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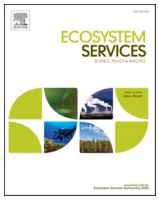

Full Length Article

# Australian Indigenous insights into ecosystem services: Beyond services towards connectedness – People, place and time

Natalie Stoeckl [a], Diane Jarvis [b,*], Silva Larson [c], Anna Larson [d], Daniel Grainger [e], Ewamian Aboriginal Corporation [f]

[a] University of Tasmania, Hobart, Tasmania 7005, Australia
[b] James Cook University, Cairns, Queensland 4870, Australia
[c] University of Sunshine Coast, Sippy Downs, Queensland, 4556, Australia
[d] University of Adelaide, South Australia, 5005, Australia
[e] James Cook University, Townsville, Qld 4811, Australia
[f] 9 Hort St, Mareeba, Queensland 4880, Australia

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ABSTRACT

The Millennium Ecosystem Assessment focused attention on benefit flows from ecosystems to humans, although nowadays, ecosystem service (ES) researchers typically acknowledge reciprocal flows from humans to nature and there is growing recognition of the need to better incorporate insights from other cultures. We set out to do this, giving primacy to the voice of an Australian Aboriginal group during a workshop that developed an (Aboriginal) model of the nature-people relationship. ES were a component of the model, but the Aboriginal model was not 'atomistic' (with separable parcels of land, separable ES, or separable individuals who are not part of community); it focused primarily on connections between and within the human and natural systems. Temporal dimensions were considerably longer than those commonly considered by Western scientists, feelings and spirituality were central, and stewardship activities were highlighted as not only improving the environment but also directly improving wellbeing. Evidently, Country needs to be looked after the 'right way'; it is not enough to simply account for the ES values that are generated or the stewardship activities that are undertaken (e.g. controlling weeds); one also needs to record *how* this is done (e.g. with respect) and by whom (e.g. traditional owners).

## 1. Introduction

The conceptualization of ecosystem services (ES) as the benefits people obtain from ecosystems (MEA, 2005) resulted in a quest to understand and account for the full range and value of ES benefits to human wellbeing (Kenter, 2018). Structured approaches to valuation of ES have been developed and applied (e.g. MEA, 2005; TEEB, 2010; United Nations, 2014a), helping decision-makers recognise the diverse forms of benefits provided by ecosystems to humans. Attention has not been focused exclusively on the way in which ecosystems benefit people. That human activity drives changes to ecosystems (directly and indirectly) has long been acknowledged and ecosystem protection is nowadays often mainstreamed by governance institutions through environmental policies (Raymond et al., 2017). Moreover, recent literature highlights that many (perhaps even most) ES are co-produced, the implication being that benefit flows are often the product of human and other inputs/capitals (Costanza et al., 2017; Jones et al., 2016; Raymond et al., 2017).

Thus, although the Millennium Ecosystem Assessment focused primarily. on a one-way flow of benefits from ecosystems to humans (that flow generating wellbeing), more recent ES models also typically depict a cyclical feedback from human wellbeing to nature (Costanza et al., 2017; De Groot et al., 2010; Díaz et al., 2015; Pascual et al., 2017; Pascua et al., 2017). Increasing emphasis is also being placed on relational values such as reciprocity (Delevaux et al., 2018; Díaz et al., 2018), with acknowledgment that human value systems and spiritual practices include duties to nature and related reciprocal norms (Morishige et al., 2018; Cooper et al., 2016). Nonetheless, this

* Corresponding author.
*E-mail addresses:* natalie.stoeckl@utas.edu.au (N. Stoeckl), diane.jarvis1@jcu.edu.au (D. Jarvis), anna.larson@adelaide.edu.au (A. Larson), daniel.grainger@jcu.edu.au (D. Grainger), admin@ewamian.com.au (Ewamian Aboriginal Corporation).

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conceptualization of nature contributing (positively and negatively) to people's wellbeing, and people contributing (positively and negatively) to nature's 'wellbeing' presents a picture of nature and people as separate objects (Kenter, 2018; Pascua et al., 2017). This debateable false dichotomy is similar to western culture's separation of biophysical and social sciences and is at odds with other world views (Gould et al. 2015).

In many Indigenous cultures nature and people are conceptualised as one body within a balanced and reciprocal relationship (Diver et al., 2019; Gould et al., 2019; Lyver et al., 2017; Ravuvu, 1983); and transcendental values guide cultural and ethical relationships (Calma, 2010; Jacobs et al., 2016; Kealiikanakaoleohaililani et al., 2018; Kenter et al., 2016).

'The term *Ngurra-kurlu* reflects the fundamental Warlpiri perspective of reciprocity between people and country', with the rough translation of *Ngurra-kurlu* meaning "from country".

"This *ngurra-kurlu* is *palka*: he got his own heart, he's got his own kidney, he's got his own liver. If you take one of them away, his whole body will drop." (Díaz et al., 2018, Example 2, Supplementary Materials; also, Holmes and Jampijinpa, 2013)

This worldview is often subjugated or over-looked in ES assessments and by the environmental planning frameworks of western industrialized societies (Lyver et al., 2017; Walsh et al., 2013). Kenter (2018) argues that putting values at centre (with co-production and reciprocity explicit) improves the transdisciplinary nature of ES investigations, enabling studies to integrate information from multiple realms to inform decisions relating to economic development, health and social care and cultural studies. We concur, but note that further improvements might also be made by incorporating other world views when configuring a model to guide investigations: when deciding what is 'at centre', what should be improved, counted and studied, one needs to look beyond western science, alone. Failure to capture the full spectrum of people's perceptions of value holds implications for the legitimacy and effectiveness of decision making and valuations (O'Neill and Spash, 2000), ultimately restricting goal building and the common sense of purpose (Armitage et al., 2008).

