

Research article

Piecemeal stewardship activities miss numerous social and environmental benefits associated with culturally appropriate ways of caring for country

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ABSTRACT

Prior research has identified both the contribution that people make to nature and the contribution that nature makes to people (by enhancing wellbeing) – with clear conceptual models to describe the interactions. Prior research has also made a clear case for incorporating insights from multiple perspectives and knowledge systems when seeking to better understand this interactive system. What is lacking, is guidance on how to operationalise some of these ideas to provide bespoke advice to environmental managers. Arguably, we have an adequate, albeit imperfect, understanding of how to operationalise (measure, value and/or otherwise account for) some parts of the conceptual model. There is, for example, abundant literature that describes different ways of valuing Ecosystem services, and a growing body of literature that describes and quantifies the ecological benefits of various stewardship activities, which will subsequently also generate an indirect benefit to people (since improved ecological conditions will improve Ecosystem services). In comparison, we know relatively little about the way in which stewardship activities directly benefit people – and it is on this gap that our paper focuses. We partially fill that knowledge gap by first reaching out to and learning from some of Australia's First Nations People. Key learnings underscore the inter-connectedness of the system, and the need for resource managers to not only monitor the extent and condition of natural system but also the extent and condition of an inextricably connected human system, in addition to the human-nature interactions. We clearly identify ways in which those insights can be used to improve and extend accounting frameworks, such as SEEA Ecosystem Accounts developed by the United Nations that are often used by natural resource managers. In so doing, we generate new insights about Indigenous stewardship (*Caring for Country*) and methods of accounting for and monitoring stewardship activities. As such, our work provides a practical illustration of one way to populate conceptual models with 'real world' data that also incorporates different world views, to support decision makers for improved social and environmental outcomes.

1. Introduction

Maintaining and enhancing beneficial contributions of nature to a good quality of life for all people is one of the major challenges today and into the future (Díaz et al., 2018). The notion of nature's contributions to people (NCP) builds on the ecosystem services concept

popularized by the Millennium Ecosystem Assessment (MEA, 2005) in two important ways: first, it recognizes the central and pervasive role that culture plays in defining all links between people and nature; and second, it elevates, emphasizes, and operationalizes the role of Indigenous and local knowledge in understanding NCP (Díaz et al., 2018).

The relationship between people and nature in the current western-

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scientific discourse is commonly viewed through the concept of 'ecosystem services' (ES) and conceptualised in a linear model. Structured approaches to valuation of ES have been developed and applied (e.g., MEA, 2005; TEEB, 2010; Haines-Young and Potschin, 2018; UNSEEA, 2021), helping decision-makers recognize the diverse forms of benefits provided by ecosystems to humans. The concept of NCP is seen by many scholars (Pascual et al., 2017; Díaz et al., 2018) as an extension to somewhat narrow conceptualisations present in ES approach (Kadykalo et al., 2019), in relation to a broad range of worldviews, knowledge systems, and stakeholders (Díaz et al., 2015a, 2015b). The NCP approach suggests that engaging a wide diversity of knowledge systems (e.g. natural and social sciences, engineering, local and Indigenous) and stakeholders (e.g. Indigenous people, businesses, farmers, local and rural communities, fishers) is necessary to address a broader range of people-nature relationships (Kadykalo et al., 2019) in recognition of diverse and evolving culturally mediated ideas about what people derive from, and co-produce with, nature (Hill et al., 2021). It also allows for diverse actors to represent different scales of nature-people interactions and results in plural valuations of nature (Hill et al., 2021).

A complementary concept to NCP, that of 'People's Contributions to Nature' (PCN), is receiving increasing attention in literature (Díaz et al., 2015a; Peterson et al., 2018; Chan et al., 2012; Kenter, 2018). PCN encompasses ways in which people interact with natural processes and together with these processes condition the state of ecosystems and biodiversity. As Matuk et al. (2020) emphasize, people's knowledge, worldviews, and practices are important dimensions of PCN, arguing that accounting more explicitly for both PCN and NCP in assessment and valuation frameworks can help decision-makers understand how ecosystems and people affect and co-produce each other. This cyclical relation between PCN and NCP is typically strong in Indigenous cultures (what Aboriginal people of Australia for example call "Caring for Country").

Frameworks that incorporate different worldviews can result in different sets of values and highlight different 'things of importance'; they thus have the potential to provide innovative messages, recommendations and policy options, for both government and stakeholder audiences. For example, Stoeckl et al. (2021) reported a study of an Australian Aboriginal group, giving primacy to that group and encouraging development of their own model of the nature-people relationship. ES were a component of their model, but the model also varied in important ways. First, it was not 'atomistic' (with separable parcels of land, separable ES, or separable individuals who are not part of community). Second, it focused primarily on connections between and within the human and natural systems. Third, temporal dimensions were considerably longer than those commonly considered by western scientists. Fourth, feelings and spirituality were everywhere central. Fifth, although stewardship activities were prominent, it was clear that Country needs to be looked after the 'right way'. A core message for those interested in monitoring and recording ES values is that it is not enough to simply record the ES values that are generated. Neither is it enough to simply record the number or value of stewardship activities that are practiced: one also needs to record how activities are undertaken (e.g., with respect) and by whom (e.g. traditional owners). Moreover, the interconnectedness of core contributors to wellbeing suggests that atomistic (partial equilibrium) type approaches to valuation may be inappropriate; instead methods that are able to value 'bundles' of complex goods that accrue benefits across communities may be required (Stoeckl et al., 2018, 2021).

Stoeckl et al. (2021) also report on an additional and direct contribution of PCN to wellbeing that extends our understanding of ES/NCP contribution to wellbeing: the services that nature provides to people clearly enhance wellbeing, but so too does the very act of 'looking after Country'. 'Giving' to nature (looking after Country) is as important to wellbeing as 'taking' (e.g., gaining ES benefits) – consistent with other literatures reporting on the wellbeing benefits of volunteering. Not only are ES in some cases co-produced by humans (Costanza et al., 2017;

Jones et al., 2016; Raymond et al., 2017); but benefits can stem from the very act of 'caring'. This critically important relationship is the focus of our paper and gives rise to the observation that stewardship plans which consider 'bundles' of activities may work better than those focusing only on piecemeal or single problems (analogous to the idea that valuation approaches that consider 'bundles' of goods may also work better in some settings).

