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Moving from reactive to proactive development planning to conserve Indigenous community and biodiversity values

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ABSTRACT

There is increased awareness of the need to balance multiple societal values in land use and development planning. Best practice has promoted the use of landscape-level conservation planning and application of the 'mitigation hierarchy', which focuses on avoiding, minimizing or compensating for impacts of development projects. However, environmental impact assessments (EIA) typically focus in a reactive way on single project footprints with an emphasis on environmental values and specifically biodiversity. This separation may miss opportunities to jointly plan for and manage impacts to both environmental and social values. Integrated approaches may have particular benefit in northern Australia, where Indigenous people have native title to as much as 60% of the land area and cultural values are closely linked with natural values. Here, we present a novel framework for integrating biodiversity and cultural values to facilitate use in EIA processes, using the Nyikina Mangala Native Title Determination Area in the Kimberley, Western Australia, as a case study. We demonstrate 1) how social and cultural values can be organized and analyzed spatially to support mitigation planning, 2) how social, cultural, and biodiversity values may reinforce each other to deliver better conservation outcomes and minimize conflict, and 3) how this information, in the hands of Indigenous communities, provides capacity to proactively assess development proposals and negotiate mitigation measures to conserve social, cultural, and biodiversity values following the mitigation hierarchy. Based on values defined through a Healthy Country Planning process, we developed spatial datasets to represent cultural/heritage sites, freshwater features, common native animals and plants represented by biophysical habitat types, and legally-protected threatened and migratory species represented by potential habitat models. Both cultural/heritage sites and threatened species habitat show a strong thematic and spatial link with freshwater features, particularly the Fitzroy River wetlands. We outline some of the challenges and opportunities of this process and its implications for the Northern Australia development agenda.

1. Introduction

Large-scale development projects profoundly transform environments, communities, cultures and economies, and often generate social conflict (Hilson, 2002; Bridge, 2004; Hanna and Vanclay, 2013; Franks et al., 2014). These types of development will continue to expand as global population and consumption increase (Oakleaf et al., 2015). Environmental licensing processes, such as Environmental Impact Assessment (EIA), play a critical role in limiting impacts from development projects to both the environment and the affected communities. In most countries, developers are required to get an environmental license before development activities can begin, and EIA has been legally adopted in almost all countries in the world (Morgan, 2012; Villarroya et al., 2014). The scientific community has responded to this requirement with decades of research establishing the mitigation hierarchy and best practices for mitigation of impacts to biodiversity (e.g.

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Kiesecker et al., 2010; Maron et al., 2015; Tallis et al., 2015), as well as conventions and systems for maintaining and sharing biodiversity information (e.g., Dunn and Weston, 2008; Lewis et al., 2008). When applied in the earliest stages of the decision-making process, EIAs can become important project planning instruments, providing information describing the consequences of specific development activities in a way that can inform approval decisions and design mitigation measures.

Since EIA is the most developed policy instrument, backed by a legal framework in many countries, it is increasingly also used to assess the social and economic impacts of planned interventions. Values considered by the EIA processes include primarily environmental values, with a focus on biodiversity. However, there is growing recognition that impact assessments and mitigation requirements should include social and cultural values with systematic frameworks and standards (Arce-Gomez et al., 2015; Vanclay et al., 2015; Partal and Dunphy, 2016). There are already International standards that call for the conservation of cultural and social values, including the UN Declaration on the Rights of Indigenous Peoples, UN Sustainable Development Goals, and the International Finance Corporation Performance Standards (IFC, 2012), andrequire assessment of risks and impacts to cultural values. Additionally, as recognized by the Millennium Ecosystem Assessment (2005), while society's demand for cultural services has continued to grow, the capability of ecosystems to provide cultural benefits has been significantly diminished in the past century. Ecosystem services are generally classified by type as provisioning, regulating, habitat/supporting, and cultural (Millennium Ecosystem Assessment, 2005; TEEB, 2011). Cultural ecosystem services (CES), defined as the non-material benefits of ecosystems and human-environment interactions, are often missing from management policy (Chan et al., 2012, 2016; Pascua et al., 2017).

In recognition of the rights of people to maintain their social and cultural identity, the concept of Free, Prior and Informed Consent (FPIC) has been established as a specific right of Indigenous peoples and is recognized in the United Nations Declaration on the Rights of Indigenous Peoples, the United Nations Universal Declaration of Human Rights, the International Labour Organization Convention 169 (Indigenous and Tribal Peoples Convention, 1989), and the Convention on Biological Diversity. FPIC is intended to enable communities to give or withhold consent to a project that may affect them or their territories and to negotiate the conditions under which the project will be designed, implemented, monitored and evaluated. A key component of the FPIC framework is that consent is sought sufficiently in advance of any authorization or commencement of development operations (Hanna and Vanclay, 2013; Vanclay et al., 2015). But like EIA, FPIC is typically a reactive process not initiated until a government entity or company informs an Indigenous community of their intention to develop within their territory. As a result, the typical project review process does not allow adequate assessment of impacts to social and cultural values because of the time, data, and technical capacity required.

Efforts to conserve biodiversity globally have developed best practices and data systems that facilitate effective impact assessment, such as criteria for threatened species designations based on rarity and vulnerability (Ricketts et al., 2005; Langhammer et al., 2007; IUCN, 2017). These have been widely adopted in EIA law and policy (Villarroya et al., 2014) and are recognized by developers and lenders (IFC, 2012), with resulting benefits for biodiversity conservation. Similar constructs to organize information to inform mitigation of impacts to social and cultural values have not been universally adopted. In many landscapes, biodiversity and cultural/social values are intricately related (Altman, 1987; Asafu-Adjaye, 1996; Garnett et al., 2009; Hill et al., 2013; Moorcroft et al., 2012). The decision-making process will benefit from a more integrated approach, particularly for developments impacting Indigenous communities where cultural values are often of great importance.

Impact assessment that considers environmental, social and economic values requires an integrating framework. In many cases, environmental impact assessment and social impact assessment have operated in separate realms. To date, few unified conceptual frameworks exist to guide the standardized integration of biodiversity and social/cultural values into environmental impact assessments or development proposals, despite Indigenous people owning or having legal title to a large portion of the world's lands and water (Oxfam, 2016; Wily et al., 2017). Geneletti (2015) proposed a conceptual framework for integrating ecosystem services into strategic environmental assessments. Tallis et al. (2015) proposed a framework for integrated biodiversity and ecosystem services mitigation. Pascua et al. (2017) developed and demonstrated a framework for eliciting place-based CES. Principles and guidance exists for how to include social and cultural values in EIAs (Vanclay, 2003; Vanclay et al., 2015; Arce-Gomez et al., 2015) and in the specific context of ecosystem services (Karrasch, 2016), but no systematic approach or analytical precedent for integrating cultural values with biodiversity has been proposed.

Therefore, we see a unique opportunity to advance mitigation for both biodiversity and cultural values jointly, to evaluate and demonstrate: 1) how social and cultural values can be organized and analyzed spatially to support proactive mitigation planning and management decisions, and how this can enable FPIC for Indigenous communities; and 2) how cultural/social and biodiversity values may reinforce each other to deliver effective conservation outcomes that address cumulative impacts at landscape-scales and that better account for social impacts. Here, we outline a method for incorporating biodiversity and cultural/social values into a development planning process, using a case study on Indigenous land in northern Australia. The result is a framework for mapping community-defined social, cultural, and biodiversity values to support EIA by enabling proactive impact analysis and informed negotiation of development proposals. The framework provides data and capacity to an Indigenous community to proactively assess development proposals and negotiate mitigation measures to avoid, minimize, and offset impacts following the mitigation hierarchy.

This framework is novel in two ways. First, it integrates spatial data representing social, cultural, and biodiversity values to enable impact analysis. Second, it provides this information directly to the Nyikina Mangala community and their aboriginal corporation, i.e. the Registered Native Title Body Corporate (RNTBC). As such, we expect that it will improve EIA processes by enabling proactive, informed assessment and negotiation of development plans on their native title lands. We discuss strengths and challenges to the process and applicability to other regions.

1.1. Background

Indigenous land management in Australia, often called ‘Caring for Country’, includes a wide range of environmental, natural resource and cultural heritage management activities undertaken by Indigenous individuals, families, groups and organizations. Resource use over more than 60,000 years occurred in accordance to seasonal and geographic patterns of the land, based on holistic relationships between traditional Indigenous people and their customary land estates—or ‘Country’. This has resulted in close linkages between cultural heritage and environment values (Altman, 1987; Asafu-Adjaye, 1996; Hill et al., 2013).

Traditional Owners hold native title rights to approximately 32% of Australia's total land area, and as much as 60% of northern Australia, through Native Title Determinations as of March 2018 (National Native Title Tribunal, 2018). Native title is the recognition in Australian law that some Indigenous people continue to hold rights to their land and waters that are based on their traditional laws and customs. The *Native Title Act 1993* (NTA) provides a system for the recognition and protection of native title rights and for its co-existence with other land-management and land-use interests. The Australian Indigenous estate has high national environmental significance and includes some of Australia's highest conservation priority lands and a diverse range of

intact ecosystems (Altman et al., 2007).

Australia's northern tropical savannas are considered the largest intact savanna in the world (Woinarski et al., 2007), with high endemism and globally-significant biodiversity (Carwardine et al., 2011, 2012; Pepper and Keogh, 2014), and occupy 99% of their original extent (Woinarski et al., 2011; Bradshaw, 2012). Following European settlement, changes in land-use and subsequent changes in fire regime and introductions of invasive species and novel disease modified significantly the composition and structure of the savannas (e.g., Woinarski et al., 2011). Today, major land uses include extensive pastoral activity, conservation management on Indigenous and public land (including traditional fire management) (e.g. Russell-Smith et al., 2009, 2015; Walton and Fitzsimons, 2015), and smaller areas of mining and irrigated agriculture.

1.2. Study area

The study area follows the boundaries of the Nyikina Mangala Native Title Determination (NTD), an area of approximately 26,100 km^2 that contains the Lower Fitzroy River and delta and the lower quarter (22%) of the Fitzroy River watershed. The Walalakoo Aboriginal Corporation, the Registered Native Title Body Corporate (RNTBC), was established to represent Nyikina and Mangala Traditional Owners interests and Native Title rights over this area (National Native Title Tribunal, 2014). Here, the Nyikina Mangala community faces a convergence of the issues described above that relate to integrated analysis and decisions about protection and management of environmental and cultural values in the face of existing and emerging development pressures. Indigenous rights holders face similar issues across northern Australia (Joint Select Committee on Northern Australia, 2014).

The NTD is located within the Kimberley region in the north of Western Australia (Fig. 1), a landscape rich in cultural heritage developed over more than 60,000 years of habitation and management by traditional owners. The West Kimberley, including the floodplains of the Fitzroy River and its tributaries, has been listed on the Australian National Heritage List for its biological richness, ancient geology and rich and dynamic Aboriginal culture (Australian Heritage Council, 2011). The Fitzroy River has particular cultural significance to the Indigenous community (Morgan et al., 2004; Toussaint et al., 2005; Watson et al., 2011; Jackson et al., 2012), supports diverse and unique native fish fauna (Morgan et al., 2004), and its coastal and floodplain wetlands are important stopping points for migratory shorebirds (Lane et al., 1996; Vernes, 2007). The Camballin/Le Lievre wetlands on the Lower Fitzroy River have been nominated as a Ramsar site (Jaensch and Watkins, 1999; Vogwill, 2015). The NTD study area supports 20 threatened animals and 19 migratory shorebirds protected by the Australian *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) (DoE, 2015, 2016), and 12 animals and 19 plants listed by Western Australia as threatened or priority species (WA DPaW, 2015, 2016a).

The development and improved agricultural productivity of Northern Australia is the focus of multiple State/Territory and Australian government initiatives that aim to double agricultural output over the next 20 years (Joint Select Committee on Northern Australia, 2014). To achieve this goal, the Australian Government suggests new and expanding agricultural projects across 400,000 ha of land (Australian Government, 2015), mirrored by State-funded programs (e.g. Department of Primary Industries and Regional Development, 2017). Given rich mineral and petroleum resources, northern Australia's mining and petroleum developments are expected to expand and will continue to provide a large percentage of Australia's resource exports (Joint Select Committee on Northern Australia, 2014). If undertaken, these development proposals have implications for biodiversity and the ecosystem services of the largely natural landscapes in northern Australia (Morán-Ordóñez et al., 2017), as well as for cultural and social values of people that manage or depend on these landscapes (North Australian Indigenous Experts Panel, 2012).

