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Is investment in Indigenous land and sea management going to the right places to provide multiple co-benefits?

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ABSTRACT

Indigenous land and sea management (ILSM) has been the focus of large government investment in Australia and globally. Beyond environmental benefits, such investments can deliver a suite of social, cultural and economic co-benefits, aligning with the objectives of Indigenous communities and of governments for culturally appropriate socio-economic development. Nevertheless, there have been very few studies done on the spatial distribution of this investment and the extent to which its associated co-benefits address socio-economic disadvantage, which is unevenly distributed across Australia. This study draws on Australian ILSM programmes to examine the spatial and temporal distribution of investment for ILSM between 2002–2012 and considers implications for the distribution of associated co-benefits. Mapping and analysis of 2600 conservation projects revealed that at least \$462M of investment in ILSM projects had occurred at 750 discrete sites throughout Australia. More than half of this investment in ILSM has been concentrated in northern Australia, in disadvantaged remote and very remote areas where a high percentage of the population is Indigenous, and Indigenous land ownership extensive. Our research has shown that ILSM investment has successfully been spatially distributed to areas with high needs for multiple social, economic, environmental and health and well-being co-benefit outcomes.

KEYWORDS

Indigenous land and sea management; programme investment; Indigenous peoples; socio-economic benefits; caring for country

Introduction

Support by nation-states for Indigenous¹ peoples' roles in land and sea management is increasing globally as a result of recognition of their rights and interests (Escobar 2010; Garnett et al. 2018), and increased attention to the value of the planet's remaining biocultural diversity (Gavin et al. 2015; Hill et al. 2019). Indigenous peoples' rights over, responsibilities for and relationships with their traditional land and sea Country have continued for over 65 000 years in Australia (Clarkson et al. 2017). Indigenous rights and interests are

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recognised formally (by many non-Indigenous land grant instruments under specific jurisdictions and land use classifications) to extend over half of Australia's land area (and almost half of the National Reserve System). Traditional land and sea management by Indigenous People is often referred to as 'Caring for Country' in the Australian context and includes a wide range of environmental, natural resource and cultural heritage management activities undertaken by Indigenous individuals, families, groups and organisations. The traditional land and sea management activities are highly diverse and have their origins in the unique world-views, and *sui-generis* governance and knowledge systems, that underpin deep economic, social, spiritual and custodial relationships between Aboriginal and Torres Strait Islander societies and their customary land and sea estates—or 'Country' (Armstrong, Morrison, and Yu 2012; Clarkson et al. 2017). Recognising the important contribution that these traditional activities can make towards conservation and towards creating jobs for Indigenous People on Country, government funding (from both state and federal governments) has invested in supporting Indigenous Land and Sea Management (ILSM) programmes from 1980s onwards (Committee of Review of Aboriginal Employment and Training Programs 1985). In 2018, the federal government alone funded 123 Indigenous ranger groups and 75 dedicated Indigenous Protected Areas (National Indigenous Australians Agency 2020). ILSM programme activities support customary or cultural resource management (e.g. hunting, gathering, burning, ceremony, knowledge sharing), actions to improve conditions in settlements (e.g. dust mitigation, firewood collection, management of water supplies), commercial economic activities (e.g. bush harvest for sale, pastoralism, management, art, carbon farming) and threat abatement (e.g. weed and feral animal control, fire management, emission reduction, threatened species management, revegetation) (Hill et al. 2012; Renwick et al. 2017; Leiper et al. 2018).

While there has been considerable effort in reviewing and evaluating programmes designed to support ILSM goals and activities, there has been less focus on the geography of ILSM investment, and associated co-benefits, at broad temporal and spatial scales. A number of studies have investigated different aspects of Indigenous engagement in ILSM programmes in Australia, with many adopting a focus on the environmental and conservation benefits, for example: regional NRM processes (Inovact Consulting 2011); Regional Forest Agreements (Wilkinson 2017; Davey 2018); Indigenous Protected Areas (IPAs) evaluation (Social Ventures Australia 2016a; Traill 2018); marine resource management (Gould and Ulamari 2017; Depczynski et al. 2019); partnerships in protected area management (Bauman and Smyth 2007; Austin et al. 2019); consultation in planning (Jackson, Porter, and Johnson 2017; Moggridge, Betteridge, and Thompson 2019); environmental management (Nurse-Bray, Wallis, and Rist 2009); community based environmental management (Wiseman and Bardsley 2016); and co-management of 'Country' (Zurba and Berkes 2014; Barber and Jackson 2017). Another area of focus has related to the use and sharing of Indigenous cultural and ecological knowledge (Hill et al. 2013; Ens et al. 2015; Pert et al. 2015; McGinnis, Harvey, and Young 2020). Other studies of investment into ILSM have highlighted the considerable expansion of ILSM (Altman et al. 2011b; Hill et al. 2013; Jackson et al. 2016; Larson et al. 2020) and its overlap with the projected ranges of threatened species (Renwick et al. 2017; Leiper et al. 2018). Yet scant inventory data or analyses are available of the actual spatial and temporal extent, and growth trajectory, of ILSM investment notwithstanding earlier interest in the extent to which Indigenous peoples in Australia are able to access funds (notably

Young et al. 1991; Lane and Williams 2009) and despite an intentional investment focus on northern and remote Australia during 2008–2013.

Furthermore, whilst some recent research has stepped beyond the environmental benefits (Barber and Jackson 2017) and has identified and investigated the social, cultural and economic co-benefits (Barber 2015; Farr et al. 2016; Jarvis et al. 2018; Jarvis et al. 2018; Addison et al. 2019), and the benefits to health and well-being (Larson et al. 2019) from such investments (Weir, Stacey, and Youngetob 2011; Robinson, James, and Whitehead 2016); the spatial patterning of investment in relation to those regions and communities most in need of co-benefits has not been considered. A step-change towards increased levels of funding for Indigenous land management occurred in 2008, with an intentional investment priority for northern and remote Australia during 2008–2013 linked to environmental outcomes (Brittingham 2013). During 2013–2020, the level of investment for these groups was maintained, with an increase in 2018, and has recently been extended out to 2028, but without a specific geographical priority (Jarvis et al. 2018; Wyatt 2020). Socio-economic disadvantage, and therefore greater need for multiple co-benefits, is not distributed evenly in Australia, but clustered largely in regional and remote locations (Australian Bureau of Statistics 2016). More than a third of Indigenous people (36.6%) live among the most disadvantaged 10% of the population and only 1.7% live among the top 10% (NACCHO 2013). This article contributes to addressing the gaps in our understanding of the spatial and temporal impacts of investment, by providing further analyses, synthesising the extent of government and non-government investment, identifying where, when and how much has been invested in ILSM programmes, and considering the implications of this in the context of the economically disadvantaged regions with a great need for multiple co-benefits.

