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# Integrating Cultural Ecosystem Services valuation into coastal wetlands restoration: A case study from South Australia

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## ABSTRACT

Elaborating the benefits humans receive from coastal wetlands using a Cultural Ecosystem Services assessment is an emergent and important field linking human wellbeing to ecosystem function. Translating these benefits into useable concepts for environmental policymakers, and managers is challenging yet important for supporting landscape restoration projects. This study responds to the call for Cultural Ecosystem Services case studies beyond the northern hemisphere. A household survey of residents adjacent to a peri-urban coastal wetland in South Australia and an online survey of interest groups were administered to identify co-benefits associated with a coastal restoration project in the region. A dynamic/relational cultural values framework guided the analysis. Findings reveal that visitation has a positive influence; people valued most the places with which they were familiar. The analysis confirms a mutual connection between: ‘doing’ (undertaking an activity), environmental awareness and appreciation, the formation of attachment to place, and having positive experiences. The analysis also points out that the naturalness of this coastline is highly valued. The findings here diverge from previous coastal landscape assessments based singularly on scenic value. The implication is that localised, place-based landscape assessments which include cultural values, offer a more deliberative approach to policy development and planning and will more likely incorporate what matters most to people.

## 1. Introduction

Coastal wetlands occupy approximately only 15 percent of the Earth’s total wetland area and yet are among the most productive and valuable of all ecosystems (Creighton et al., 2019; Davidson et al., 2019; Kelleway et al., 2017). They deliver a wide range of ecosystem services, support biodiversity, and contribute to the wellbeing of millions of people (Barbier, 2019; Davidson et al., 2019; Laegdsgaard, 2006; Newton et al., 2018; Pinto et al., 2014). Emergent interest focusses around the capability of these environments to counteract effects of global warming (Endter-Wada et al., 2020). Irrespective of their socio-ecological importance, coastal wetlands are among the most threatened of all the Earth’s environments (Barbier, 2019; Millennium Ecosystem Assessment, 2005) with more rapid rates of degradation and reduction than any other ecosystem (Boon et al., 2015; Darrah et al., 2019; Gedan et al., 2009; Lau et al., 2019). Losses are attributed to human-induced pressures associated with landscape modification and conversion for agriculture, urbanisation, ongoing development (Adam, 2002; Laegdsgaard, 2006) and climate-induced sea level rise (Kelleway

et al., 2017). As a result, it is predicted that their contraction and degradation will continue (Mojica Vélez et al., 2018; Webb et al., 2013). This loss has significant implications for both people and the environment.

In recognition of their value and current threats there is an enhanced shift to protect coastal wetland habitats (Barbier, 2016; Creighton et al., 2017; Laegdsgaard, 2006; Scholte et al., 2016). Public support for these environments is considered critical in resisting development interests (Dietsch et al., 2016; Dobbie, 2013; Scholte et al., 2016). However, gaining support for wetland protection and restoration is challenged by widely held public perceptions and negative associations with these ecosystems (Scholte et al., 2016); they are cited as examples of un-aesthetic and under-valued landscapes (Boon, 2012; Dobbie, 2013; Lothian, 2007).

Competition over land use is an enduring challenge at the coast, especially in urban and peri-urban settings where space is limited, and land values are at a premium. Resisting the conversion of undervalued coastal seascapes to other uses requires robust reasoning (Kobryn et al., 2018; Pedersen et al., 2019). The Ecosystem Services (ES) framework

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provides a valuation methodology that systematically elaborates the benefits humans receive from nature (Costanza et al., 2017), and a means by which to argue for coastal wetland conservation. Humans benefit from ES in multiple ways from life supporting (e.g. food and shelter), to life fulfilling (e.g. recreation), and life affirming services (e.g. cultural identity) (Newton et al., 2018). Three of the four ES categories: provisioning, regulating, and supporting services have direct and tangible benefits and are often assigned monetary value (Díaz et al., 2018). The Cultural Ecosystem Services (CES) category: ‘the contributions that ecosystems make to human well-being in terms of the identities they help frame, the experiences they help enable and the capabilities they help equip’ (Fish et al., 2016a: 330), is based on intangible attributes and is more difficult to quantify (Chan et al., 2012; Fish et al., 2016b; Gee et al., 2017; Kenter et al., 2015; Milcu et al., 2013; Pizzirani et al., 2014; Poe et al., 2014) and for this reason is often underrepresented in ES assessments (Cabana et al., 2020; Martin et al., 2016; Newton et al., 2018; Poe et al., 2014).

CES is a rapidly emerging field of inquiry, with a growing number of empirical studies responding to the call for enhanced methodologies and to elevate the status of cultural values in the ES framework (Blythe et al., 2020; Brown and Hausner, 2017; Kobryn et al., 2018; Scholte et al., 2015) and be more explicitly recognised and incorporated into policy-making and environmental management (Díaz et al., 2018). However, the bulk of CES empirical studies to date emanate from the northern hemisphere (especially Europe and the US) and focus on terrestrial landscapes, leaving an absence of coastal, marine and estuarine CES studies (Ahtiainen et al., 2019; Blythe et al., 2020; Kobryn et al., 2018; Martin et al., 2016). At the time of writing only three other Australian empirical studies examining CES in coastal environments had been published (Kobryn et al., 2018; Marshall et al., 2019; Martin et al., 2020).

Several empirical studies concentrating on measuring CES have helped to build analytical approaches and frameworks to measure

cultural services as tangible concepts (Cabana et al., 2020; Church et al., 2014; Fish et al., 2016b; Kenter et al., 2015). With now advanced theoretical developments on CES, further empirical studies are needed, especially from the southern hemisphere (Blythe et al., 2020; Brown and Hausner, 2017; Martin et al., 2016), and especially for marine and coastal environments.