In summary, prior research has identified both the contribution that people make to nature and the contribution that nature makes to people (by enhancing wellbeing) – with clear conceptual models to describe the interactions. Prior research has also made a clear case for incorporating insights from multiple perspectives and knowledge systems when seeking to better understand this interactive system. Arguably, we have an adequate, albeit imperfect, understanding of how to operationalise (measure, value and/or otherwise account for) some parts of the conceptual model. There is, for example, abundant literature that describes different ways valuing ES/NCP, and a growing body of literature that describes and quantifies the ecological benefits of various stewardship activities (PCN), which will subsequently also generate an indirect benefit to people (since improved ecological conditions will improve ES/NCP). In comparison, we know relatively little about the way in which stewardship activities directly benefit people – and it is on this gap that our paper focuses. We partially fill that knowledge gap by first reaching out to, and learning from some of Australia's First Nations People, and second, considering ways in which those insights can be used to improve and extend accounting frameworks such as SEEA EA (UNSEEA, 2021) that are often used by natural resource managers. **As such, our work provides a practical illustration of one way to populate conceptual models with 'real world' data that also incorporates different world views, to support decision makers for improved social and environmental outcomes.**

The remainder of the paper is structured as follows: Section 2 describes the materials and methods of the paper; Section 3 discusses the Results – focusing primarily on insights from the workshop with our Aboriginal partners. Our discussion (Section 4) shows how insights from our workshops could be used to improve and extend the SEEA EA framework (UNSEEA, 2021), giving practical examples of metrics/indicators that could be incorporate. Our conclusions are presented in section 5.

2. Materials and methods

2.1. Conceptual framework

Ecosystem accounting is a recent phenomenon that strives to extend traditional national accounting approaches beyond the purely economic to also include the environment in national accounts. The United Nations System of Environmental Economic Accounting – Ecosystem Accounting (UN SEEA EA) is a recent global standard on accounting for both the economy and the environment for governments around the world (UNSEEA, 2021). The UN SEEA EA conceptualisation is represented as a linear (one-way) flow from ecosystem to society (Fig. 1). However such a representation fails to account for the benefits entailed from society "caring" for their environment (Country).

Our conceptualisation of the people-nature interactions overcomes this lack of reciprocal conceptualisation by representing the flow of benefits as cyclical rather than purely linear. Our model is consistent with the literature on ES, NCP and the emerging work on PCN, and builds on previous work of Stoeckl et al. (2018, 2021). The cyclical and integrated people-nature model (Fig. 2) shows where nature provides benefits to people via ES (right-side) and where people also provide benefits to nature (left-side). Irrespective of benefits to nature (and thus ES), stewardship activities are also directly beneficial to society (dotted arrows). The model identifies that the full range of potential benefits to society from nature flows from two sources: those flowing directly from nature to people (solid arrows), and also those flowing from people back

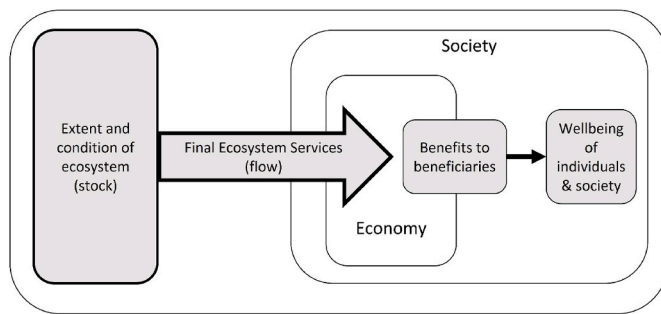


Fig. 1. The SEEA EA general ecosystem accounting framework adapted from: SEEA Committee of Experts on Environmental-Economic Accounting (2021) System of Environmental-Economic Accounting - Ecosystem Accounting: Final Draft, page 28 (UNSEEA, 2021).

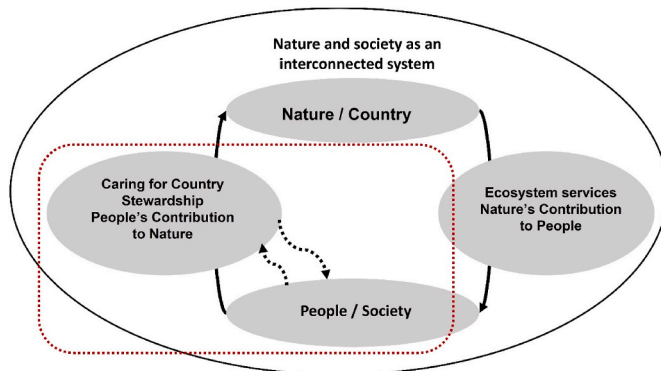


Fig. 2. Conceptual model of interconnected flows of benefits from nature/Country to people, via ES/NCP; and from people to nature/Country, via stewardship/caring for Country/PCN activities, modified from Stoeckl et al. (2021).

to people via the benefits of participation in stewardship and caring for Country activities (dotted arrows, Fig. 2). To optimise benefits to people it is important that neither benefit flow is impeded. This research adds to previous research exploring potential barriers that can impede these flows; if we seek to maximize nature's contribution to people, and the contribution to people from peoples caring for nature, we need to better understand these barriers and develop policy recommendations to enable these barriers to be addressed and minimised.

We focus on the links between society and stewardship, noting that actions taken by people influence nature (for good or for bad – as when people pollute) but also that the very act of caring, generates benefits for society, even if there is no positive impact on nature. We are primarily interested in potential barriers that prevent stewardship activities from directly benefiting society (the sub-loop). Previous research has considered barriers to providing stewardship through an entitlements and access lens – people can only care for Country if they have the capacity to do so (Stoeckl et al., 2021). Matuk et al. (2020) argue that practices correspond to the material dimensions of people's culture, and thus are entangled with nonmaterial values and knowledge. Thus, both material and nonmaterial dimensions are important for assessments of people-nature systems.

We contend that over and above these barriers, people do not just need the capacity to be able to provide stewardship: they need the control/sovereignty/agency to ensure that the stewardship/caring for Country activities are carried out in the *right way* (Addison et al., 2019; Stoeckl et al., 2021). Critically, the *right people* need to be empowered to decide what, when and how the activities should be undertaken. Specifically, there needs to be local autonomy of decision making by the TOs, not (what we term) *disembodied stewardship* where decision making and activities are performed from a distance by those who are

not *from* and *of* that "Country".

2.2. Study area and participants

We partnered with some of the Traditional Aboriginal owners of Aboriginal land in the Kakadu region of Northern Australia which include Bininj and Munggy people, owners of the land to the north and south of Kakadu, respectively (Fig. 3). The views presented in this paper are those of representatives of Munggy traditional owners from southern Kakadu.

The Creation ancestors gave Bininj/Munggy a kinship system linking people to all things and the cultural responsibility to look after all. The TOs have a deep understanding of the Country and their traditional ancestral knowledge is a vital part of managing Kakadu's rich environment (Kakadu Board of Management, 2016). Kakadu National Park (KNP) was established in 1979 and was first added to the World Heritage List in 1981, being listed for both its cultural and natural significance. It is the largest national park in Australia, covering almost 20,000 square kilometres. Since establishment, Kakadu's traditional owners have leased their land to the Director of National Parks to be jointly managed by Bininj/Munggy and Parks Australia (managing body of Commonwealth National Parks in Australia) as a national park.

