Reconceptualizing ecosystem services: Possibilities for cultivating and valuing the ethics and practices of care

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Abstract

This paper responds to a recent call for geographers to engage with the ecosystem services concept which is an increasingly dominant global model for environmental policy and management. We focus on its economic exchange mechanism, payment for environmental services (PES), and reject the conventional notion of it as either an economic or an environmental strategy. Rather than treating a disaggregated nature as the 'fixed stock' of ecosystem services, we value instead actual human and non-human interrelations and practices and focus on how we might reconfigure the socio-cultural *relations* between people and nature as the valued stock.

Keywords

Introduction

The turn toward placing a monetary value on nature is now the subject of expansive geographical critique, although less attention has been given by geographers to the ascendant organizing

framework in conservation policy and practice – ecosystem services and their economic exchange mechanism, payment for environmental services (Bakker, 2010; Dempsey and Robertson, 2012; McAffee and Shapiro, 2010; Robertson, 2004). While it is a turn which has been embraced from numerous vantage points and for various reasons, from within the discipline of geography registered concerns centre on processes and outcomes which may perpetuate the commodification of nature and attendant restructuring of social relationships under neoliberalism's commodity logic (Harvey, 1996; McCarthy and Prudham, 2004; Roth and Dressler, 2012; Smith, 2007).

In this paper we wish to step outside of this milieu of apprehension and begin by asking what possibilities there are for radically reshaping the ecosystem services concept. We are interested here in the potential for a conceptual and material shift from a 'biophysical basis for value' (Costanza, 1991: 334) to valuing (in the fullest sense) alternative socio-natures, making them legible in ways which may even upturn the cart of conventional nature-culture thinking and practice.

Our starting point for this theoretical exploration is the messy politics of the ecosystem services concept and the ways in which this politics at the micro-scale is just as often entangled with other ontologies of non-human agency and care. We then link these entanglements empirically with the late 20th-century literature pertaining to Australian indigenous 'resource management'. This literature charts the efforts and strategies of Australian indigenous peoples to be recognized for their land and sea management knowledge and practices, either through employment in government agencies, such as protected area and natural resource management organizations, or by establishing their own community-based management agencies and 'ranger' groups. Reviewing this literature, we traverse several decades of indigenous environmental policy and program development to the contemporary moment in which some Australian indigenous groups are energetically embracing opportunities arising from payments for ecosystem service discourse and new forms of capitalist value.

From the insights drawn from the political trajectory of entangled ontologies and the indigenous environmental management experience in Australia, we then locate ourselves in the relevant

geographical literature. We explore how valuing 'nature' may be reconfigured as a way of enabling the valuation of alternative or non-capitalocentric (Gibson-Graham, 2006) ways of being in, knowing and doing nature. In addressing this question, we are responding to the recent call from Dempsey and Robertson (2013) for geographers to engage with ecosystem services and, in doing so, 'further broaden understandings about the operation of the value form, the production of nature, and neoliberalization more generally' (p. 760). The challenge, we argue, is to think through the ways in which these new value fields, which must by the very definition of value extend far beyond pricing (cf. Sullivan, 2009), can explicate the significance and worth of engendering communicative reciprocity within and across human–non-human realms. We argue that extending our understanding of ecosystem services in this way, where the 'service' is the communicative potential, the quotidian practice and the ecological function, foregrounds a relational ethic of care and responsibility. This reconceptualization may contribute usefully to urgent and important efforts to preserve, extend, adapt and benefit alternative lifeways (cf. Strang, 2013). In this uniquely geographical approach, we revisit the cultural turn in socio-nature studies and weave its key ideas into the fabric of people's affective socio-ecological worlds. We are then able to reconceptualize and explore the pragmatic possibilities emerging from this increasingly dominant form of environmental governance.

If we take the question of 'what it means to be and become human today, in dynamic relationship with non-human worlds' (Sullivan, 2009: 24; 2010) as one of our most pressing problems (Bakker, 2010; Latour, 2009; Smith, 2007), then the task of making visible and legible alternative ways of being in and knowing the world is critical. In taking up this challenge, we reject the notion of payment for ecosystem services as either an economic or environmental strategy, at least not in the conventional understandings of analytical categories of economy and environment. Rather, we are interested in the human–non-human interrelations and practices that can be valorized and empowered through the idea of ecosystem services. We seek here to pay attention to the sub-strata of relatedness, reciprocity and communication at the heart of alternative conceptualizations of both the 'economy' and the 'environment'. In our case study, our antipodean lens provides new insights into the possibility of the ecosystem services turn conjoining productively with other community-controlled nature conservation strategies and with

recent international shifts in conservation, environmental governance and social justice (Stevens, 2014; Roth and Dressler, 2012).

Agency and the micro-politics of ecosystem service practices

Recent literature on post-humanism, affect and pluralist ontologies reminds us that all human and non-human encounters are shaped as much by the agency of non-human beings and things as by that of humans (Braun and Whatmore, 2010; Bennett, 2010; Howitt and Suchet-Pearson, 2006; Tuana, 2008; Ingold, 2011; Rose, 2011). Indeed, some have argued that this is a world perpetually 'coming-into-being' (Ingold, 2006: 10) or 'co-becoming' (Bawaka Country et al., 2013). For indigenous cosmologies in particular, this is a world comprised and understood through an entanglement of socially constituted invisible and visible forces brought into being through both praxis and story. Such a world, according to theorists like Ingold, transcends language preoccupations with networks and classification. It enables a recognition and acceptance of the fact that relations between people, animals, physical objects, and indeed spiritual entities simply 'happen, they carry on, they *are* their stories' (Ingold, 2011: 175). They and their relations are in this way forever 'alive' and dynamic, continuously woven *together* into the fabric of the world.