Church et al. (2014) relational framework (Fig. 1) illustrates the dynamic relationship between environmental spaces and cultural practices that give rise to CES. Cultural benefits and services do not arise passively from ecosystems. Rather, they accrue through place-based human experience and interaction with environments (Church et al., 2014). Relational interactions are framed by three dimensions of well-being: ‘identity’ measured by symbolic associations; ‘experiences’ as described by encounters with nature; and ‘capabilities’ as measured by skill acquisition.

Following Church et al. (2014), three components frame this inquiry: practices (actions people take or things people do), spaces (settings in which actions happen—places, landscapes or ecosystems), and ecosystem benefits accruing from the intersection of space and place (meanings or significance generated through specific practices in specific spaces) that contribute to well-being (mental and physical health benefits).

Here we present an empirical case study from South Australia designed to investigate CES to contribute to a landscape scale restoration project. Case studies such as this are important in helping to understand location-specific characteristics of CES. The findings support the significance of CES and the importance they have for more inclusive and enhanced decision-making (Wegscheidl et al., 2017), and a more complete application of the ES model.

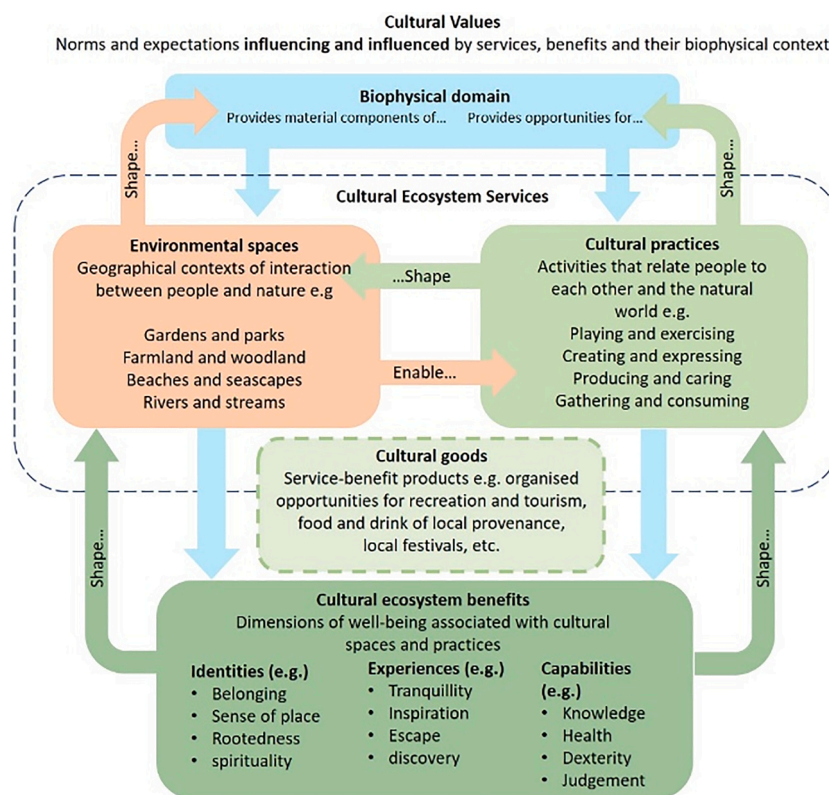


Fig. 1. The dynamic cultural values framework. (Source: Church et al., 2014, p.15—reproduced with permission).

## 2. Methods

### 2.1. South Australian coastal wetland case study

The biophysical domain of this study north of the City of Adelaide in South Australia, comprises approximately 70 km of low-energy coast from Torrens Island to Thompson Beach (Fig. 2). The coastline is characterised by wide tidal flats sequenced by a zonation of seagrass meadows, intertidal sand flats and mangroves, and supratidal saltmarsh (EPA, 2013; Bourman et al., 2016) (See Fig. 3). South Australia is recognised as a centre of biodiversity for saltmarshes in Australia and the study area comprises some of the largest intact, connected coastal native vegetation and habitats in the Adelaide region (Bourman et al., 2016; DEWNR, 2018; Saintilan, 2009). Detailed studies of the region identify high biodiversity and conservation values (Caton et al., 2009). Factors contributing to these values include endemic habitat, rare vegetation communities, vegetation abundance, coastal reptile habitat and vegetation patch size. The highest conservation values in the region are recorded at Thompson Beach (Caton et al., 2009). In keeping with the global interest around Blue Carbon and the high rates of sequestration associated with coastal wetlands, the South Australian government has recognised the significance of the region as an important carbon sink (DEWNR, 2018).

Some natural features of the region have been affected by human modifications and uses, but the region is sparsely populated aside from small townships and low-density housing. Few roads connect to the

coast from the arterial highway. Natural resources of this coastal region have been utilised for fishing, agriculture, mining, grazing and recreation. The region has importance for indigenous and European heritage.

Conservation opportunities are emerging, largely because of the cessation of commercial salt production in 2013 (DEW, 2019; Dittmann et al., 2019). Since the 1940s levee banks constructed to create salt evaporation ponds restricted both tidal flows and public access to parts of the coast (Caton et al., 2009; Coleman et al., 2017). A trial to re-instate tidal flow to a salt pond has demonstrated the potential for ecological restoration (Dittmann et al., 2019).

### 2.2. Survey method

This study used an inquiry-based approach to consider cultural values associated with human-environment interactions (See Church et al., 2014; Fish et al., 2016b). Flinders University granted ethics approval (Social and Behavioural Research Ethics Committee project number 8408) to undertake an online survey of interest groups and a household questionnaire in July 2018. The survey instrument included a mix of 20 closed and open-ended questions. The instrument was first converted to the Qualtrics online survey platform (Qualtrics 2018), and shortly after was converted to a hard copy colour A4 document to be delivered to 500 households. Table 1 presents the variables and data types collected.

