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The amenity value of Abu Dhabi's coastal and marine resources to its beach visitors

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ABSTRACT

Abu Dhabi, marketed as a centre of economic development in its geographic area during the post-oil era, is renowned for being a choice destination of high value individuals and tourists, due to its rich coastal and marine resources as well as the high quality of services. Outbreaks of harmful algae blooms (HAB) (red tides) due to increased eutrophication as a result of a decline in water quality, however, is posing a serious threat to the amenity values the tourist can appreciate. The amenity values include beach and ocean views, recreation and sport opportunities and facilities, as attractions, among others. To investigate the amenity value of the coastal and marine resources of Abu Dhabi to the beach visitors, we use a contingent valuation assessment after collecting data from a sample of 103 beach visitors. We conducted an econometric analysis to examine factors that potentially affect their behaviour. We determined firstly if the respondents were willing to accept compensation for visiting another beach in the event of an outbreak of HAB and its amount; or in another scenario if they would be willing to pay an annual fee, and its amount, for restoration and mitigation of the beach pollution.

The results show that the beach amenity value, therefore, is estimated at between US$8.3million/ha and US $13.8million/ha based on the beach size. Factors such as the travel time from place of current residence the beach, the residence status, the number of beach visits and household size and income have affected the willingness-to-accept (WTA) of the respondents.

1. Introduction

Coastal and marine resources offer a range of ecosystem goods and services to its users. These include water quality maintenance, visual amenity, beach recreation and shipping channel maintenance. Using one service, however, may reduce the levels of another service. For example, dredging to open waterways for oil tankers can increase sediment movement that inhibits coral growth and in turn reduces the recreation options (Burt et al., 2011; Burt, 2014). The Abu Dhabi authorities actively market the city as a preferred destination for high value individuals and corporations and, in the process, commit to maintain and provide a well-functioning marine and coastal ecosystem to deliver a range of quality ecosystem goods and services. It is especially the amenity value of the coastal and marine resources that is accentuated in marketing the city.

Empirical studies in the recent literature estimate the value of public good (such as the coastal and marine resources in our case) by conducting surveys illustrating the consumers' maximum willingness to pay to acquire the good in question (Zhao and Kling, 2004). More specifically, to evaluate the preferences for environmental quality (as a public good), the contingent valuation method (CVM) is often used in literature (Ahleim and Buchholtz, 2000). In this method, one can ask for the participants' willingness to pay (WTP) for an improved product (better environmental quality) or for their willingness to accept (WTA) compensation for abandoning expectations for improvement.

In this analysis we are interested in the amenity values beach users derive from the Abu Dhabi city beaches and the supporting marine ecology. This is an important consideration given that the city is being marketed as a preferred destination for the global traveller and business person, with beach and ocean views, recreation and sport opportunities as attractions (Abu Dhabi Urban Planning Council, 2013, 2014a, 2014b; Environment Agency – Abu Dhabi, 2014). The consequences of urban growth, however, include an increase in eutrophication and the number of red algae blooms as discussed above (see also AGEDI, 2008; Al Shehhi et al., 2014; Burt et al., 2011; Burt, 2014; Cheung et al., 2012; Foster and Foster, 2013; Ghaffour et al., 2013; Grandcourt et al., 2011; Sheppard et al., 2010; Zhao and Ghedira, 2014).

By marketing the city as a preferred destination with good quality coastal and marine resources as incentives for the global traveller, investors and travellers have an expectation or perceived

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entitlement to the direct and indirect benefits of these 'free' non-marketed good-quality ecosystem services supplied by the ocean, as communicated in the planning documents.

Current developments, as will be discussed below, has the potential to jeopardise these values. Because of the need to manage the environment prudently, based among others on the words of the Late Sheikh Zayed Al Nahyan (see below), we embarked on estimating the economic value of Abu Dhabi's coastal amenity values to its beach visitors using both a WTA compensation for a deterioration in quality of coastal amenity values, and a WTP to contribute to a hypothetical restoration fund to avoid a loss in these amenity values, followed by an econometric estimation of the factors affecting the respondents WTA and WTP for the improvement of the beaches.

The paper is structured as follows. The next section presents the specific case of Abu Dhabi with regards to its coastal and marine resources. The following section explains the theoretical background of the methodology, the specific details of the contingent valuation method and the econometric method to be used. Next, we present the results of the survey, the estimation of the WTA and WTP and the empirical findings of the econometric model; while the last section concludes.