In this paper, we present insights generated from a transdisciplinary investigation of an Australian Aboriginal conceptualisation of the nature-human system. We begin by reporting on findings from a workshop undertaken with the Australian Aboriginal group, whereby we explored their conceptualisations of the relationship between nature and people (describing methods in section 2 and presenting results in section 3). In section 4 we use insights from that Aboriginal conceptual model of the nature-human system to refine a western science conceptualisation, that had been previously developed with the intent of focusing thought on Ecosystem Services (ES) and measurement of their 'value' (to human wellbeing). The refinements allow us to make suggestions about ways in which those interested in ES might better incorporate Aboriginal and Torres Strait islander perspectives. Ultimately, we note it may be possible to develop a genuinely 'blended' model that captures the spirit of both (ala Ryder et al's (2020) '*Weaving a research interface'* and Tengö et al.'s (2017) *Knowledge weaving*) although we do not yet do so – flagging first, the need for further discussions with other Aboriginal and Torres Strait Islander groups. Section 5 offers some concluding remarks and makes suggestions for further research.

## 2. Methods

### 2.1. Overview

Our research team included people from diverse backgrounds: western scientists with backgrounds in social and economic sciences, and engineering (one of whom is Aboriginal/Torres Strait Islander); as well as Traditional Owners (TOs)[1] of Australian Country and Ewamian Aboriginal Corporation Board members.

The board of the Ewamian Aboriginal Corporation (EAC) who, on behalf of their people, expressed interest in partnering with the western-trained scientists for this study, recognizing potential benefits to their community. The Board's primary aim is to promote community goals, acting in accordance with the native title act of Australia. Their traditional lands are located in inland north Queensland, Australia. Hereon in, we use the term "Country", the term used by the participating Aboriginal people when talking about their traditional lands. During the late nineteenth century significant populations of these people were forcibly moved to areas including Cherbourg in south Queensland (approx. 1000 kms from traditional lands), Palm Island and Mona Mona missions in North Queensland. Although many remained close to their ancestral lands, living at the Georgetown Reserve and working as stockmen and domestic helpers through to the 1980 s, few currently live on their traditional country. Nowadays, there are groups living in and around Brisbane, Cherbourg in the South East of Queensland and Cairns, Mareeba and Kuranda in the North East.

The Board has achieved much for its geographically dispersed community members; having a clear vision of the desired sustainable future of its people, a shared concept of the context, and a clear sense of what may be required to achieve that vision. As such, the EAC was a good case study for this research. Of two female and three male Board members participating in this study, two live in the Brisbane/Cherbourg area, while the others are in North East Queensland. Two female participants were in their late forties; the male participants were between 58 and 70 years of age.

The methodology we employed is similar to that which is outlined in Ryder et al (2020), which had been developed by a team of (mostly) female Aboriginal researchers. The methodology seeks to create knowledge by weaving Western science and Indigenous knowledge in a manner that empowers the voices of Aboriginal people. Rather than starting with the 'voice' (or model) of western scientists, we thus started with a workshop where the Aboriginal team members developed their own model of the nature-people relationship. We then worked together to consider which (western science) ES, if any, were implicitly embedded within the Aboriginal model. The Aboriginal model was then compared and contrasted with a conceptual model derived from understandings in western science, the differences and similarities generating insights that could inform ES assessments.

### 2.2. Developing a conceptual model of the human-nature system using insights from Aboriginal Australians

We held a joint workshop with five members of the EAC Board and three western-trained scientists during October 2019. Although Western concepts of ecosystem services and of relations between nature and people were at the forefront of our minds when devising workshop activities, we were particularly mindful of the problem of a 'led witness'. As such, the western scientists did not share western science conceptualisations with the EAC board members, instead co-designing the following activities to allow the EAC Board to construct their own model:

**Activity 1:** Board members were asked to tell stories about people's connections to Country. We hoped to learn more about the Board's perceptions of how they themselves as individuals, and their community, inter-related with and/or benefited from nature, but we took care not to impose that perspective on board members. Instead, board members were asked to simply talk about the way in which they connected to Country and to provide examples of activities undertaken on

[1] The term Traditional Owners is legally defined in Australia to include those people recognised as traditional owners of a specific tract of land, based on their traditional and cultural associations with that land.

Country when making those 'connections' – discussions were allowed to flow freely. In addition to storytelling, board members wrote down key words/ideas on post-it notes, placing them on the table for all to see. As discussion progressed, board members grouped the post-it notes together as they felt appropriate, and larger index cards were used to record theme names that best described each grouping. Arrow cards were subsequently added to show how these groups related Fig. 1. The 'mental model' thus created is described in section one of the workshop results.

**Activity 2:** Board members were asked to talk about what they did for country – describing the management activities, priorities and actions undertaken to best protect the connections they spoke about during the first session. This activity was designed to elicit stewardship-type activities – however, the discussion was not led in that direction; as above, it was allowed to flow freely. As before, key concepts were first written on post-it notes, and then discussed and grouped by the participants, with the arrow cards used to indicate connections. Section two of the workshop results describes the 'mental model' of what participants and their community did for country.

**Activity 3:** Board members were asked to talk about the way in which the ideas/concepts developed in the first two activities fit together – essentially building their own conceptualisation of the system. During this activity additional cards were introduced, including emoticons indicating satisfaction or not with parts of the system, healthy Country and healthy people cards, directional arrows, and timescale cards. The links between people and nature were discussed, exploring how the ideas and concepts developed in the first two activities fit together. This resulted in a drawing of a 'mental map', a representation of EAC conceptualisation of the system, presented in section three of the workshop results.