This synthesis aims to guide investors towards decisions that help ensure Indigenous peoples are engaged equitably in management of their land and sea Country for biocultural diversity conservation and human well-being, so as to ensure a dual objective: that land is managed sustainably and that the well-being of Indigenous peoples with high needs for multiple benefits is enhanced. By focusing on these wide ranging objectives, this article seeks to encompass benefits that go beyond the confines of financial or social return on investment analysis (for example, as considered by (Social Ventures Australia 2016a, 2016b, 2016c)). Evidence is accumulating that involvement in Indigenous land management provides benefits to health, well-being, culture, local languages and knowledge systems, spirituality and societal cohesion that are welcomed by participants and the broader Indigenous communities (Schultz et al. 2018; Schultz et al. 2019).

The next section of the article provides a review of the history of investment in ILSM programmes in Australia, followed by an overview of the multiple co-benefits that have been identified from this investment. We then set out our methods, collection of ILSM data, and analyses undertaken to examine where investment in ILSM has been made and whether these places have high needs for multiple co-benefits. Results of spatial analyses are then presented, and a discussion of some of the dominant spatial and temporal patterns in ILSM investment across Australia during 2002–2012, the period of marked increased investment including a specific focus on northern/remote Australia linked to environmental outcomes. The impacts of these patterns of investment are then evaluated and further discussed.

History of ILSM investment in Australia

In Australia, Indigenous peoples engage in ILSM with multiple stakeholders (governments, scientists, producer groups, conservationists, philanthropists and others) through a range of mechanisms: formal government-supported natural resource management (NRM) projects (Roughley and Williams 2007); Indigenous and co-managed protected areas (Muller 2003; Nursey-Bray and Rist 2009; Ross et al. 2009); endangered species initiatives (Nursey-Bray 2009); water planning processes (Jackson and Altman 2009; Hemming et al. 2019; Jackson and Moggridge 2019; Jackson and Nias 2019; Moggridge, Betteridge, and Thompson 2019; Mooney and Cullen 2019; Poelina, Taylor, and Perdrisat 2019; Williams, Connolly, and Williams 2019); and the pursuit of cultural objectives conventionally undertaken in the absence of non-Indigenous actors (La Fontaine 2006). ILSM was first identified as an important area for investment by governments in the mid-1980s because it provided motivation for Indigenous peoples, and offered opportunities for work that extended into remote regions, where formal labour markets were often poorly developed or non-existent (Miller 1985; Rowse 2002; Johnston et al. 2007). At the time, two national programmes provided funding for short-term projects, often implemented in conjunction with the Community Development Employment Program (CDEP) in remote settlements and, from the early 1990s, in rural and urban areas (Morphy and Sanders 2001). Since 1991, with the beginning of the National Landcare Program, Australia's NRM programmes have undergone a paradigmatic shift in scale and scope (Lane, Taylor, and Robinson 2009). This shift can be traced through three main phases: Natural Heritage Trust (NHT) 1 investment (1997–2002), NHT2 investment (2002–08), and Caring for our Country (2008–13).² In 2007, a four-year Working on Country (WoC) programme was announced and subsequently extended. In 2012–13, it funded more than 680 rangers³ working in more than 95 Indigenous ranger teams across Australia to undertake a variety of land and sea management activities. WoC was incorporated into the Caring for our Country initiative from December 2007, together with the National Landcare Program, the NHT and the Environmental Stewardship Program (WalterTurnbull 2010).

Unlike the WoC programme, the IPA programme directly targets outcomes for biodiversity and heritage conservation and seeks to provide a planning and land management framework for Indigenous owned land and sea to be managed as part of the National Reserve System (NRS). It has been funded as part of the National Investment Stream (NIS) of the NHT since 1997. IPAs have been described as a ground-breaking initiative that straddles two major contemporary issues: environmental management, and Indigenous cultural survival and adaptation (Hill et al. 2011). All states and territories now have legislative arrangements that provide for co-management of protected areas between Indigenous peoples and governments (Ross et al. 2009), which has driven further expansions in formal Indigenous land and sea management. The Australian Government supports IPAs through the IPAs element of the Caring for our Country initiative, which received another major boost in August 2007, when the Indigenous Land Corporation (ILC) contributed \$7 million over three years to expand the work of Australia's existing IPAs. Then, in 2008, the Australian Government tripled its funding for IPAs, boosting it to \$50 million for a period of five years, and prioritising investment in northern and remote Australia. IPAs have enabled Indigenous groups to balance conservation and economic values as

well as pursue livelihoods. For example, of the thirty participants, three Indigenous leaders interviewed in the Nikolakis, Grafton, and Nygaard (2016) study were involved in successful IPA initiatives in the Murray Darling Basin, and all acknowledged the importance of IPAs in supporting adaptation to climate change. Also reported from half of the thirty interviews, Indigenous peoples saw that were opportunities that could result from an increased emphasis on holistic land management based on traditional knowledge, such as land rehabilitation through Caring for Our Country schemes, or through the Indigenous Protected Areas (IPA) Programmes.

More recently, the initiation of the Biodiversity Fund in 2011–12 and the second five-year Caring for our Country programme in 2012–13 has provided further investment. The Indigenous Carbon Farming Fund established by the Australian Government in 2013 (Brann 2012) provided \$4.2 million until 2014–15 for 44 projects that support Aboriginal and Torres Strait Islander groups and individuals to participate in the Carbon Farming Initiative (Robinson et al. 2014). Additionally, some Indigenous land management organisations receive investments on a fee-for-service basis for quarantine and management of invasive species, and interpretative and maintenance works in national parks (e.g. signage, walking track reconstructions) (Smyth 2011). Further interest and engagement in ILSM from non-government conservation organisations, research agencies, and other prospective partners has appeared. The growth in government programmes supporting and investing in ILSM reflects the interaction between caring for Country and environmental issues, and the productivity of Indigenous environment collaborations. The spatial and temporal distribution of this investment in ILSM across the socio-ecological landscape, and its relationship to the distribution of socio-economic disadvantage, has not been studied previously.