Convenience sampling was adopted for the online survey (OL) of interest groups. Sixty-one contacts with a specific interest in the coastal

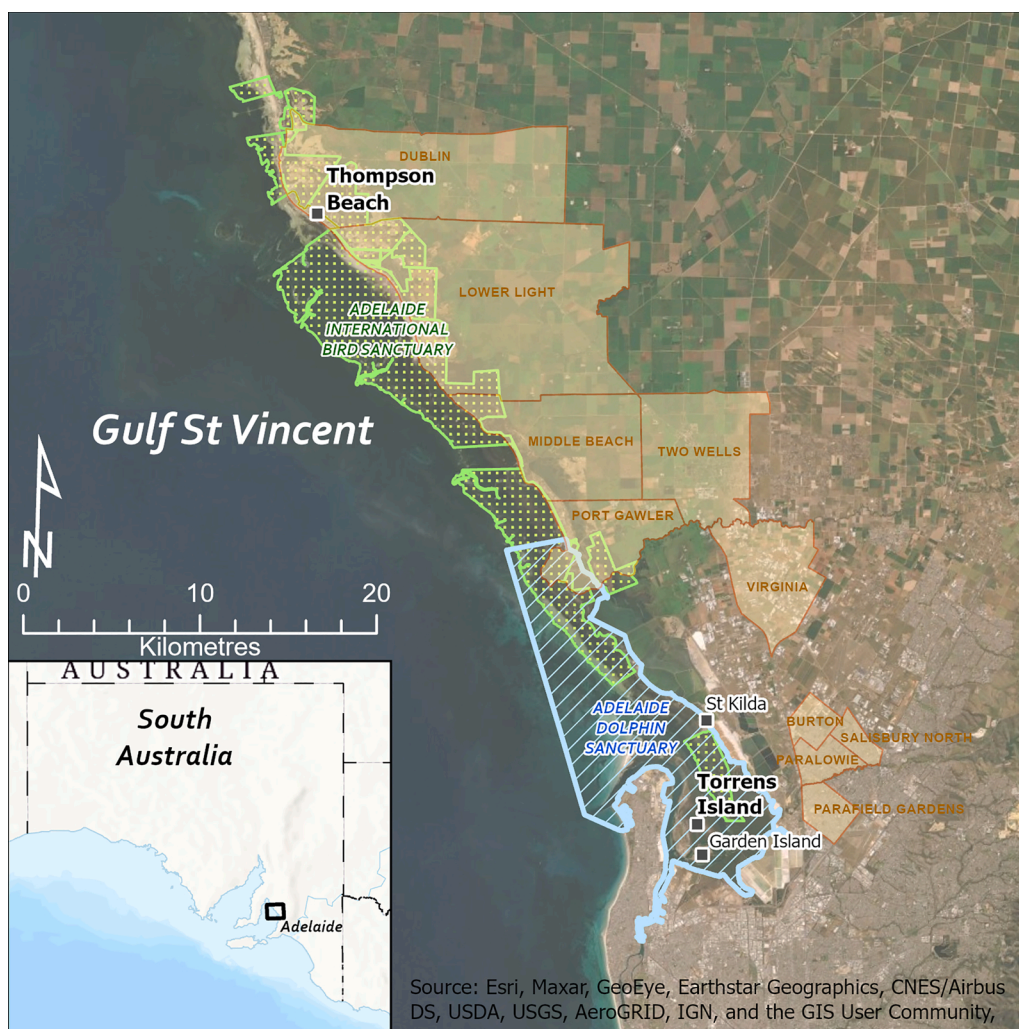
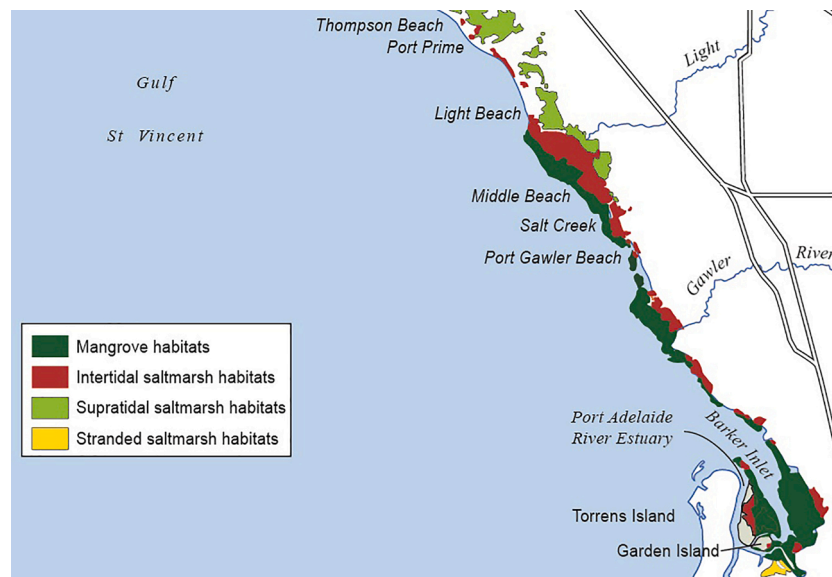


Fig. 2. Map of the study region.





**Fig. 3.** Floristics of the northern Adelaide coastline.  
(Source: Bourman et al., 2016 p.179 reproduced with permission).

wetlands including various societies, clubs, and community groups active in the region, relevant local and state government employees, and elected members of the three local councils with a coastal boundary in the study region, were invited by email to distribute the online survey to their networks on 2 July 2018 with a follow-up reminder on 20 July 2018.

A three-staged cluster sampling method was used to select households for questionnaire delivery (Neuman, 2014). The first stage involved identifying suburbs adjacent to this northern Adelaide coastline. Altogether ten suburbs lie adjacent to this coast, four situated on the coastward side of the main arterial road, and six on the landward side (see Fig. 2). Using Australian Bureau of Statistics 2016 Census ‘QuickStats’ data, the 500 questionnaires were proportionally allocated for distribution to suburbs by population size.