2. Methods

This study began with a systematic definition of values by traditional owners in the *Walalakoo Healthy Country Plan* (WAC, 2017), a cultural and natural resource management plan that follows the

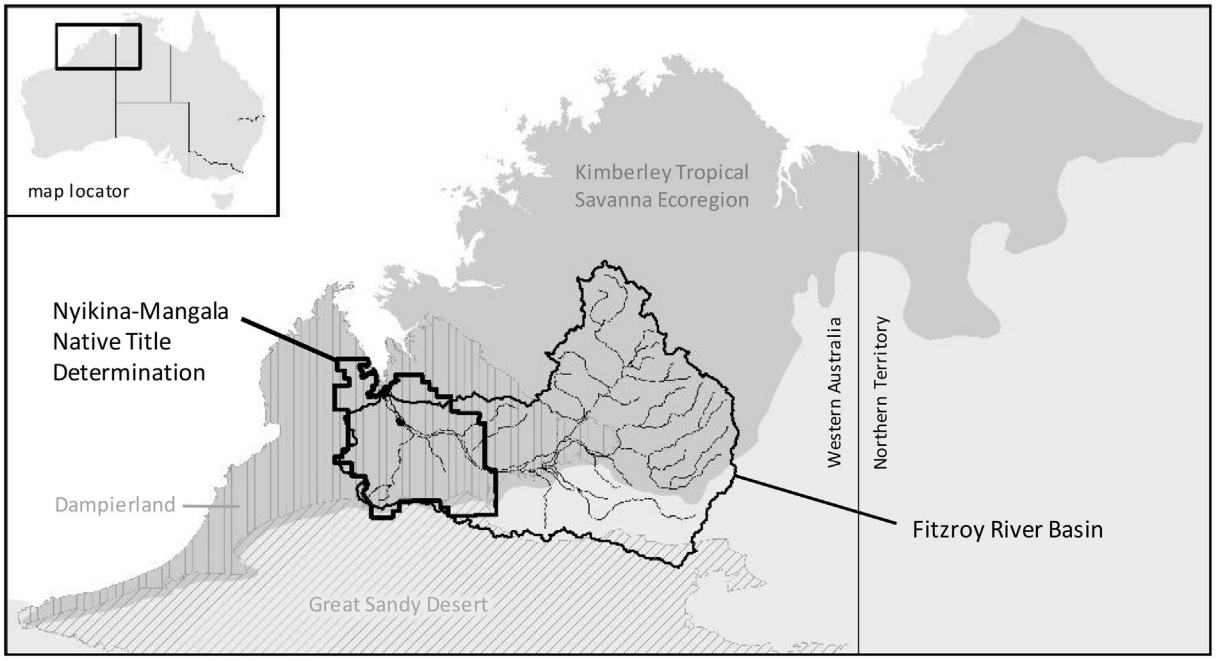

Fig. 1. Location of Nyikina Mangala Native Title Determination (NTD) area and the Fitzroy River Basin within the Kimberley region, north-western Australia. The NTD lies on the southwestern side of the Kimberley Tropical Savanna Ecoregion (Olson et al., 2001) and across two IBRA biogeographic regions (Thackway and Cresswell, 1995; Environment Australia, 2000): Dampierland and the Great Sandy Desert.

Healthy Country Planning (HCP) methodology. Based on this information, the community defined spatial priorities for avoiding development impacts. Last, we organized the spatial datasets in an information system to support community resource management decisions, development planning, and impact mitigation.

Healthy Country Planning is an adaption of Open Standards for the Practice of Conservation (Schwartz et al., 2012), a globally recognized planning framework that guides community and conservation groups through a multi-step participatory process for the development of an adaptive management plan (Carr et al., 2017). Through the HCP process, the community defines conservation values within a participatory planning framework. This facilitates the development of a structured understanding of their vision, values, threats and their interactions. The Healthy Country Planning methodology has been widely adopted throughout Indigenous Australia for the development of management plans for Indigenous Protected Areas and other Indigenous Land Management Initiatives (e.g. Moorcroft et al., 2012; Jupp et al., 2016; Carr et al., 2017; Austin et al., 2017, 2018).

The first step in the HCP process is to engage the community and define values or targets. The Nyikina Mangala community defined a set of seven natural, cultural, and socio-economic targets that collectively represent Nyikina and Mangala people's values and vision for Healthy Country (See Table 1). Following the Open Standards for the Practice of Conservation (Schwartz et al., 2012), all HCP target definitions include key ecological attributes in terms of viability and integrity that include the ecosystem services provided. In terms of ecosystem service categories defined by the Millennium Ecosystem Assessment (2005) and TEEB (2011), all targets provide CES, and several targets also provide provisioning, regulating, and habitat/supporting services. To improve decision-making and the EIA process, we developed spatial datasets to represent and integrate social/cultural and biodiversity targets in an impact assessment framework. A detailed data management and intellectual property agreement was developed prior to gathering and collating information for the study.

To facilitate use in EIA processes we developed spatial datasets to represent cultural, social, and biodiversity values of the Nyikina Mangala community across the Native Title Determination (NTD), specifically four targets defined by the HCP: Cultural and Heritage Sites, Freshwater Places, Native Animals, and Bushtucker/Bush Medicine Plants. The community defined threatened species protected by national and state legislation as nested targets within the target groups Native Animals and Bushtucker/Bush Medicine Plants, in accordance with their traditional view of country. However, threatened species are typically addressed independently by legal regulations and mitigation requirements. For the purpose of this study, we describe cultural/social values and threatened and endangered species separately and analyze the relationship between them. This allows us to assess the additionality of listed threatened species to the larger range of culturally important values.

Table 1
list of targets defined in the Healthy Country Plan.

1. Nyikina Mangala Lore and Culture: Language, dance, song, stories, ceremony, customs
2. Cultural and Heritage Sites: Rock-art, burial sites, massacre sites, old camping places, artefact scatter, old workshops and ceremony sites
3. Freshwater Places: Fitzroy River, springs, wetlands, creeks, billabongs, fish and birds, bush-fruit / medicine plants along the river
4. Native Animals: traditional food-sources and threatened and endangered animal species
5. Bushtucker / Bush medicine Plants: traditional plants used for foods, medicine and tools
6. Right Way Fire Management: Early Dry Season burning implemented by Traditional Owners
7. Being Strong on Country: Being in control of country and being able to gain livelihoods from Nyikina Mangala country

2.1. Cultural/heritage sites

The NTD contains hundreds of sites with significance to Nyikina Mangala lore and culture. These sites range from artefacts and rock art to ceremonial sites to physical features attached to traditional stories. We compiled a database of the locations and attributes of 663 sites identified in 18 surveys between 1983 and 2015, including sites in the register maintained by the Western Australian Department of Aboriginal Affairs (DAA). This dataset includes only survey records. The spatial pattern of site records is largely determined by survey effort, and areas without survey records may contain un-recorded sites.

To facilitate use of this cultural spatial data in EIA processes, the community working group defined areas to avoid development as a 2 km buffer around each cultural/heritage site. The 2 km zone is a placeholder pending a site survey for any development project. Development proposals that go forward must conduct site surveys to redefine the protection zone around each cultural/heritage site based on the specific characteristics of the site and the surrounding landscape.

2.2. Freshwater features

The freshwater places identified by the HCP include the Fitzroy River and tributaries, their floodplains and riverine wetlands, as well as springs and other wetlands and waterbodies occurring across the NTD and associated native flora and fauna. We mapped and classified these as four types of features: floodplains of the Fitzroy River and major tributaries, riparian areas of smaller tributaries, large water bodies and wetlands, and smaller ephemeral water bodies (details in Appendix 1). A national surface hydrology dataset (Geoscience Australia, 2015) delineates major floodplains, water bodies and wetlands at 1:250,000. Permanent and semi-permanent water bodies are critically important for Indigenous subsistence livelihoods, cultural heritage, and biodiversity (Jackson and Robinson, 2009) but locations of those water bodies are not mapped consistently. To address this data gap we delineated the floodplains and riverine wetlands of smaller tributaries with a topographic model (Smith et al., 2008) derived from a digital elevation model (Geoscience Australia, 2011; Gallant et al., 2011) at 1 arc-second (30 m) resolution, and mapped other small and ephemeral water bodies with a supervised multispectral classification of Landsat 8 OLI imagery (USGS, 2015) collected April 2015. The community working group defined freshwater protection zones to avoid development that consist of the floodplains and riverine wetlands of the Lower Fitzroy River, the Fraser Rivers, and their major tributaries that lie within the NTD.

2.3. Plants and animals identified for cultural-socio-economic purposes

'Native animals' include many common animal species that are valued for hunting. 'Bush tucker/bush medicine plants' also include many common plants species that are gathered for food, medicine, utensils, arts/crafts, and fuel. The distribution of common animals and plants generally follow patterns of biophysical habitat. To map the general distribution of common animals and plants, we developed a biophysical habitat classification (Fig. 2) that defines eleven biophysical habitat types across the Fitzroy Basin analysis area, including the freshwater features mentioned above. The classification typology is based on biogeography, landforms, vegetation structure, and surface hydrology (Appendix 1). The resulting mapped biophysical classification is a reasonable proxy for the distribution of common, widespread species and represents landscape-level environmental gradients and the physical template for broad scale processes necessary to maintain habitat (Hunter et al., 1988; Groves et al., 2002). However, the biophysical units will not capture the distribution of rare or sparsely-distributed species or species with habitat requirements that are not well-represented by the biophysical units. As such, the biophysical habitat classification also functions as a coarse filter for biodiversity, following

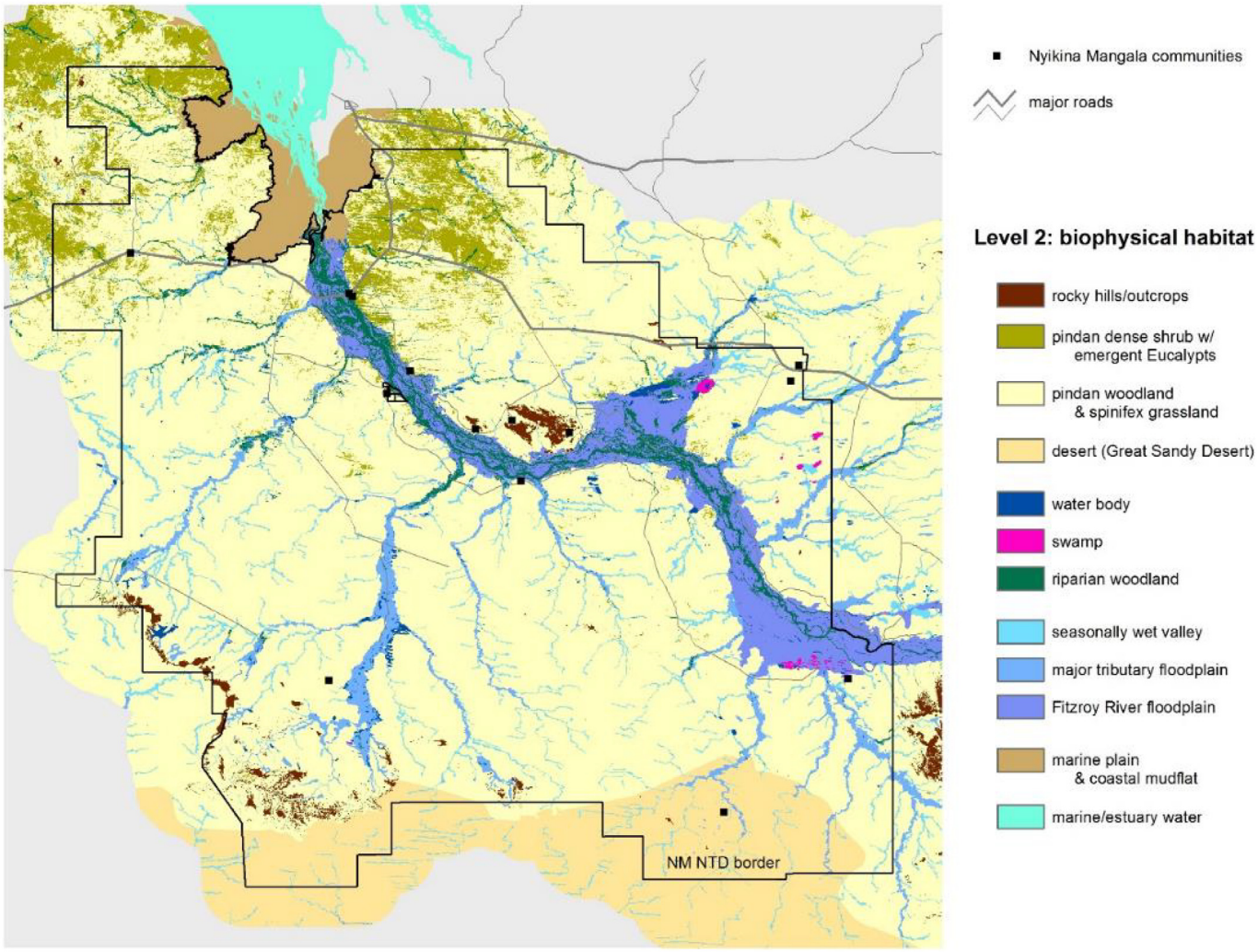

Fig. 2. Biophysical Habitat Classification and Spatial Model. Details in Appendix 1.

a widely used coarse filter/fine filter strategy for conservation planning (Hunter, 1991; Noss, 1996; Groves, 2003), representing a major component of biodiversity: common native animals, plants, and ecological communities.