At first glance, such a world is far removed from the neoliberal concept of ecosystem services which has emerged within and alongside the aspirational rhetoric of apolitical, context-free technologies of 'new public management' (Ernston and Sorlin, 2013). A world of continual co-becoming contrasts with one in which the stock of nature and value are comprehensively measured and the services that 'nature' provides to humans are commodified, appropriated and commercialized under the rubric of ecosystem services. Formally admitting within its domain only that which is codifiable, the shift to ecosystem services comprises a cosmology and modality ostensibly dependent on the development of a 'depoliticizing', 'de-historicizing', even 'de-ecologizing' global technology (Ernston and Sorlin, 2013: 274; Norgaard, 2010).

In this paper, we propose a situated re-reading of these developments and a review of these ecosystem service aspirations. We argue that recognizing both the messy micro-politics of its deployment and the agency of non-human nature within the human–nature encounters it seeks to

value reveals that the concept of ecosystem services is as well an inherently relational practice of 'value articulation' (Ernston and Sorlin, 2013: 274). As such, it is also open to processes of re-articulation. If we accept that matter is political (Braun and Whatmore, 2010) and that nothing exists outside it relations with others (Rose, 2005; Ingold, 2011; Bawaka Country et al., 2013), then it is our contention that excavating the relational practices and intersecting cosmologies which constitute particular instances of the ecosystem services model is an essential element of its robust critique. Indeed, as Ernston and Sorlin (2013: 274) reveal by tracing what they call the social and political trajectories of local decision-making in the context of 'manufacturing global expertise', the objectivist biophysical reality purported to underpin ecosystem services thinking is a fallacy.

As non-indigenous geographers with two decades of experience working in the area of indigenous resource management, we reflect on our own academic and professional experiences and, informed by this extensive and geographically diverse ethnographic fieldwork, we provide our own analysis of ecosystem services developments and the literature pertaining to it. Our inquiry is informed by a postcolonial political and legal sensitivity to the unique, deeply affective and caring relations between indigenous people and their land and resources (cf. Borrows, 2002: 146). At the same time we recognize that these relations are dynamic, practical, creative and opportunistic (cf. Strang, 2013; McWilliam et al., forthcoming). Both of us have witnessed the construction of discourses relating to new forms of capitalist value in the regions in which we work, including the efforts of local actors to engage with and shape these value forms.

In one case, Sue Jackson was engaged in a nature valuation project that sought to articulate, measure and quantify the value of aquatic life to the subsistence or customary economies of a number of indigenous Australian language groups in watersheds at risk from water resource development. Applying economic methods to arrive at a replacement value for the aquatic life consumed by local communities (Jackson et al., 2011), these valuations were a strategic part of a research agenda that entailed ethnographic and participatory investigations and elucidations of the micro-politics of river life and the multivalent capitalist and non-capitalocentric values of tropical river systems to Aboriginal peoples (Jackson et al., 2012, 2014; Jackson, 2006). These multiple and intersecting values were fleshed out through a mixed methods approach which

sought to make an impact at a micro and macro political level and on the techniques of social assessment in the context of water resource development (Jackson et al., 2011).

In another case, Lisa Palmer has carried out research in East Timor where new nationhood has seen the Timorese government and international donors move to formalize and 'pay' for communities to carry out a practice known as *tara bandu*, the customary ritual regulation of natural resources. Emerging in its 'modern' form via a messy historical trajectory of colonial and postcolonial politics (Shepherd, 2013), local peoples have shown an extraordinary preparedness to risk engaging with processes not dissimilar to those emanating from the now globalized ecosystem services model (Palmer, forthcoming). In these political engagements across plural ontologies, differently configured, if co-constitutive, socio-environmental domains have been brought into being. While it is clear that '*tara bandu* represents an attempt by modern institutions to appropriate, reformulate, rationalize, standardize and, ultimately, harness' the realm of indigenous agency and religious belief for the purposes of environmental resource management, it is also clear that for local Timorese communities this engagement 'suggests a praxis of opportunity', a space for co-becoming, 'one in which the risks must be continually assessed' (McWilliam et al., in press; Palmer and Carvalho, 2008; Palmer, 2010).

While we acknowledge in this paper that it is important to recognize the risks and chart the micro-politics which have guided the willingness or otherwise of indigenous and local actors to embark on these paths, we also contend that an overly refined attention to matters of risk and co-option can be both obfuscatory and paralyzing. We argue instead for a more hopeful embrace of such fragile engagements along with a robust critique of the ongoing creation of dynamic and adaptive formal and informal resource management cultures. While below we expand on this discussion of agency and reflect on the need to recognize and cultivate an ethic of care, we first turn to our case study and illustrative examples of what Coombes et al. (2013: 692) refer to elsewhere as 'progressive spaces of Indigenous mobilization'.

Formal support for indigenous natural resource management in Australia
Australia has now had over three decades of policy-driven recognition of indigenous peoples' natural resource management practices. This process began in 1975 with the establishment of

Kakadu National Park, Australia's first protected area to be jointly managed by the federal government and the region's Aboriginal traditional land owners (Lawrence, 2000). Recognition of Aboriginal land management practices and a training program for indigenous rangers was the cornerstone of the early years of park management, or joint management, as it is known locally (Haynes, 2013). Through the decades, the early enthusiasm for this arrangement and embrace of indigenous focused land management ideologies and practices in Kakadu has been dulled by entrenched bureaucratic processes and the insidiousness of dominant non-indigenous ideas about and priorities for nature conservation (Haynes, 2013; Palmer, 2007).