For Bininj/Munggy the word 'Country' not only refers to the landscape but also captures the rich interconnections between land and people – they are inseparable. Nonetheless, the KNP Values Statement (Kakadu Board of Management, 2016) separates the Country (landscape) from tangible and intangible cultural values of the park. The tangible aspects of Bininj/Munggy cultural heritage are described as rock art sites, artefacts and other cultural sites; while intangible aspects include traditional knowledge about Country and seasons, ancestral stories and beliefs, languages and cultural practices and rituals. This knowledge is used to help keep land, plants, and animals healthy and strong as well as to undertake the right management activities at the right time of year. This traditional knowledge is invaluable and recognised as a great asset for the management of the park.

For the Munggy people in the south of the park, Buladjang, or 'Sickness Country', is a particularly important area. Munggy people, of the Jawoyn language group, believe that powerful creation ancestors rest here including Bula, the Rainbow Serpent. 'Sickness Country' extends over 2000 square kilometres and coincides with high concentrations of uranium, thorium, arsenic, mercury, fluorine and radon in the water and air, which are leached from rocks in the region. Strict rules and protocols govern access to many sites, and traditionally, women and children were banned from entering those areas.

Discussions with the Munggy partners took place over two days in February 2020, at Pine Creek. Discussions were in the form of a workshop, with an introduction session followed by structured sessions and finally a closing session to consolidate the discussion and learnings from the workshop. Six Munggy representatives, two women and four men, from Yurikmanj; Wurrkbarbar; and Bolmo Clans, participated. Three non-Aboriginal scientists (two women (both economists) and one man (ecologist)), also participated. During the introductory session participants were introduced to each other and to the project, and the ethical considerations and requirements were presented and discussed.

2.3. Data collection and analysis

The first session was conducted using the mental model elicitation and analysis method. Elicitation was 'situated' (i.e. conducted close to Munggy lands; Jones et al., 2014) and included both oral (Morgan et al., 2002) and visual-based (Kearney and Kaplan, 1997) procedures. Elicitation concentrated on the mental model of Munggy connection to Country. Munggy participants were asked to tell stories about people's connections to Country – both the way in which they connected to Country and the activities undertaken on Country when making those 'connections' -providing information about how the community

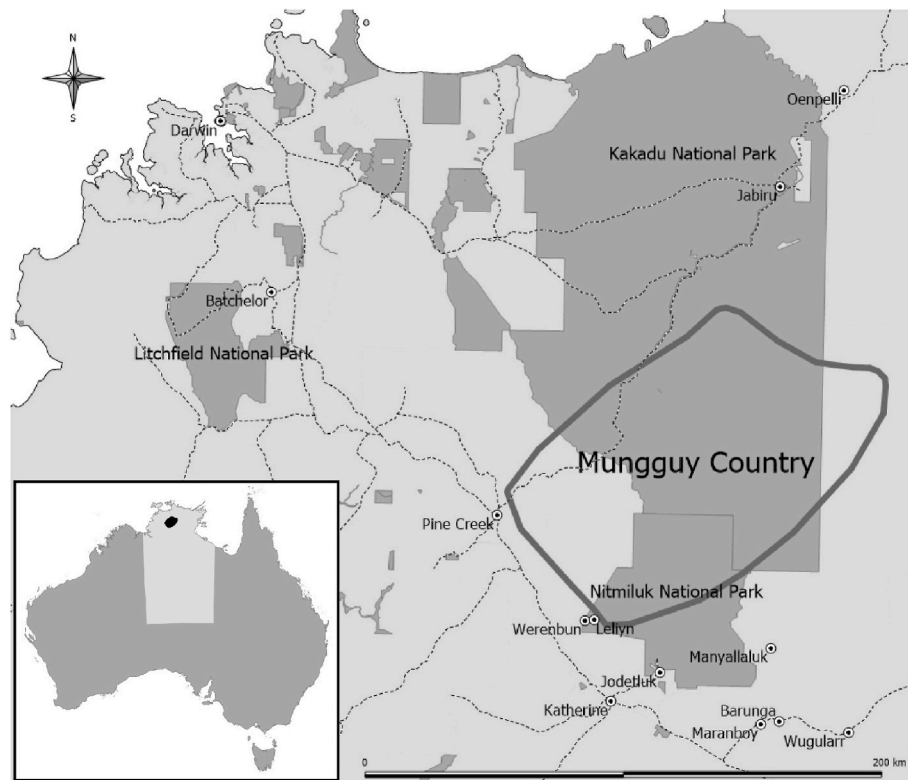


Fig. 3. Country of the Munggy Traditional Owners as indicated by members of the Yurkmanj; Wurrkbarbar; and Bolmo Clans that participated in this research. The indicated area is NOT intended to represent Native Title areas and is designed to roughly indicate rather than precisely identify the Country of the research project participants.

inter-related with and/or benefited from nature and their traditional lands within NNP. Participants were encouraged to record key concepts and points on post-it notes. As discussion progressed over the workshop, participants 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. These groupings, or themes, were subsequently arranged to show how the groups related to each other, using arrow cards to show these inter-relationships. The ‘mental model’ of connections to Country thus created is presented in results section, as well as participants quotes emerging from the analysis of the transcribed session recordings.

In the second session the TOs described and agreed on the activities on Country they would like to see taking place or would like to do themselves. The data collection and analytical method followed a deliberative Delphi panel approach. This approach enables deliberative social views to develop from the sharing of individual viewpoints (Stoeckl et al., 2018; Grainger and Stoeckl, 2019) and resulting in panel participants arriving to a ‘joint’ score that allowed for ranking of the priorities (Curtis, 2004; Spash, 2007). In the final step, the top three scoring potential projects were discussed in relation to the Munggy conceptual model of the people-nature connected system, seeking to understand the inter-relationship between activities conducted on Country and the peoples’ connections to Country, and to understand how the activities supported and strengthened those connections. Analysis of the written notes and discussions are presented in the results section.

3. Results

3.1. ‘Mental model’ of connections to country

The mental model created by participants was centered around spiritual connections to the land. The spiritual connections were seen as

a wheel, interlinked into a three-dimensional sphere. Five themes were identified: ‘Cultural places’; ‘Being on Country’; ‘Looking after Country’; and ‘Bush tucker’ (traditional food from the land), all linked to a central theme of ‘Spiritual connections to Country’ but were also connected to each other (Fig. 4a). In addition, there was a second yet connected model of historical timelines (Fig. 4b), where Munggy cultural connections to Country were divided into three distinct timelines: ancient past; recent past to present; and desires for the future. Each of these themes is further described below.

