



Original Articles

Assessing recreational benefits as an economic indicator for an industrial harbour report card



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ABSTRACT

Industrial harbours are a complex interface between environmental, economic and social systems. Trying to manage the social and economic needs of the community while maintaining the integrity of environmental ecosystems is complicated, as is the identification and evaluation of the various factors that underpin the drivers of economic, community and resource condition. An increasingly popular strategy to deal with the identification and evaluation challenges in complex human-environmental systems is to use a report card system which can be used as a summary assessment tool to monitor the health of aquatic ecosystems. To date though these have largely focused on environmental factors, and it is only very recently that attempts are being made to include social, cultural and economic indicators. There has been limited consensus in the selection of social and economic indicators applied in different aquatic report cards but as recreation is such an important activity, typically some measure of recreation benefit is included. However, there has been no commonality in the measures applied to assess its performance as an economic indicator.

This paper is focused on the assessment of recreational benefits as an indicator of economic value in the report card for Gladstone Harbour in Queensland, Australia. It is the first aquatic health report card to include an assessment of the nonmarket value of recreation which makes it a more comprehensive indicator of economic value compared to other report cards based on measures of employment, participation or expenditure. There have now been three consecutive years of reporting (2014–2016) of the Gladstone Harbour report card, and the results indicate that the recreation index appears to be effective in monitoring changes over time.

1. Introduction

Recreation and physical activity provide important health (physical and mental) and social benefits which improve community well-being (e.g., Morris and Hardman, 1997; Ambrey and Fleming 2014; Budruk and Lee 2016; Fenton et al., 2017). A major challenge for resource managers of areas such as coastal zones is to be able summarise and evaluate recreation benefits in these areas so that different competing uses can be managed. Numerous studies have examined the demand for, and determinants of, coastal recreation (Onofri and Nunes 2013). Many studies have assessed coastal recreation, following two main approaches. The first is to assess the direct and indirect economic benefits of the recreation market, which include the direct private benefit to commercial enterprises and the associated flow on effects (Access Economics, 2008). The second is to evaluate recreation benefits directly, where non-market valuation techniques are applied because the benefits are not directly revealed in market transactions.

Coastal resource managers not only require information about the economic value of recreation but also about the factors that may impact on that value and the quality of the recreational experience. In beach valuation, this has typically been explored in terms of access and amenities (e.g., Lew and Larson 2005; Oh et al., 2008; Whitehead et al., 2008; Roca et al., 2009; Barry et al., 2011); beach nourishment/erosion (e.g., Shivlani et al., 2003; Huang et al., 2007; Marzetti, 2009; Gopalakrishnan et al., 2011) and coastal water quality (e.g., Le Goffe 1995; Hanley et al., 2003; Beharry-Borg and Scarpa 2010; Halkos and Matsiori 2012). The quality of recreational fishing is more often linked to changes in catch rates (e.g., Bergstrom et al., 2004; Rolfe and Prayaga 2007; Melstrom et al., 2015).

The popularity of beach recreation has led to its dominance in the extensive global literature on the non-market value of coastal recreation (e.g., Whitehead et al., 2008; Roca et al., 2009; Barry et al., 2011; Rolfe and Gregg, 2012; Windle and Rolfe 2013). While the trip value of an individual beach visit might be relatively low, the total aggregate

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value may be more significant if participation rates are high. In comparison, recreational fishing (e.g., [Lew and Larson 2005](#); [Prayaga et al., 2010](#); [Raguragan et al., 2013](#); [Farr et al., 2014](#); [Pascoe et al., 2014a](#)) is usually a higher cost activity and while it attracts a higher economic value for a recreational trip, the aggregate value to the community may be lower than other recreation activities due to lower participation rates.

River estuaries are also popular settings for coastal recreation, as these are often associated with major urban centres that historically developed around shipping and ports. It is these areas where resource management challenges are often most visible, particularly ports and harbours that are complex interfaces between environmental, economic and social systems ([Hallett et al., 2016](#)). Trying to manage the social and economic needs of the community while maintaining the integrity of environmental ecosystems is complicated, as is the identification and evaluation of the various factors that underpin the drivers of economic, community and resource condition ([Pascoe et al., 2016](#)).

An increasingly popular strategy to deal with the identification and evaluation challenges in complex human-environmental systems is to use a report card system which can be used as a summary assessment tool to monitor the health of aquatic ecosystems (e.g., [Dauvin et al., 2008](#); [Bunn et al., 2010](#); [Halpern et al., 2012](#); [Kelble et al., 2013](#); [Pascoe et al., 2016](#)). A report card is a familiar assessment tool that is easy to understand and interpret, and can translate the complexity of ecosystem management into a readily and widely understood format ([Halpern et al., 2012](#); [Connolly et al., 2013](#); [Pascoe et al., 2016](#)). The structured approach of environmental report cards, together with their summary into simple indexes and regularity of performance gives them some powerful advantages for communication with the community compared to complex and more discrete applications of economic analysis ([Halpern et al., 2012](#); [Sheldon et al., 2012](#); [Connolly et al., 2013](#)). However, while the use of environmental report cards has increased, reporting has principally focused on bio-physical indicators and it is only more recently that attempts are being made to include social, cultural and economic indicators ([Curtin and Prellezo 2010](#); [Connolly et al., 2013](#); [Pascoe et al., 2016](#)).