Meanwhile, other transformative initiatives have emerged outside of the formal state-based conservation system as responses to demands for indigenous land justice and reconciliation, as well as the pressing need to craft regional development pathways to address indigenous disadvantage in ways that accord with local aspirations (Bauman et al., 2013). Beginning in 1987–8, the Contract Employment Program for Aboriginals in Natural and Cultural Resource Management (CEPANCRM) provided environmental employment opportunities for indigenous people throughout Australia. The program was given further impetus, funding and support following the recommendations of the Royal Commission into Aboriginal Deaths in Custody in 1992–3. It was widely recognized for the contribution it made to environmental management and the social, cultural and economic objectives (including education participation) encompassed in many government initiatives dealing with indigenous issues (Breckwoldt et al., 1997). In 1990, these initiatives were documented by Elspeth Young and others in the seminal collection *Caring for Country* (1991), which reviewed support for indigenous land management and described the challenges of moving from the era of claiming ancestral lands (1970s–1990s) to the contemporary one of reoccupying and managing very substantial tracts of claimed land. Postcolonial land claims had by this time seen close to half of the Northern Territory's land-base, some of it degraded, come under indigenous ownership and control, and most other Australian states had instituted statutory land rights regimes. In remote and regional Australia, re-establishing connections with customary estates could be most effectively undertaken from small, remote settlements, or homelands, and for a relatively short time this social agenda was sanctioned and actively supported by the Australian state (Altman, 2012).

Young's collection was followed a decade later by another academic collection, edited by geographers, titled *Working on Country* (Baker et al., 2001) that again examined indigenous resource management issues and initiatives, but this time in the context of significant influences on the national legal and political landscape resulting from the Commonwealth Government's native title legislation (1993). Native title claims were then expected to further strengthen the legitimacy of indigenous peoples' stake in environmental and cultural resource management, and a nascent community sector had emerged with practical responses to the dramatic shifts to the legal landscape brought about by the High Court when it overturned Australia's founding legal fiction of *terra nullius*. For instance, in the two decades to follow the High Court decision, most Australian states would introduce new legislation and/or amend existing conservation legislation to enable joint management over protected areas (Bauman et al., 2013).

While by the mid-1990s funding for these early community-centered environmental labor programs had been discontinued, the legacy of this formal support for indigenous organizations influenced the success and capacity-building capabilities of many of those that now participate formally in a range of national biodiversity and natural resource management initiatives (Davies et al., 1999; Muller, 2008; Putnis et al., 2007; Smyth, 2011). In north Australia, strong interest in indigenous land management activities, or 'caring for country', saw the creation of numerous community-based organizations facilitated by natural resource management units within land councils. 'Caring for Country' was the name given to the largest specialist environmental and cultural resource management program run by the Northern Land Council which, in 1995, had proposed linking employment aspirations with an environmental management program as a remote area livelihoods or community development strategy (Kerins, 2012; Northern Land Council, 2006). The network of community groups soon grew into a burgeoning 'social movement … attempting to reverse destructive social and cultural change that had come about from people separated from and thus losing management control of their ancestral country' (Kerins, 2012: 36).

Indigenous contributions to protected area management were also transformed during the early days of the caring for country movement with the commencement in 1996 of an initiative referred to as the Indigenous Protected Area (IPA) program (Bauman et al., 2013; Muller, 2008).

The program supports traditional owners of lands or seas who voluntarily dedicate their lands as protected areas, in line with the reserve categories of the International Union for Conservation of Nature (IUCN) which promotes biodiversity and cultural heritage management. Langton et al. (2005) argue that this unique Australian program of establishing community-oriented protected areas was critical to supporting the lifeways of indigenous peoples and local communities, assisting in the preservation and maintenance of their traditional biodiversity-related knowledge and enabling them to participate in both customary subsistence and market economies. They argued that in contradistinction to other global programs of community-oriented protected areas, IPAs were an example of community-*controlled* conservation. In the estimation of these authors, the focus on conservation enabled through guaranteed land security and the ability of indigenous and local peoples to exercise their own governance structures was central to the success of the IPA program (Langton et al., 2005). As a result of this highly successful program, indigenous landowners are the single largest contributor of land to Australia's protected area system (ANAO, 2011).

Alongside the IPA program, the federal government funds a suite of indigenous and non-indigenous community-based natural resource management initiatives, many of them housed under a program titled 'Caring for Our Country', established in 2008. At the time of writing, the indigenous programs were fully subscribed and were not inviting new funding applications (Smyth, 2011). Current fiscal arrangements do not meet the cost of effective management of vast indigenous estates (Altman and Dillon, 2005) and, though independent from direct government control, indigenous land and sea management groups remain heavily reliant on government funding.

Some of these initiatives concerning indigenous peoples have been documented in a collection focused primarily on activities in the Northern Territory, edited by Altman and Kerins and titled *People on Country* (2012), which includes chapters by indigenous authors and organizations, and in the 2011 Australian State of the Environment Report (Smyth, 2011). The semiotics of the national flagship environmental grants program titled 'Caring for Our Country' appear on the surface to indicate that there has been a shift within mainstream conservation discourse toward a conceptual embrace of practices and priorities emanating from the indigenous realm.