**Activity 4:** The concept of ES was introduced and their relevance to the Aboriginal developed model of the nature-people system were explored. The overall concept of ES, and the broad classification of ES (provisioning, regulating and maintenance etc.) were explained, with different ES introduced to illustrate the different types of ES. Ten cards, each focusing on a different service, were used to clarify the different concepts for the board members, with the selection based upon those services that have recently formed the basis of discussion papers as part of the UN SEEA Ecosystem Accounting project[2]. Board members were asked to fit these cards into their narrative as appropriate, and also add any additional ES they see as important. Section four of the workshop findings describes this activity.

All workshop sessions were recorded (with permission) and subsequently transcribed. Transcripts were analysed for emerging themes by two independent researchers to ensure that written notes indeed captured all the concepts discussed and to provide deeper understanding of the concepts discussed. NVivo qualitative data analysis computer software package (QSR International) was used to analyse for the most frequently occurring words or concepts in transcripts from each activity. The analysis was run to include stemmed or similar words (for example, 'cultur-e' was stemmed to also include 'cultur-al'). The number of times that similar words occurred within the transcript was counted and weighted percentages were calculated[3]. Both the analysis of transcripts and of the written records (sticky notes and diagrams) are presented in the results section.

[2] UN SEEA Ecosystem Accounting project: https://seea.un.org/events/expert-meeting-advancing-measurement-ecosystem-services-ecosystem-accounting.

[3] Weighted percentages are the frequency of the word relative to the total words counted, so that the overall total does not exceed 100%.

## 3. Workshop results

### 3.1. Activity one: Connections to country

The discussion about connections to country highlighted five interrelated themes, subsequently labelled, by the Aboriginal board members, as *Cultural connections, Feelings, Activities, Bridge over troubled waters* and *Future.* The key ideas relating to each theme that were discussed during the session, with a brief summary, were:

- 'Cultural Connections': Participants were very proud to belong to the "*Oldest culture in the world*". Different aspects of culture, cultural heritage, and cultural practices were discussed, including sacred women's and men's places, ceremonies, ancestors, spirits, artefacts, stories, totems, traditional foods, customary law etc. All of those aspects strengthen spiritual connections of people to their Country. People are "*Craving to live on Country and practice culture*" and to pass on culture and tradition to youth.
- 'Feelings': This theme refers to feelings one has when on one's country, and included aspects such as *'Healing', 'Belonging', 'Connecting', 'Reflecting'*. For example, *"Yeah, because when you come here* [on Country] *you can feel it. When you come here, it's something that you can't explain. It's just you know it's there, that your people, your ancestors are… you've just got this feeling where you almost cry. And that's what happens when you come here."* Feelings are result of the spiritual connection with the Country, where people "*Connect to ancestors through country*" and "*Do a lot of thinking and reflection when on country*". As one participant summarised it, "*Country is in your heart*". Feelings also include those related to disposition, intergenerational trauma, stolen generation, discrimination. Feelings of reconciliation and the joy of reconnecting to land, were also expressed.
- 'Activities': a range of cultural undertakings that were traditionally conducted on the land, as a significant expression of the culture, such as various ceremonies, storytelling, songs and dances. Learning about and collecting traditional (naturally occurring in the wild) medicinal plants and foods were noted as important cultural activities. Camping was also seen as a cultural activity, as it was a prerequisite for spending extended time on Country and learning 'hands-on' about Country. In a way, cultural connections manifest through activities, "*Activities are linking feelings to culture*".
- 'Bridge over troubled waters' referred to feelings of trauma, loss of culture and the stolen generation, but also the ways to healing, truth-telling, granting of the native title and saving and recording language and stories.
- 'Future' was the theme that brought visions of the desired future, "*aspirations to get off welfare*" and be able to support themselves. Education in the future was seen as "*going both ways, educating both white and Indigenous kids*". "*Break the cycle*" related both to welfare, but also to crime and offense, "*Stop kids from going to prison*". Both tourism and technology were seen as industries that could support these aspirations, and provide work on Country.

Notably, the first three themes contain several keywords and examples that strongly parallel the examples of cultural ecosystem services. But many other words, not normally associated with ES, appear within those three themes. The other two themes (*Future* and *"Bridge over troubled waters")* are rarely, if ever, ones that are associated with ES. Evidently, the Aboriginal conceptualisation of the relationship between people and nature includes, but is not limited to, ES.

All of the themes were seen as being inter-connected; some with overlapping concepts. For example, 'Feelings' and 'Activities' themes were strongly linked: "*When you're doing all these activities on Country, you're feeling all of that."* and *"It makes you feel good.*"

Reflective of the significant harm imposed on Aboriginal people and country as a result of European colonisation (Anderson et al., 2005;

**Fig. 1.** During the storytelling sessions, important aspects and flows were also recorded on sticky notes by board members.

Hindle, 2007), board members spent much time discussing the importance of repairing/healing that damage (*'Bridge over troubled waters')* to build a better *'Future'*. Notably, the ES and other keywords/activities embedded within the first three themes were seen as important contributors to that healing process.

The results from NVivo analysis confirm that the most discussed concepts were those related to feeling (weighted percentage = 1.31), culture (0.89), Country (0.65) and activities on Country (0.57). Bridging the past (0.46) to the future (0.40) via, among other things, better education (0.31), was also an important part of the story. What also emerges from the NVivo analysis is the finding that relations between Country and people are highly gendered: women (weighted percentage = 4.84) and men (3.08) have different places of significance to them (sacred places) and are engaged in different activities (cultural activities such as ceremonies but also provisioning activities).

### 3.2. Activity two: What people do to protect/look after those connections

Three main themes were clearly identified by board members when asked to focus on things that people do to protect/look after the connections discussed during the first activity. These were given collective names by board members: '*Respect*'; '*Sharing*'; and '*Caring*'.