More broadly there have been many studies that have focused on the selection of social and economic indicators; much of it driven some years ago with the focus on sustainable development and the need to adopt a triple bottom line approach ([Strange and Bayley 2008](#)). The development of indicators became an industry of its own ([King et al., 2000](#)) that still thrives today. Nonetheless, the challenge of measuring socio-economic indicators in a uniform and simplistic manner has limited their inclusion in aquatic health report cards. In a recent review of 14 aquatic monitoring and report card programs [Connolly et al. \(2013\)](#) only identified two cases where either economic and/or social indicators were applied. The Great Barrier Reef report card applies social (adoption of best management practices) as well as ecological indicators,¹ while the Ocean Health Index (OHI) reports on ten goals and includes ecological, social and economic indicators, with the latter two including 'Artisanal fishing opportunities', 'Coastal livelihoods and economies', 'Sense of place' and, 'Tourism and recreation'.² More recently, the inclusion of socio-economic indicators is becoming more commonplace. The preliminary report card for America's Watershed (the Mississippi River), released in 2015, presented the overall status for six broad social, environmental, and economic goals (Transportation, Water supply, Flood control and risk reduction, Economy, Ecosystems, and Recreation).³ In 2015, the Healthy Waterways program, (which has been producing report cards for Southeast Queensland (Australia) waterways since 2000), introduced a new waterway

benefits rating which measured the level of social and economic benefits to local communities in terms of Community satisfaction, Access, Recreation, Recreational fishing and Drinking water.⁴ Other regions in the Great Barrier Reef catchment area (Wet Tropics⁵ and Mackay Whitsunday⁶) have recently piloted aquatic health report cards. In both cases, the inclusion of socio-economic indicators has been outlined in the design phase, but they have not been fully included as indicators in the initial report cards.⁷

There has been limited consensus in the selection of social and economic indicators applied in different aquatic report cards. Typically some measure of recreation benefit is included but there has been no commonality in the measures applied to assess its performance. For example, recreation is measured by related expenditure in the 2016 Southeast Queensland Healthy Waterways report card⁸; by the proportion of the total labour force engaged in the tourism and recreation sector in the 2015 Ocean Health Index; and by participation in recreational activities in the 2015 America's Watershed report card.

The report card for the Gladstone Harbour in central Queensland, the focus of attention in this paper, provides an assessment of the environmental, economic, social and cultural health of the harbour area (see <http://ghhp.org.au/>). The economic value of both tourism (market benefits) and recreation (non-market benefits) are included in the economic component of the report card. The value of tourism is included as an indicator (along with shipping activity and commercial fishing) in the category (indicator group) 'Economic performance' while the recreation benefits are assessed as a separate category 'Economic value (recreation)'. Three separate indicators of recreational value are assessed: beach recreation, other land-based recreation and recreational fishing (land and water). This paper is focused only on the assessment of recreational benefits for the report card.

There have now been three consecutive years of reporting (2014–2016) of the Gladstone Harbour report card, and the results provide useful insights into the efficacy of the recreational index applied in the assessment. Two research questions are developed to examine these insights in more detail. The first asks if the recreation value of the three activity types are significantly different from each other. This is important as it establishes the potential transferability of values across different recreational activities as there is little evidence in the literature to provide any such guidance. The second research question asks if the recreation index is sufficiently sensitive to change over time (if appropriate). This is important as it establishes the sensitivity of the measures applied to assess the performance of the three recreation indicators and the efficacy of the recreation index applied in the report card.

This paper is outlined as follows. Background information about the case study is presented in the next section, followed by methodological details. The results are outlined in the fourth section with the discussion and conclusion presented in the final section.

2. Case study background

Gladstone, with a population of over 67,000, is located on the central Queensland coast in Australia and is a key access point to the southern Great Barrier Reef ([Fig. 1](#)).

Historically an agricultural area, it has developed into a major industrial hub and is home to several world scale industries including alumina, aluminium, cement, manufacturing, power and liquefied natural gas (LNG) ([Pascoe et al., 2016](#)). The Port of Gladstone has

⁴ <http://healthywaterways.org/report-card> (accessed 21/12/16)

⁵ <http://wettropicswaterways.org.au/report-card/> (Accessed 6/1/17)

⁶ <http://healthyriverstoreef.org.au/2015-download/> (Accessed 6/1/17).

⁷ Other Cultural heritage and Stewardship indicators were included in the first report card (2015) for the Mackay Whitsunday region.

⁸ At the time of writing this paper, full methodological details had not been publically released.

¹ <http://www.reefplan.qld.gov.au/measuring-success/report-cards/> (accessed 31/01/17)

² <http://www.oceanhealthindex.org/> (accessed 21/12/16)

³ <http://americaswater.wpengine.com/reportcard/> (accessed 21/12/16)

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