differently to changes in the environment



Key findings - tourists

 Perceptions about environmental quality (here, water quality), influence values and willingness to pay to help improve the environment



Key findings - Tourists

 And different types of visitors willing to pay different amounts to protect the environment.



Insights and implications

'Values' of current visitors to the catchment, likely to differ from tourists in other parts of the world

People's decisions about whether to move to (or stay in) the north

Values and priorities of residents

Environment

Values and priorities of visitors

People's decisions about whether to visit the north

Northern development priorities and choices 'Development' or environmental changes which alters the 'mix' of tourists to the region will change tourist values and priorities

Summary: What did we learn?

- Dynamic models linking economy with environment work. Prices and wages can affect sediment loads (as does the weather) – with lags.
- Spatial models linking economy with environment work.
- The 'values' of current residents and tourists indicate strong preferences for developments that preserve the recreational and non-use values of the GBRWHA
- But the dynamic nature of the system indicates that this is not a 'given'. Changes to the
 - quality of the environment
 - economic structure of the region
 - demographic make-up of the region's population
 - mix of tourists to the region

will affect values, and thus preferences

- This could make it either easier or harder for
 - Managers to protect the values for which the GBR obtained world heritage status
 - Tourism operators to attract people to visit the region
 - Businesses and other organisations to attract people to come and live in the region

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Thank you



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What did we learn?

• The influence of socioeconomic variables (e.g. price, cattle numbers) on <u>water</u> <u>quality/sediment</u>

Price changes can affect water quality in GBRWHA

(market based policies may be able to help achieve some environmental goals)

 The relative 'value' (benefit) of the goods and services provided by the Great Barrier Reef World Heritage Area (GBRWHA) to <u>residents</u> and <u>visitors</u>

Residents and Visitors perceive the 'productive' values of the GBRWHA and catchments to be less important that non-productive values

(suggests strong preference for developments that keep those non-productive values intact)

Developments which alter the 'mix' of tourists or residents, will impact tomorrow's values

- we have improved some traditional 'non-market' valuation methods & trialed new methods
- A continuation of the long-term monitoring of tourists as they leave Cairns airport (which Bruce Prideaux has been undertaking since 2007)

Changing mix of visitors, with changing motivators and activities