The concept of 'Respect' includes both the respect for culture and the Country. Respecting ones neighbours, elders, ancestors, respect for self, each other ("*working as one mob*") and for all Aboriginal people (by others), and respecting of differences, were all discussed as parts of this theme. It was also acknowledged that is was important to "*Respect, but move on*".

'Sharing' related both to sharing the traditional knowledge (language, song and dance, beliefs, celebrations) among themselves and with others (specifically, National Parks and conservation groups), but also to the broader education of all Australians on Indigenous culture.

'Caring' comprised of various ways of caring for Country, such as weed and pest control, fire management, conservation, water quality testing. This theme however also includes caring for People – maintaining culture and tradition, improving people's wellbeing, and ensuring that Country is left to future generations "*in good condition*".

As in the first activity, the stories were told with a temporal dimension – reaching back to the past (that is *our culture),* through the period of colonisation, with aspirations for the future. Here too, the core themes of *respect, sharing* and *caring,* were seen as mechanisms to heal damage done through colonisation and to build a better *future,* and the concepts were interlinked. Respect for ancestors is closely linked to caring for Country, for example, *"We're respecting our ancestors by restoring* [the Country]. *Respecting them"*; but also respect of self: "[by caring for the Country] *we're celebrating ourselves and our ancestors.*" Sharing the knowledge of how to care for the land is also important for self-respect, as it generates pride: "*Caring for your Country you hear a lot of people talk about Aboriginal people being the best managers of their land.*" As summarised by one board member, "*It's about share, care and respect and all these things that go with it. And that we still care for our Country*."

Three additional themes were noticeable in the narrative: that of 'Preserving' (land, culture, identity), 'Honouring' (past, ancestors, sacred sites), and 'Aspirations' (for future). Board members indicated a connection between Country, history and culture, suggesting an interdependent relationship between the role that the land plays in preserving culture, and vice versa. These concepts can also be seen in the 'Aspiration' theme, which included aspirations for successful planning (natural resources management), better understanding and relationship among all stakeholders, improved education and more opportunity to connect to Country.

The NVivo analysis results confirm that the most discussed were concepts of respect (weighted percentage = 2.62), caring (2.14) and sharing (2.11) with/to country (1.58) and people (1.46).

### 3.3. Activity three: EAC conceptualisation of the Country-people system

The links between people and nature were discussed, exploring how the ideas and concepts developed in the first two activities fit together. This resulted in a drawing of a 'mental map', a representation of EAC conceptualisation of the system (Fig. 2). Themes identified during the discussion on 'What people do for Country' (black text in Fig. 2) were described as interlinked (two directional arrows between the themes), and so were the themes of Caring, Sharing and Respect described during the 'Connections to Country' discussions (white text in Fig. 2 and two directional arrows). The themes of Caring, Sharing and Respect; and the themes of Activities, Feelings and Cultural Connections, are closely linked to each other (inner ellipse). This interlinked system was placed in a temporal dimension, sitting between the past (preserving and honouring culture) and the future (with aspirations for future). Colonial history, including the displacement from traditional lands, also had a prominent place in the conceptualisation, where a 'bridge over troubled waters' would assist in linking the past and culture to the future aspirations.

### 3.4. Activity four: Relevance of the western concepts of ES to EAC conceptualisation of the Country-people system

In the final activity, western notions of ES were introduced and board members were asked to link the various ES to concepts and the ideas they had previously expressed, with ten 'examples' of ES presented (Table 1). One example of a provisioning service and four examples of regulating services were acknowledged as being "important "*things that Country does for people*" but were not further discussed, other than a sole