3.1.1. Being on Country

Being on Country is an important aspect of the spiritual connection. ‘Walking around’ is seen as important for wellbeing, as well as taking older people back on Country and listening to their stories. One’s Country is perceived as the “Most beautiful place” increasing individual and community wellbeing (“Money is not wellbeing”). Not only is being on Country important to its people, but it is also important to Country itself - “Country is getting lonely” if not regularly visited by its traditional owners.

3.1.2. Cultural places

There is a whole range of cultural places on Munggy Country, with more than 3000 registered sites. These include caves in which groups lived during wet season, as well as specific places for men; young men; women; birthing places; rock art sites; and dreaming sites. Participants described how “feelings get stronger in special places”, and that “Country is our churches and our cemeteries”. Some parts of Munggy land were traditionally described as ‘sickness country’. They gave people “bad, creepy feeling” and were particularly forbidden for women, “frightening places that don’t want women to see”. The ‘sickness country’ very much corresponds with the location of uranium deposits: although Aboriginal people may not have understood the scientific concept of atomic radiation, they did observe its effects, in particular on pregnant women and

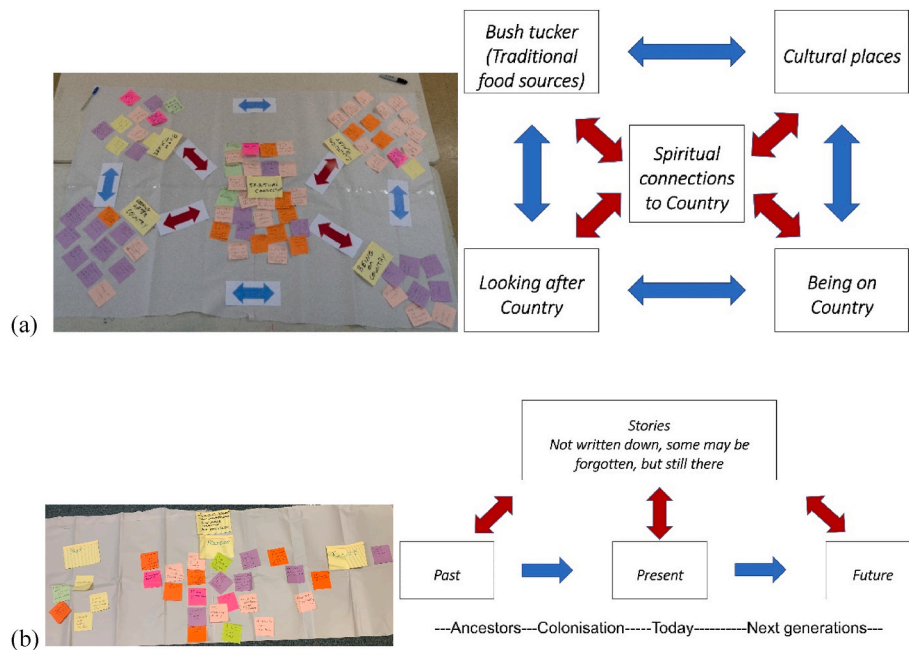


Fig. 4. Mental models of (a) connections to the Country, and (b) perceptions of historical timelines. Mental models as created by Munggy participants (left) and schematised (right).

children, and devised cultural protocols to prevent women and children passing through radioactive zones and getting exposed.

3.1.3. Bush tucker

One perceived connection to Country was through consumption of traditional food from the land (bush tucker). Traditional food was fished (in particular, barramundi and turtles), hunted (kangaroo, wombats) or gathered (various plants); and obtaining water was also important. The spiritual importance of the bush tucker is not just because it provides sustenance to the body, it also acts as an important conveyor of traditional knowledge and techniques, and of more general understanding of land and seasons. Knowing where to look for water and food, and when, was essential. For example, finches were followed as they indicate where the water is; or the water was obtained from Wattle trees. Vegetation was cleared from creeks and ponds as to provide for turtles and fish (ensuring sufficient amount of oxygen). And there were times of the year when certain species were not collected: “*Bush tucker, you’ve got to learn when to eat it. You eat it and look after it*”. Introduced plants and animals (such as buffalo) are therefore not just ‘pests and weeds’ for TOs. They are destroying food sources and waterways that sustain people, thus indirectly damaging traditional lifestyle.

3.1.4. Looking after country

Looking after Country is therefore an essential aspect of connection to the land. Management of pests and feral animals, bushfires, recording and maintaining rock art sites, were all mentioned as essential for the health of the Country.

3.1.5. Spiritual connections

All of the themes presented above are important building blocks contributing to the Spiritual connections to the land. The ‘lore’ (traditional rules) and ‘protocols’ that set out ways of appropriate behavior on the land, as well as stories and knowledge, are passed down from generation to generation: “*Pass on knowledge to next generation*”; “*Spirits still caring for Country and looking after*”.

An individual’s connection to the Country and feelings related to it are very strong. In the words of the participants: “*I was born here - I am part of the story*”; “*Country tells you where to go - feelings tell you to go*”;

“*Feelings that grandfathers are here*”; “*Feel history, feel ancestry*”, “*Grandparents still care for Country and care for me*”; “*Country welcomes you*”.

History, ‘proper processes’, ceremony, initiation, feelings, totems, dreaming sites, and other aspects of spiritual connection with land are thus all important parts of identity. ‘Feelings’ were an important theme identified during analysis of the voice recordings. In addition to positive feelings of “*Feeling good on land*”; participants also talked about feeling trauma of the past and current “*frustration at government*”. Feelings of being underpaid, underappreciated, and losing identity, were also discussed.

3.1.6. Historical context - timelines

Munggy cultural connections to Country are divided into three distinct timelines: ancient past; recent past to present; and desires for the future (Fig. 4b). History of the people goes back thousands of years, but as it is oral history some of the stories have been lost. History also presented ancestry of the land, where different clans were sometimes warring with each other, and sometimes working together. Colonisation abruptly interrupted the life of Munggy people, bringing terror, depression, anxiousness and fear. Cultural activities were forbidden, ceremony lands were moved, secret sites and rock art were destroyed by pastoralists and miners (to make dams, roads, etc.). Then the trauma of ‘Stolen generation’ came, further disconnecting people from the Country. TOs were “*privileged to have land back*”. But the pressure continues, particularly from mining: “*BHP offer(ed) us \$8million for land - we don’t want money we want to look after the land*”; and for tourism developments: “*Always getting pressure to open Country for tourism industry*”. However there was a strong position among participants that “*People own land - it belongs to people*” and that all decisions should be made jointly, “*Work together, with the Northern Land Council, Parks, and Traditional Owners*”.

This is also a key vision for the future: joint decision-making between TOs and other interested parties. “*Wrong people are on Country*”, but “*Relationships are changing*”. “*Working with (the) next generation*” is also essential for maintaining and improving condition of the Country. In the analysis of discussion voice recordings, ‘Ownership’ was a strongly identified theme. Discussions of this theme centered around limited authority of TOs over land and in decision-making; and on disruptions

from the mining industry.