2.4. Species protected by state and national regulations and international agreements

Species listed as threatened or priority by state and national legislation that occur in the NTD area include 32 animals - 9 mammals, 15 birds, 6 fish, and 2 reptiles (DoE, 2016; WA DPaW, 2016a) and 19 plants (WA DPAW, 2015) as well as 18 migratory shorebirds protected by international agreements (DoE, 2015). State legislation also protects 3 threatened and priority ecological communities that occur in the NTD along the Lower Fitzroy River and have been designated and mapped by WA DPAW (2016b). We defined the threatened animals and migratory shorebirds as focal biodiversity targets, listed in Appendix 2, and developed spatial models of potential suitable habitat based on habitat definitions in literature and existing spatial data compiled in the biophysical spatial model. Because observation data for all these species is absent or very limited, we were not able to develop species distribution models derived from occurrence data. Instead, we developed models of potential suitable habitat for 22 threatened species (6 mammals, 11 birds, and 5 fish) and one model to represent the Lower Fitzroy riverine and estuarine wetlands used seasonally by the 19 migratory shorebirds. Source datasets and method details are listed in Appendix 2. The habitat models were reviewed by the community working group and other experts in the ecology of the Kimberley region and revised accordingly (Sarah Legge, pers. comm.). For the remaining 10 animals and all the rare plants, habitat and distribution are not well-defined in literature or reliably predicted with existing spatial datasets, so we judged these species "data deficient" and did not develop habitat models.

2.5. Comparing spatial patterns of cultural/social values with biodiversity values

To assess the relationships between cultural/social and biodiversity targets, we summarized the thematic associations and spatial relationships between cultural/heritage site attributes, threatened species habitat, and landscape features, and specifically freshwater features. To illustrate distribution patterns of cultural/heritage sites and threatened species habitat across the study area, we created a grid of 3 × 3 km cells and sampled the count of cultural/heritage sites per cell and the count of threatened species with modeled habitat occurring in each cell (Fig. 3).

2.6. Landscape measures of access and disturbance

The availability and provision of native game animals and bush tucker/medicine plants, and any ecosystem service, requires consideration of two components: supply of ecosystem services, and

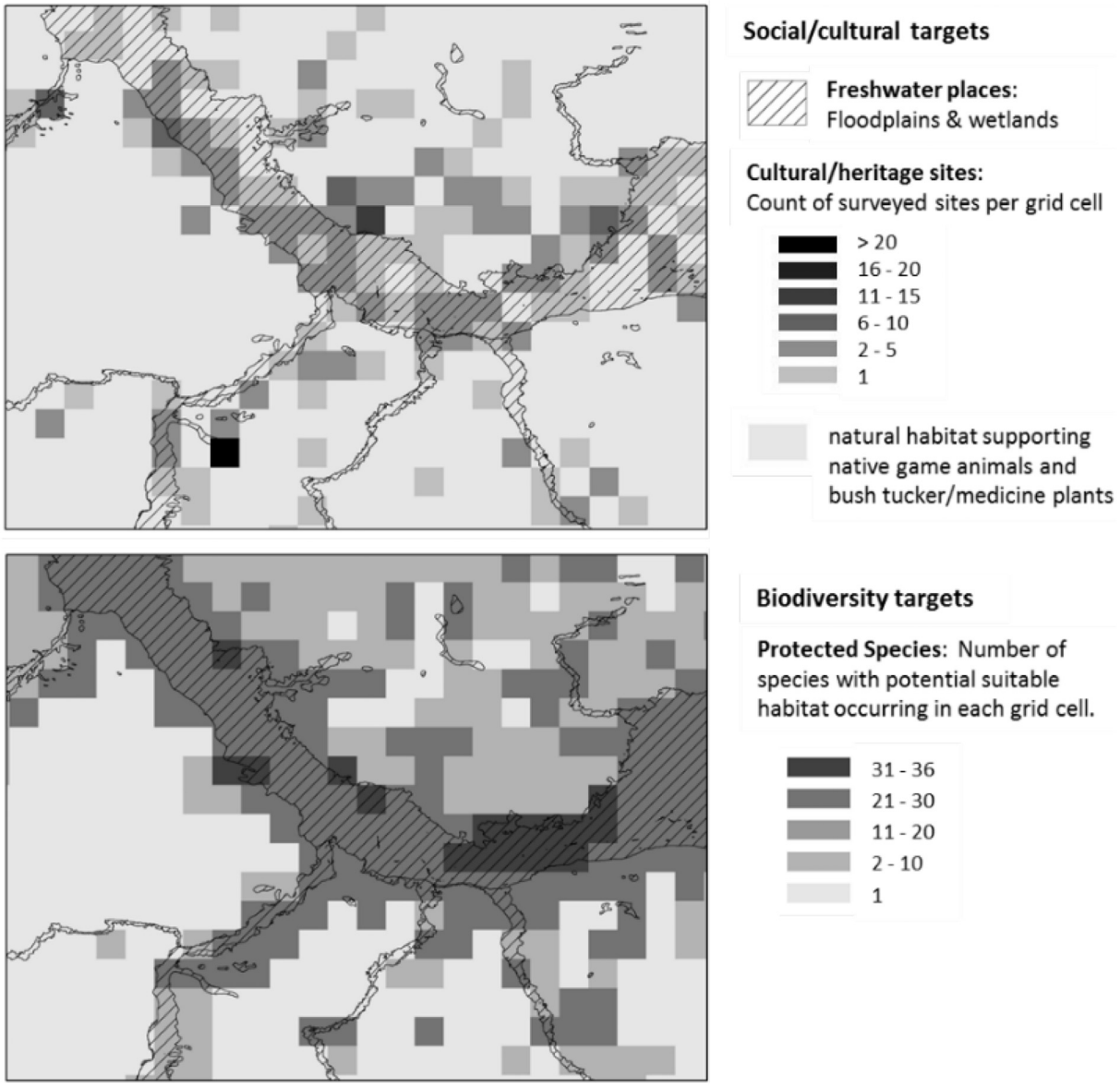

Fig. 3. Spatial pattern of aggregated social/cultural targets and biodiversity targets.

physical and legal access to the services (Tallis et al., 2015). To measure and map the pattern of relative accessibility across the study area, we calculated a spatial metric of access as the sum of proximity to Nyikina Mangala communities and the proximity to roads (Fig. 4), with proximity measured as the inverse of euclidean distance from each population center and road segment to the edge of the NTD. The result is a measure of ecosystem service provision in terms of access for any part of the landscape and any feature. Data sources and calculations are documented in Appendix 3.

Similarly, the abundance and viability of native game animals and bush tucker/medicine plants, and the provision of other ecosystem services, depends on current ecological condition and historic disturbances (Woinarski et al., 2007; Raiter et al., 2014). To estimate and map patterns of ecological disturbance, we developed two spatial measures. The first is a spatial index of disturbance from infrastructure and human land use (Fig. 5) derived from available public spatial datasets representing population centers, roads, mine operations, petroleum operations, local hydrological alteration (dam walls, canals), livestock use (bores, water pumps, tanks), and other infrastructure (airports, power lines, fences). Data sources and calculations are documented in Appendix 3. The result is a coarse, generalized measure of cumulative impacts. The second metric is the frequency of destructive late-season fires between 2000 and 2015 recorded by NAFI (2016), shown in Fig. 6. Late dry season fires occur after July 31, burning hotter and over larger extents than in the early dry season, and are ecologically destructive and an urgent threat to biodiversity in the region (Woinarski et al., 2011; Carwardine et al., 2012; Bartolo et al., 2012). Fires are monitored and recorded in public datasets by NAFI.

2.7. Decision framework for mitigation

Through a series of workshops, the community working group developed a framework to assess development proposals and define conditions for negotiation of mitigation measures according to the types of spatial targets affected and the accessibility and ecological condition of these targets (see Fig. 7). The framework follows steps in the mitigation hierarchy to avoid, minimize, and offset impacts.

To enable the Nyikina Mangala community to conduct rapid spatial analysis of the potential impacts of development proposals, we developed a Geographic Information System (GIS) software application that measures and reports the types and amounts of targets occurring in a user-defined proposed development footprint or impact area. The

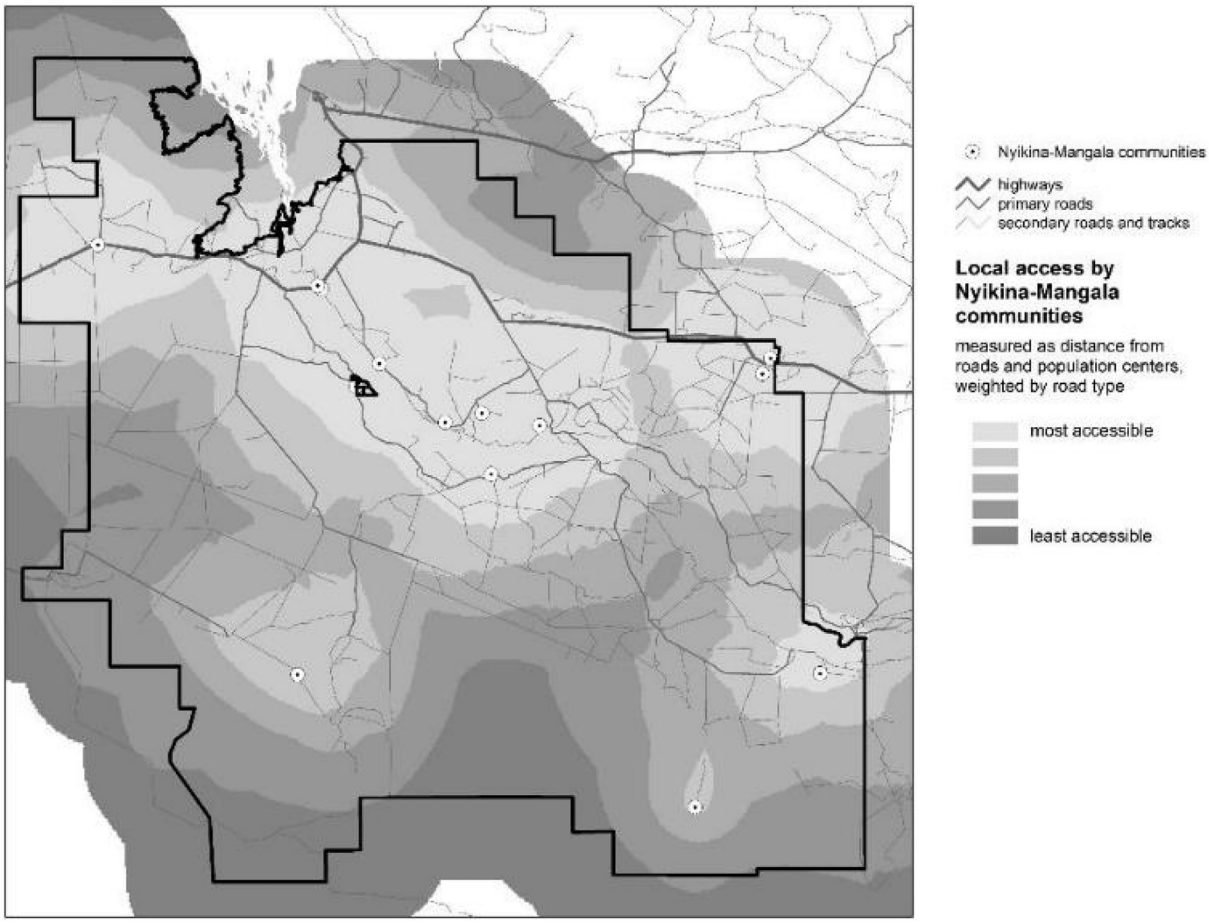

Fig. 4. Spatial index of access based on proximity to Nyikina Mangala population centers and roads.

application also analyses and reports the area of the footprint that lies in each of the three classes of access, three classes of disturbance from the cumulative impacts of land use and infrastructure, and four classes of destructive fire frequency.

3. Results

Based on existing survey of cultural/heritage sites, 41% of sites are thematically linked to freshwater based on the site attributes. Almost 70% of sites occur within a kilometer of a water body or the floodplains and riverine wetlands of the Fitzroy River and major tributaries. Cultural/heritage sites are also more abundant near rocky hills and outcrops.

Of the 22 threatened species for which we developed spatial habitat models, potential habitat of 17 or 77% of modeled species occurs in the Fitzroy River floodplain and riverine wetlands, and for 13 or 60% of those species, potential habitat occurs exclusively in the Fitzroy River floodplain. All 19 migratory shorebirds protected by international agreements also use the Fitzroy River floodplains and riverine wetlands seasonally during the wet season. Potential habitat of four modeled species includes rocky hills and outcrops – Black-flanked Rock-wallabies use rocky hills exclusively, while Northern Quoll and two threatened bat species use rocky hills as refuge habitat and for denning and roosting.