Multiple co-benefits from ILSM investment in Australia

Investigations of outcomes from this history of investment in ILSM have identified that multiple co-benefits have occurred, delivering improved social, economic, health and well-being, cultural and environmental outcomes for Indigenous communities in Australia. Recently, Barber and Jackson (2017) have synthesised and critically reviewed the co-benefit literature arising from Australian Indigenous cultural and natural resource management programmes. They identified a wide suite of co-benefits but also some conceptual gaps and inconsistencies in approaches or agreed-upon metrics. Payments for environmental or ecosystem services (PES)⁴ schemes (a market-based mechanism used to encourage the conservation of natural resources) have also been shown to generate significant social co-benefits and to add to wellbeing. Greiner and Stanley (2013) in their PES study of Indigenous peoples in northern Australia classify Indigenous-focused activities funded under the government's 'Caring for Country' initiative as PES schemes with a social co-benefit agenda. Three types of social co-benefits are identified and discussed, and the sum of these co-benefits gives the total social co-benefits associated with any PES-style programme. A specific example is the Carpentaria Ghost Nets Australia Programme⁵ which has used a 'fee for service' arrangement (2004–2013) to build the capacity of 31 coastal Indigenous communities to protect over 3,000 km of saltwater Country from ghost nets (discarded or abandoned fishing nets). Other examples, particularly market-based, include Indigenous participation in emission reduction and carbon sequestration

projects (e.g. West Arnhem Land Fire Abatement Project (Heckbert et al. 2008; Whitehead et al. 2009)).

Here we discuss four categories of benefits that have been reported by Weir, Stacey, and Youngetob (2011) as associated with ILSM investment literature review: (1) health and well-being benefits; (2) cultural and socio-political benefits; (3) economic benefits; and (4) environmental benefits. We also include a brief discussion of the spatial distribution of socio-economic disadvantage, and areas with the high needs for the delivery of these associated co-benefits.

Health and well-being benefits

Links have been reported between the natural environment, cultural identity and Indigenous health (King, Smith, and Gracey 2009), as well as engagement in biodiversity management activities including lowered rates of diabetes and cardio-vascular disease (Nurse-Bray and Hill 2010). Health and well-being benefits from ILSM have been attributed to several factors. A systematic review of Australian and international research published in peer-reviewed journals by Davies et al. (2011) indicated that these benefits fall into three groups: (1) a reduction in health risk factors associated with Indigenous peoples' behaviours and lifestyles (e.g. exercise, diet, smoking, drinking, hygiene) (O'Dea, White, and Sinclair 1998; Burgess et al. 2005; Johnston et al. 2007; Rowley et al. 2008; Burgess et al. 2009; URBIS 2012); (2) reduction in health risk factors from Indigenous peoples' social, political, ecological and physical environment (e.g. governance, housing, land condition, health services, education and employment opportunity) (Morice 1976; Burgess et al. 2005; Morphy 2008; Burgess et al. 2009); and (3) psycho-social moderators that mediate the direct impacts of the health risk factors and have powerful indirect impacts on health by strengthening Indigenous peoples' 'sense of control' over their own lives, 'self-esteem', or 'mastery' (Morice 1976; McDermott et al. 1998; Kingsley et al. 2009; Berry et al. 2010). This moderates the health impacts of sustained stress, which is a significant cause of illness and chronic disease among Indigenous peoples (Wilson 2003; Cass et al. 2004; Davies et al. 2011). Further to these groupings which adopt a fairly narrow health-based definition of health and wellbeing, ILSM programmes have been found to contribute positively to the overall wellbeing of Indigenous peoples, defining wellbeing as a holistic concept relating to people's overall quality of life and levels of satisfaction with their lives (Larson et al. 2019; Larson et al. 2020).

Social (including cultural and political) benefits

Various researchers (Bauman and Tran 2007; Hunt, Altman, and May 2009; Hunt 2010; Weir, Stacey, and Youngetob 2011) have studied the cultural and socio-political benefits of Indigenous peoples' involvement in ILSM. Benefits which have been identified through ILSM (including the expansion of ranger programmes) include increased opportunities for intergenerational transfer of knowledge from senior Aboriginal people to younger generations (URBIS 2012), which is critical to the maintenance of cultural practices and institutions. In addition to, and as part of, intergenerational relationships, ILSM also supports customary and social practices for both women and men and facilitates their relationships with the land. Gendered landscapes have been identified within Country (Jones 2005) with

women and men expressing their relationship with the land in different ways. Conducting ILSM activities ‘on Country’ allows women to continue to practise cultural activities such as women’s hunting and gathering, healing ceremonies and kinship ceremonies; traditional arts and crafts, and cooking.

Hunt, Altman, and May (2009) furthermore examined Indigenous peoples’ involvement in ILSM and NRM identifying social benefits for education, training and skills development, reduced substance abuse, reduced anti-social behaviour of young people, and increased access to housing and employment. ILSM activities have also helped foster relationships between Indigenous peoples and those supporting ILSM activities ‘on Country’ including land managers, as well as in government, community and health services; resulting in an increased capacity for governance over land and sea for which Indigenous peoples have or share responsibility, including through development of synergies in the work of rangers and land-holding organisations. Green and Martin (2017) in their study of challenges for the Wik Aboriginal people of Aurukun, described how participants who returned to and carried out activities on Country felt that this provided a way to counter feelings of disempowerment and despondency arising from living solely in Aurukun and served to build cultural resilience, thereby also likely providing physical and psychosocial health and wellbeing benefits. Furthermore, ILSM programmes have been found to help empower Indigenous groups, offering greater opportunities for influence and control over activities and developments within their communities (Addison et al. 2019).

Economic benefits

The opportunity for Indigenous peoples to undertake environmental work on their own land has been recognised as an important means of promoting employment and economic well-being within an Indigenous community and has been the focus of substantial and long-term investment (Altman 2000). Economic benefits of ILSM include: production of food sources and other resources in the customary economy (Altman 2003); employment as rangers and payment for environmental services activities e.g. fee-for-service contracts (Putnis, Josif, and Woodward 2007; Hunt, Altman, and May 2009); synergies between the market, customary and welfare economies; production of materials in the arts and crafts industry (Davies, LaFlamme, and Campbell 2008; Koenig, Altman, and Griffiths 2011); commercial wildlife harvesting (Fordham et al. 2010; Wilson, Edwards, and Smits 2010); production of goods for sale in the carbon market (lowered emissions and increased carbon sequestration) (Gerrard 2012; Robinson et al. 2014); cultural tourism and ecotourism (Altman 2006; Smyth et al. 2007); native foods collection and production for sale into the market (Hunt, Altman, and May 2009); and use of intellectual property of Indigenous Ecological Knowledge (IEK) in various enterprises, including medicines, and cross-cultural communication (Edwards and Heinrich 2006; Pert et al. 2015). ILSM programmes have been found to promote self-sustaining growth in the number of Indigenous owned businesses (Jarvis et al. 2018).