The second cluster sampling stage followed a ‘lottery-draw’ selection method within each of the 10 suburbs by pinpointing the streets on a map where questionnaires would be disseminated. The third stage involved identifying the starting point for disseminating the questionnaires. Every fourth house on the same side of the pinpointed street received a questionnaire until 10 questionnaires for that street had been delivered. If the street ended before 10 questionnaires were delivered, then questionnaires were delivered to the opposite side of the street. This process was followed until all 500 questionnaires were administered on 18 July 2018. There was no opportunity to follow-up households to encourage completion.

Of the 88 responses, 77 completed all questions. Eleven respondents did not answer all questions and were excluded from the quantitative analyses of the respective questions. The open-ended responses were transcribed to a Word document for coding and sorting. Codes were manually assigned to the transcripts and then sorted for analysis. To test associations between variables, Chi-square  $r \times k$  crosstabulation tests were performed in IBM SPSS Statistics 25.

### 3. Results

The conceptual framework underpinning this study explains CES as a mutual exchange between the interactions of people with their environment—the spaces (e.g. the geographical context), and the practices or activities that relate people to one another and their environment (See Fig. 1). This cultural space—cultural practice interplay in turn shapes and is shaped by a range of cultural ecosystem benefits (Church et al.,

2014; Fish et al., 2016a). These are the culturally defined dimensions of ES. The results are set out following the components of this dynamic framework.

#### 3.1. Survey response

Thirty-seven online surveys and 51 questionnaires were returned, making a combined total of 88 responses. Given that nonprobability-sampling methods were used, it is not possible to provide a response rate for either the online or household survey (AAPOR, 2016).

The study attracted a wide geographical spread of people with an interest in the coastal region under study; respondents did not necessarily live in the region to have an attachment to it. Eighty-one respondents (92 %) provided their postal or zip code. Fifty-two respondents’ (59 %) postal code matched the 10 suburbs adjacent to the northern Adelaide coastline, 47 of which were from the household questionnaire. Most of these were returned from post codes seaward of the main arterial road. In contrast, 25 of the 30 respondents from the online survey who provided their postal codes were from 20 suburbs outside the study region, covering an array of western, northern, and eastern metropolitan suburbs of the city of Adelaide, and some regional locations as far as 260 km from the study area.

Twenty-seven respondents (31 %) acknowledged they belonged to a community or social group that used the northern Adelaide coastal region between Torrens Island and Thompsons Beach. Twenty-three of these identified their group. The most commonly cited social groups in the household questionnaires were ratepayers’ associations whilst the online survey respondents identified bird watching groups (e.g. Birds SA, Birdlife Australia) and environmental ‘friends of’ or action groups (e.g. Friends of the Adelaide International Bird Sanctuary’, ‘Adelaide Dolphin Sanctuary Action Group’).

Of the 500 randomly distributed household questionnaires, a return rate of about 10 percent is not an unreasonable outcome (Neuman, 2014). According to de Leeuw (2008) and Neuman (2014) response to surveys has been decreasing over time and e-mail surveys tend to have a lower response than mail surveys. The total population pool is not known for the online survey and it also remains unknown as to whether network contacts disseminated the survey as requested by the researchers. As such, the data set is not generalizable to the wider population (Berdie and Anderson, 1976). With a low number (88) of responses, results have been interpreted with respective care.

**Table 1**  
Data characteristics elicited by the questionnaires.

Variables	Type	Values	Description
Visitation	Binary	Yes (1) No (2)	Visited the region in last year
Frequency of visits	Nominal	1–5	Frequency of visitation to the region High values indicate high visitation rate
First visit	Nominal	1–5	Length of time Low values indicate less time
Cultural connection	Binary	Yes (1) No (2)	Identify a connection
Heritage significance	Binary	Yes (1) No (2)	Awareness of the cultural heritage significance of the region
Social Group	Binary	Yes (1) No (2)	Member of a social group in the region
Activities	Nominal	1–21	Main activities carried out in the region
Attractions x 11 sites	Nominal	1–5	Awareness of attractions High values indicate high awareness level
Attraction Importance x 11 sites	Nominal	1–5	Importance attributed to regional attractions High values indicate high importance level
Importance – 3 <sup>rd</sup> person x 7 environmental quality attributes	Nominal	1–5	Importance of place rating High values indicate high importance level
Importance – 1 <sup>st</sup> person x 9 environmental quality attributes	Nominal	1–5	Importance of place rating (experience/capability) High values indicate high importance level
Coastal climate change	Nominal	1–5	Degree of concern about future coastal climate change impacts High values indicate high agreement level
Future preference	Nominal	1–4	Four scenarios seeking preference for the development of the region High values indicate strong conservation preference
Asset value x 7	Nominal	1–5	Importance of assets, features, and environmental services High values indicate high importance level
Preservation x 7	Nominal	1–5	Importance of preservation of assets, features and environmental services High values indicate high importance level
Age	Nominal	5 classes	
Gender	Nominal	3 classes	

More men (HH 29/OL 15; 49 %) than women (HH 21/OL 14; 40 %) participated in the study—10 people (11 %) gave no response to the gender assignment. Forty-four percent of respondents were aged over 60 (n=HH 28/OL 11), with an additional 38 percent aged between 41 and 60 years (n=HH 30/ OL 14)—8 people, (9%) gave no response to the age question.

Eighty-four percent of respondents who answered the question (n = 72 of 86), said they had visited the coastal region at least once in the last year and more than 35 percent visited (n = 28 of 79) at least weekly. Most respondents had a long engagement with the region; 55 percent (n = 47 of 86) said they visited the region for the first time more than ten years ago, and a further fifteen percent (n = 13 of 86) at least six years ago.

### 3.2. Important spaces in the coastal wetlands of peri-urban Adelaide

A key CES is the material context that provides for ‘the interaction between people and nature’. The surveys canvassed opinions about 11 of

the most prominent geographical sites regarding visitation rates and importance ranking of sites.