Yet, as discussed below, if we understand the indigenous concept of 'caring for country' as being drawn from a different ontological order, this seemingly seamless shift in discourse lacks any profound challenge to the conceptual roots of mainstream natural resource management. A number of studies of Australia's system of natural resource governance and management confirm the asymmetry in power that stubbornly constrains indigenous participation, with the 'invisibility' of indigenous interests being a major theme of the literature in this field (Lane, 2002; see also Lane and Williams, 2008; Altman and Jackson, in press). Lane and Williams (2008) show that the primary agents of environmental management in Australia – decentralized, regionally organized boards or statutory committees – have been largely unable to accommodate the needs or values of indigenous communities. In specific policy sectors, such as water, Australian governments have failed to redress inequalities in water distribution and management powers (Jackson and Langton, 2012).

In forging the latest trend in recognizing indigenous natural resource management in Australia, some indigenous community groups and organizations, as well as academics and policy-makers, are seeking more secure pathways to indigenous self-management. In doing so they are experimenting with alternative models for economic and social life, including ones that tap private willingness to pay for a wide range of services that provide public environmental benefits such as fire management oriented towards carbon abatement and exotic weed and animal control (Altman 2012; Gerrard, 2008; Heckbert et al., 2012; Luckert et al., 2009; Russell-Smith et al., 2009; Winer et al., 2012; Zander, 2013).

Before we discuss the ontological underpinnings of the terms such as 'caring for country', we first map out the global turn to placing a monetary value on environments or ecosystems and their services and establishing contractual arrangements that specify payments conditional on environmental performance – also known as payment for ecosystem services.

A new generation of environmental programs: Payments for ecosystem services
Given added impetus by global environmental governance policies designed to address biodiversity loss (Costanza et al., 1997; Ferraro, 2011), the turn to ecosystem services reflects a

policy trend towards market-based instruments and economic valuation of ecosystems that has grown into a dominant global model for environmental policy and management (McAfee and Shapiro, 2010; Norgaard, 2010). In the face of opposition to regulatory approaches to conservation and difficulties associated with enforcement, financial instruments have been vigorously promoted as incentives to stimulate and sustain voluntary endeavors and achieve environmental outcomes.

Ecosystem services (ES) are defined as ecosystem functions that are beneficial to humans (McAfee and Shapiro, 2010). ES include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, diseases, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (MEA, 2005: v).

In some parts of the world, financial incentives such as payment for ecosystem services (PES) have been investigated as a means of integrating conservation and development goals and addressing lack of investment in conservation management, particularly on privately and communally-held land (Grieg-Gran et al., 2005; Wunder, 2005). PES is thought to be particularly well-suited to the conditions facing marginalized and impoverished communities strongly dependent on natural resources, such as indigenous peoples, with advocates conceiving PES as a 'triple win solution for nature, private investors, and the poor' (McAfee and Shapiro, 2010: 580; see also Corbera et al., 2007; McElwee, 2011). Although the market is the model that lends PES legitimacy by reflecting the promise of contracting between service suppliers and beneficiaries (Pattanayak et al., 2010), in practice, the 'dominant format of PES is not that of standard market trades, but that of state or more generally public payments' with governments acting on behalf of beneficiaries (Vatn, 2010: 1246).

Ecosystem service programs more broadly construed have a much longer lineage in particular parts of the globe and, according to Gómez-Baggethun and Ruiz-Pérez (2011), rudimentary forms of PES have been in existence in the US and Europe for decades. Payments to farmers were promoted to stimulate soil conservation practices and protect farmers from urban encroachment. The widespread expansion of PES as an integrated development and conservation

agenda, however, dates fundamentally from the last two decades, during which time 'the commodity frontier' has expanded towards entirely new types of ecosystem services (Gómez-Baggethun and Ruiz-Pérez, 2011: 619). Market-based environmental policies and programs such as REDD (Reducing Emissions from Deforestation and Forest Degradation) and other carbon and biodiversity offset initiatives are now topics of keen academic interest (Bumpus, 2011; Goodman and Boyd, 2011; Robertson, 2004; Roth and Dressler, 2012) and, with the exponential growth in valuation studies across the globe, are of relevance to environmental policy-makers and managers. The burgeoning literature reveals a spectrum of positions on PES throughout the world, from close adherence to market-oriented reasoning to outright rejection of private ownership and utilitarian rationales for conservation that require monetary valuation of nature (McAfee and Shapiro, 2010; Gómez-Baggethun and Ruiz-Pérez, 2011).

Explicating the political ecology of these experiences is an important way of beginning to assess the prospects and challenges ahead for emerging programs in Australia and elsewhere as well as the implications for indigenous communities, who often occupy a marginal political and economic position in settler states and whose territories can be particularly attractive to REDD and other PES schemes (Birrell et al., 2012; Griffiths, 2007; Van Dam, 2011). For example, in most countries of Latin America, where over the last 30 years there has been devolution to indigenous people of their traditional lands, particularly forests (Van Dam, 2011), the long entrenched neoliberal preference for placing an economic value on nature through the marketization of ecosystem services has received significant critical attention from academics, broad-based social movements and indigenous communities with an interest in this historically significant reform of agrarian structure (Corbera et al., 2007; Grieg-Gran et al., 2005; Kosoy and Corbera, 2010; Vatn, 2010).

While this attention has produced a far-ranging critique of its failings, some writers and activists, conscious of heterogeneity and ambivalence in the ecosystem services concept and its application, have been keen to interrogate such processes for their social, economic and environmental possibilities (cf. Bakker, 2007; Dempsey and Robertson, 2013; Higgins et al., 2012; Lockwood and Davidson, 2010; Mansfield, 2007; McAfee and Shapiro, 2010; Coombes et al., 2013). Writing about Australian trends in neoliberal forms of environmental governance,

Higgins et al. (2012: 377) note that 'a number of scholars have argued that they may at the same time create spaces of resistance, open up progressive political possibilities, or incorporate alternative rationalities of governing'.