Furthermore, significant regional economic benefits have been found to result from ILSM programmes, with these benefits accruing within Indigenous and non-Indigenous households (Jarvis et al. 2018). Whilst the initial, direct, economic benefits from investments in ILSM programmes may flow predominantly to Indigenous people, particularly

if those employed by the programmes are solely or predominantly Indigenous, a large proportion of the secondary or flow on economic benefits tend to flow to non-Indigenous businesses due to the greater strength, depth and size of non-Indigenous economic systems relative to Indigenous economic systems, even within rural and remote locations within Australia (Stoeckl et al. 2014). Accordingly, a significant proportion (and in some regions the majority) of the total economic benefits resulting from investment in ILSM programmes has been found to flow to non-Indigenous households (as opposed to Indigenous households) (Jarvis et al. 2018). Economic analysis based on the direct and indirect benefits (incorporating the multiplier effect) have found benefits to accrue to regional economies (Jarvis et al. 2018), and to the general economy at state and national level (The Allen Consulting Group 2011). Further benefits can also flow to the state and national budgets as a result of reduced expenditures on services such as public health, policing, policing and corrective services and public housing, and by increased tax revenues as a result of the additional jobs and enterprises that can result from ILSM programmes (The Allen Consulting Group 2011; Bueren et al. 2015). However, as the main focus of this article is on co-benefits that can help address disadvantaged communities, we do not focus further on the wider state and national economic benefits that can arise from investment within ILSM programmes.

Environmental benefits

For the first time in 2006, the National State of the Environment (SOE) report considered through selected case studies environmental management by Indigenous peoples (Brown et al. 2006). Recent research into the investment in ILSM (Berry et al. 2010; Wilson, Edwards, and Smits 2010; Concu 2012; Social Ventures Australia 2016a, 2016b, 2016c; Austin et al. 2018) has demonstrated a substantial number of environmental benefits including: increased levels of activity in border protection, quarantine, fire management, wildfire abatement, carbon sequestration and trading, weed control, feral animal control, biodiversity conservation and fisheries management, generating benefits both for Indigenous peoples and the wider Australian society. Furthermore, improved environmental condition of land and sea under Indigenous management, and restoration of wetlands and water resource management have been described, with one study reporting lower rates of weed infestation, and healthier fire regimes for maintaining biodiversity values than in adjacent protected areas. Other environmental benefits have included adaptive management of wildlife resources, and enhanced production of some species through fire management, harvesting and cultivation practices. In addition, many of the areas under Indigenous management have been recognised as environmental priorities due to their conservation significance (Altman, Buchanan, and Larsen 2007).

Distribution of socio-economic disadvantage and the need for multiple co-benefits

Indigenous people in Australia generally are disadvantaged, when compared to non-Indigenous populations, with respect to life expectancy, child mortality, access to early childhood education, educational achievement, and employment outcomes (Council of Australian Governments 2009). The Australian Bureau of Statistics (ABS) broadly

defines relative socioeconomic advantage and disadvantage in terms of *people's access to material and social resources, and their ability to participate in society* (ABS 2018). While Indigenous disadvantage is persistent despite location, there is evidence that the greater access to resources in urban and peri-urban Australia also advantages Indigenous populations. For example, the Carson et al. (2018) study showed that urban areas consistently experienced lower adult Indigenous mortality compared with rural areas. While Indigenous people have elevated risks of cancer compared to non-Indigenous people across all categories of remoteness, the most pronounced elevations are detected in remote and very remote regions (Tervonen et al. 2016). Deficiencies in funding, resourcing and long-term working partnerships have been identified as significant barriers encountered by remote Indigenous peoples seeking to uplift their conditions through endogenous development (Stewart, Anda, and Harper 2019). In addition, an extensive review in the education sector found that directing funding towards the people and places with the greatest level of need has the best outcomes for lifting performance (Gonski et al. 2018). Thus, understanding whether ILSM investments are targeted towards areas with greater socio-economic disadvantage is important to the delivery of the identified multiple co-benefits.

Methods

In this article, we interpret investment in Indigenous land and sea management (ILSM) programmes as including NRM, cultural resource management, commercial economic activities and activities to improve living conditions in settlements, funded by state and federal government and philanthropic organisations. ILSM includes planning, training, capacity building and knowledge integration, as well as action. Indigenous peoples do not make a distinction between Indigenous land management and Indigenous sea management—both are considered aspects of management of ‘Country’. We focus here primarily on the land component but include some information about Indigenous management of the sea, where relevant data are available, primarily where it has occurred in association with Indigenous management of adjacent land. Sea Country management programmes are of relevance as the socio-economic co-benefits from these programmes will flow to the coastal communities involved in the programme delivery. Investments made only in marine issues, such as fisheries management, may have been missed from our analyses; however due to the limited scale and nature of these programmes their omission is not considered to be a significant limitation to the findings presented here (Nurse-Bray, Fidelman, and Owusu 2018). We also recognise that Indigenous peoples engage in a range of policy-level activities and partnerships to translate their responsibilities for people and Country into land management programmes, policies and legislation.

Collection of ILSM investment data

Data were collected on investment in ILSM projects and organisations from 2002 through to 2012 specifically for a consultancy report prepared in 2013 by Hill et al. (2013); this accordingly excludes NHT1 data and reflects the lack of time and resources required to obtain pre-2002 and subsequent data, and noting that policies on spatial targeting and extent from the largest investor, the Australian Government, continued essentially

unchanged until 2018. The data on investment in projects was obtained primarily from online sources, except for the ILC data, which were provided directly by ILC. The secretariat to the Australian Landcare Council (ALC) provided a table summarising government and non-government investment programmes in ILSM. We used this table to guide our searching of online sites and documents, and to compile a Microsoft Excel spreadsheet that now includes 2 600 records of projects at 735 individual sites.