The locations of the 11 sites of interest (see Fig. 2) include: the Thompson Beach walking trails, the Adelaide International Bird Sanctuary National Park – *Winaityinaityi Pangkara*, and the Lower Light Rifle Range, the Samphire Discovery saltmarsh trail at Middle Beach, the Middle Beach Caravan Park, the Port Gawler Conservation Park, the Port Gawler Dirt Bike track, Adelaide Dolphin Sanctuary, the St Kilda Adventure playground, the St Kilda Mangrove Trail and Interpretive Centre, and the Garden Island Boardwalk.

Overall, protected spaces and non-commercial ‘natural’ recreational sites were the places respondents identified as the most visited (Fig. 4a). Of all the 11 sites more than half of respondents had repeat visits to the international bird sanctuary and the large adventure playground, which was the most visited of all sites. More than one-third of respondents had visited the other nature-based sites (national parks, sanctuaries and walking trails). The three commercial sites represented places that had been heard of but never visited by the largest number of respondents.

Respondents also rated the importance of the 11 sites. The three protected sites and the nature trails were rated by two-thirds of respondents as ‘very important’ or ‘important’ (Fig. 4b). The commercial sites received an inverse response, with the rifle range receiving the lowest importance ranking.

The six most visited sites were also ranked as being the most important. Respondents were more likely to rate a site as being important if they had visited it at least once (Chi-Square test  $X^2 = 232.942$ ,  $df = 12$ ,  $P < 0.0001$ ). For example, the Adelaide International Bird Sanctuary National Park—*Winaityinaityi Pangkara*, of all 11 sites, was a) the site that most respondents had visited multiple times and b) was the site most highly rated as either ‘important’ or ‘very important’. Seventy-eight percent of respondents who had visited the site once or more rated it as ‘very important’ ( $X^2 = 18.848$ ,  $df = 8$ ,  $P < 0.016$ ).

Respondents in this study were asked to rate a suite of environmental qualities ‘landscape value, aesthetics, and native flora and fauna’. Of the people who answered this question 99 percent, (n = 78 of 79) agreed that such qualities were either ‘very important’ or ‘important’ to them. Respondents used quality descriptors such as ‘wilderness’, ‘pristine’, ‘beauty’ and ‘tranquillity’ in their qualitative responses. When asked to describe their sense of belonging or attachment to the region, respondents often combined environmental quality attributes:

*‘There is such diverse beauty in these areas any time of year and the scope of birds, wildlife and flora is captivating’. [Online survey ID 44]*

Respondents used examples of environmental quality to explain their decision to dwell in the region:

*I found Middle Beach about 17 years ago and happened to purchase a property there. I love the quiet coastal feel and brilliant star-studded skyline. [ID 85 Household Survey]*

### 3.3. Cultural practices in the coastal wetlands of peri-urban Adelaide

Participants were asked to identify the main activities they participated in when visiting the region. The most frequently recorded activity was ‘observing nature/scenic appreciation’ (n = 46 of 88; 52 %), followed by birdwatching (n = 45 of 88; 51 %) (Fig. 5). Respondents also identified a range of action-oriented or sporting activities (walking, boating etc.) and pursuit of interests such as photography. Fishing emerged as a prominent activity of residents responding through the household survey, followed by nature-based activities. Online survey respondents, who mostly lived further afar from the study area, visited to undertake activities such as birdwatching, nature observations, photography or research. The region also serves as a meeting place and a site for spiritual and traditional activities for some. Almost one-third of respondents (n = 27 of 88; 31 %) said they belonged to a community or