Here we offer our understanding of this turn toward ecosystem services in Australia before making an appraisal and critique of both its processes and its conceptual foundations. In this we wish to extend ourselves beyond the genre of anti-neoliberal critique focused only on explicating the dangers of extending the realm of commodification to nature (Katz, 1998; Liverman, 2004; Smith, 2007; Castree, 2008a, 2008b). Given our subject area and the history of colonial relations (see, for example, Baldwin, 2009), adding to this critique might be tempting for, on the surface, the popular and persuasive idiom of 'caring for country' seems at odds with the logic of neoliberal environmentalism which is predicated on a preference utilitarian philosophy and privileges individualistic measures of benefit. Yet, framed by our concern to understand dynamic human–non-human interrelations, our intention is to plumb the articulations between the possibilities opened up by these conceptualizations and their attendant valuation practices and to (re)define the ontological grounds for such actions. First, however, in the context of the Australian situation, we address ourselves to the powerfully twinned critique of nature as commodity and ecosystem services as neoliberal agent of the market.

Payment for environmental services provided by indigenous Australians
In Australia, a number of researchers, policy-makers, indigenous people and organizations are vigorously exploring ways to engage with PES discourse and create the means to derive income from environmentally beneficial management actions undertaken on indigenous lands. In doing so, they seek to finance the retention and/or re-establishment of traditional land management practices or connections to country (Altman, 2012; Campbell et al., 2007; Luckert et al., 2009; Muller, 2008; Winer et al., 2012). There are now several hundred community-based indigenous land management groups around Australia undertaking a wide array of practices on their indigenous tenures, including:
- low-intensity patch burning;
- harvesting of bush or wild foods (plants and animals);
- control of feral pests and weeds;

- fencing off and cleaning out waterholes;
- rehabilitation of eroded areas;
- ritual practices and increase ceremonies; and
- maintenance of language and the ecological knowledge embedded in language and art. (Campbell et al., 2007)

Under PES schemes, indigenous groups who effectively manage landscapes are enabling their activity through a number of financial mechanisms. They tender for contracts for environmental services purchased by governments (e.g. weed control, bio-security monitoring; see Muller, 2008; Hill et al., 2013); by industry or business (e.g. through purchase of carbon credits or biodiversity offsets; see Russell-Smith et al., 2013); and/or they sell their services (e.g. feral animal control) to a fund underwritten by voluntary donations from Australian citizens (Zander, 2013). Some corporations might be motivated to purchase these services not as a direct offset but as part of a corporate social responsibility strategy. To give an indication of the economic importance of PES to some groups, consider that one of Australia's most well-established indigenous ranger groups, the Djelk Rangers from Arnhem Land, were in 2011 obtaining 22 per cent of their revenue from fee-for-service earnings from public and private sector clients by providing maritime surveillance and bio-security services for Customs, Australian Quarantine Inspection Service, and NT Fisheries (Concu, 2011).

The Djelk Rangers use these finances to employ over 35 indigenous staff as well as to cover the operational costs of a range of activities, including weed and feral animal control, fire management and coastal patrols (Concu, 2011). Without this funding, these activities would not be carried out at this scale or intensity. Following the success of the Djelk Rangers' coastal surveillance activities, Australia's customs agency expanded the program to include other indigenous land and sea management groups.

Concu (2011) highlights an important aspect in the character of these indigenous PES activities: government agencies are outsourcing a portion of their responsibility to protect the environment by contracting local indigenous rangers to provide environmental services, but the compensation for this service is based on accounting rules for grant-funding and ranger group estimation of the

cost of delivering service, not on any estimates of the benefits that the rangers' activities generate for the Australian public.

In turn, these rangers are responding in innovative ways to demonstrate the cost effectiveness and efficiency of these kinds of programs. Groups like the Djelk Rangers have been 'instrumental in streamlining the data reporting and information that is delivered back to government through the use of CyberTracker™', a hand-held monitoring device that records costs incurred (effort, travel, duration) and spatially explicit environmental data (e.g. weed infestations, turtle sightings) (Concu, 2011: 23). According to Concu (2011: 23), the Commonwealth Government can now more easily 'see' the 'benefits and accountability that this brings to the ranger groups', and, in turn, has invested funds to employ two dedicated CyberTracker™ support officers to work with indigenous ranger groups.

Savanna burning is a particular environmental service that is currently promoted as highly prospective by indigenous organizations such as the North Australian Indigenous Land and Sea Management Alliance (NAILSMA). With Australian wildfires producing 7 per cent of accountable global greenhouse gas emissions (Russell-Smith et al., 2013), the benefits from savanna burning by indigenous land-owners are described in the following terms: it is 'good land management practice and *aligned* with traditional burning practices; the *quickest* way to reduce greenhouse emissions on Aboriginal lands held in north Australia; the *quickest* way to generate credits for money; flexible – you can decide to stop the project' (Australian Government and NAILSMA, 2013; emphasis in original). Motivated by the prospect of such benefits, over 40 indigenous organizations have recently applied for funding under Australia's new carbon farming initiative that includes wildfire management as an abatement activity (http://www.environment.gov.au/cleanenergyfuture/icff/pubs/icff-category2-projects.pdf; see also Robinson et al., 2014).