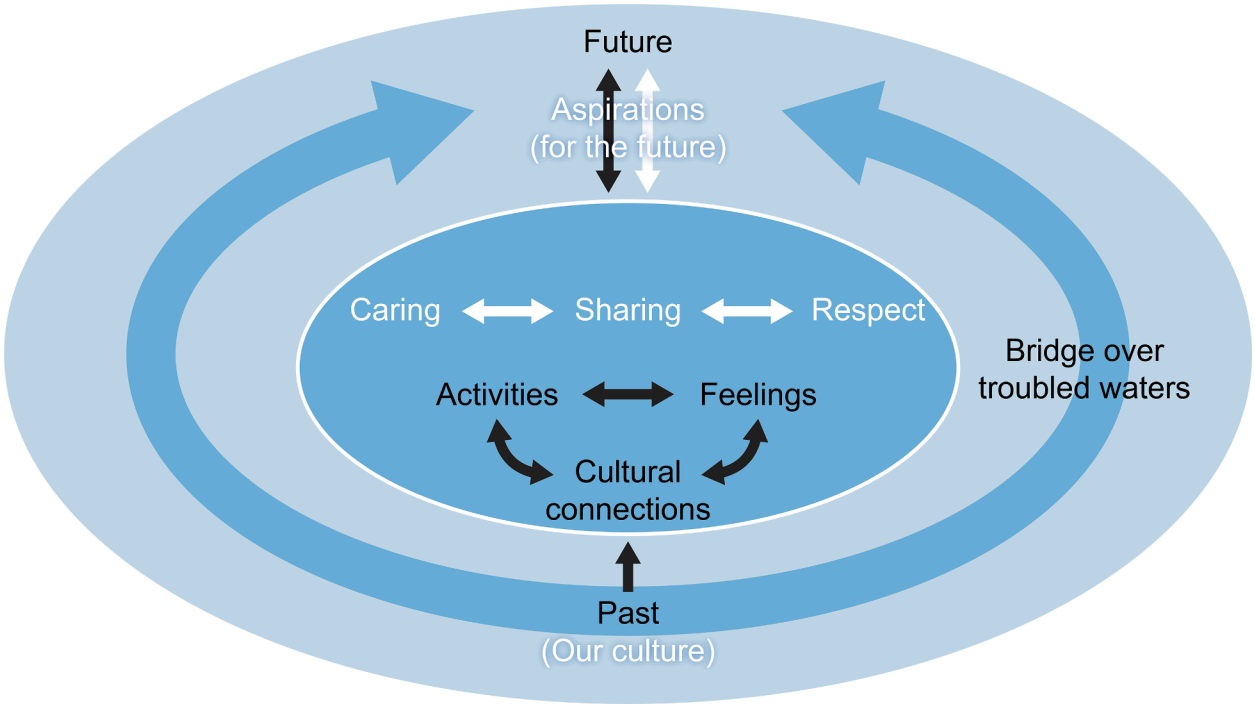


**Fig. 2.** Mental map of the key themes discussed when talking about (a) 'connections to Country' – black text; and (b) 'what people do for Country' – white text; arrows represent directions of connections between the themes. Six themes in the oval are all closely connected, and placed in a temporal dimension from past, over present, to future.

**Table 1**
Ecosystem services cards and examples introduced during Activity 4.

| ES classification | Example cards provided | Related Aboriginal Theme |
|---|---|---|
| Provisioning services | Crops and Forestry | * |
| | Fisheries | Activities |
| Regulating and maintenance services | Soil retention | Caring |
| | Air filtration | * |
| | Water purification | * |
| | Carbon sequestration | * |
| | Flooding mitigation | *Caring – renamed as water holes |
| | Water supply | |
| Cultural services | Recreation | Activities |
| Overall ES | Habitat and biodiversity | Caring |

* Acknowledged as being 'important things that Country does for people' but not further classified.

comment that a lot of flooding is due to "*building in wrong places*".

The other example ecosystem services (representing provisioning, regulating and maintenance, cultural, and overall ES) were considered much more relevant to board members and to the model they had developed, relating to two conceptual groupings developed by board members themselves: "Activities" (a theme related to ways in which people connect to country); and "Caring" (a theme related to what people do for Country).

Fisheries and Recreation were grouped under 'Activities'. The Fisheries example of an ES also prompted board members to add the following to their examples of 'activities': 'Traditional tucker (food) and medicines', and 'Practicing Native Title rights and interests'. The Recreation example of an ES prompted board members to also add: 'Opportunity to visit Country'; 'Organised (group) access to Country' and 'Traditional recreation'.

The last three cards were conceptualized as 'Caring' - the aspects of nature (or ES) that need to be cared for and 'helped' by people. The discussion of 'Caring' included very important aspects of how Country should be cared for ("*nature's way*"; "*without machines*"), hence not all 'caring' is perceived as 'appropriate' or equally beneficial. Another interesting conceptualization was related to 'Biodiversity and habitats'. It was 'Habitats' that board members were interested in conserving, managing and improving; with the inherent understanding that 'healthy Country' (healthy habitats) will result in "*healthy animals and plants and healthy people*". Health and physical and mental wellbeing were strongly linked to country on several occasions, for example "*Let's make Aboriginal people better. How do we do that? Because a lot of us drink …are sick and with diabetes. How do we move on and make sure that doesn't happen anymore? … I reckon they need to come back to the bush, live off the land.*" Followed by another participant, "*The first step is to reconnect with the Country. That's the key isn't it? In order to move forward with all of those things you just said.*" This exchange demonstrates the perception of the importance of Country, that living on the land and reconnecting with their Country is what board members believe would assist in "*making Aboriginal people better*". Or, "*Let's bring their family here* [to Country], *let's look after their wellbeing*".

## 4. Discussion

Our investigation has generated several insights relevant to conceptualisations of the nature-human system and ES. We highlight the significance of Aboriginal worldviews captured in this study and show their relationship to westernised conceptualisations of the relationship between people and nature in Fig. 3. We describe Fig. 3 in stages. First, we describe the most naïve skeleton outline of Fig. 3 (the main arrows, and four ellipses). We then discuss important insights from our workshop that enhance our understanding of this system – not only for Indigenous Australians, but perhaps for people worldwide. We attempt to show how those insights enhance the 'skeletal' representation, by adding further detail to Fig. 3 (e.g. text within ellipses, dotted arrow, bigger ellipse) that attempts to represent the additional insights gained through our Aboriginal partners.

More sophisticated representations exist, but at the simplest level,

both the notions of ES and stewardship can be represented in a cyclical and integrated human-nature model where nature provides benefits to people and where people can provide benefits to nature (Fig. 3). Here, nature (ellipse at top centre) is conceptualised as being comprised of separable parts (e.g. blocks of land, trees) and 'Nature' is conceptualised as being essentially separate from humans. We note that the term ES is an inherently human-centric notion that considers "*what nature does for (or to) people*". In Fig. 3 we simplistically represent ES as the arrow on the right hand side, which extends from the top ellipse labelled 'Nature' to the bottom ellipse labelled 'Society'.

Like the separable blocks of lands or trees assumed to comprise the system 'Nature', in this first *skeletal* representation, individuals are also conceptualised as separable/independent from each other. The arrow on the left-hand side of Fig. 3, which goes from 'Society' to 'Nature' explicitly acknowledges that human activities can harm (e.g. through pollution) or benefit nature (e.g. through various stewardship activities). Like the concept of ES, this too is very human centric – essentially asking "*what people do for (or to) nature*". The different foci of this (simplistic) outline also reflects a realist knowledge perspective common to most of western sciences: *nature* and the arrow on the right are typically the concern of natural/biophysical scientists, while social scientists and humanities often focus on *society* and the arrow on the left.