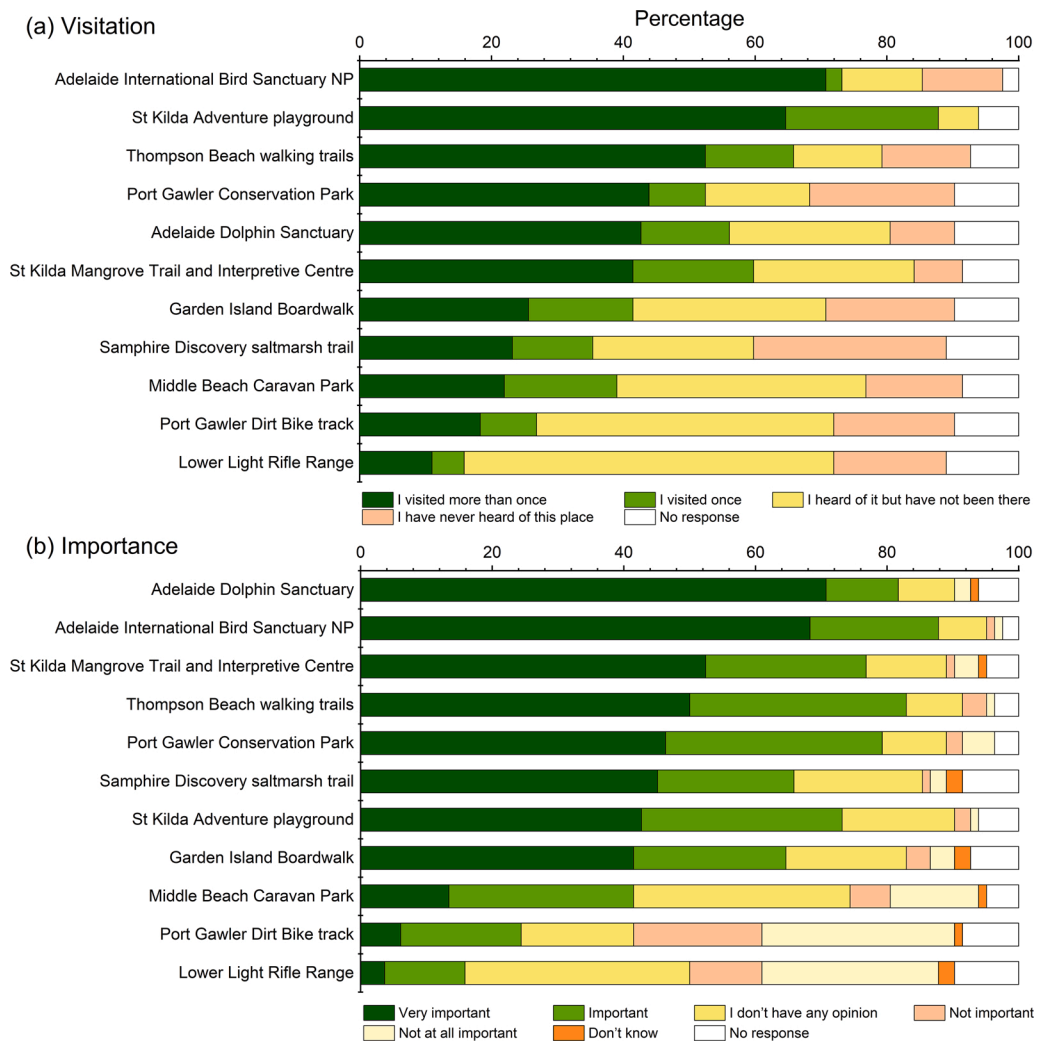


Fig. 4. Spaces – (a) visitation rates and (b) importance rating of sites in the study region. (93 % of respondents (n = 82 of 88 answered these questions).

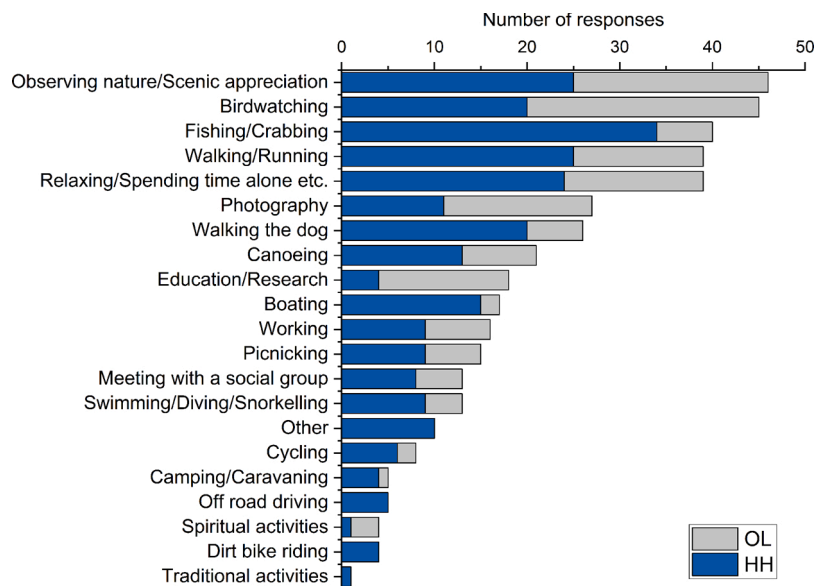


Fig. 5. Practices—activities undertaken in the study region (by number of responses from household (HH) and online (OL) survey delivery) (90 % of respondents (n = 79 of 88) answered this question).

social group that used the coastal region. The coastal wetlands under study were rated by 79 percent of respondents (n = 63 of 80 who answered the question) as ‘very important’ or ‘important’ ‘places to go to meet people’.

3.4. Cultural ecosystem benefits—connections between environmental spaces and cultural practices

Respondents were given statements by which to rate the importance of 12 wellbeing measures enabled by the interplay between the CES of environmental spaces and cultural practices. These statements included measures associated with each of the three cultural ecosystem benefits ‘identity’, ‘experience’ and ‘capability’. Some statements sought a personal rating e.g. ‘The coastal region fosters a sense of pride in me’, while others were universal e.g. ‘The coastal region invokes a sense of freedom’. Each cultural ecosystem benefit is discussed in turn below and illustrated in Fig. 6.

3.4.1. Ecosystem benefit—Identity element

Four rateable wellbeing statements related to the CES of ‘identity’ (see Fig. 6(a)). All four statements were rated highly but of all the statements, ‘the coastal region helps generate good memories for me’, achieved the highest rating. When respondents were asked about their sense of belonging, or, if they had an attachment to the coastal region, several respondents identified length of the connection to place (rootedness), and place as a site of memory and reminiscence. The questionnaires asked participants if they had any personal cultural connection to the coastal region. Altogether 18 people (20 %) agreed they had a personal connection. Several respondents expressed their ‘identity’ attachment to place by talking about their family and/or ancestral connections and about the place as being ‘home’.

*I have lived at Parham for almost 40 years. I love the whole coastline; the changing seasons, birdlife, fishing and crabbing. I visited the beaches with*

*my parents who are now no longer here. I have many memories to share with the next generation [ID43 Online Survey]*

3.4.2. Ecosystem benefit—Experience element

Ninety-one percent of respondents (n = 73 of 80 who answered the question) expressed they felt ‘enjoyment’ when visiting the region (Fig. 6(b)). Respondents also responded strongly to the statements about the region generating feelings of relaxation and freedom. When asked what benefits the coastal region offered them, many respondents described feelings of calmness and/or peacefulness arising from encountering a physical attribute of this coast, and, happiness generated from an aesthetically pleasing encounter with nature.

*I feel at home under the open bowl of the sky, listening to the birds, squelching in the mud and not hearing another human or human activity in the entire soundscape. [ID40 Online Survey]*

3.4.3. Ecosystem benefit—Capability element

Respondents gave various examples of the capabilities they have developed on the basis of a practice they carried out in the region. Participants articulated the role that ecological phenomena played in shaping their individual and social capacities to help them understand, and encourage them to take action through monitoring, educating or conserving. The most highly rated wellbeing statement (Fig. 6(c)) was the ‘capability’ benefit, ‘providing for knowledge’ with 93 percent of respondents (n = 74 of 80 who answered the question) rating this as either ‘very important’ or ‘important’. The statement that ‘the coastal region encourages healthy living’ achieved the second highest rating with 83 percent of respondents (n = 66 of 80 who answered the question) rating this as either ‘important’ or ‘very important’.