We focused our attention on the websites of the Australian Government (particularly the Departments of Sustainability, Environment, Water, Population and Communities [DSEWPaC]; and Agriculture, Fisheries and Forestry (DAFF)), the National Water Commission, and philanthropists (Myer, Christensen Fund, Australian Environmental Grant-makers Network, Lottery West, Pew Environment Group and The Nature Conservancy (TNC)). Additionally we looked at a number of corporate philanthropic organisations, including Rio Tinto Foundation, BHP Community Fund and Telstra Foundation, but did not find any Indigenous Land Management projects. We found data on the Queensland Wild River Rangers and expenditure from the Aboriginal Benefit Account (ABA) established under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cwlth), from which we identified Indigenous Land Management expenditure items based on project titles. We also identified several other possible sources of funding for ILSM—cooperative research centres, state and territory governments, and private purchasers of ILSM services—but were not able to collect data on them. The ALC secretariat requested that data be made available to us about the WoC projects (under the Caring for our Country programme) from the Environmental Resources Information Network (ERIN); we received the spatial data for the location of all these projects, but not the investment amounts. As noted above, we also received data from the ILC about its investments in ILSM since 2002, together with data on the location of all its current and past properties. Although we were not able to source complete data on a number of other identified sources of investment, including investment by state and territory governments, private corporations and not-for-profit organisations, the data set is the most comprehensive, spatially located data set that has ever been assembled on ILSM in Australia.

In all cases, we collected information on projects in which an Indigenous organisation was funded to manage land, including collecting IEK, and undertaking land and sea management activities. We also collected information for projects in which a non-Indigenous organisation was funded but the project involved ILSM. In some instances, the Indigenous Land Management work was only one component of the project; in these cases, we estimated a proportion based on the project description. In relation to funding for NRM regional bodies, where Indigenous-specific activities were mentioned in the project summary, we also estimated a proportion based on this description. Where Indigenous-specific activities were not mentioned, we allocated the same proportion as had previously occurred under the NHT1 and NHT2 (Truss 2005) for the state or territory in which the NRM regional body is located. We recognise that the lack of specific identification of ILSM activities in some data sources limits the robustness of these methods. However, our estimation criteria were conservative to minimise the risk of overstating ILSM investment.

We collected data about the IPA investments from the DSEWPaC website. For the years 2002–03 to 2005–06, we estimated funding to each of the IPAs in receipt of funds to calculate the total expenditure for this period, as reported in Gilligan (2006). After 2006, data are available online. For multi-year funding, we divided the full amount of

funding into equal amounts for each year. Data on the total funding from the NHT1 and NHT2 programmes were sourced from data supplied to the Australian Parliament (Truss 2005). For Caring for our Country, data were sourced from the review of the programme (Australian Government Lands and Coasts Caring for our Country Review Team 2012). These data were used to prepare the comparative analyses of trends in investment over time. For further details readers are referred to the report by Hill et al. (2013).

Use of supplementary spatial data

Spatial data sources/layers were used to provide insight into the status of Indigenous Land Management. Temporal data sets of Aboriginal lands were identified from the National Native Title Tribunal (NNTT), Environmental Resources Information Network (ERIN) (in Department of Sustainability, Environment, Water, Population and Communities or DSEWPaC), the ILC, Geoscience Australia, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), and Commonwealth Scientific and Industrial Research Organisation (CSIRO). The two main national data sets (from Geoscience Australia and ABARES) were land tenure for 1993, and areas managed primarily for traditional Indigenous use in 2005–06 (Land Use of Australia, Version 4). The Australian Land Use and Management (ALUM) classification is the nationally agreed classification system for attributing land use information in Australia. It has a three-tiered hierarchical structure. Primary, secondary and tertiary classes are broadly structured by the potential degree of modification and the impact on a putative ‘natural state’ (essentially, a native land cover). Primary and secondary classes relate to land use—the main use of the land, defined by the management objectives of the land manager. Tertiary classes can include commodity groups, specific commodities, land management practices or vegetation information. The relevant ALUM tertiary class for our analysis was ‘1.2.5: Traditional Indigenous uses—area managed primarily for traditional Indigenous use’. Other Land Use of Australia time-series data sets available at the 1:2 500 000 scale include 1992–93, 1993–94, 1996–97, 1998–99, 2000–01 and 2001–02. However, for our study, the most up-to-date land tenure data available are arranged by local government areas in the form of Digital Cadastral DataBase (DCDB), which can often be updated daily. However, obtaining state-by-state cadastral data sets was beyond our capacity.

DSEWPaC provided data relevant to Protected Areas and their IUCN Management Category, including IPAs, and the ILC provided data about the location of ILC on properties and its Indigenous Land Management investments. The ILC also provided a map showing its acquisition activities, since data-sharing arrangements prevented provision of the actual cadastral data. The spatio-temporal analyses and intersections reported in the following section were conducted on the place-based ILSM projects and associated spatial layers to provide further insight into the patterns of ILSM investment and co-benefits using Environmental Systems Research Institute (ESRI) ArcGIS 10.2 software. To understand areas with the greater need for co-benefits, we overlaid the summed total funding for ILSM projects with ABS data: Socio Economic Indexes for Areas (SEIFA): Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD); Index of Economic Resources (IER); and Index of Education and Occupation (IEO) at the ABS Statistical Area Level 1 (SA1). We also used Accessibility/Remoteness Index of Australia (ARIA) which measures remoteness in terms of access along the road

network from populated localities to each of five categories of Service Centre; localities that are more remote have less access to Service Centres.

To examine where ILSM projects had been funded in relation to environmental priorities, we overlaid the location of: Australia's 15 national biodiversity hotspots; of Australia's bioregions and of the locations and density of listed species under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*; and of the location and IUCN category of protected areas.

Results

A total of 2600 projects with associated investment funding data were analysed from 2002–12 from government and non-government sources. From these data, at least \$462 million has been invested in total, in ILSM projects throughout Australia during this period. Two distinct investment periods can be identified: (1) pre 2007–08, and (2) 2007–08 onwards (Table 1) as shown by a 51% increase in funding from 2006–07–2007–08. Australian Government conservation and landcare programmes contributed an overall 65% to investment in ILSM, followed by the ILC (20%), and philanthropic organisations (13%). A significant \$12.1 million (or 64%) annual rise is evident in Australian Government funding in 2007–08, and then again even more significantly in 2009–10 with a with a 100% annual increase of \$58 million.⁶

Overlaying the summed total funding for ILSM projects over three of the ABS SEIFA indices revealed that 28% of funding has been distributed to areas considered most disadvantaged, although 16% had also been distributed to those with a decile ranking of eight which are considered least disadvantaged (Figures 1–2).⁷ These least disadvantaged regions are urban areas, where small pockets of disadvantaged populations exist and have been found to be associated with high Indigenous populations (Maas et al. 2019). The IEO funding was more evenly distributed, whereas for IER those most disadvantaged received more of the bulk of the funding (30%).