Fig. 3 shows the general distribution of surveyed cultural/heritage sites and potential habitat of protected species in relation to the Fitzroy River floodplain. To protect the specific locations of cultural/heritage sites, the map spans only a 60 × 90 km portion of the NTD and the datasets are resampled in a 3 km resolution grid. Cultural/heritage sites have not been completely or consistently surveyed across the NTD, so gaps and low values are likely areas that have not been surveyed or for which survey data was not available. Social/cultural targets also include native game animals and bush tucker/medicine plants that are present across the landscape but are not quantified in terms of abundance.

The mitigation framework (Fig. 7) defines conditions for negotiation of mitigation measures following steps in the mitigation hierarchy to avoid, minimize, and offset impacts. The community working group defined avoidance areas for developments in the NTD as 1) cultural/heritage sites including a two kilometer buffer zone around each site and 2) freshwater protection zones defined and mapped as the floodplains and riverine wetlands of the Lower Fitzroy River, the Fraser Rivers, and their major tributaries inside the NTD. The defined avoidance areas for cultural/heritage sites and freshwater features cover approximately 13% and 12% of the NTD, respectively. Together, the two protection zones cover 21% of the NTD. The landscape measures of access (Fig. 4) and ecological condition (Figs. 5 and 6) provide measures of ecosystem services provision and inform steps to minimize and offset impacts.

4. Discussion

Environmental impact assessments (EIAs) are intended to minimize risks to environmental values and human rights, lessen adverse impacts, and strengthen positive outcomes of business investments. For an EIA to fulfill this purpose, it must consider the perspectives of everyone affected by a developer's operations. Too often, developers ignore social and cultural impacts, focusing instead on environmental assets that often do not fully represent a community's values, and in doing so, forfeit the opportunity to minimize human rights violations and costly

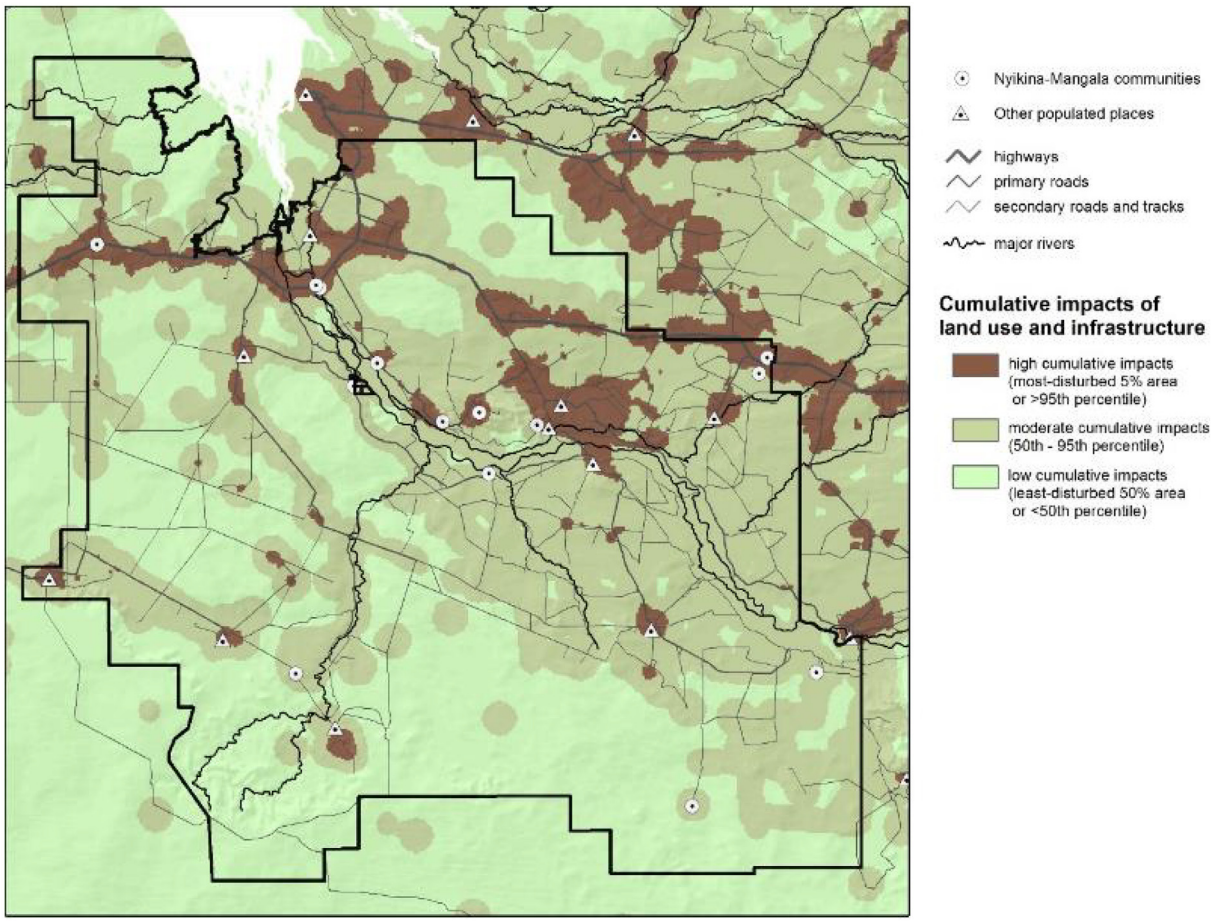

Fig. 5. Spatial index of disturbance representing cumulative impacts of land use and infrastructure derived from existing spatial datasets representing population centers, roads, active mine operations, petroleum operations, local hydrologic alteration, livestock use, and other infrastructure (details in Appendix 3). The result is a coarse, generalized measure of ecological condition.

conflicts. Here we present a practical framework and process that can be applied proactively to assess impacts to environmental, social and cultural values. We discuss application of this proactive planning approach to the Nyikina Mangala Native Title Determination (NTD) in Northern Australia as well as technical capacity needed to expand implementation more broadly.

In the Nyikina Mangala NTD, there is a strong thematic and spatial relationship between cultural/heritage sites and freshwater features, and the Lower Fitzroy River in particular. Biodiversity, represented by potential habitat for threatened animals, is also concentrated in Lower Fitzroy freshwater systems. Both cultural/heritage sites and threatened species habitat also show a strong spatial relationship in rocky hills and outcrops. A significant fraction of cultural/heritage sites are located near rocky hills, and four threatened species use rocky hills, one (Black-footed Rock-wallaby) exclusively.

The concentration of social/cultural and biodiversity values around freshwater features may be expected in arid climates where human settlements, species richness, and ecosystem productivity are highly dependent on water availability (e.g. Davis et al., 2017). The Fitzroy River and its tributaries provide multiple ecosystem services including water, game animals, bush tucker/medicine plants, and habitat for threatened species. Similarly, rocky hills have value for historic human settlements and as unique habitat for native plants and animals (e.g. Fitzsimons and Michael, 2017). However, cultural/heritage sites were not surveyed systematically across the NTD, and there is likely some survey bias for areas near the Fitzroy River and rocky hills due to higher access.

Though the Fitzroy River provides critical social/cultural values and biodiversity values, much of the riparian zone, riverine wetlands and water bodies have been degraded by livestock grazing (Morgan et al., 2004; Watson et al., 2011), and fish passage and freshwater habitat connectivity have been impaired by the Camballin barrage (Morgan et al., 2005). The river is also threatened by future development (Australian Government, 2015; Department of Primary Industries and Regional Development, 2017; Morán-Ordóñez et al., 2017). Water quality and flows are affected by withdrawals, sedimentation, and pollution across the watershed. Although not the focus of the current study, any impact assessment of development projects in the watersheds of the Fitzroy River and Fraser Rivers, including projects in the upper basins outside the NTD, should evaluate impacts to water quality and quantity in the downstream sections of the river inside the NTD.

The decision framework developed here is a means to ensure FPIC is possible for communities within existing mechanisms, and allow communities to shift from a reactive role to a pro-active role in development processes. We mapped targets defined in the Healthy Country Plan: cultural/heritage sites, freshwater features, common native animals and plants represented by biophysical habitat types, and legally-protected threatened and migratory species represented by potential habitat models. The community defined protection zones for cultural/heritage sites and freshwater features that cover 21% of the NTD. To represent differences in provision and viability of native animals and plants and other ecosystem services, we developed spatial measures of access and ecological condition.

This spatial information can be the basis to proactively apply the mitigation hierarchy – first avoid, then minimize, and if appropriate also offset impacts – to balance conservation objectives with impacts

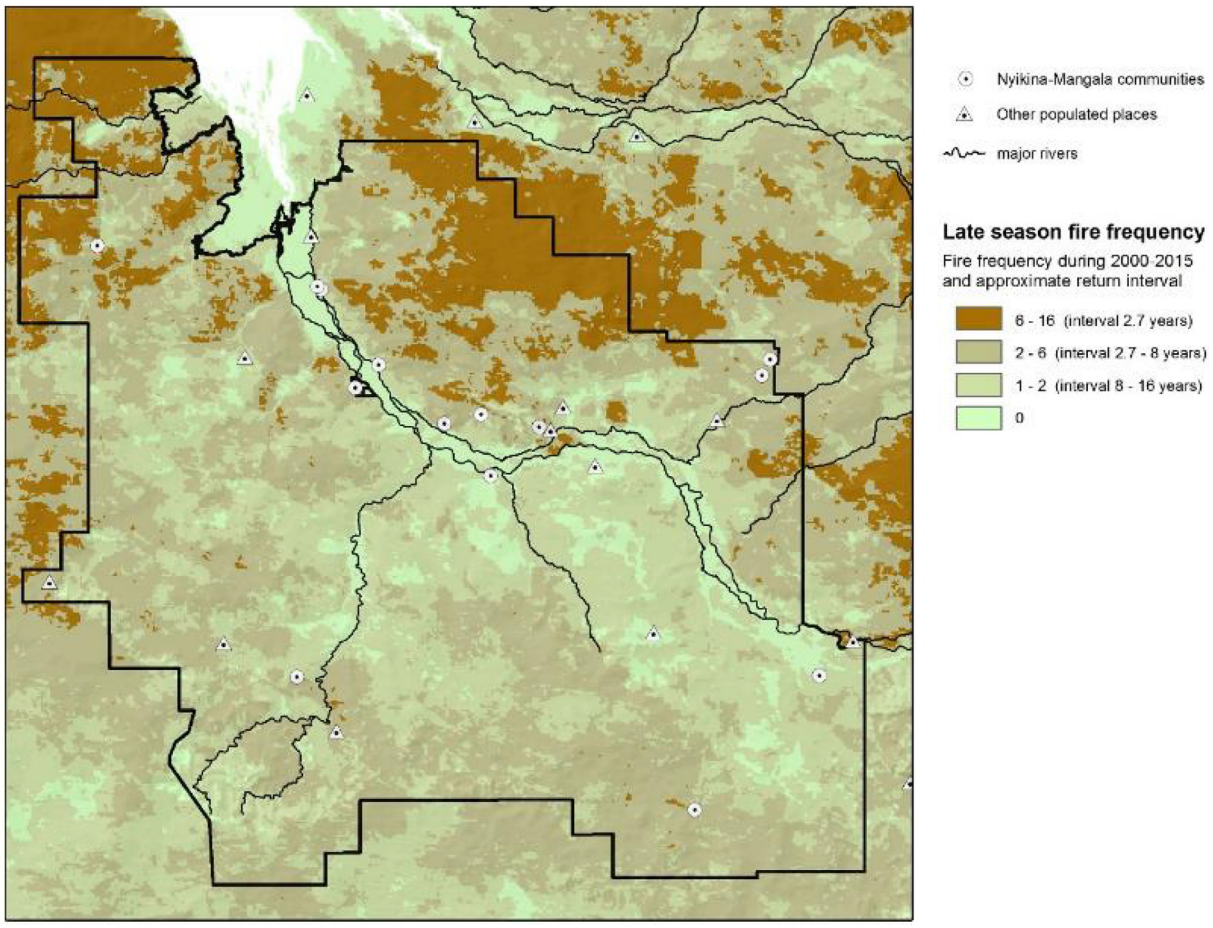

Fig. 6. Frequency of late-season destructive fires between 2000 and 2015 (NAFI, 2016). This is an indicator of ecological condition based on fire regime and fire history.

associated with future potential development (see Fig. 7). The high priority conservation areas identified to avoid development impacts to cultural/heritage sites and freshwater features cover approximately 21% of the NTD. Though the cultural/heritage sites dataset is incomplete and the avoidance area will likely expand, the 21% figure suggests that some conflicts could potentially be resolved by redesigning development footprints to avoid impacts to those conservation targets. Mitigation recommendations can be defined based on the location and the nature and distribution of conservation targets affected. Where proposed development overlaps highly irreplaceable targets, greater emphasis should be given to avoidance than minimization. In some areas and for some targets, offsets may be appropriate to further mitigate impacts.