3.2. Strengthening connections to country

3.2.1. What would help to strengthen connections

Participants described steps necessary to strengthen cultural connections and help look after people and Country. Three main themes emerged from the analyses of the voice recordings and written notes (Table 1): Making decisions; Sharing culture; and Caring for Country, are further discussed below.

'Making decisions' theme was dominated by discussion on relations between Parks Australia and the rights of TOs, the need to "Respect the land" and "Share Country the way we want to share it". There were suggestions of "Walking with Parks" so that Parks Australia can "Understand Country" and "Listen to Aboriginal culture and Aboriginal land protocols". Also, opinions were voiced that "Parks should do what the Traditional Owners tell them", and "We should be doing things ourselves not relying on Parks". Need for greater collaborations on behalf of Parks Australia, where TOs are part of employment scheme and have access to infrastructure of Parks; getting maintenance and management contract from Parks; have an Indigenous ranger group set up; and receive more training, were also discussed.

An important emerging theme here was the importance to TOs of not only **what** is done on the land, but also **who** does it and **how** is it done: "just the right people can go", "Where, how and who cares for Country matters"; [it is] "Not just what you do, but how".

The theme of "Sharing culture" had two sub-themes, sharing the culture with the Aboriginal youth and sharing with the wider community. Spending more time on Country with youth was seen as a key to sharing:

"... we want to take our own kids and that's so the kids can say they know that place. That's not happening."

In terms of Caring for Country, there was discussion that Caring for Country isn't like other jobs: "It's not about working Monday to Friday or 8:00 to 4:00, you go. If that fire's burning 10:00 at night, you're [inaudible] you're working, you're protecting that site."

Land management by Parks Australia was perceived as poor, in particular in relation to fire management or "cold burns". Cold burns are a traditional method of burning the Country during the cooler early dry season, using low intensity managed fire to remove fuel, thus preventing larger, more damaging, wildfires later in the year, whilst also ensuring seeds and nutrients in the soil are protected and animal and bird habitats are maintained and protected (Skiba, 2020):

"But they say from April to so (sic) and so June, you can only burn. Old people (have) been burning anytime, every time, when it might be like now, a week with no rain. You burn then. It's February. There's no set time, you know what I'm saying?"

"Fire is more than carbon farming, it's our culture".

Table 1

Themes emerging from the discussion on what would strengthen cultural connections and help look after people and Country.

Theme	Sub-theme
Making decisions	
Sharing culture	- With young people - With others
Caring for Country	- Managing, using traditional knowledge - Monitoring, using traditional knowledge - Activities - Logistics

3.2.2. Inter-relationship between on-country projects and the peoples' connections to country

Top three ranked projects in both rounds of scoring were walking burns; rock art maintenance; and ranger base and on Country management and monitoring. For each, the following was then discussed: (a) what should be done about it; and (b) who should do it. In addition, each project was discussed in the context of five themes identified in Fig. 4, mental models of connections: Cultural places; Being on Country; Looking after Country; Bush tucker; and Spiritual connections. Helicopter burns were also discussed as something needed in certain circumstances, but not an activity that could replace walking burns.

The main objective of walking burns is cold burning of the Country; however this is by no means the only objective. During walks participants are also expected to share knowledge and learn about rock art; walking tracks; plants and animals; and men places and women's places. Participants would also learn how to survive in wild and be independent, and to understand threats such as buffalos and snakes. The essence of walking is to become sensitive and observant, and learn and feel the Country. The style of burning is essential, using natural barriers to protect flora and fauna and protecting sacred sites. The strong connection of walking burns to five themes of cultural connection identified by Mungguy is evident in Fig. 5. a. Walking burns contribute to being on Country, looking after Country, cultural places and bush tucker. All these connections reinforce spiritual links of people to Country (Fig. 5a).

In contrast, helicopter burning does not lead to connection to Country, nor does it create any spiritual connection: on the contrary, it detracts from it (Fig. 5b). Burning from the helicopters was discussed as an activity that takes place quite a lot now but should be largely replaced by walking burns. The need to be careful when helicopter burning, not to harm plant life, animals or secret and rock art sites, was stressed (Fig. 5b). This approach was seen as suitable only in extreme cases, when access by foot is not possible or is too dangerous. In spiritual and connection to Country terms, this is a very different activity compared to walking burns.

Most rock art sites are accessible on foot only. Maintenance activities include removing dead wood to stop fire creeping and burning around rock art – these are early/light burns that protect art from potential later fires. Fencing might need to be erected to keep out pigs, wallabies and dingos. Data on condition should be recorded on site to help prioritise future management actions. The relationship between rock art maintenance and the connections to Country is presented in Fig. 5c.

On-Country land management and monitoring discussion first focused on the logistics and skills required for rangers before moving on to actual activities rangers could do. Final discussion on this project was about monitoring of the on-Country management, and participants proposed some indicators of success that could be used for monitoring (Fig. 5d). Condition and abundance of selected bush tucker species; condition of art sites and cultural places; and condition of land and threats to land, were proposed as indicator for Bushtucker, Cultural places and Looking after Country themes, respectively. These types of indicators are very much in line with the ES accounting approaches. However, indicators for Being on Country and Spiritual connection to Country were centered around people's wellbeing, not condition of ecosystem/land. Being on Country makes people feel good, hence the level of satisfaction recorded to question such as "How satisfied are you with the amount of time you have opportunity to spend on Country?" could be used as an indicator here. Similarly, for spiritual connections, Country in good condition makes people feel good, while Country in poor condition makes people sad. Hence, "How Country makes you feel?" could be used as an overall indicator of condition of the land (Fig. 5d). In words of the workshop participants:

"When you do weeds and ferals [animals], and you clean up your land ... You clean it with care. It feels good ... with weeds and ferals, you can feel it in your heart."