In 2012, in recognition of the potential benefit of carbon trading schemes to indigenous land owners, Australia announced an indigenous carbon farming initiative, a program whose success or failure is tied to the fate of the European carbon market (McDonald, 2013). The Australian government will provide A\$22.3 million over five years to enable indigenous landowners and

managers to earn carbon credits by undertaking projects to reduce emissions or store carbon, which the then Environment Minister stated will 'not only provide benefits for our environment but also provide employment opportunities in indigenous communities' (Burke, 2013). Robinson et al. (2014) surveyed indigenous organizations across Australia and found that 94 per cent (of 62 respondent organizations) indicated a high level of interest in pursuing carbon market opportunities and 74 per cent identified potential opportunities in local ecosystem service delivery projects. These authors report on the positive endorsement by some indigenous leaders for participating in carbon offset activities and their assessment that this market represents 'the largest opportunity in history to drive sustainable poverty alleviation in Aboriginal communities' (Moliter and Tilmouth, 2011: 1). Rowan Foley, indigenous General Manager of the non-profit organization Aboriginal Carbon Fund, describes this field of entrepreneurial effort as Australia's indigenous carbon 'industry' (2011: 7).

An agreement between the Northern Territory government, western Arnhem Land indigenous traditional owners and the gas company ConocoPhillips exemplifies the type of private sector investment in environmental service provision by indigenous landowners advocated as desirable by organizations like NAILSMA and the Aboriginal Carbon Fund. The Northern Territory Government required the developer to offset greenhouse gas emissions from a liquified natural gas plant as a condition of operating. The offset mechanism is the provision of funds (A$17 million over 17 years) to indigenous land owners to reduce emissions and sequester carbon (Whitehead et al., 2008). Multiple land-owning groups spanning 24,000 km^2 have achieved this by embracing non-indigenous knowledge, for example of the behavior of carbon and of techniques for measuring rates of sequestration and abatement, and reinstating a fire regime based on local traditions and agreed to by consensus (Russell-Smith et al., 2013). Under this regime, indigenous landowners have been enabled to overcome remote area access difficulties (Hill et al., 2013) and establish firebreaks that lead to a reduction in overall fire frequency, particularly the frequency of late season fires. A reduction in fire frequency allows relatively more of the fuel to be biologically decomposed, which produces less greenhouse gas than combustion. Although the primary goal is to reduce greenhouse gas emissions, the initiative needs to be seen in the broader context of providing the economic means to reconnect traditional owners to their country, to retain cultural practices and to adapt them to new circumstances. At

the same time, it is reducing the impact on biodiversity of decades of out-of-control fires (Cook et al., 2012). Heckbert et al. (2008) estimated employment opportunities from carbon abatement in the tropical savannas in the order of 490 full-time-equivalent positions, equating to approximately 1400 seasonal positions.

Indigenous rangers operate in a 'hybrid' space where the customary, market and state economic sectors intersect (Altman, 2005), a point that Altman (2012: 16) refers to as a 'bliss' (or optimal) point deploying welfare economics theory. Indigenous leader Marandoo Yanner from the Gulf of Carpentaria describes the evolution from government grants to contracts for environmental services:

> In the past five years, Carpentaria Land Council rangers have lit hundreds of thousands of hectares to protect country from late season wildfires, shot over 40,000 feral pigs in sensitive habitat and prevented the spread of serious weeds into the Northern Territory. Most important of all, we have 20 rangers that are now professional land and sea managers.
> Contracting indigenous people by government to manage country in remote Australia is just common sense. We have a cultural obligation to look after country. In the Gulf we rejected the early half-arsed CDEP[1] ranger programs where people were given uniforms and then asked to paint rocks white ('green welfare'). (Yanner, 2013)

In these engagements with market-based conservation programs, some indigenous leaders, in combination with other actors, are seeking a niche in the market for environmental services by influencing the policy frameworks that define standards of accreditation for trading schemes. These policy-making efforts are currently focused on the notion of 'co-benefits'[2] and seek to enlarge the scope of benefits, or services worthy of remuneration, beyond those that generate environmental outcomes (Foley, 2011). A recent paper on the 'indigenous carbon economy' described co-benefits as

> … ancillary opportunities that carbon offset projects might offer indigenous people [and] include the delivery of ecosystem services in a way that may also provide cultural, health,

social, conservation and amenity benefits to local Indigenous communities (in addition to generating carbon credits for commercial sale). (Robinson et al., 2014: 124)

The authors identified the standardization of co-benefits as a priority task for indigenous groups involved in range of mitigation schemes including savanna burning (Robinson et al., 2014). Market-based conservation schemes such as these are 'highly consistent with Australian governments' neoliberal and free-trade policy direction' (Higgins et al., 2012: 378) and, as in other high-income nations, the concept of PES is appealing 'largely because it complements ongoing efforts to redirect agricultural subsidies toward public goods through conservation payment schemes' (Ferraro, 2011: 1134). Significantly, in contrast to the international literature, there are few published critiques emanating from the Australian engagement with PES insofar as it concerns indigenous community-based environmental management and, despite strong interest in the economic opportunities, little is known about Australian indigenous perspectives on the ecosystem service framework underpinning PES – its logics, categories of service and their functionality.

Much of the Australian commentary and policy advocacy tends to present PES in clear-cut terms of development opportunity and not in its propensity to reshape environmental governance (for good or ill), nor bring about progressive or regressive changes as a result of extending market relations into new domains. Zander (2013), for example, notes that a number of authors have suggested that PES is 'the new paradigm for NRM on indigenous-held land in northern Australia' (2013: 11).