Biodiversity offsets within the Mitigation Hierarchy have been used by all Australian states and territories, and by the Australian Government where a development is likely to impact on matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (Fitzsimons et al., 2014; Hawdon et al., 2015; Maron et al., 2015). These schemes vary by jurisdiction, in the types of biodiversity matters considered, in the metrics used to assess impact and determine offsets, and instruments and guidance used to implement them (e.g. DSEWPC, 2012). Nonetheless, they typically consider ecological communities (typically vegetation types) or threatened species (and their habitats).

Areas that are more accessible or that support intact habitat in good ecological condition may necessitate a higher requirement for mitigation of impacts from development projects and other land use changes (McKenney and Kiesecker, 2010; Villarroya et al., 2014). Accessibility and ecological condition, as represented by the access and disturbance measures, indicate greater provision ecosystem services or abundance of native plants and animals including rare and threatened species. These measures can inform decisions about the conservation significance and mitigation burden of development in any given location (see examples in Fig. 7).

Packaging cultural and social data at a landscape scale can also guide other management decisions in the NTD. Sites that occur in highly accessible and/or highly disturbed areas could benefit from management plans and actions such as fences, walkways, and signage to reduce risk of degradation. Disturbance measures may also guide restoration and threat management actions such as fire and grazing management and invasive species control. Management actions for biodiversity in the Kimberley region have been studied and prioritized by Carwardine et al. (2012) in terms of cost effectiveness.

Australia was one of the first countries to require free, prior and informed consent in local legislation (MacKay, 2004). Considering the stated plans of national and state governments to further develop northern Australia, there is a timely opportunity to enhance current development assessment processes to better incorporate Indigenous social/cultural values, as outlined in this paper. Considering the significant area in Northern Australia to which Indigenous people have Native Title and rights to FPIC, incorporating such processes would improve the social, cultural and environmental outcomes of development proposals and reduce conflicts.

Some legislative and policy instruments already in place will benefit from proactive planning. For example, Native Title holders have the right to negotiate development proposals that impact their native title rights and interests – which also leads to rights to compensation if there are subsequent impacts on native title rights and interests. Improved

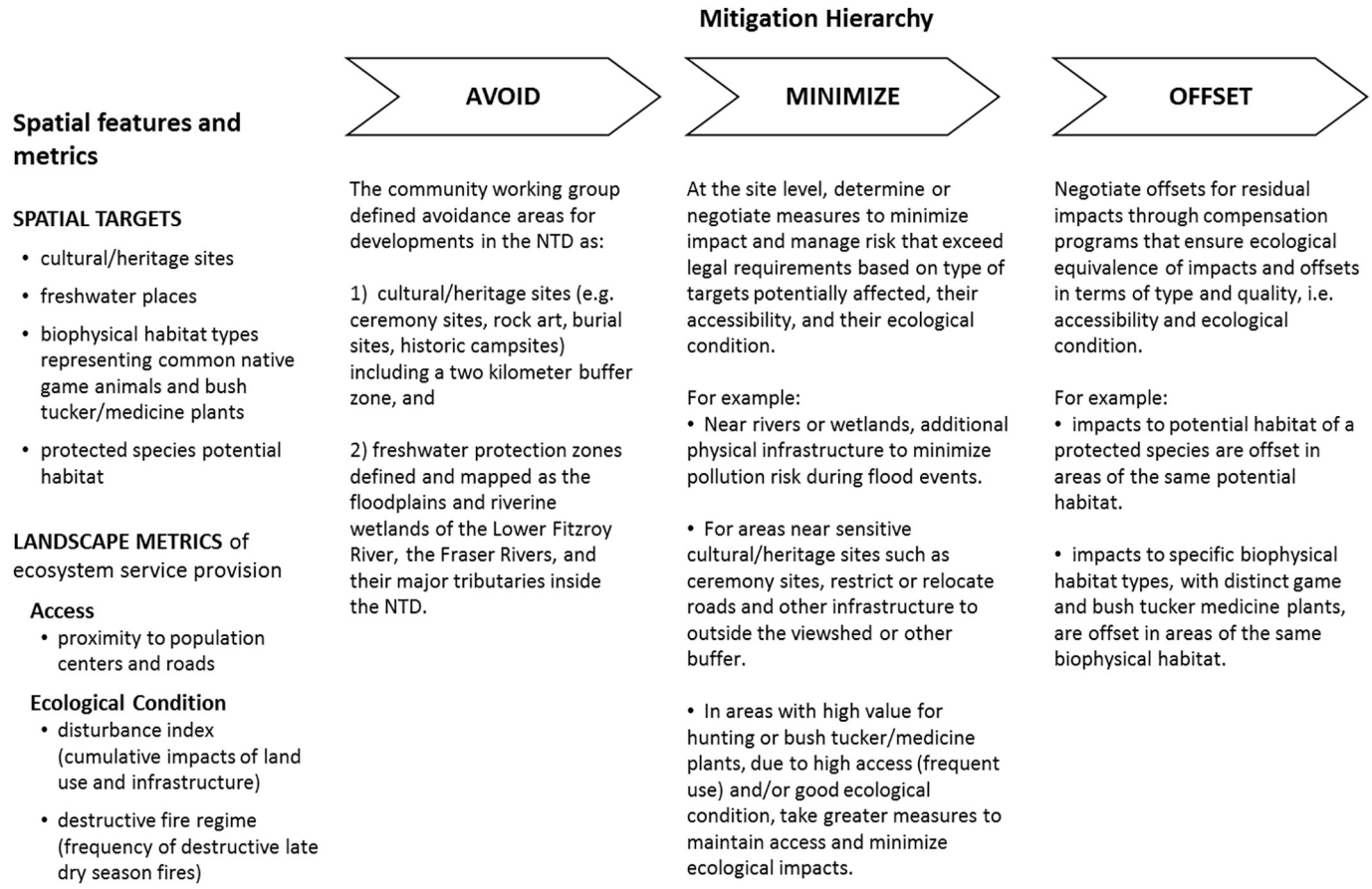

Fig. 7. Spatial framework for integration of social, cultural, and biodiversity values into the mitigation hierarchy. This diagram shows how the spatial framework provides evidence to guide the EIA process and support negotiation of conditions for design and operation of a development project following steps in the mitigation hierarchy.

quality of information and analysis will contribute to more informed negotiation and improve implementation of cultural heritage protection requirements at both Federal and State government levels (e.g. *Federal Aboriginal and Torres Strait Islander Heritage Protection Act 1984*; *Western Australia Aboriginal Heritage Act 1972*). Native Title Representative bodies (NTRB) that hold a statutory role to represent groups of Registered Native Title Body Corporates (RNTBCs) and the RNTBCs themselves are faced with such a high volume of exploration license applications and other development proposals that reviewing and responding to each proposal is nearly impossible due to limited capacity and time. A spatial framework similar to what we have developed that allows identification of areas with high values and high vulnerability would enable NTRBs and RNTBCs to prioritize and focus limited resources on high-risk or high-conflict proposals.

For development projects that are likely to impact biodiversity values such as threatened species and ecological communities, Federal (EPBC 1999) and state or territory (Western Australia Biodiversity Conservation Act 2016) legislation require impact assessments prior to permit application. These assessments are typically made by consulting companies and use existing public datasets, but may collect new biodiversity data depending on the size of the project and the likelihood of impact to a highly threatened species. Governments will then assess the suitability of the proposed development and approve, request modifications, or reject the proposal, depending on the type and range of species affected. This may vary by state/territory jurisdiction. The threatened species potential habitat models developed for this study indicate what legally-protected species might occur in or be affected by a proposed development site, for internal reference by the community, and may inform surveys conducted as part of the impact assessment process.

4.1. Data use, limitations and sensitivities

Proactive planning can benefit both traditional owners and developers. For traditional owners, planning and organization is critical to FPIC, enabling timely decisions about avoidance and mitigation and strengthening negotiating position. These proactive decisions can also steer investments away from areas of conflict, saving time and expense for all parties. However, spatial planning requires spatial data, which is often incomplete. In particular, the coverage of cultural/heritage sites and threatened species records depends on survey effort, and areas without survey records may contain un-recorded sites and species. In this study, the cultural/heritage sites dataset was compiled from 18 different sources with varying survey designs and extents, leaving large portions of the NTD where data was not available. Because the cultural/heritage sites survey reports do not include absence data, it's impossible to estimate or distinguish unsurveyed areas from areas without sites.

Local surveys for cultural/heritage features and threatened species are a critical part of EIA in the exploration phase of any development project, but are limited in extent to each development site. This underscores the need for proactive, landscape-level surveys. Funding for regional survey efforts will be a critical limiting factor if landscape-level proactive planning is to be conducted more widely. A useful precedent for funding proactive regional planning is Healthy Country Planning in Australia that began with several workshop and pilot studies supported by The Nature Conservancy that developed a replicable model and demonstrated its utility. Since then, Healthy Country Planning has been applied in over 140 projects by more than 20 organizations with funds

from various sources including Aboriginal corporations, NGOs, government, foundations, and the private sector (Carr et al., 2017). Technical capacity for collecting and managing survey data has improved across Australia with GPS survey software such as Fulcrum (Spatial Networks, Inc., 2018) and CyberTracker (Ansell and Koenig, 2011) and with online spatial information platforms such as the Atlas of Living Australia (2018), Northern Australia Fire Information (2016), Queensland Globe (Queensland DNRME, 2018), and Western Australia Landgate (Western Australian Land Information Authority, 2018).

The process of compiling general predictive models to map conservation targets can guide survey efforts. Like many parts of the world, the Nyikina Mangala NTD and the Kimberley region lack comprehensive surveys and datasets describing the distribution of native animals and plants, from relatively common game species and bush tucker/medicine plants to rare and threatened biodiversity (McKenzie et al., 2009; Carwardine et al., 2011). The biophysical habitat classification and the disturbance index created as part of this assessment may guide surveys for both site-level impact assessments in the short term and landscape-level sampling designs across the NTD.

Bringing sensitive and threatened features into spatial planning while protecting their locations presents a challenge. For this study, the Nyikina Mangala community compiled a detailed dataset of cultural/heritage sites for internal use and allowed the broad summary of their cultural data for external stakeholders, but have chosen to keep the precise locations private to preserve and protect these values, as there is evidence that publishing locations to aid planning and conservation could harm the same values (Lindenmayer and Scheele, 2017). However, there is already precedent in the fields of paleontology and archaeology that advance restrictions on the publication of site locations and the promotion of government policies and regulations to limit collection and trade in artefacts and culturally sensitive important material. There is also precedent in Australia where the High Court can hear cultural stories in closed sessions in determining connection to country for Native Title determinations. Indigenous communities and aboriginal corporations must have confidence that secure mechanisms are in place for sharing sensitive spatial information to proactively inform and guide development plans while protecting locations. This will require new tools and approaches to data sensitivity and access.

To enable the Nyikina Mangala community to conduct rapid assessments of the potential impacts of development proposals in the NTD, we developed a Geographic Information System (GIS) software application that measures and reports the types and amounts of targets occurring in a user-defined proposed impact area. This allows the Walalakoo Aboriginal Corporation to facilitate community decision-making by reporting and comparing various development scenarios. A capacity-building program is underway that includes application testing, GIS software training, and development of a technical user manual.

Cultural assessments face other methodological challenges in addition to limited availability of comprehensive and current spatial data. Not all cultural values are readily mapped or measured spatially. Intangible values that cannot be mapped such as spiritual beliefs, language, and oral history are necessary to maintain culture (Partal and Dunphy, 2016; Watson et al., 2011). Also, cultural values are not static and will change over time. Threatened species listings will also change over time, as many northern Australian mammal populations are experiencing a decline (Fitzsimons et al., 2010), and many of these species have not yet been listed under state/national threatened species legislation. Therefore, planning frameworks like this must be adaptive and allow for regular updates and revision.

4.2. Future directions/conclusions

There is an urgent need to transform development planning from reactive site-level planning for individual projects to consider landscape-level development scenarios in advance of proposed development projects (Kiesecker and Naugle, 2017; Kiesecker et al., 2017). In view of the FPIC principles, all development projects affecting the lives of Indigenous peoples require their early and sustained input to ensure that projects mitigate impacts to social and cultural values and reflect their choices of development (UN, 2008). With this case study we illustrate that proactively compiling social and cultural values is possible and practical. This can strengthen traditional Indigenous governance systems, reinforcing the role of Indigenous peoples in the decision-making process and improving their position to negotiate with other parties, be they local or national authorities, the private sector, or international development institutions.

First and foremost, Indigenous peoples need an opportunity to strengthen their individual and collective capabilities to exercise their rights and have a greater say in decisions that affect their values and futures. Healthy Country Planning (Carr et al., 2017) can provide a clear articulation of community values and objectives for management of their own land. This provides a foundation for defining and mapping targets in a spatial decision-making framework and analyzing these targets in existing legal and policy contexts, including threatened species and cultural heritage legislation. Spatial planning requires training and capacity building in both the technical aspects of spatial planning and in the effective analysis and interpretation of results is required. Additionally, the effective use of spatial planning for decision-making requires capacity for analysis of results in the context of the relevant legal and policy environment.