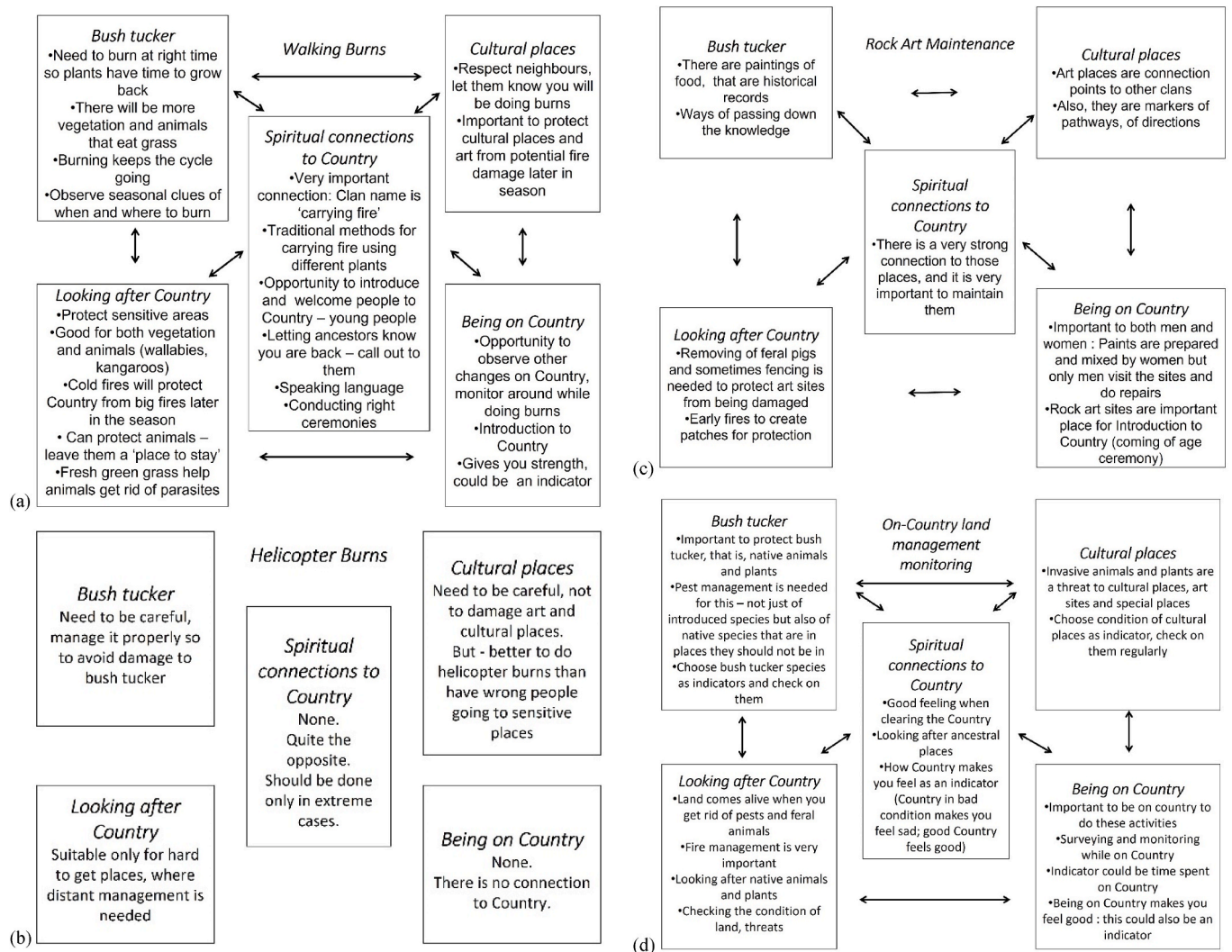


Fig. 5. Perceived connections of each suggested project with the Country: (a) walking burns; (b) helicopter burns; (c) rock art maintenance; and (d) on-Country land management and monitoring.

"Spiritual (sic) to see the Country come back to it's natural Yeah, and like all the animals, they get happier. Everything is healthy."

"And when you see that you have lots of animals, everything will grow beautifully"

4. Discussion

The mental model of connections to Country developed by the Munggy traditional owners participating in this study comprised five themes interlinked into a three-dimensional sphere. Four of the themes identified (Cultural places; Being on Country; Looking after Country; and Bush tucker) were connected to each other and were all linked to a fifth and central theme of Spiritual connections to Country. This explicit interconnectedness of the indigenous nature-people system is well described in both Australian (Russell et al., 2020; Stoeckl et al., 2021) and international literature (Chan et al., 2012; Pascal, 2017; Lyver et al., 2017; Matuk et al., 2020), yet it is still largely ignored in the valuation approaches that depict people-nature relationships as linear and one-way flows (Jacobs et al., 2016; Díaz et al., 2015a; Pascual et al., 2017; Kadykalo et al., 2021).

A second separate yet connected model depicted historical timelines, where Munggy cultural connections to Country were divided into three distinct timelines from ancient past; to recent past to present; and desires

for the future. These findings are similar to those of Stoeckl et al. (2021), who also point the critical importance of time and the different (much longer) time scales of relevance to Indigenous, compared to non-Indigenous, Australians. We thus argue that approaches such as the one used in this study, that seek the diversity of worldviews, and provide space for inclusive language, framing and knowledge, will result in models that have similarities with other mental models, but will likely be unique and context specific. Thus, we support arguments that hybridization between general and context-specific perspectives might be required in order to fully represent the values of all stakeholders, in particular in instances of hybridized government-community natural resources management arrangements (Addison et al., 2019).

Nature-people interactions occur at different scales, and thus should be developed to better suit different audiences and decision-makers (Hill et al., 2021). We support Hill et al. (2021) who argue that there is an urgent need for cultural differences to be taken seriously in humanity's efforts to conserve and restore nature. Respectful collaboration between different knowledge systems and worldviews can also significantly enrich the empirical, methodological and epistemological bases for action to stem the decline of nature and create more sustainable futures (Hill et al., 2021).

Making decisions; Caring; and Sharing, were identified as three key aspects that could strengthen connection with the Country. The key contemporary issue for Munggy appears that of self-determination,

governance, and respectful decision making. This supports findings of Addison et al. (2019) who demonstrate that, in line with Sen's (1999) thesis of development as freedom, Indigenous groups involved in natural resources co-management programs conceptualize their development as a path towards control, leadership, empowerment and independence. In contrast, government actors align with the vision of development in ways that more closely aligns with Sen's conceptualisation of capabilities, where the aim is to increase human and social capital thus focusing on the relative uptake of jobs or training (Addison et al., 2019).

The cyclical model presented in this paper builds on the model presented in Stoeckl et al. (2021) by illustrating how on ground activities create a benefit to wellbeing that is direct (from doing) and is separable from wellbeing achieved via ES. This model is perceived as holistic, and people's benefits from nature are inseparable from people's contribution to nature. We found that the flow of benefits associated with the act of people looking after Country is direct and strong, but, only occurs if Country is looked after 'the right way': if the right people are doing the right things at the right time. As an example, Munggy participants discussed two different forms of fire control, 'walking burns' and 'helicopter burns'. To maximize the benefits of this activity to both Country and the people, walking burns should be conducted with the engagement of traditional owners, at the time determined by their traditional knowledge and observations. Caring for Country through practices such as burning cannot follow the western-concept of 'schedule' - the land needs to be cared for as required, by listening and knowing what it needs and when.

Drawing on Indigenous traditional ecological and cultural knowledge of bio-cultural indicators when planning fire management is essential to ensure cool burning takes place in the right locations, at the right time and in the right way (McKemei et al., 2020). Indigenous knowledge and decision-making on issues such as burns will not only maximize benefits to the ecosystem, it will also directly enhance wellbeing - a result of 'looking after Country'. Prior research has established the wellbeing benefits that can arise from Indigenous land management practices (Larson et al., 2019, 2020), and furthermore, from the opportunities for culturally appropriate sharing of traditional knowledge (Jarvis et al., 2021). Evidently, this flow of benefits from stewardship activities to society is maximized when the Country is looked after 'the right way': if the right people are doing the right things at the right time.