Similar to the pro-market debate in conservation circles elsewhere noted by Roth and Dressler (2012), Australian proponents appear not to be aware of the international experience that shows (i) policies framed by market-efficiency criteria alone are likely to bypass small-scale indigenous groups (McAfee and Shapiro, 2010), particularly those with weak or fragile governance arrangements and/or unrecognized or non-conforming property rights; (ii) ecosystem services may 'crowd out' other obligations and protectionist motivations (Vatn, 2010) or social development outcomes (Corber et al., 2007); and (iii) there is a limited empirical basis for attributing changes in poverty to PES (Pattanayak et al., 2010). Zander and Garnett (2011:1F),

for instance, promote PES as a poverty alleviation mechanism, albeit one they regard as constrained by social tenures and by the very modes of production that have contributed to the high conservation status of some indigenous estates:

> One of the main obstacles is that most Indigenous people have group rather than individual land ownership and hence cannot sell their services as private goods, such as in bidding auctions. Also cultivation of Indigenous land for commercial production is rare, so there is no reason to use conservation money to set land aside. Thus, in economic terms, opportunity costs for conserving land are very low.

Alternatively, in Altman and Kerins's edited collection (2012), *People on Country: Vital Landscapes, Indigenous Futures*, fundamental questions of power are raised by many of the authors who are attuned to the normalizing and disciplinary effects of the new forms of accountability, conditionality and surveillance that are likely to be required by performance-based environmental service schemes. The ways in which these schemes may undermine the ability of indigenous groups to determine local priorities, benefit from or resist the commodification of local indigenous ecological knowledge and freely identify as indigenous rangers or environmental managers on their own terms are recognized (Buchanan and May, 2012; Kerins, 2012; Altman 2012). Moreover, this work presents the social and ecological complexity of indigenous land management as a public good deserving of state support.

Drawing on a narrative similar to the one advanced by PES advocates responding to the deepening rural crisis in Latin America (McAfee and Shapiro, 2010), Altman et al. (2012) present PES as a policy catalyst for revaluing remote indigenous landscapes and customary relationships in the context of a recent divisive national debate over the future of indigenous livelihoods in remote Australia. In such contexts, the agenda for pro-market policies 'does not spring from a simple narrative of marketization' (Dempsey and Robertson, 2013: 759); rather, there are multiple trajectories at play, including importantly 'threats to their land and livelihoods posed by climate change' (NAILSMA, 2011: 2, cited in Robinson et al., 2014: 124). PES strategies here, as in many other places, are being selectively employed to advance broader

indigenous agendas in ways that reflect their histories and contemporary realities (Roth and Dressler, 2012).

Discussion

For some indigenous peoples it could be argued that to accept the neo-Marxist critiques of the dangers of commodifying nature (see Castree, 2008a, 2008b) and turn away from receiving payments for ecosystem services is akin to throwing the baby out with the bathwater. This is particularly so when the alternative to an emerging 'caring for country economy' (Smyth, 2011: 10) is little more than a reassertion of the historically dominant model of 'managerial' conservation and development approval without consent and with minimal benefit. Yet as the literature makes abundantly clear, in state or international civil society led 'managerial' arrangements, the rules of engagement are defined by those who dominate and are in control of the formal system (Chapin, 2004; Langton et al., 2005). In such situations, indigenous peoples and their land and sea management practices are relegated to 'noises' in the 'established order of things' (Dikeç, 2005: 173, cited in Palmer, 2007; cf. Chapin, 2004; Howitt and Suchet-Pearson, 2006; Lane and Williams, 2008). In critiques of the neoliberal commodification of nature, what is most often glossed over is the creative ways in which these programs may be harnessed by indigenous peoples seeking ways of preserving, extending, adapting and benefiting their own dynamic land and sea management practices and related socio-ecological lifeworlds, or to the task of redressing socio-economic inequalities (Castree, 2007; Mansfield, 2007).

It is in the spirit of addressing this potentiality that we turn now to some salvage geography. We are interested in what can be salvaged out of the now well entrenched (if often internationally criticized) turn to ecosystem services. We seek possibilities in this turn for furthering indigenous livelihoods and resource management practices, ceding them voice and recognizing their agency in the pursuit of diverse platforms for action rather than relegating their environmental relations to mere noise. We also seek to prize open pathways for other alternative ways of being in and knowing the world.

In his critique of the underpinnings of ideas pertaining to ecosystem services, Norgaard (2010: 1219) has powerfully argued that '[t]he metaphor of nature as a stock that provides a flow of

services is insufficient for the difficulties we are in or the task ahead'. Indeed, at the 'local' scale, the complex processes of change, interdependence, and exchange relevant to creating local livelihoods and socio-ecological modes of being need to be understood before we can sustainably reconfigure the marketization of ecosystem services. Across the indigenous world, complex sets of relations exist between human and non-humans, collapsing simple nature/culture distinctions (Viveiros de Castro, 1998). Animated by spiritual essences, nature in its entirety is understood as circulating life energy between the visible realm of bodies and things and the invisible spiritual or 'interior' realm. Hence, rather than treating nature as 'fixed stock', we might treat an indigenous understanding of flows and the 'spirit of relatedness' as 'stock'. In this reconfiguration of the 'stock' of ecosystem services, it is the interconnections and the ways in which things happen as a result of these interconnections which matter. Rather than promulgating a fixed stock metaphor, we are challenged to consider a relational ontology and the ever expanding and contracting stock of relatedness on which we must focus our attention and value.