*Increased involvement over the past three years with ongoing surveys and volunteer activities has endeared this wonderful and unique environment to me. [ID44 Online Survey]*

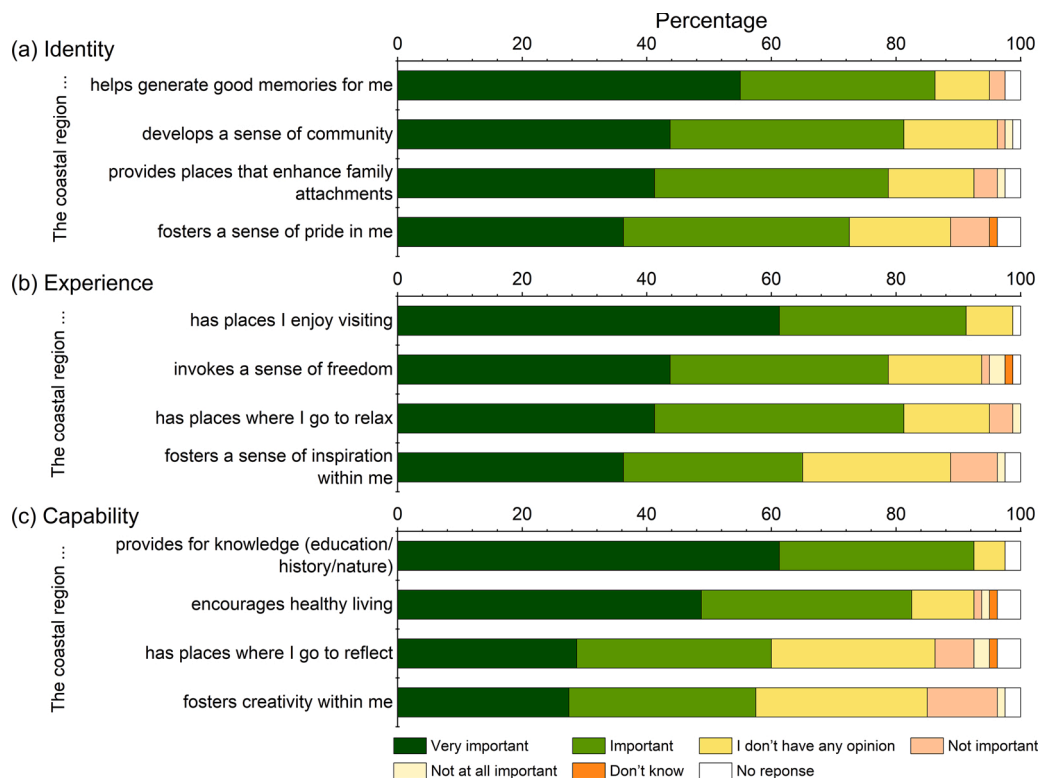


Fig. 6. Cultural ecosystem benefits derived from the coastal wetlands north of Adelaide (91 % of respondents (n = 80 of 88) answered this question).



### 3.5. Understanding culture

Eleven of the 18 respondents who had a personal cultural connection explained this connection through cultural ecosystem wellbeing dimensions (e.g. Identity, Experience or Capability measures). For example, nine of these 18 respondents interpreted ‘cultural connection’ as a combination of the space in which they performed specific activities:

*I have wandered those swamps for more than 23 years. I have conducted research in that area, which builds on some fundamental science conducted within the same sites, over more than a hundred years. [ID40 OL]*

Others explained their cultural connection through an enmeshment of the relational components of the framework including ‘environmental space’ attributes (by specifically identifying the geographical context), ‘cultural goods’ (by specifically identifying the service-benefit) and ‘cultural ecosystem benefits’ (by specifically identifying one of the wellbeing benefits):

*As a ... conservator of birdlife I have a keen interest in the birds that inhabit this region and in joining with other like-minded people to ensure that the birds and their habitats are protected and maintained. [ID45 OL]*

There was a temporal aspect to many qualitative answers about personal cultural connection both in terms of frequency of visitation to specific places, as well as the longevity of a connection through family land ownership, or length of residence, or length of association with the region.

Thirty-two respondents (36 %) agreed they were aware of broader cultural heritage in the region. Twenty of these said that First Nations people had a connection to the region with 11 specifically identifying Kaurna, the original people of the Adelaide plains.

## 4. Discussion

This paper set out to undertake a geographically explicit empirical assessment of the CES of coastal wetlands in South Australia to affirm the co-benefits of a restoration project. It also responds to an identified research need for empirical studies of coastal CES (Brown and Hausner, 2017) and more specifically, coastal wetlands. Protection of vulnerable coastal habitat requires robust and defensible arguments to support planning and management efforts (Kobryn et al., 2018). The household and online surveys analysed here provide insights from those who live in the region, as well as people who live beyond it but value it highly. It is the first study of its kind in this region that articulates a contemporary cultural connection to the coastline, providing decision-makers with an indication of the importance of the cultural values attached to the region. The findings suggest that this South Australian coastal region, as perceived and reported by respondents, is contributing to human well-being in significant ways.

### 4.1. Coasts as sites of special CES significance

Coastal and marine environments are cited as places with a concentration of values close to shore, with influencing factors of tenure, access and population density (Brown and Hausner, 2017; Kobryn et al., 2018). They are also cited as places where values are likely to be aligned according to a highly diverse array of interests. In addition, generating public and policy support for the protection of vulnerable coastal habitats requires communicating the importance of these places to policy makers and the wider community. The use of CES frameworks (and social science research methods) can make plausible and valuable contributions to understand the socio-cultural aspects of human-environment interactions, incorporating all the links between people and nature (Díaz et al., 2018; Marshall et al., 2019).