2. Background: Abu Dhabi

The Abu Dhabi Emirate is currently home to about 1.4 million people of which close to 50% are located within the city (Statistics Centre – Abu Dhabi (SCAD), 2014). In their aspiration to become a regional leader in environmental performance and sustainability, multiple interlinked policy agendas have been prepared for the Emirate including the Abu Dhabi Environment Policy Agenda, UAE green Growth Strategy and UAE Vision 2021. These plans were prepared through cross-sectoral stakeholder engagement including water and electricity, oil and gas, dredging, nuclear authorities, NGOs and academia, among others. The Emirate, however, is in a period of rapid growth, given its rapidly growing population, contributing to elevated pressures to its coastline where urban growth is primarily focused. The oil industry is also largely focused on the marine environment. Consequently, there is an intensive use of the marine environment for economic inputs such as oil, shipping routes, water for desalination, fish harvesting, recreation and general coastal amenity services linked to culture, marketing and relaxation. The marine ecosystems are also recipients of the outputs of the developments, waste water discharge, thermal cooling water discharge, brine discharge, dredging spoil, ballast discharge and accidental petro-chemicals pollution (Burt, 2014).

As a result, urban settlement, inshore canalisation, oil extraction and shipping, there has been an increase in surface water temperatures, salinity, nutrient levels, sediment, resource harvesting and chemical pollution in recent years (AGEDI, 2008; Al Shehhi et al., 2014; Burt et al., 2011, 2014; Cheung et al., 2012; Foster and Foster, 2013; Ghaffour et al., 2013; Grandcourt et al., 2011; Sheppard et al., 2010; Zhao and Ghedira, 2014). The state of marine ecological assets has declined due to these pressures and recent indicators of these declines are, for example, the following:

- Coral reefs have declined by 40% in recent years (Burt et al. 2011; Sheppard et al. 2010)
- Socotra cormorant (*Phalacrocorax nigrogularis*) colonies have declined in number to only 30% of 1980 levels (BirdLife International, 2014)

One of the ecological responses to declining marine functionality has been an increase in intensity, frequency and duration of harmful algal blooms (HAB) and inshore eutrophication (Environment Agency – Abu Dhabi, 2014). HAB events, also known as red tides lead to toxic water conditions and large scale fish die-offs, resulting in poor water quality, odour and beach conditions, which unsafe and unsuitable for recreation and general use of the coastline. As part of a systematic biodiversity conservation assessment, mapping of condition took place within the Emirate to identify ecological integrity of ecosystems, including where ecosystems have been lost or degraded. This data established for the Emirate a basis for determining areas of conservation opportunity as well as highlighting conflict with other land and marine use activities.

The declining marine functionality and associated increase in disservices of poor water quality, is in conflict with the Capital 2030 vision of a world class city, which states (Abu Dhabi Urban Planning Council, 2014a):

> A Unique Environment – Planning for careful, sensitive growth is prudent so that we preserve the critical natural environment that makes Abu Dhabi unique. It is important to identify and conserve these distinct environmental and cultural amenities first and then determine where new development might best be located, striking a balance between conservation and development. Protected areas can always be sensibly developed at a later date, but it is very difficult to reclaim a damaged environment.

Current development trends and changes in the near-shore water conditions place this vision at considerable risk.

The need to develop a motivation for elevated marine conservation has given rise to the question of the economic value of the coastal and marine amenities in Abu Dhabi. This study investigates this question using the double-bound continuous choice contingent valuation method and considers both the willingness to accept (WTA) compensation for any value loss in amenity as a result of a decline in the quality of the coastal and marine resources, and the willingness to pay (WTP) to avoid future damages by contributing to a hypothetical restoration fund.

3. Methodology

In this section, we present the specific tools and methods we use to achieve the paper's purpose: theoretical aspects of the contingent valuation method, the survey and the econometric methods.

3.1. Contingent valuation

Although numerous valuation techniques have been proposed in the literature (Dixon et al., 1994), the method preferred by many when seeking to estimate the direct and indirect values of non-marketed commodities is contingent valuation (Bowers, 1997; Callan and Thomas, 1996; Kahn, 1997; Rao, 2000). Contingent valuation provides a stated preference by the interviewee as to his/her perceived value of a resource and/or the change in value given a specific scenario. Two types of contingent valuation studies are used, namely the willingness to pay (WTP) for a service, and/or the willingness to accept (WTA) compensation for the loss of and/or deterioration in a service.

The contingent valuation method has been successfully applied to estimate the economic value of coastal and marine resources in the past within different countries and continents, such as Japan (Zhai and Suzuki, 2009), Mexico, (Barr and Mourato, 2009) China (Huang et al., 2013), Sweden (Östberg et al., 2012), the UK (Georgiou et al., 2004) and the United States (Petrolia et al., 2010), as well as smaller islands like the Azores with great access to ocean and marine resources (Ressurreição et al., 2011). As discussed by