The overlays of the location of Australia's 15 National biodiversity hotspots (Figure 3) showed that very few had received large amounts of funding. The majority of hot-spots received less than 4%, and the Border Ranges North and South received the most at 4%. The five bioregions which have received the most ILSM funding were primarily in the Northern Territory (NT): Darwin Coastal (11%), Burt Plain (7%), Arnhem Coast (6%), and the MacDonnell Ranges (6%), with only one found outside the NT - Sydney Basin (7%). Additionally, areas which have a high density of threatened species recorded received less than 1% funding, with more funding being directed to areas where the count of threatened species was fewer than six. Furthermore, 20% of total ILSM funding has occurred in areas where species of national significance with EPBC Act 1999 status of 'endangered' have been recorded, and 32% to species with a 'vulnerable' status (Figure 3).

The distribution of ILSM funding summed over various types of Aboriginal-held tenure areas, such as where Native Title exists (5%), Indigenous Land Use Agreements (23%) (Commonwealth of Australia 2017), or IPAs (12%), shows that once again funding has been directed to these areas particularly, except for the Sydney area. When looking at the distribution of funding to protected areas, little of the funding has gone to International Union for Conservation of Nature (IUCN) categories IA and IB, whereas 4% has been allocated to IUCN category II National Parks, and 10% to VI category areas

Table 1. Total and annual investment and annual change in investment (+/-) in Indigenous land and sea management in Australia 2002–12, by investor, showing two distinct time periods i) pre 2007–08 and ii) 2007–08 onwards.

		INVESTOR														
Financial Year		Australian Government Programmes			Indigenous Land Corporation			Philanthropic			*Other			Annual FY Total \$	Total annual \$ +/-	%
		Annual \$	Annual +/-	%	Annual \$	Annual +/-	%	Annual \$	Annual +/-	%	Annual \$	Annual +/-	%			
Pre 2007–08	2002–03	2,264,144			626,137									2,890,281		
	2003–04	3,285,068	1,020,924	31	1,067,932	441,795	41							4,353,000	1,462,719	34
	2004–05	3,287,826	2,758	0.1	2,607,221	1,539,289	59				200,000	200,000		6,095,047	1,742,047	29
	2005–06	2,385,145	–902,681	–38	3,829,626	1,222,404	32				541,625	341,625	63	6,756,396	661,348	10
	2006–07	6,725,689	4,340,544	65	6,704,749	2,875,124	43				223,290	–318,335	–143	13,653,728	6,897,333	51
	Sub-total \$	17,947,872	6,725,689		14,835,666	6,704,749					964,915	223,290		33,748,453	13,653,728	
%	53			44						3						
Post 2006–07	2007–08	18,886,407	12,160,718	64	16,099,863	9,395,113	58	3,133,775	3,133,775		280,000	56,710	20	38,400,045	24,746,317	51
	2008–09	25,333,610	7,385,738	29	16,442,280	342,417	2	15,841,283	12,707,508	80	564,300	284,300	50	58,181,473	19,781,428	34
	2009–10	58,716,784	58,716,731	100	15,619,337	–822,943	–5	21,232,082	5,390,799	25	1,515,700	951,400	63	97,083,903	38,902,430	40
	2010–11	87,916,717	69,030,310	79	16,674,343	1,055,006	6	12,480,193	–8,751,889	–70	1,316,220	–199,480	–15	118,387,474	21,303,571	18
	2011–12	90,853,309	65,519,699	72	15,117,070	–1,557,274	–10	9,369,434	–3,110,759	–33	1,714,000	397,780	23	117,053,813	–1,333,661	–1
	Sub-total \$	281,706,827	212,813,196		79,952,893	8,412,320		62,056,767	9,369,434		5,390,220	1,490,710		429,106,707	103,400,084	
%	66			19						1						
2002–12	Grand Total \$	299,654,699	219,538,885		94,788,559	15,117,070		62,056,767	9,369,434		6,355,135	1,714,000		462,855,160	117,053,813	
	%	65			20			13		1						
	Average	29,965,470	21,953,888		9,478,856	1,511,707		12,411,353	1,873,887		794,392	214,250		46,285,516	10,340,008	

*Other investors include: Aboriginal Benefit Account (ABA), Raising National Water Standards (RNWS), and Wild River Rangers.

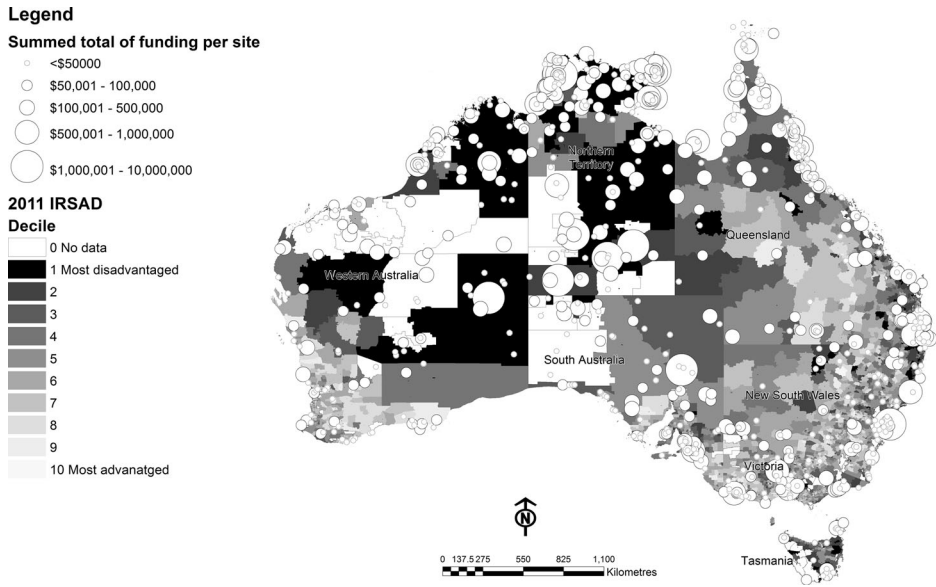


Figure 1. Location of summed ILSM projects funded over ABS Index of Relative Socio-economic Advantage and Disadvantage (IRSAD).

managed mainly for the sustainable use of natural ecosystems. Very small percentages (i.e. $\leq 1\%$) of the total funding have been allocated to designated protected areas, other than IPA's, National Parks (4%) and Nature Parks (1%). When looking at the type of governance which has management and decision-making responsibility of protected areas and where funding has been distributed, once again community conserved areas⁸ were the