The fields of conservation planning and mitigation planning for biodiversity have produced best practices and data systems to help facilitate effective impact assessment. These include criteria for prioritizing protection of species and habitat areas based on concepts of rarity and vulnerability (Tallis et al., 2015) and spatial frameworks that identify conflicts between development proposals and with conservation goals (Saenz et al., 2013). These have been widely adopted in EIA law and policy (Villarroya et al., 2014) and are recognized by developers and lenders (IFC, 2012), with resulting benefits for biodiversity conservation. Similar criteria and frameworks for social and cultural values have not been universally accepted. As Indigenous communities define these criteria, this will help facilitate and strengthen the incorporation of their values into development approval processes.

Given growing global resource demands (Oakleaf et al., 2015), land use conflicts are likely to increase with profound implications for both biodiversity and Indigenous land values. Incorporating the likelihood of future change into land-use planning can alleviate uncertainty and ultimately make societal adaptation to change more efficient and less costly (Kennedy et al., 2016a, 2016b). Predicting and quantifying future impacts can help to justify proactive protection of places important to Indigenous communities and biodiversity and to underscore the consequences of failing to do so (Kiesecker et al., 2017). We hope our study will motivate regulatory agencies and land managers to proactively map social, cultural, and biodiversity values and forecast impacts at the landscape level, and use this information to avoid a business-as-usual development trajectory. Proactive planning to predict and avoid impacts to social and biological values will, in the long run, be the less costly and more sustainable path.

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Declarations of interest

None.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.eiar.2018.09.002.

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CAPitalising on conservation knowledge: Using Conservation Action Planning, Healthy Country Planning and the Open Standards in Australia

By Ben Carr, James Fitzsimons, Natalie Holland, Todd Berkinshaw, Keith Bradby, Stuart Cowell, Paula Deegan, Paul Koch, Michael Looker, Tony Varcoe, Philippa Walsh and Frank Weisenberger

More than 20 organisations use Conservation Action Planning (CAP), Healthy Country Planning and the Open Standards for the Practice of Conservation in over 140 projects, covering almost 160 million ha across Australia. This review documents the history, evolution and application of CAP in Australia and discusses its strengths, limitations and lessons learnt by users, including conservation planners, practitioners and policymakers.

Key words: *Conservation Action Planning, conservation planning, Healthy Country Planning, participatory conservation, targets, threats.*

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Figure 1. Conservation Action Planning (CAP) at Neds Corner, north-west Victoria. CAP is an adaptive management framework that guides the development of strategies, work plans and measures of success to achieve conservation impact. (Photograph: James Fitzsimons). [Colour figure can be viewed at wileyonlinelibrary.com]

Introduction

For biodiversity conservation, the collective capacity to achieve outcomes increases with an adaptive management framework that informs and guides actions and measures and refines their effectiveness over time (Salafsky *et al.* 2002). Conservation Action Planning (CAP) is one such framework. Originally developed in the 1990s and introduced into Australia in 2001, it has now evolved and is used at multiple scales across public, private and Indigenous lands by a range of government agencies and not-for-profit organisations (Fig. 1).

In Australia, CAP and its adaptation designed for Indigenous conservation projects, Healthy Country Planning (HCP), are the tools and processes most commonly used to implement an approach now known internationally as the 'Open Standards for the Practice of Conservation' (herein 'Open Standards'). The Open Standards are a globally recognised framework widely adopted across many countries and organisations which evolved from, among other things, early versions of CAP. For clarity, in this article, we use the term CAP broadly to describe the contemporary Open Standards approach, Healthy Country Planning and Conservation Action Planning.

While the adaptive management cycle is well known to most conservation practitioners, CAP uses the key steps of this cycle to develop a holistic programme that links desired outcomes to prioritised actions and resources, with appropriate measures of success (Fig. 2; Appendix S1). A number of tools and frameworks for conservation planning are used in Australia, including spatial prioritisation tools such as MARXAN and Zonation that seek to optimise the design of conservation reserve systems (e.g. Ball *et al.* 2009; Moilanen *et al.* 2009), and project evaluation and prioritisation (e.g. Pannell *et al.* 2012). These approaches tend to focus on either the initial strategic planning or the subsequent action that is necessary to achieve outcomes. CAP aims to do both and integrate these into a continuous review and improvement cycle. CAP therefore provides an overarching framework that can be used in combination with other conservation planning tools (particularly spatial prioritisation tools) as required.

A lack of literature on the Open Standards (and by inference, CAP) was identified by Schwartz *et al.* (2012). The purpose of this article is therefore to start filling these gaps by providing, from the viewpoint of our own long-term involvement in CAP and the Open Standards, a case study and literature review of its history, evolution and application in Australia. While a detailed evaluation of CAP in comparison with other conservation planning approaches or frameworks is beyond the scope of this article, we have sought to include here our perceptions of its strengths, limitations and some of the lessons learned by us and other conservation planners, practitioners and policy-makers using CAP.

Purpose and History of Conservation Action Planning

What is Conservation Action Planning?

Conservation Action Planning is an adaptive management framework that guides the development of strategies, work plans and measures of success to achieve conservation impact. CAP is a practitioner developed and driven tool that seeks to balance speed, efficiency, accuracy and cost to provide a 'credible first iteration' plan of action to then be continually reviewed and adapted (Low 2003). Internationally, The Nature Conservancy (TNC) initially developed the approach in the early 1990s, largely in response to a broadening of its focus from site-based

Figure 2. The Open Standards adaptive management cycle (from www.conservationmeasures.org). [Colour figure can be viewed at wileyonlinelibrary.com]

conservation to incorporate landscape-scale conservation and the ecological processes required to sustain conservation outcomes (Poiani *et al.* 1998; TNC 2000, 2003, 2010, Groves 2003; Low 2003; Kareiva *et al.* 2014).

Since its development, CAP has been adopted and adapted by many organisations (Dudley *et al.* 2007). One of its historic adaptations was integration in 2002 with approaches used by WWF, Wildlife Conservation Society, Conservation International and Foundations of Success into what is now known as the Open Standards for the Practice of Conservation. The Open Standards are a framework to inform and improve conservation project design, prioritisation, management and monitoring to achieve success (CMP 2013). Their objective is to 'bring together common concepts, approaches, and terminology in conservation project design, management and monitoring to help practitioners improve the practice of conservation' (CMP 2013).

The Open Standards were released in 2004 by the Conservation Measures Partnership (CMP), a collaboration of conservation and funding organisations, that included WWF International, Conservation International, Jane Goodall Institute, Wildlife Conservation Society and The Nature Conservancy (for a full list of current members see http://www.conservationmeasures.org/about-cmp/members/). These organisations were seeking better ways to align the language, design, management and measurement of their conservation actions.

The approach has an explicit adaptive management structure that requires documentation of the assumptions on which decisions are based to support transparency (Schwartz *et al.* 2012). The Open Standards are common property, freely and openly available to conservation organisations worldwide (see http://cmp-openstandards.org/).

The CAP process involves identification of a project's scope, its 'targets' (values), the systematic and strategic assessment of target viability, prioritised threats and strategies to address threats and/or increase the viability of targets. CAP asks three questions (Salafsky *et al.* 2002):

1 What should our goals be and how do we measure progress in reaching them?

2 How can we most effectively take action to achieve conservation?

3 How can we make conservation work more effective?

Conservation Action Planning is a process, specifically designed to be implemented and reviewed in an adaptively managed cycle of planning, doing and then reviewing (Fig. 2; further description of the Open Standards cycle that CAP uses is provided in Appendix S1).

The focus of the CAP framework when it was initially designed by The Nature Conservancy was on helping practitioners to decide what to do at a site or landscape scale rather than determining which site or landscape to work in. However, more recently in Australia, the framework is used, with the support of other tools, to both identify areas of interest within a specified scope and plan how these values can be conserved, providing a framework into which more detailed restoration and management planning can also be integrated.

Participatory processes in Conservation Action Planning

Conservation Action Planning uses participatory processes involving conservation planners, technical experts and scientists together with informed community representatives and practitioners with local expertise and knowledge (e.g. Dudley *et al.* 2007; Moorcroft *et al.* 2012). The process encourages the use of multidisciplinary and diverse teams to ensure that people with relevant skills and knowledge are involved at appropriate points in the process, for example ecologists in establishing indicators, strategic thinkers for strategy development and practitioners and managers for work planning and budgeting, respectively. The involvement of local people is often a key feature of the process and for Healthy Country Planning this involves local Indigenous communities and owners of land with traditional knowledge. The inclusive nature of CAP means that 'the people who will ultimately be responsible for implementing the project must also be involved in designing and monitoring it' (TNC 2007).

Typically, the initial phase of the process is a series of facilitated workshops led by a trained and skilled facilitator and involving experts, planners and practitioners at various times. Some organisations develop an initial values analysis to input into this workshop. The outputs of initial workshops are developed with contributions from specific subject matter experts, published reports, technical (including spatial) information/data and scientific knowledge incorporated to address knowledge gaps. The process uses results chains (program logic/theory of change) models to explicitly tease out how actions will lead to a desired result through a series of 'if-then' steps. Results chains involve a strategy, expected outcomes and the desired impact (Margoluis *et al.* 2013). The process and experience of thinking about how to achieve outcomes is valued as an important outcome in itself together with the final documented plan (Fig. 3).

History of Conservation Action Planning in Australia

Conservation Action Planning was introduced to Australia in 2001 by The Nature Conservancy, to help build the capacity and strengthen the strategic effectiveness of Australian conservation organisations. This was done through a series of training workshops and support to Australian organisations to apply CAP to the properties and landscapes in which they work. Initial training was designed to allow staff to share their experiences and approaches with others engaged in similar work. This exposure to the

Figure 3. A team from the Crocodile Islands Rangers developing a results chain in a Healthy Country Planning workshop (Photograph: Natalie Holland). [Colour figure can be viewed at wileyonlinelibrary.com]

process gradually generated interest and support from groups including Greening Australia, Bush Heritage Australia, Trust for Nature (Victoria) and programmes such as Gondwana Link.

By 2003, CAP was being used by the Trust for Nature (Victoria) and in 2004 work began on the first large-scale CAP for the Fitz-Stirling region of Gondwana Link (Box 1; Fig. 4), a Western Australian initiative by a consortium of restoration and conservation organisations. Greening Australia and Bush Heritage Australia, members of that consortium, also began using CAP for planning their conservation work in other parts of Australia.

By 2015, more than 20 organisations were implementing CAP in over 140 projects across Australia (Fig. 5). These range from the site/property scale through to landscape scale/cross tenure planning, public, private and Indigenous protected area planning and management, and species recovery (Table 1). Here, we outline the geographic scales at which CAP has been used in Australia by various organisations – along with its use for other planning objectives, such as Indigenous cultural values and individual species or species groups. The process of its delivery by different organisational types is also outlined.

Different Applications of Conservation Action Planning in Australia

Geographically based application by a range of organisations

Site/property scale

Conservation Action Planning is used as the basis of property management planning by an increasing number of conservation and restoration groups (e.g. Bush Heritage Australia, Greening Australia, Trust for Nature (Victoria), Tasmanian Land Conservancy and Nature Foundation SA) and government agencies (e.g. Parks Victoria). Bush Heritage Australia has adopted and institutionalised the CAP approach as the basis for their property and regional-scale planning framework (Walsh *et al.* 2013). They use it to determine what to protect, where, how and when to work, who will undertake the tasks, what resources and equipment they will need and how much time and money it will cost. Trust for Nature (Victoria) used CAP as the basis for management of their 30 000 ha Neds Corner property and surrounding public land in far north-west Victoria (Fig. 1) and for coastal lands around (Koch 2011) Port Phillip Bay and Western Port Bay.

Catchment/subcatchment scale

Conservation Action Planning has been applied at the catchment (watershed) and subcatchment scale to focus and prioritise conservation efforts. Examples include the Derwent Estuary Conservation Action Plan (which includes marine assets; Einoder *et al.* 2011) developed in 2012 by a group consisting of local governments, government agencies, universities, research groups and conservation groups. Some regional Natural Resource Management (NRM) groups (e.g. Natural Resources Northern and Yorke in South Australia, North Queensland Dry Tropics and Port Phillip and Westernport Catchment Management Authority) have adopted CAP as the basis of planning in their regions or subcatchment areas.

Landscape scale

At the landscape scale, CAP has been used for over 10 years as the basis for planning, managing and measuring conservation actions. In a review of large-scale connectivity projects in Australia, CAP was the most common framework used for planning across tenures (Fitzsimons *et al.* 2013). It was used to plan Australia's major large-scale linkage programmes (some briefly described below) including Gondwana Link (Bradby 2013), Great Eastern Ranges Initiative (Dunn *et al.* 2012; Spooner *et al.* 2013), Habitat 141° (Carr 2013), Tasmanian Midlandscapes (Males 2012; Cowell *et al.* 2013), Bunya Biolinks (Freudenberger *et al.* 2013) and South Australia's NatureLinks (Gates & Kondylas 2013) (see also Walsh *et al.* 2013).