Previous CES studies of coastal environments are criticised as having

been narrowly focussed with an overemphasis on specific services, namely ‘recreation and leisure’, and ‘aesthetic services’ (Ahtiainen et al., 2019; Brown and Hausner, 2017; Milcu et al., 2013) to the detriment or marginalisation of inclusion of other CES. Reasons provided for this imbalance are that both aspects have an economic link e.g. recreation and leisure (to tourism) and prized development and/or visitation sites. Church et al. (2014: p.329) urge for a methodological approach that captures ‘culture as an expression of people’s occupancy, experience and affiliation with landscape and place’. Responding to these criticisms and suggestions, this study provides original insights into how people in proximity to coastal wetland environments north of the city of Adelaide value such sites. The dynamic framework applied in this study asked about a wide range of socio/cultural and activity-based values, which revealed what environmental services, cultural practices and ensuing wellbeing benefits the respondents associated with specific locations. The benefits derived through the mutual reinforcement of space (being in a place) and practice is clearly articulated by participants in this study.

Coasts are recognised globally (Brown and Hausner, 2017) and locally (Lothian, 2005, 2007) for their scenic values. Landscape quality assessments of coasts have been undertaken in the UK, New Zealand, and some Australian states with the purpose of setting policy and management prescriptions for places valued as ‘high quality’ (Lothian, 2005). These methodologies rely upon the single valuation criterion of aesthetic quality. In these studies, scenic quality ratings are based on the presence or absence of aesthetic factors such as visibly diverse geographical features as well as ‘naturalness’ of scenery (Lothian, 2005, 2007). The outcome of Lothian’s South Australian coastal view-scapes study rendered the low-lying, wide expanses of coastal wetlands as ‘low’ quality landscapes because they lack diversity, and ‘unpredictability’ (Lothian, 2005). His finding is at odds with the values held by the respondents in our study who rated the environmental quality attributes positively. This divergence points to the importance of using methodologies that include several valuation measures and engaging participants familiar with the assessed environment.

### 4.2. Reflections on the framework

A broad array of methods exists to account for CES. Other studies exploring CES in the coastal zone have used spatial mapping to capture geographical distribution of values over a wide spatial area (Kobryn et al., 2018; Marshall et al., 2019) or applied classification systems, or indicator sets and predictive models to measure relative importance of CES (Ahtiainen et al., 2019; Hernández-Morcillo et al., 2013). Limitations of static and linear assessment techniques is noted (Cabana et al., 2020). This study offers new insights from an Australian perspective. Applying a relational framework helps to better understand CES benefits and how they accrue through the complex interactions between people and nature as articulated by the public in this coastal region which also compliments the findings from other studies in different locations (Costanza et al., 2017; Fish et al., 2016a, b). The relational CES framework has revealed several important characteristics. Visitation has a positive influence. This study suggests that people value most the places with which they are familiar. The analysis confirms a mutual connection between: ‘doing’ (undertaking an activity), environmental awareness and appreciation, the formation of attachment to place, and having positive experiences. The dynamic framework applied here accommodates the enmeshment of environmental services, cultural practices and ensuing wellbeing benefits, as articulated by respondents in this study. This correlates to other studies that find when people articulate CES they bundle together different components such as environmental services (spaces and practices), cultural goods and well-being benefits (Ahtiainen et al., 2019; Plieninger et al., 2013). While the study illustrates the complexity of the interplay between spaces and practices, it shows that respondents were able to articulate both concrete measures as well as abstract concepts, providing an expansion of values presented in other

studies.

#### 4.3. The study context

Coastal wetlands are vulnerable due to increased human activity. This study highlights the importance of context. The region is not easily accessible and is sparsely populated yet respondents familiar with the region highly value its naturalness. Online survey respondents (largely representing conservation and environmental groups) from a wide geographical distribution expressed their attachment to the region. Other studies have also found that where coasts are less accessible by road, nature-based values dominate (Brown and Hausner, 2017). A policy response from this South Australian case study may well be to increase access to sites for recreation and tourism that were previously inaccessible under mining lease. Herein lies a double-edged sword. These South Australian coastal wetlands are vulnerable and increasingly threatened by human impacts (pollution, off-road vehicle use and development). Enhanced awareness of the importance of the region may have an unanticipated effect of attracting more visitors and for it to be 'loved to death'.

There is scope to further investigate what matters to the people in this region. The study captured the perceptions of conservation groups and people who use and visit the region for environmentally benign activities, as well as residents undertaking fishing activities. Missing are perspectives of First Nations people, and visitors from outside the region who may participate in extractive uses or heavy-impact activities such as off-road driving. The region is likely to be of value to such users and their input would provide a different perspective to that generated in the study presented here. An alternative strategy to access these groups could be strategic sampling with direct contact at targeted sites. This method could not be realised in this study due to time and funding constraints.

#### 5. Conclusion

There is a rapidly expanding research community espousing the need to include CES in coastal land use planning and management. Identifying cultural values associated with places of high biodiversity status, confronted with development pressure and climate impacts has much to offer. Understanding cultural values can inform conservation programs, as values frame what is important in the lives of people, about the places in which they live, and ultimately motivate behaviour. This study has provided tangible measures by which to assess cultural values at a given location that policy makers and planners can use as evidence of the co-benefits associated with an environmental restoration project.

#### CRediT authorship contribution statement

**Beverley Clarke:** Conceptualization, Investigation, Writing - original draft, Writing - review & editing, Formal analysis, Project administration, Supervision. **Aung Ko The:** Writing - original draft, Investigation, Software, Data curation, Formal analysis. **Harpinder Sandhu:** Conceptualization, Writing - review & editing, Funding acquisition. **Sabine Dittmann:** Conceptualization, Software, Data curation, Writing - review & editing, Formal analysis, Funding acquisition, Visualization.

#### Declaration of Competing Interest

The authors report no declarations of interest.

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