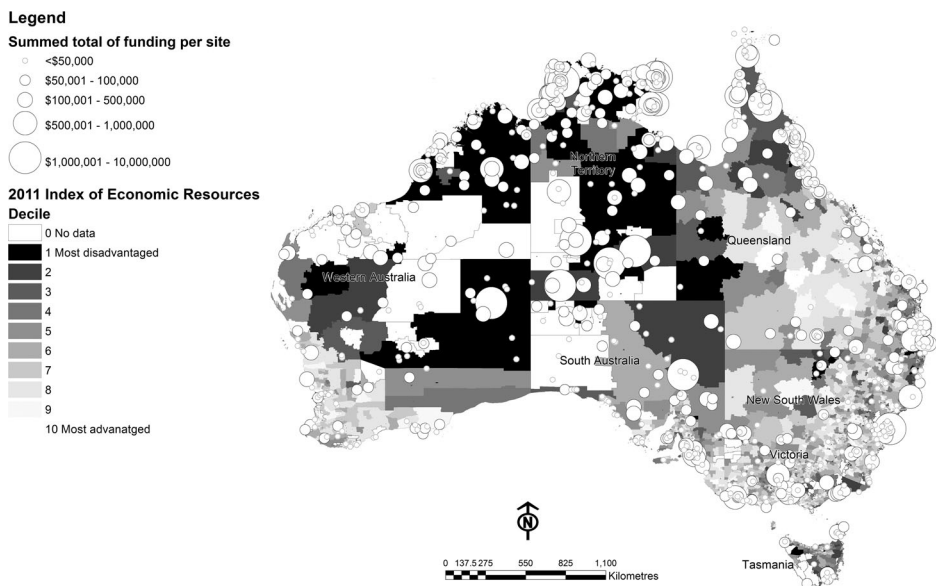


Figure 2. Location of summed ILSM projects funded over ABS Index of Economic Resources (IER).

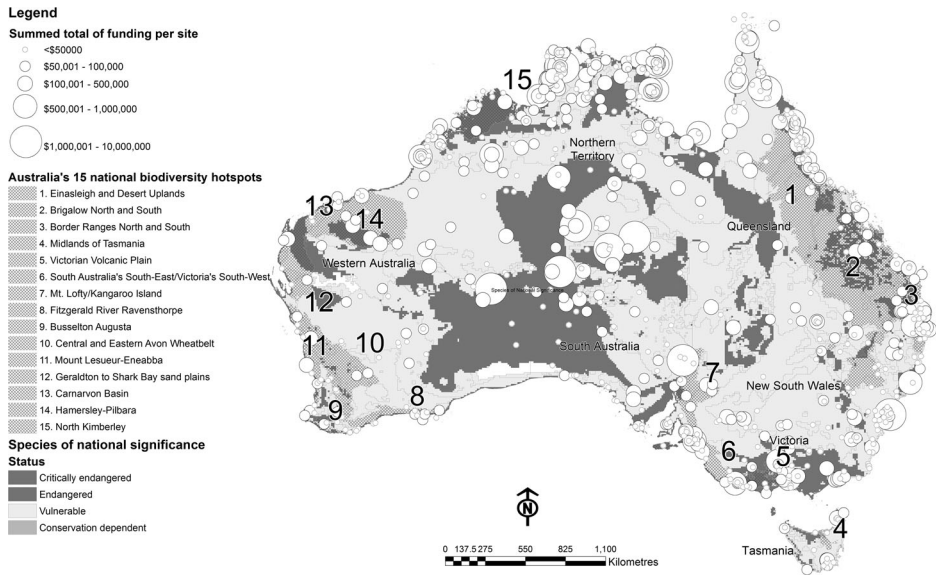


Figure 3. Location of summed ILSM projects funded over Australia's 15 national biodiversity hotspots.

main beneficiaries with 12% of the total funding, followed by government (7%), joint (0.9%), and privately managed areas (0.9%).

Overlaying the total funding for ILSM projects 'on-Country' from 2002–2012 with the ABS ARIA remoteness index, showed that ILSM investment has gone to areas with low access to services and high need for health and well-being co-benefits. **Figure 4** shows a concentration of funding in the 'very remote' and 'remote' areas of Australia (59%),

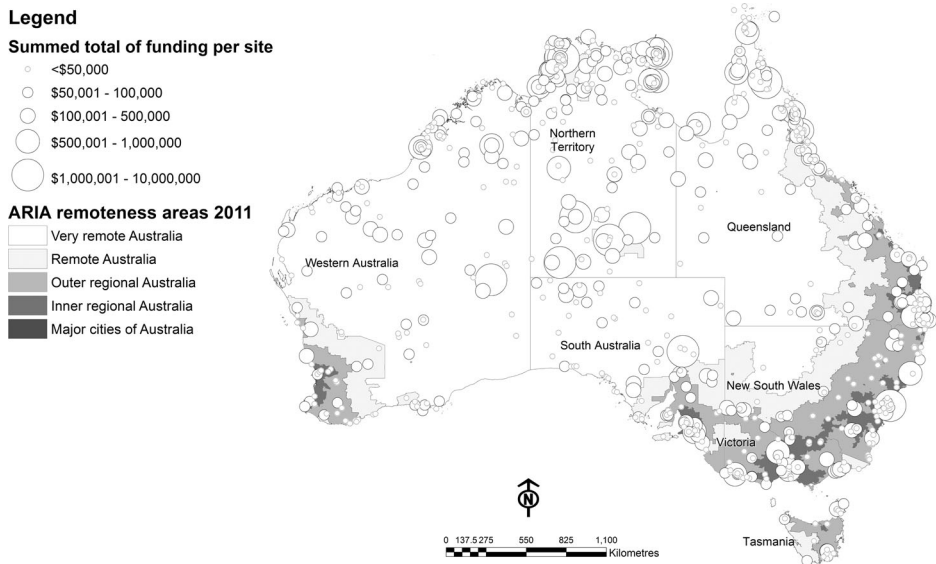


Figure 4. Map showing the location of summed ILSM projects funded over ABS Accessibility/Remoteness Index of Australia (ARIA).

although outer regional areas also received 21%. Of the top 10 funded sites, five of the 10 were located in either ‘very remote’ or ‘remote’ areas, and two of the 10 in major cities (i.e. Sydney). Furthermore, when states and territories of Australia are compared, NT has received the majority of funding this century - \$14 million, followed by \$11.6 in Queensland, \$7.6 million in Western Australia, and \$3.2 million in Tasmania.

Discussion

Since the early 1990s, the Australian Government has provided substantial resources for investment within ILSM programmes, with a step-change increased level since 2008. This study examines the spatial distribution of national ILSM funding investment from 2002–2012 and considers whether the investment is targeted to areas of high need for the associated multiple co-benefits. Our analysis revealed that the total of ILSM funding was concentrated mainly in the NT and remote areas of Australia.