Box 1. Targets, threats, objectives and strategic actions in the Gondwana Link Fitz-Stirling Conservation Action Plan (Gondwana Link Ltd 2008).

The plan identifies six targets:

- Creek systems
- Proteaceous-rich communities
- Tammar and Black-gloved wallabies
- Mallet and Moort woodlands
- Flat-topped Yate (or Swamp Yate) woodlands
- Freshwater systems

Threats to these targets that were identified included:

- Inappropriate fire management
- Predation by feral species
- Catchment clearing
- Invasive non-native alien species
- Fragmentation
- Pathogens including *Phytophthora cinnamomi* and other pathogens
- Cropping practices
- Grazing practices
- Development of roads or utilities

Four objectives for the Fitz-Stirling landscape:

- By 2012, restore at least 16 000 ha of native vegetation, including at least 2000 ha of proteaceous-rich communities that support native insect, bird and other vertebrate pollinators.
- By 2012, exclude stock grazing and manage foxes, other feral predators, plant pathogens (including *Phytophthora cinnamomi*), and invasive weeds over at least 60 000 ha of native vegetation in the Fitz-Stirling area.
- By 2012, significantly improve the condition of at least 60% of the creeks within the Corackerup catchment and, by 2017, within the Monjebup and Mid-Pallinup catchments.
- By 2017, increase the populations of Tammar and Black-gloved wallabies within the Fitz-Stirling area by 30%.

The Plan identified six strategic actions to achieve the agreed conservation objectives:

- Develop a landscape plan that identifies key areas for implementation of all strategies
- Purchase properties that most effectively deliver Gondwana Link's ecological objectives
- Manage properties owned by Gondwana Link groups to demonstrate effective conservation practices in the Fitz-Stirling area
- Build integrated management across tenures through partnerships and other collaboration
- Restore native vegetation systems on geographically and ecologically suitable sites
- Reduce sediment and nutrient loads into creeks by rehabilitating erosion prone surfaces

The flexibility of CAP provides an overarching framework for developing and delivering landscape-scale conservation outcomes (Beyer & Baker 2013). Some such initiatives used other conservation planning and analysis techniques in conjunction with CAP. For example, the Great Eastern Ranges initiative (Pulsford

Figure 4. Looking along the Gondwana Link pathway in the Fitzgerald to Stirling planning area, showing some of the approaches being implemented following the Conservation Action Plan. Image: Green Skills and Airpix Photographs. [Colour figure can be viewed at wileyonlinelibrary.com]

et al. 2013) used different methods (including CAP alongside satellite remote sensing and modelling to identify connectivity corridors, gaps and habitat fragmentation, ecosystem productivity, species richness, endemism and refugia) that varied according to planning scale, availability of relevant data and stakeholder interest.

Gondwana Link (Western Australia). One of the first large-scale applications of CAP in Australia was in the fragmented but largely agricultural areas of Gondwana Link in south-west Western Australia, between the Fitzgerald River National Park and the Stirling Range National Park (Bradby 2013; Bradby *et al.* 2016). Gondwana Link and its member organisations have consistently used CAP as the basis of their conservation outcome planning and implementation processes. Eight plans using the CAP framework have been developed for Gondwana Link's focus areas, and a largely CAP-based *Whole of Link Ecological Guide* (Gondwana Link 2014) has been produced to provide an overview and context for the individual area CAP plans within the larger programme.

As an example of the approach, the Fitzgerald to Stirling Plan identifies six conservation targets, each with one or more 'nested', or sub- targets, nine threats, four objectives and six strategic actions (Gondwana Link Ltd 2008; Box 1). This CAP was instigated in 2004, has been reviewed and renewed a number of times since and is augmented by a spatial prioritisation (Lesslie 2012; Neville 2012) and individual site-based restoration plans (e.g. Jonson 2010). It continues to provide the collectively agreed basis for planning and conservation action in this landscape, is implemented by several organisations across the 240 000 ha area and is increasingly informed by focused research and an ecological monitoring programme that measures the response of the conservation targets to the ongoing management actions.

NatureLinks (South Australia). Conservation Action Planning was used in the South Australian NatureLinks initiative, with planning led by Greening Australia, including in the WildEyre conservation programme that is part of the East meets West NatureLink. The WildEyre CAP (WildEyre Working Group 2009) was instigated in 2008 by a range of groups who have been implementing the strategic actions identified in the CAP. The Living Flinders Conservation Action Plan covers the southern part of the Flinders Olary NatureLink with planning undertaken by a consortium of local groups led by the Greening Australia in partnership with the Northern and Yorke NRM (Berkinshaw & Durant 2012). Two other plans using the CAP framework cover the Yorke Peninsula and parts of the Northern and Yorke NRM. CAP has provided landscape level detail and interpretation of NatureLinks' original high-level objectives and principles (Gates & Kondylas 2013). An important development arising from NatureLinks has been the integration of CAP into NRM planning by the Northern and Yorke Natural Resources Management Board (Northern and Yorke NRM 2014).

Application on Indigenous land: Healthy Country Planning

Healthy Country Planning (HCP) is the evolution and adaptation of CAP to improve its relevance and appropriateness for planning and management of country from an Indigenous perspective. The scope of HCP incorporates tangible and nontangible values and ecological, cultural and socio-economic objectives (Davies *et al.* 2013). The HCP adaptations of CAP include the customisation of language to communicate the concepts, the inclusion of more socially and culturally relevant targets and the consideration of viability and threats from a cultural as well as an ecological perspective (Moorcroft 2012; Moorcroft *et al.* 2012) (Fig. 6). The first application of HCP arose through a partnership between Wunambal Gaambera Aboriginal Corporation, Bush Heritage Australia and the Kimberley Land

Figure 5. Areas covered by Conservation Action Planning, Healthy Country Planning and Open Standards processes in Australia (as at December 2015).

Table 1. Summary of completed or initiated Conservation Action Plans (or similar) in Australia as on 1 December 2015

Application of CAP by type	Number of projects	Area (million ha)[†]
Conservation Action Planning	111	90.35
Healthy Country Planning	31	65.07
Other Open Standards-based approaches	3	0.67
Totals	145	156.09

[†]Does not include projects where boundaries are unclear or unknown.

Council to develop a plan for Wunambal Gaambera country in the Kimberley. The Wunambal Gaambera HCP guides management over approximately 2.5 million hectares of land and sea (Wunambal Gaambera Aboriginal Corporation 2010, reviewed in Austin *et al.* 2017).

Following this initial application, the Kimberley Land Council adopted HCP as their preferred planning approach to develop plans of management, which are required for the inclusion of Indigenous Protected Areas in the National Reserve System. HCP has been used in the development of eight indigenous land management plans within the Kimberley region up to mid-2016. Annual training workshops have been run in Northern Australia since 2011 to introduce Indigenous ranger teams and traditional owner groups to HCP, and train coaches to facilitate HCP. This has resulted in HCP being used by at least 30 indigenous groups across Northern Australia. More recently, there has been increased interest in HCP in central and southern Australia. In 2014, the Martu people completed a HCP covering 13.6 million hectares in the Great Sandy Desert, Little Sandy Desert and Gibson Deserts (Kanyirninpa Jukurrpa

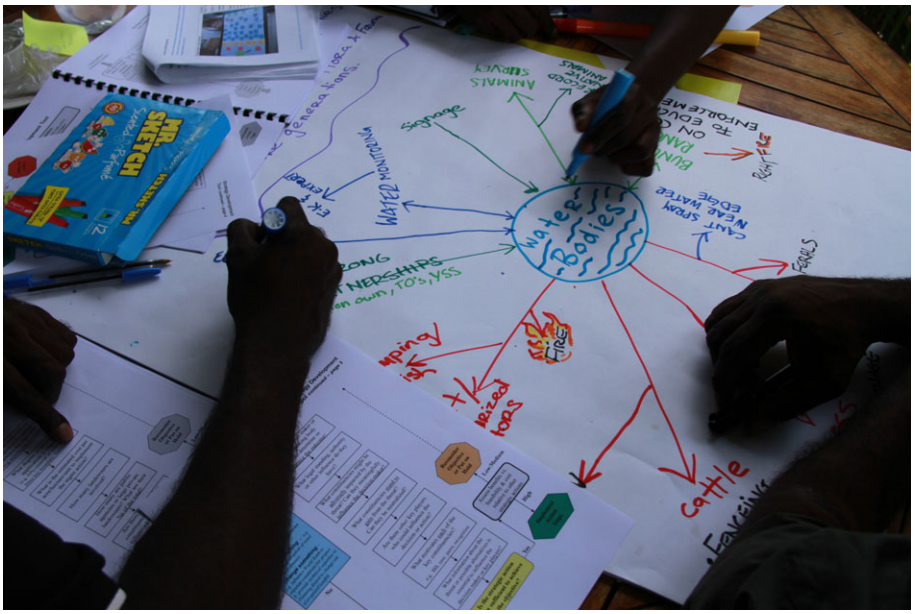

Figure 6. Bunuba Rangers from Fitzroy Crossing in the Kimberley, Western Australia, learning the tools of Healthy Country Planning (Photograph: Natalie Davey). [Colour figure can be viewed at wileyonlinelibrary.com]

2014; Jupp *et al.* 2015), and in 2014, the Arabana people in South Australia completed a HCP over their country, including Kati Thanda–Lake Eyre. CAP has been highlighted as a recommended framework for IPA planning in the Australian Government's *Guidelines for Australian Indigenous Protected Area Management Plans* (Hill *et al.* 2011). Across Australia, at least 25 HCPs are complete and another six are in preparation (Fig. 5; Table 1).

The degree of Indigenous community involvement in CAP, through HCP, provides a pathway to incorporate Indigenous language and core concepts, respecting and supporting community integrity, shaping 'a more equitable intercultural conservation space' (Moorcroft *et al*. 2012; Godden & Cowell 2016). A recent mid-term evaluation of the Wunambal Gaambera HCP (Austin *et al.* 2017) suggests that while broader community understanding of the HCP process can be limited, there are perceived benefits to the application to the resulting plans and processes. Beyond this review however, there has not yet been a detailed evaluation across all HCPs.

Species-based application

Conservation Action Plannings have been used for single species-based planning (e.g. South-eastern Red-tailed Black-Cockatoo) as well as for groups of threatened species. BirdLife Australia has recently used CAP as the basis for planning the recovery of a group of six threatened mallee birds in the Murray-Mallee region of south-eastern Australia. The Threatened Mallee Birds Conservation Action Plan recognised the efficiency of incorporating the same or similar actions identified within separate recovery plans and adopting an adaptive management framework to threatened bird recovery (Thomas *et al.* 2015). CAP has also been used to plan the recovery of a group of five species listed under the *Environment Protection and Biodiversity Conservation Act 1999* found within the Mary River Catchment in south-east Queensland (Smith *et al.* 2012). The Mary River Threatened Species Recovery Plan recognised the value of the CAP approach in overcoming the 'knowing-doing gap' that occurs when existing knowledge about what needs to be done to achieve conservation is not translated into effective conservation action (Smith *et al.* 2012).

How organisations are delivering Conservation Action Planning

Nongovernment

Conservation Action Planning in Australia is supported and used by a range of organisations. The Nature Conservancy was instrumental in the growth and development of CAP through running a series of training workshops focused on training key personnel in the methodology and supporting these people to take the approach back to their respective organisations and fostering its uptake. The Nature Conservancy have run over 10 CAP training workshops across Australia since 2001, and these workshops have trained over 300 people across 30 organisations and have supported many groups and landscape-scale collaborations in using the methodology. The Nature Conservancy also have actively sponsored and supported the Healthy Country Planning (see above) adaptation of CAP and continues to foster Healthy Country Planning across northern and arid Australia.

Greening Australia worked with The Nature Conservancy to drive training and development of a network of users from 2006. Greening Australia uses CAP as the basis of its landscape-scale conservation programmes and other collaborative conservation projects involving diverse stakeholder groups. Projects using CAP have been running successfully for many years and have maintained strong and diverse partnerships that have survived changes in the political landscape and funding cycles. In addition to Greening Australia's active contribution to Gondwana Link, examples of collaborative conservation programmes include the Pilbara region, Habitat 141°, Victorian

Volcanic Plain, WildEyre, Living Flinders and Naturally Yorke.

Bush Heritage Australia uses CAP as the basis of their organisation planning and operations across their reserves and partnerships. They have integrated key elements of CAP including work planning and budgets, monitoring, analysing data, reporting and adapting into their business practice to improve their efficiency and effectiveness.