Another relevant and emerging theme in the literature is that of the presence and importance of relational values, a theme strongly supported by the findings of this paper. Similar to findings of Stoeckl et al. (2021), whilst the representatives of Aboriginal groups do discuss the benefits that ES generate for individuals, benefits were more often discussed with reference to families, groups and the wider society. It highlights findings that in many cultures individual values are not the most dominant ones, rather, it is community values that matter most (Graham, 1999; Gould et al., 2019; Grainger and Stoeckl, 2019). Further, as Stoeckl et al. (2018) suggest, different types of goods and services can benefit individuals and communities in different ways.

In ES approaches, including those seeking to account for ES (UNSEEA, 2021), a whole range of wellbeing contributions are subsumed under the term 'cultural values' and considered separable from provisioning or regulating ES. It could be argued that, in Indigenous conceptualizations, all ecosystem values are 'cultural values': culture cannot be separated from the Country. The role of spirituality and relational values (relations between Country and people and relationship between people) is strong, and values and benefits are context specific.

To capture such a plethora of values, extensions to accounting frameworks such as SEEA EA (UNSEEA, 2021) would be required. Recent literature explicitly argues the need to recognize Indigenous perspectives within SEEA EA accounts (Normyle et al., 2022c) and pilot studies have worked with Indigenous groups to trial accounts preparation (Normyle et al., 2022a, 2022b). However, a noted limitation of these works is their failure to capture cultural dimensions including

cultural values and cultural activities on Country (Normyle et al., 2022a). This work builds on discussions, over several years now, of the ineffectiveness and discrimination of single-value approaches (Jacobs et al., 2016), with recommendations for a plural valuation culture and its establishment as a common practice (Tengö et al., 2017). 'What people are managing for?' is a key question that needs to be answered before the 'right' outcomes can be defined and the suitable indicators assigned. And as 'What people are managing for?' is scale and audience dependent, so the 'right' outcomes and the suitable indicators might need to be context-specific for a given scale and audience.

Our findings support calls for 'hybrid' monitoring/accounting approaches (Kadykalo et al., 2019): some indicators might be relevant in most instances and thus transferable; other indicators might need to be context-specific. Also, we emphasize that if wanting to describe the full extent of the people-nature system, not all indicators can be biophysical in nature (condition of the land, i.e., condition of the creek; number of species; hectares of mangroves). Some indicators, as suggested in this case study, need to monitor spiritual connections to land (specifically, the condition of people, i.e. 'feeling good').

Ecosystem accounting approaches, such as the SEEA EA (UNSEEA, 2021), focus attention on measuring (a) the extent and condition of ecosystem assets at specific points in time (the end of each accounting period), and (b) the flow of ES supplied by those assets during the accounting period. The accounting system comprises both physical accounts, utilizing a range of biophysical metrics, and monetary accounts, measured in \$, that provide estimates of the monetary value of the flow of ES and of the ecosystem asset; the accounting standards prescribe methods for deriving these physical and monetary values of the assets and of the flows, mainly adopting an anthropocentric and use value focus (UNSEEA, 2021).

Despite seeking to measure the individual and societal wellbeing benefits flowing from ES (Fig. 1), the SEEA accounting system does not include any measures of wellbeing (at either the individual or community/societal level), either at a point in time or as a change over time. We recommend that to capture the full extent of the wellbeing benefits that flow to people from nature (either as ES flows or because of stewardship activities) such systems should also incorporate measures of the 'state' or 'condition' of the human component of the interlinked and inseparable people-nature system (Fig. 6). For accounts to provide useful information on the system, they need to reflect the whole system, not just a part.

Fig. 6 allows us to identify additional (broad classes) of indicators that could be considered within accounting systems when seeking to include insights from Indigenous people within, or alongside, SEEA EA related monitoring activities. These are set out in Table 2. We have deliberately described indicators in general terms - using the core components of Fig. 6 as column headers to ensure that all core elements of the model are considered.

With this format as a foundation, we have added several key elements: a) the importance of the condition/capacity of society to enjoy the benefits provided by ecosystem services, b) the further benefits that can flow to nature and back to society by enabling/supporting the 'right' people to care for Country in the 'right' way. This highlights the importance of the 'flows' (the relationships) between the 'stocks' of nature and society, and, hence the need for appropriate indicators to monitor the quality of those flows. We have not identified indicators relevant to ecosystem extent and conditions, as these are well covered elsewhere.

We have not sought to prescribe a specific suite of indicators. Just as we need the 'right' people to look after Country the 'right' way, the 'right' people should also determine what should be monitored and measured. While we have provided a generalised model and transferable approach and method. However, the development of specific indicators should be Indigenous-led and context specific, empowering the TOs of the land and society that we seek to account for. We emphasize the critical importance of working with Indigenous

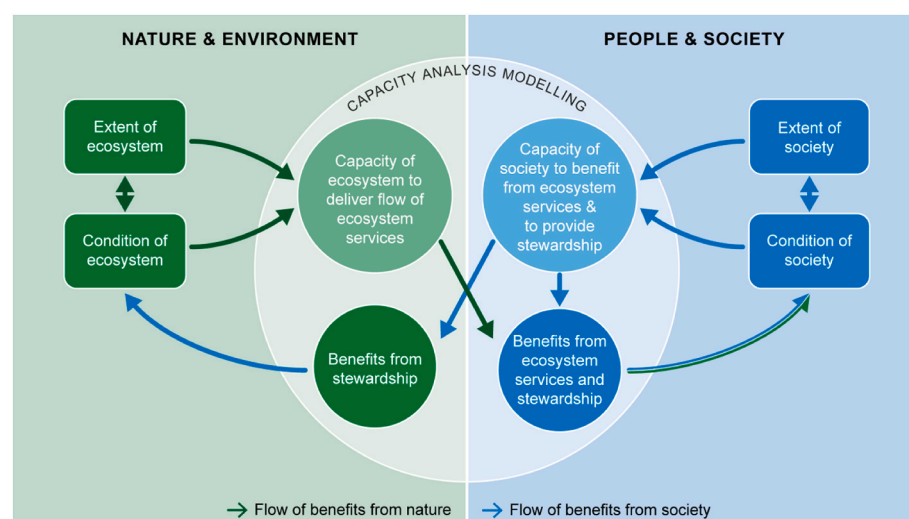


Fig. 6. Measuring the extent and condition of both nature and society. Flows depicted by green arrows represent the flow of benefits recognised within SEEA EA, adapted from SEEA Committee of Experts on Environmental-Economic Accounting (2021) System of Environmental-Economic Accounting – Ecosystem Accounting: Final Draft, page 145 (UNSEEA, 2021) (which was itself based upon Maes et al. (2018)). We add society to the relationship, with blue arrows depicting flows of benefits from society. Further, we add the need for capacity analysis modelling to include capacity of ecosystems to deliver ecosystem services (as recommended by SEEA EA) but also to include modelling of the capacity of society to benefit from ecosystem services and to provide stewardship services. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Table 2

Enabling factors (to generate ecosystem-services values) and additional (broad classes of) indicators that could be included in Environmental-Economic Accounting – Ecosystem Accounts to better capture core factors relevant to Indigenous connections to Country.