The ***first*** insight from our workshop (highlighted in Fig. 2) relates to the critical importance of time – and the different time scales considered relevant to Indigenous and non-Indigenous Australians. This is not explicitly shown in Fig. 3, but when considering human-nature relations, it is evident that interconnections must be considered over much longer timeframes than is the norm in some settings. Typically, economists working with estimates of costs and benefits that extend into the future use *discounting*. A substantive body of literature suggests that *social discount rates* (those associated with non-market goods) decline through time. In an ideal world, one should use hyperbolic (Laibson 1997), or other discounting regimes (Rubinstein 2003)), but this is not always feasible. An alternative is to select a discount rate that is appropriate to the time horizon considered, and Weitzman (2001) suggests using 2% for time horizons in the range of 26–75 years; 1% for time horizons in the range of 75–300 years; and 0% if the time horizon exceeds 300 years. Given the time horizons relevant to Indigenous Australians, it is evident that discount rates should probably be zero, at most, 1%.

***Second***, it is clear that we need to make explicit allowance for interconnections in the system. Many of the descriptors and themes identified in the workshop (cultural connections; activities; caring) can be linked to descriptors used in the western science literature when identifying various ES. That the words which describe some ES also describe some Indigenous values is evident from our investigation, and this has been recognised before (see, for example, Lyver et al., 2017). But our findings highlight that the inter-relationships between various ES and the inter-relationships between people and Country need stronger emphasis to properly capture Aboriginal views. This is particularly, although not exclusively, so when considering cultural services. CICES 5.1 (Haines-Young and Potskin, 2018) identifies two clear ways in which cultural services enhance wellbeing:

a) through direct, in-situ physical and experiential interactions with living systems (i.e. camping, fishing, rock art – in line with examples associated with Division 1 Group 1, of cultural services in CICES 5.1; and
b) from 'feelings' and/or spiritual connections (in line with examples associated with Division 1 Group 2 (intellectual and representative direct in-situ interactions) and Division 2 (spiritual, symbolic and other interactions with the natural environment that are indirect, remote and do not require presence in the environmental setting), of cultural services in CICES.

The distinction hints that the two different types of (cultural) ES may be separable but this was clearly not the case in our workshop. In non-Indigenous settings, the link between what some economists would term 'use' and 'non-use' values (somewhat akin to the physical versus spiritual cultural services) has been documented amongst the general Australian population (Rolfe and Windle, 2012)[4] and our workshop broadens and deepens these insights. Spiritual interactions and values are evident always, but it is clear that spiritual values are greatly enhanced through physical interactions. Being 'out on Country' (fishing, camping or other), for example, strengthens spiritual bonds.

We have highlighted the importance of considering these interconnections by adding text within both the top and the right ellipses of Fig. 3. Simplistic representations of the system are those that consider various parts of the landscape and different ES to be separable from each other (by, for example, estimating the 'value' of each individual ES that derives from each parcel of land and adding); it would be better to explicitly acknowledge (and wherever possible monitor/account for) interconnections between the services.

Relatedly, whilst the Aboriginal board members discussed the benefits that ES generate for individuals, benefits were more often discussed with reference to families/groups and/or to wider society. It highlights that although in Western societies individual values are often dominant, in other cultures it is community values that matter most (Graham, 1999; Gould et al., 2019). Even in non-Indigenous societies, research suggests that altruism is commonly present (Grainger and Stoeckl, 2019; Camerer and Thaler, 1995), and different types of goods and services can benefit individuals and communities in different ways (Stoeckl et al., 2018). We have highlighted the importance of considering values at community (in addition to, or instead of) individual values, by adding text in the bottom ellipse (marked *Society)* of Fig. 3.

***Third***, the services that nature provide to people clearly enhance wellbeing, but so too does the act of 'looking after country'. Some of the connections to Country descriptors that grouped under the themes of *Cultural connection*, *Feeling and Activities* (section 3.1, overview in black text in Fig. 2) provide examples of various ES (or, crudely, examples of "what nature does for people"). Section 3.2 describes activities where people look after nature. Discussions highlight that 'giving' (in this case, to nature – as when *Looking after Country*) is as important to wellbeing as 'taking' (e.g. gaining ES benefits). Thus our findings confirm not only that benefits and ES are in some cases co-produced by humans (Costanza et al., 2017; Jones et al., 2016; Raymond et al., 2017) but also indicate that benefits do not need to flow via ES, they can stem from the very act of engagement in 'caring'. This is consistent with findings from the wider literature about the wellbeing benefits of giving and volunteering (Choi and Kim, 2011; Black and Living, 2004), including giving through environmental stewardship (Molsher and Townsend, 2016). In line with SEEA recommendations (which suggest that in addition to measuring ES, expenditures on things such as environmental protection and natural resource management activities is also measured to develop environmental protection expenditure accounts (EPEA) (United Nations, 2014b), it is clear that one should not only document nature's benefits to people (ES), but also people's services to nature – the core point here being that when in indigenous settings, it may be appropriate to blend, rather than separate the two accounts.

We have highlighted the importance of considering these interconnections in Fig. 3 by including a dotted arrow that goes from the left ellipse labelled *Land management / stewardship* to the bottom ellipse labelled *Society*. In addition to acknowledging that stewardship activities enhance wellbeing indirectly by improving nature and thus enhancing wellbeing (effectively going all the way around the circle);

[4] Rolfe and Windle (2012) assessed non-use values associated with the Great Barrier Reef and were able to conclude that at least some (recreational) option values were included in expressions of WTP that were associated with non-use/spiritual values – specifically, respondents who lived outside Queensland and who had plans to visit the reef in the future, had higher WTP to protect the reef than those without such intentions.