Government

Several government agencies in Victoria, Queensland, and the Commonwealth have promoted the use of CAP. Government agencies interest has developed through staff being exposed to CAP and through participation in CAP workshops. Wardrop and Zammit (2012) note that NGOs 'testing and proving' techniques such as CAP are often important precursors to government take up. Parks Victoria has adopted CAP following external audits (VAGO 2010, 2011), which highlighted the need to improve the links between expenditure on management actions and both the expected and achieved outcomes. The CAP process is progressively rolling out across 16 planning landscapes within Victoria, including the River Red Gum forests, Grampians, Wilsons Promontory and the Otways, and it has been used for most of Victoria's 24 Marine National Parks and Marine Sanctuaries. Parks Victoria has found the CAP process particularly useful for its 'asset-led' approach and the development of logic chains between the goals for priority conservation assets, the management strategies to achieve those goals and the performance indicators required to measure change.

Parks Victoria's experience to date is that the CAP process provides a strong step-by-step structure, and they are developing the most efficient and effective combination of desktop data analysis, expert consultation and use of structured workshops to engage with stakeholders in capturing knowledge and opinion and in establishing priorities (T. Varcoe, Parks Victoria, March 2017, personal communication). To improve guidance for investment, Parks Victoria has been exploring the use of other decision support tools such as Structured Decision Making, as an adjunct to the CAP process, particularly in the assessment of costs and benefits of implementing alternative strategies. Finally, Parks Victoria has also recently commenced a trial of the Miradi software (see below) for capturing and communicating the outputs of the CAP process at different geographic scales, and to evaluate its functionality and utility in embedding logic chain thinking in their work.

Our Reflections on the Strengths and Limitations of Conservation Action Planning

Below we outline the various strengths and limitations of CAP from our experience in Australia, informed by reports and published literature from within Australia and internationally.

Strengths

Focused on impact and explicit programme logic

Conservation Action Planning's focus on the composition of the planning team, adaptively managing the process and the importance given to developing detailing work plans, budgets and monitoring all focus on achieving an impact. That is, CAP is 'outcome-oriented' rather that 'output-oriented'. Consequently, the objectives developed during the strategy phase are always defined as:

- Specific – they target a specific area for specific levels of quantitative improvement
- Measurable – they quantify a readily measurable indicator of success
- Attainable – what realistically the project can achieve given the time and available resources
- Relevant – the objectives will most efficiently and effectively achieve the desired outcome
- Time-bound – specify when the result(s) will be achieved by.

Schwartz *et al.* (2012, p. 170) considered that one of the most compelling benefits of Open Standards is that it 'require(s) practitioners to state specific goals that are measurable, impact oriented, realistic and time limited'. Recent analysis by Park *et al.* (2013) of the quality of targets developed by Natural Resource Management bodies in New South Wales and Victoria found the majority of their biodiversity objectives are not specific, measurable or time-bound. CAP provides tools and techniques that help address these shortcomings including a structured though adaptable planning framework, results chains and situation analysis to improve the realism of objectives and strategies and a recurring focus on defining objectives, implementation of actions, reviewing actions and then revising the plan in the light of the review.

The specific linking of 'relationships among discrete actions, intermediate outcome and the desired final impact' (Margoluis *et al.* 2013, p. 3) through using results chains is considered an integral strength of the CAP process. Results chains are a structured way of making cause and effect explicit and provide a basis for increasing understanding of why some conservation strategies will be more effective and efficient in achieving the stated objectives than others (Margoluis *et al.* 2013).

Participatory

Conservation Action Planning, as it is implemented in Australia, has a strong focus on inclusion that results in a process and set of strategies and actions that are recognised and owned by a diverse group of stakeholders. The benefits of this approach have been long recognised (Pressey & Bottrill 2009) and contrasts with 'plan

then consult' approaches which can often disenfranchise key stakeholders. CAP helps to clarify the role of the various parties involved and to highlight areas where they could and should be working together. Additional benefits include understanding of stakeholder's aspirations, motives and methods. Effective long-term partnerships often come from this increased understanding, and these can lead to collaboration that is more effective to implement actions identified in that planning process (e.g. Gondwana Link; Bradby 2013).

Adaptable and flexible

Conservation Action Planning has been broadly adapted to apply to local circumstances. Schwartz *et al.* (2012, p. 172) states that 'the Open Standards are compelling, in part, because they are general and flexible guidelines capable of being moulded to fit individual situations'. One of the most important adaptations in Australia has been the evolution of Healthy Country Planning. Guidance on incorporating climate change considerations into CAP has also been developed (TNC 2009; Game *et al.* 2010; Poiani *et al.* 2011). The Conservation Measures Partnership has developed adaptations to the Open Standards to incorporate human well-being and social targets (CMP 2012).

Conservation Action Planning's use in Australia is independent of a legislative basis and the fact that is it not currently mandated through administrative practice has enabled it to retain a high degree of flexibility and ability to be customised or adapted by a particular user. Nonetheless, this would not exclude CAP's use in a regulatory process.

A common language

Margoluis *et al.* (2013) considered that development of a common lexicon for the practice of conservation is a significant strength of the CAP process. The common steps and common language allow plans to be independently analysed, reviewed and combined or aggregated, facilitating peer review and candid exchange of the CAP process. This common language also facilitates communication about the practice of conservation and enables comparison and analysis of projects targets, threats, objectives and strategies.

Capacity and tools

The support of CAP through a worldwide Conservation Coaches Network is considered a major strength of the approach. The Network is made up of trained and experienced facilitators who teach the CAP methodology, guide participants through the process, facilitate and provide training in CAP workshops, and share lessons learned. Conservation Coaches provide the practical experience (including involvement in multiple CAP processes before becoming a coach) that is often necessary to achieve effective conservation results (Kareiva *et al.* 2014). The Network of Conservation Coaches is active in more than 60 countries across six continents and represents over 80 organisations. The Australian Conservation Coaches Network (CCNet Australia) of over 30 trained coaches (and many more in training) is a multipartner collaboration that supports developing and evolving the CAP methodology and ensuring that its use and application is tailored to Australian issues and conditions.

Specific software known as Miradi has been developed to support the CAP process and the management, storage and sharing of CAP information. Miradi is open-source conservation project support software designed by conservation practitioners, for conservation practitioners (Miradi 2014). Miradi is a tool for capturing, managing and sharing the outcomes from the CAP process. 'Miradi Share' is a web-based or 'cloud' database that allows exchange of conservation project information around the world and builds a network of people and a repository of knowledge focused on protecting the natural world (Bush Heritage Australia 2013).

Limitations

There are several recognised limitations in both the CAP structure and approach. Some of these are described as weaknesses; however, they often arise because CAP attempts to balance speed, efficiency, accuracy and cost to generate a 'credible first iteration' rather than comprehensive planning. The CAP process is not designed to provide highly specific, detailed analysis but rather generate adaptive management processes to inform and direct conservation actions in the most efficient manner, with frequent revision.

The Nature Conservancy (TNC 2011) have recognised some of the limitations inherent in CAP through an internal review in order to make it more relevant to emerging planning and conservation challenges such as the need to better integrate human well-being values. The following is drawn from that review and our own experience.

Insufficient scoping, planning and resourcing

The prerequisites for a successful CAP are (i) a shared common understanding of who the planning is for; (ii) who will 'own' the process and implement the plan; and (iii) a shared commitment to action and resourcing to implement the plan. The internal review found that sometimes these prerequisites are not sufficiently scoped, assessed, measured or resourced and this can contribute to failure or lack of engagement (TNC 2011). It is our view that this is more a limitation of the quality of the plan development, rather than a framework limitation. Solutions to this may include clearer guidelines to ensure those engaged in

commissioning and developing CAP are cognisant of the requirements and costs of undertaking CAP to the standard required for success.

Strategy selection

The process of strategy identification, development, testing, comparison and selection within the CAP framework has been identified as needing improvement (TNC 2011). This limitation was also identified by Low *et al.* (2010, p. 39) in a study of conservation planning framework used by public and private land managers in the western United States who found that 'CAP lacks a methodology for actually optimising and quantitatively testing alternative strategies'. Both studies recognised the subjective nature of strategy and cost-benefit analysis used in CAP and the limited transparency in CAP's decision support process. Game *et al.* (2013) suggested this is caused by the algorithms that are imbedded in the assessment of risk and threats to targets in CAP not being explicit or easily modified within the tools that support the CAP process.

Wintle (2008), in a national review of biodiversity investment prioritisation tools used in Australia, noted that CAP lacks sufficient tools to enable comparison between alternative actions. Improvements that have been identified include more explicitly comparative frameworks that allow alternative strategies to be assessed and the most effective and efficient strategy that addresses a particular conservation need identified (TNC 2011). A specific weakness in the strategy selection process is the lack of specific Return on Investment criteria to allow value for money between alternative action strategies to be evaluated. Decision Analysis could also improve the process within CAP that support the selection of the optimum set of conservation actions (TNC 2011). To overcome this perceived weakness, Parks Victoria has trialled the use of Structured Decision Making as an additional decision support and optimisation step for strategy and action prioritisation (Walshe *et al.* 2013). In our view, while it is correct that the focus of CAP is on identifying strategic actions rather than an explicit process for determining priorities among potentially competing projects or areas, this can be resolved by integrating its use with other prioritisation techniques.

Insufficiently explicit spatial prioritisation

Some authors have suggested that the strategies and actions in CAP are not necessarily linked to spatially explicit priorities for investment in on-ground works (e.g. Wintle 2008). While CAP does not have its own explicit spatial tool, other spatial tools, including maps, are used extensively in the process of identifying targets, examining threats and developing strategies. We also believe the CAP process helps establish the key parameters for the development of spatial models – and reduces the likelihood the models are developed without a clear link to practitioner/stakeholder driven planning. In addition, there is no limit to the level of detailed planning that can be incorporated into or supplement CAP – a point that is addressed below.

Future Directions and Development of CAP in Australia

Spatial Conservation Action Planning

Since the development of the original CAP framework, there has been considerable development of spatial conservation planning tools. A number of organisations are examining how spatial information and tools can be integrated into the CAP framework including tools to analyse and combine existing spatial data to generate new spatial data that corresponds to elements of a Conservation Action Plan (TNC 2015).

A recent review of the Open Standards framework identified one of its key strengths was its ability to connect and interact with other planning approaches (Schwartz *et al.* 2012). For example, while the focus of CAP is on identifying strategic actions rather than an explicit process for determining priorities among potentially competing projects or areas, a wide array of complementary tools can be used in conjunction with CAP to make plans more spatially explicit and prioritised. For example, the Investment Framework for Environmental Resources (INFFER; http://www.inffer.com.au) is useful for prioritising among potentially competing on-ground natural resource management projects (Koch *et al.* 2010; Pannell *et al.* 2012). It was used successfully in conjunction with CAP in the Living Flinders project in South Australia (Greening Australia 2010) and as a tool for more fully developing, costing and prioritising projects initially identified using CAP. Schwartz *et al.* (2012) also recommended linking CAP and its support frameworks (e.g. Miradi) to existing spatial planning approaches (e.g. MARXAN) in a more explicit manner rather that adding spatial capacity to CAP or Miradi itself.

Accreditation

As the demand for CAP training (and coaches) increases, a formalised, industry-based accreditation process that supports development of CAP and establishes and maintains standards will be needed. Currently, CCNet Australia aids with training, mentoring and support to CAP coaches the global Conservation Coaches Network is in the process of developing a more formalised accreditation process for coaches than the informal certification currently in use. There is a role for universities to support formal accreditation through the Protected Area Learning and Research Collaboration (PALRC; http://www.palrc.com/) – CCNet coaches, as part of the PALRC

collaboration, facilitate training in the Open Standards as part of conservation planning and management courses at universities.

Government uptake

While CAP is being adopted by many nonprofit organisations and agencies, as outlined above, there has been increased interest from state, territory and Australian Government funding programmes as they have become more exposed to and see some of the uses and benefits of CAP in managing their delivery of conservation projects and funding programmes. There are opportunities for Australia's 56 Regional NRM groups to make greater use of CAP in helping them plan and achieve both conservation and broader NRM outcomes in a structured, transparent and outcome-based manner.

Conclusion

Conservation Action Planning is increasingly being used at a range of scales for planning conservation actions in Australia. Its growth is due to many factors including the inclusive and participatory nature of the planning process and the adaptive nature of the planning cycle, and most importantly, its ability to focus on achieving the most effective conservation outcomes. The uptake of CAP, the diversity of users, locations and scales of application indicate that it is a useful tool that is able to be modified and supplemented with other processes and planning approaches.

The support provided through published and online resources and the integration of CAP in the global 'Open Standards for the Practice of Conservation framework' provides rigour, backup, resources and capacity to the CAP process. The availability of CAP coaches and an established network of Conservation Coaches (that itself is part of a global coach's network that provide access to the knowledge and resources of a global team) offer significant assistance to users. CAP will continue to evolve, adapt and grow as a result of its use by a range of groups and organisations in Australia. The evolution of CAP to support the aspirations of Indigenous people in their land and sea management is a good example of this adaptation and evolution at work, and these developments are now being noted, promoted and exported worldwide.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Components of the Open Standards cycle that CAP uses (source: Open Standards for the Practice of Conservation: http://cmp-openstandards.org/)