	Ecosystem asset (stock) SEEA EA	Ecosystem Service (flow) SEEA EA	Society (stock)	Natures benefits from people (flow) (SEEA)	People benefit from looking after Country (flow)
<i>Enabling factors (must be present for people to be able to (a) benefit from ecosystem services [no benefit, no 'value' – of either flow or asset] and (b) maintain condition of Country [thus ensuring long term sustainability]).</i>	<i>Ecosystem must be present and in good condition (extent and condition).</i>	<i>TOs must have access to Country.</i>	<i>TOs must be healthy enough to get out on Country and appreciate services.</i>	<i>The Country must be looked after the right way.</i>	<i>The 'right' people (TOs) need to look after Country.</i>
Potential indicators to measure/monitor Some can be general, some context-specific.	Numerous examples through the literature (including condition of sacred sites) – not repeated here.	Number of people who are able to go out on Country – the places they are able to access and the length to time they are able to stay. Could also keep track of age, gender (etc) of visitors and of activities undertaken while there. Could also aim to monitor perceived benefits (flow) from native title, Indigenous Protected Areas (IPAs), Indigenous Land Use Agreements (ILUAs), etc.	Could monitor overall (subjective) wellbeing of people; in addition to monitoring objective indicators of wellbeing (that may include things such as income, housing, education, physical health, etc – these should be selected by community) Land tenure relating to native title (IPAs, ILUAs etc).	Extent to which TOs are satisfied that their Country is being looked after the 'right way'. Extent to which Traditional knowledge and practices are used when caring for Country &/or satisfaction of TOs that the correct practices are being used. Extent to which TOs manage and make decisions.	Number of TOs who can go out and care for Country (relative to number of non-TOs caring for Country).

communities to test, refine, and appropriately contextualise indicators: one size will not fit all. However, there are existing examples of Indigenous-led and developed environmental monitoring, such as the Bininj/Mungguy Healthy Country Indicators,¹ a model that could be adopted to developing appropriate SEEA EA indicators.

5. Conclusion

This paper sought to contribute to the literature by providing a practical illustration of one way to populate conceptual models with 'real world' data that incorporates different world views, to support decision makers for improved social and environmental outcomes. The cyclical model of the interconnection nature-people system that was co-developed in this study reinforces findings from previous studies. It is

holistic and highlights that people are inseparable from nature. Furthermore, it illustrates how on-ground land management activities can directly create a benefit to human wellbeing – this is in addition to the wellbeing benefits that accrue indirectly through improvements in the environmental condition and hence ecosystem services. Critically, this additional benefit is contingent upon a particular type of stewardship: **the right people, doing the right things at the right time**. That is, the environment needs to be cared for in 'the right way', by listening and knowing what it needs and when, using and drawing on Indigenous traditional ecological and cultural knowledge.

When developing natural resource management arrangements, particularly those that involve co-management between government and other sections of society, we recommend consideration be given to hybridization between general and context-specific perspectives, developed from respectful collaborations between different knowledge systems and worldviews to fully represent the values of all stakeholders and achieve more sustainable outcomes. Furthermore, we recommend that systems such as SEEA EA that are intended for monitoring and

¹ For further information on this work see <https://www.nesplandscapesn.edu.au/projects/nesp/healthy-country-indicators/>.

reporting the condition and value of the environment and the wellbeing benefits that flow to people from nature should also incorporate measures of the 'state' or 'condition' of the human component within the interlinked and inseparable people-nature system, and such measures and indicators should be adapted to reflect the specific social and cultural connections between people and nature in different contexts.

For this study, researchers partnered with Australian Aboriginal Traditional Owners; however, the methods are transferable to other countries with First Nations peoples. The policy recommendations are likely to be applicable internationally wherever policy makers seek to develop policies to benefit the environment and human wellbeing, rather than limited purely to the Australian context; however further research within other regions and other countries, partnering with other First Nations groups in different contexts is required to confirm this.

We conclude by advocating for a paradigmatic shift from atomistic and linear modes of representing people-nature relationships to an interconnected and cyclical model that incorporates peoples' potential to contribute to the stewardship of nature which produces benefits to nature and enhances the wellbeing of people. A cyclical model will lead to a fuller and more comprehensive accounting and enable a more sustainable culturally appropriate way of "caring" for Country. Our model was developed through collaboration with Indigenous peoples and just as we were able to teach them our Western ways of knowing, they were able to teach us their Indigenous ways of knowing as well. Thus, a cyclical model should not only be a representation of people-nature relationships but also of Indigenous-Western knowledge sharing collaborations.

6. Novelty and relevance statement

This study is novel in two ways. First, it extends previous frameworks for understanding the human-nature system by explicitly recognizing stewardship does not only benefit people indirectly by improving the condition of the landscape (and thus ecosystem services). When conducted appropriately (by the right people in the right way) stewardship also directly enhances human wellbeing. Some types of stewardship (particularly 'atomistic' approaches which, for example, focus on a single issues such as carbon sequestration or weed control rather than on whole-of-landscape caring) may fail to generate these additional direct wellbeing benefits. Second, this study demonstrates a method for operationalizing a 'connected' framework that describes the nature-people system to develop indicators that can be adopted for monitoring and accounting for the activities and benefits that flow to the environment and to people. Such information should contribute to improved decision making and policy for managing the environment.

7. Data statement

The data that has been used is confidential, as agreed with workshop participants and required by the ethical approval granted by the James Cook University Ethics Committee for this research project.

Author contributions

Silva Larson: Conceptualisation, Methodology, Formal analysis, Writing – original draft. Diane Jarvis: Conceptualisation, Methodology, Investigation, Writing – review & editing, Project administration, Funding acquisition, Natalie Stoeckl: Conceptualisation, Methodology, Investigation, Writing – review & editing, Funding acquisition, Ryan Barrowei: Investigation, Bessie Coleman: Investigation, David Groves: Investigation, Joshua Hunter: Investigation, Maria Lee: Investigation, Michael Markham: Investigation, Anna Larson: Formal analysis, Glenn Finau: Writing – review & editing, Michael Douglas: Investigation, Funding acquisition.

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.

Data availability

The data that has been used is confidential.

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