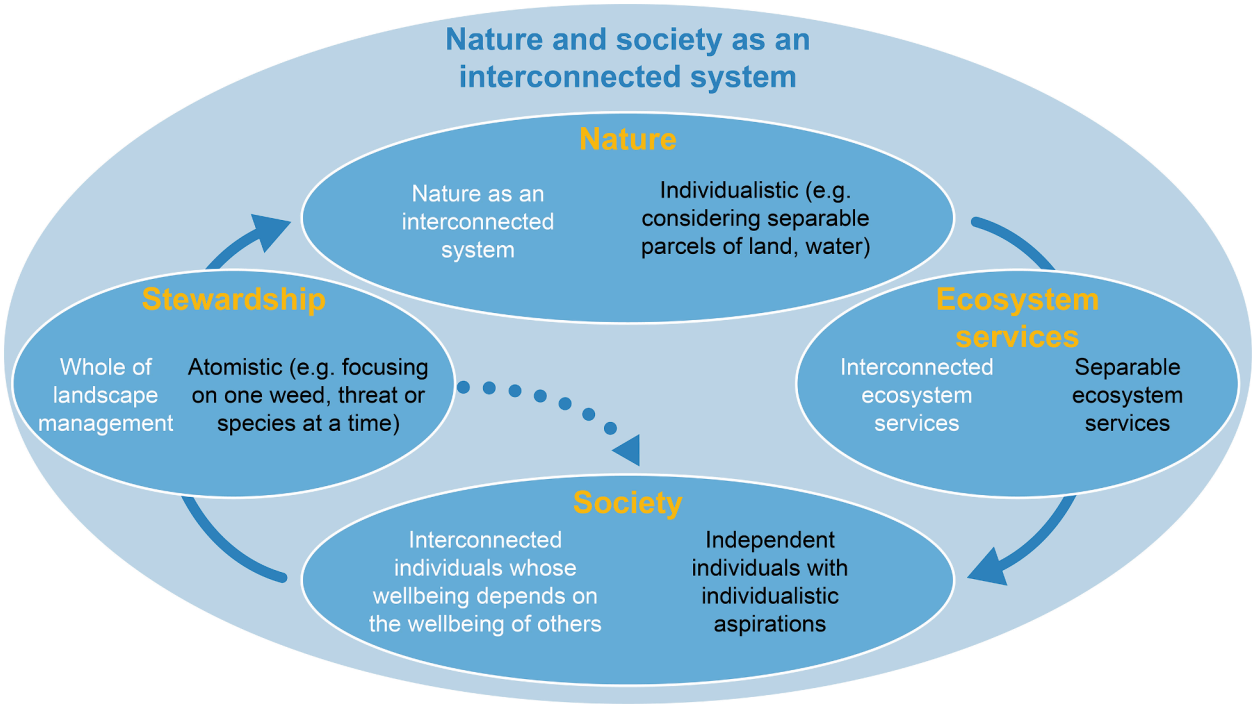


**Fig. 3.** Adapted from Fig. 3 Stoeckl et al. 2018 and derived from Western Science literature, with amendments made in line with insights from the workshops. The cyclical and integrated human-nature model shows where nature provides benefits to people via ecosystem services (right side) and where people also provide benefits to nature (left). Nature, Society, ES and Stewardship activities can be conceptualized as simple and individualistic (black text within each oval) but they are interconnected (white text within each oval). Irrespective of benefits to nature (and thus ES), stewardship activities are also directly beneficial to society.

we suggest that representations should also account for the direct wellbeing impacts of stewardship activities.

***Fourth***, it is clear that just being 'on Country' or simplistically managing Country by, for example, controlling weeds, is not enough: the way in which one behaves when out on Country, and the way in which one cares for Country is crucially important not only for the wellbeing of Country but for the wellbeing of People. Descriptors reported in section 3.2, which are also summarised in the white text of Fig. 2, group into the broad themes of *Caring* (for Country), *Sharing* (of knowledge for better management) and *Respect* (for both land and people). Critically, the '*how*' is broader than just the '*who*': insights from our workshop underscore the point that if Country is looked after the 'right way' (caring, sharing and with respect), the flow of benefits (wellbeing) will be greater than if it is simply tended from a distance. When Country is looked after the 'right way', it strengthens spiritual connections (point one above) and increases wellbeing even more than would be expected if the volunteering/giving was undertaken in a way that is removed from country (as would be the case, with a monetary donation only). Women and men have different places of significance to them (sacred places) and are engaged in different cultural and provisioning activities, confirming arguments from the literature on importance of gendered approaches (UNESCO, 2015), and recognising the different obligations and responsibilities that can result from patrilineal and matrilineal descent (Holmes and Jampijinpa, 2013). Caring, Sharing, Respect, Activities, Feelings and Cultural Connections, are all perceived as closely linked to each other and inseparable. This is not dissimilar to the holistic Warlpiri concept of *ngurra-kurlu* (described in the introduction) (Holmes and Jampijinpa, 2013). Evidently, simply accounting for *what* is done (e.g. by keeping track of expenditures on particular types of environmental protection and resource management activities in EPEA, United Nations, 2014b) is insufficient; one also needs to account for *how* activities are undertaken, and by whom.

Notably, Indigenous land management activities are not generally atomistic – it would be unusual, for example, for someone to go out on country to look for a single weed. Instead, while out on country, they may look for a weed, care for a sacred site, tend a water hole, learn from an elder, and share knowledge with the young (Holmes and Jampijinpa, 2013). We have, therefore, drawn attention to this by adding text in left ellipse that is labelled *Land management / stewardship activities.* That text clearly distinguishes between atomistic and holistic land management, our suggestion being that simplistic assessments would consider money or time spent on individual activities; more sophisticated ones should consider resources used for whole of landscape management.