In Australia’s NT, Indigenous peoples own almost half of the land mass and 85% of the coastline (Northern Land Council 2020). At the end of this study, more than 70% of the NT Indigenous population live on Indigenous land, predominantly in remote townships (Australian Bureau of Statistics 2010). By intersecting the ILSM funding data with ABS SEIFA indexes we have demonstrated how ILSM funding has been made available to areas classified as most socio-economically disadvantaged (primarily in the NT), except for inner-city Sydney. However, while this appears an exception at the scale of the SEIFA data, more fine scale analysis (Maas et al. 2019) has shown that small pockets of disadvantage exist in such urban areas that are associated with high Indigenous populations, suggesting that this investment could also be addressing those most at need.⁹ Overlays with ARIA measures of remoteness showed that ‘remote’ and ‘very remote’ communities have received the majority of ILSM funding over the years. It is also evident areas classified as ‘very remote’ have a lower decile score for all SEIFA indexes, and a wider distribution of scores for the IRSAD and the IEO, than other major cities and inner regional areas of Australia. Significantly, it has been reported that Caring for our Country programmes provide an economically viable form of employment for Indigenous peoples in remote communities, where people live close to or on the land being managed (Altman, Buchanan, and Larsen 2007; Morrison 2007). Many programmes that have been successful in remote area communities such as ‘ranger programmes’, art centres, and outstation resource centres have arisen organically through creative use of government programmes such as working for welfare payments, rather than being the specific objective of a government programme (Garnett and Sithole 2007). Such programmes contribute to regional economic development (Jarvis et al. 2018), and also contribute to self-sustaining future economic growth by encouraging and facilitating growth in Indigenous owned business enterprises (Jarvis et al. 2018). However, it is not only economic opportunities that have been created; positive health outcomes for Indigenous peoples from Caring for Country activities are also becoming apparent (Green and Martin 2017; Schultz and Cairney 2017; Schultz et al. 2018), and improved wellbeing as measured by quality of, or satisfaction with, life in general (Larson et al. 2019). Our results provide further support for long-standing Indigenous demands for government investment supporting Indigenous peoples to manage their Country—such investment was applied

concurrently to environmental management and areas with great need for the associated multiple co-benefits.

In Australia, the native title system has been one of the key means of negotiating Indigenous issues related to natural resource management, and Indigenous interests in Country have been recognised to varying extents for more than half of Australia. Conservation activities associated with water, biodiversity and climate change are increasingly taking centre-stage within native title (ATSISJC 2010), and more recently within IPAs (Traill 2018). Previous research has shown an emerging recognition that hotspots of biodiversity often correspond to hotspots of cultural diversity (Bridgewater 2002; Pretty et al. 2009) and that any hope for saving biological diversity is predicated on a concomitant effort to appreciate and protect cultural diversity. By overlaying the ILSM funding on Australia's 15 national biodiversity hotspots, threatened species, national species of significance database and areas where Indigenous interests in Country have been recognised, we have been able to demonstrate that funding for ILSM has also corresponded somewhat with these areas of cultural diversity and biodiversity priorities. Research has shown that links exist between the natural environment, cultural identity and health, especially among Indigenous peoples (King, Smith, and Gracey 2009). By restoring connections to Country through ILSM activities, traditional ecological knowledge is applied and re-invigorated, resulting in documented improvements in social, cultural and physical health and well-being as well as the health of the landscape (Altman et al. 2011a; Jarvis et al. 2018; Larson et al. 2020, Synergies Economic Consulting (Synergies) 2015; Traill 2018). Furthermore, if communities themselves initiate ILSM projects, rather than relying on governments and researchers, this can result in further benefits such as empowerment, capacity building and partnerships to manage the land and sea, contributing 'to development as freedom' (Addison et al. 2019).

Conclusion

We argue that although a substantial amount of ILSM investment occurred between 2002 and 2012, it is not only the amount of investment that matters, but also and especially, where the investment has been distributed across the social-ecological landscape. Our study has shown that many of these ILSM programmes targeted at 'Caring for Country' have also been targeted to areas with the greatest need for social, cultural and environmental co-benefits for Indigenous peoples, particularly in rural and remote locations, where disadvantage can appear intractable. This reflects in part a priority of the Australian Government from 2008 to 2013, linked to environmental outcomes, to invest in northern and remote Australia. This spatial priority by the Australian Government shifted in 2018, and did not appear in the announcement in March 2020 of continued investment through to 2028. The investments undoubtedly make significant contributions to the conservation of globally valued environmental and cultural assets. These results show consideration by governments of the spatial targeting of investments is warranted as a means both of addressing environmental management needs and targeting socio-economic disadvantage through the delivery of associated co-benefits to areas of high need. Future analysis to consider the implications of the policy shift in 2018 away from explicit spatial prioritisation is merited. Further understanding the contributions Indigenous peoples and ILSM in Australia make towards national and international

goals of managing biodiversity, and delivery of multiple co-benefits, will better support the delivery of evidence-based policy.

Notes

1. The term Indigenous is capitalised throughout when referring to Indigenous peoples, many of whom have expressed preference for this convention and adopted it themselves (see Johnston et al. 2007). Australian Aboriginal and Torres Strait Islander peoples are referred to herein as Indigenous People.
2. For more information on Caring for Country please refer to: Greiner and Stanley (2013), (Burgess et al. 2008; Burgess et al. 2009; Weir, Stacey, and Youngetob 2011).
3. In Australia, Indigenous rangers combine traditional knowledge with conservation training to protect and manage their land, sea and culture (National Indigenous Australians Agency (2020))
4. Payments for ecosystem services (PES) occur when a beneficiary or user of an ecosystem service makes a direct or indirect payment to the provider of that service. For more information see UNDP (2020)
5. For more information on the Ghost Nets Programme see Ghost Nets Australia (n.d.)
6. Note: No adjustment has been made for inflation in these figures.
7. Note: Analyses with SEIFA data were performed at the SA1 level which is designed to maximise the spatial detail available for Census data. Most SA1s have a population of between 200–800 persons with an average population of approximately 400 persons.
8. Governance type ‘community’ is defined as... "Community conserved areas where indigenous peoples or local communities (settled or mobile) hold decision-making authority, responsibility and accountability'. See Australian Government and Department of the Environment and Energy (2019).
9. In general, Indigenous communities in urban areas have scant opportunities for ownership and management or co-management of land and waters, limiting the potential of investment in these situations. Nevertheless, some cities are beginning to recognise such opportunities, for example through the *Yarra River Protection (Wilip-gin Birrarung murron) Act 2017 (Victoria)*.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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