***Finally***, the workshops highlighted that by reuniting people and Country, one could begin to heal at least some of the wounds inflicted through the process of European colonisation. Indeed, some examples of increased Indigenous involvement in stewardship activities, strengthening the health and wellbeing of both people, and the land and water on Country, have been described as decolonising (Hemming et al., 2017; Martuwarra RiverOfLife, Taylor and Poelina, 2021). Arguably, 'healing' could be interpreted as a type of cultural service, albeit through an Indigenous lens that envisages a connected and symbiotic system (represented in Fig. 3, by the large ellipse that encompasses all). In line with Kenter (2018), we acknowledge that it is better not to work with simplistic conceptualizations that present nature and people as separate objects. This also returns us to our first point – relating to time horizons. Western science suggests Aboriginal Australians have been looking after this continent for close to 60,000 years (Clarkson et al., 2017). Returning people to country may not only help heal Aboriginal people directly and spiritually, but it may also generate numerous other benefits – e.g. allowing them to engage in proper stewardship (which benefits people directly) and to also improve the condition of country, and its ability to provide ES for all.

Our key point therefore, is that in a connected system,'what nature does for people' is not inherently separable from 'what people do for nature', these things are blended symbiotically and holistically. This is in accordance with findings elsewhere in the literature of conceptualization of nature and people as one body, within a balanced and reciprocal relationship (Diver et al., 2019; Lyver et al., 2017), part of one family that shares ancestry and origins (Salmón, 2000; Watts, 2013).

Although separable ES can be identified, the wellbeing benefits associated with cultural services can only be fully realised when activities and other non-physical interactions are done the right way. Nature is a system inseparable from people, providing goods to people in a complex way, and being managed by people on a whole of the landscape basis. That is the essence of the people-nature relationship. *"And I guess is if any of these bits fail, Country isn't cared for and people aren't cared for. You need to balance everything."*

## 5. Conclusion

Broader relationships to nature, including the importance of transcendental values, are very common in Indigenous and other non-western societies, yet are poorly addressed in ES assessments and environmental planning (Lyver et al., 2017; Walsh et al., 2013). Our research, grounded in a belief that genuinely transdisciplinary study opens doors to improved understandings, has generated insights that allow us to suggest ways better account for Indigenous views in ES assessments:

1. The temporal scale considered by our Aboriginal partners is considerably longer than that normally considered by Western Scientists – ancestors and future generations must be included and their values should not be 'discounted'.
2. Accounting for ES in indigenous settings needs to note that direct physical connections strengthen spiritual connections.
3. Wellbeing enhancing physical activities are not only those that involve 'taking'; 'giving' also directly enhances wellbeing. Moreover, when 'giving' is done appropriately, this further strengthens spiritual connections, further enhancing wellbeing: TOs should be able to determine how the caring takes place, with sharing, caring and respect.
4. Critically, ES are a component of the 'Aboriginal model' (Fig. 2); but the Aboriginal model is not 'atomistic' (with separable parcels of land, separable ES, or separable individuals who are not part of community); it focuses primarily on connections between and within the human and natural systems.

Interpersonal relationships and 'feelings' (relating to caring, sharing and respect) are, on occasion, glossed over in the literature – tangentially or implicitly considered only as a type of cultural service (associated with spirituality) or considered, in economic terminology, to be a *non-use* value. We find that in most instances feelings are created not in relation to self but in relation to others, and are often complex social constructs (of being on the land and in contact with ancestral beings; of healthy habitats that can be home to healthy animals and healthy people). The ES framework has been criticised (see Raymond et al., 2017) for over-emphasising how humans economically benefit from the ecosystem, as opposed to understanding human–environment relationships (Jackson and Palmer, 2015; Setten et al., 2012); and for superficially considering the inherent qualities of culture (Chan et al., 2016; James, 2015). The concept of spirituality commonly forms the basis of indigenous peoples' connection to the land (e.g., Calma, 2010; Grieves, 2009; Kingsley et al., 2013; Martuwarra RiverOfLife et al., 2021), however, the role it plays often remains unclear, isolated and undervalued in environmental planning and management (Houde, 2007).

This resonates strongly with the writings of Kenter et al. (2016) and Raymond and Kenter (2016), who highlight the importance of transcendental values that guide people's cultural and ethical relationship with nature and influence their positive and negative emotional responses. The importance of transcendental values is evident in workshop discussions and in Fig. 2: the people-nature relationship is placed within broader discussions of justice, fairness, caring and responsibility, which in turn were placed within a long-term vision of the past that created current situation and aspirations for the future. Mutual 'caring' leads to a conceptualisation of the environment (country) and culture (people) as one; something very different to ES frameworks (and valuation methods) that promote an acultural and decontextualised understanding of the types of benefits provided by ecosystems and that impose a duality between aspects (see Raymond et al., 2017). Broader relationships to nature, including the importance of transcendental values, are very common in Indigenous and other non-western societies, yet are poorly addressed in ES assessments and environmental planning (Lyver et al., 2017; Walsh et al., 2013). Our work highlights these concepts, which can be difficult-to-conceptualise through a lens trained (tainted) by western-science, need be considered up front.

Evidently, a reductionist people–place binary, with ES flowing from place to people and stewardship activities flowing back, creates a false dichotomy and misses other crucially important world views. The relationship between people and place (reflected in experiential knowledge) is arguably inseparable and extends temporal dimensions beyond those most often focused on in Western science (and in policy/management decisions). Relevant relationships (between people; between people and nature; and between parts of nature) need to be captured in ES and other assessments; and should not just include relationships of today but also those of our ancestors and of future generations. Feelings and spirituality (inextricably tied to relationships) are central, and stewardship activities are critical – not only because they improve the environment but also because they directly contribute to wellbeing. Evidently, if truly aiming to quantify the wellbeing that nature contributes to, it is not enough to simply account for what ES values (e.g. provisioning, cultural) are generated or which stewardship activities are undertaken (e.g. controlling weeds); one also needs to record *how* ES values and/or stewardship activities are undertaken (e.g. with respect), and by whom.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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