Shifting focus briefly from the stereotypically remote indigenous heartland of 'ecosystem service thinking' to the city, the cosmopolitan heart of globalized lifeworlds from where our most 'powerful' ideas emerge, we now want to consider how this ethic of relatedness might transpire in mainstream thinking and practices. In his poignantly titled paper 'The Good City' (2006), Ash Amin argues that to recover, repair and re-enchant the landscapes in which over half of global humanity will soon live, we need to cultivate an ethic of care. Amin is not referring here to a 'love thy neighbor ethic of care, but one based on the rights of recognition' (2006: 1021). Similar to our aim of recovering positive possibilities in the turn to 'nature markets', rather than wishing away the 'seductions, distortions and divisions of market individualism' in the city (2006: 1013), Amin argues that we need to focus our urban attentions on principles of relatedness and on fostering a public culture of care. In a manner which draws our attention to the need for a shift to a relational ontology, this pathway, he cautions, is not to create 'a public culture of forced mixture with the stranger and strangeness, but one that demands acceptance of relatedness as central to urban existence' (2006: 1017).

It seems to us, however, that this meditation on ways to recover the 'good city' is as applicable to relations outside of this (arbitrary) urban boundary, extending to the suite of relations between what at least some of us might think of as nature and culture. For example, if we consider that we are not related to nature (beyond, that is, the instrumental), then we can make it strange, we can alienate it, fetishize it and make it subject to the marketer's whims. Yet if, as in Australian indigenous ontologies, the environment is a space of care (cf. Popke, 2006), the subject of complex sets of relations, and is considered sentient, then 'country' is treated as a moral agent which communicates with people and can be happy, sad, good, bad, or angry (Rose, 1988: 381; Povinelli, 1993). Caring for 'country' then becomes a complicated, uncertain and always under negotiation matter wherein affective relationships with so called 'nature' are held in the foreground of people's actions and decisions.

Objective nature as an idea in itself is commodity fetishism *par excellence*. It is to this that we need to address ourselves before worrying about how much further markets might take an idea that Western enlightenment philosophies of all persuasions first began. As Jacobs writes, '[p]art of the legacy of the cocktail of Enlightenment thinking and the transition to capitalism was the invention of "external", "primordial" Nature' (1996: 135; see also Smith, 1997). In creating such an objectivist category, together they encouraged the culturally naive acceptance of a reified world existing outside social relationships (Taussig, 1980). Today, in the most pressing realms of environmental governance, such as climate change research and associated public policy debates, such immutable categories of nature, while useful for some agendas some of the time, continue to reify the world. For example, the accepted global governance framework for understanding climate change is 'totalizing, all-embracing and inclusive', 'collapsing human life into a systems framework' in which dominant causation is attributed to the global biophysical environment and its 'boundaries' (Nielsen and Sejersen, 2013: 194). At its core, this is an ideology which alienates the relationships between humans and nature and obscures the ways through which the 'local' is always actively engaged in creating the 'global' (Nielsen and Sejersen, 2013; see also Head and Gibson, 2012). Recovering climate change research from environmental determinism (and we might add the notion of fixed stock), Nielsen and Sejersen argue we need to understand 'scale as relational' and make 'it possible to view climate change as more than just global physical transformations of "smaller" scales'(Nielsen and Sejersen, 2013: 195). They conclude that:

> [C]limate change is an ongoing process, a work of conceptualization and not reducible to a global physical phenomenon understood to penetrate local lives. How people perceive, live with and transform climate change should thus be questions pursued more vigorously by human geography. (2013: 199–200)

Similarly, substituting 'nature' for 'climate' in the quote above, understanding 'caring for country' as ontologically relational and affective has profound implications for the recognition and promulgation of ecosystem services programs and for understanding their effects on nature, human–nature relations and human subjectivities. If we extend the concept of relatedness from humanity to all existence and foster an ethic of care which recognizes the agency of all 'others', be it other people or other nature, and the specific cultivation of these relations by humans, we avert the broadening of a schism between nature and culture – the schism that in the ecosystem service framework construes nature as provider/producer and human as consumer. If we can instead think of particular socio-ecological practices as a 'service' worthy of remuneration that cultivates and extends this web of relatedness and communicative practices between people and 'nature', we can both challenge the commodification of nature and mitigate its worse effects.

Existing formulations of the ecosystem service concept are not yet readily able to advance this goal or fulfill this promise, for although the metaphor tries to grapple with the nature–society dualism, the framework is hampered by a particular form of materialist ontology that ignores how deeply intertwined are the social and natural. The transformations resulting from its application instead serve to 'emphasise conceptual difference rather than continuity between human and nonhuman worlds' (Sullivan, 2009: 23; see also McAfee and Shapiro, 2010). The metaphor of servitude reinforces the conceptual difference between nature and culture in a Hegelian hierarchy: nature serves culture (Sullivan, 2009: 23).

Nowhere is this more evident than in the classification and definition of *cultural ecosystem services*, a term which 'encompasses any and all non-material benefits people obtain from ecosystems: spiritual enrichment, cognitive development, reflection, recreation, tourism, and aesthetic experiences' (Martin-Lopez, 2009; see also Chan et al., 2012). According to Chan et al. (2012: 14), cultural services 'are perhaps best understood as those that do not fit well in other

sectors of ES research' and their failure to fit renders them subordinate to other dominant categories because they are difficult to measure (or perhaps vice versa):

> These values and benefits are so divergent from each other and so overlapping with the values associated with other 'master' categories of services (provisioning, regulating, supporting) … that we can imagine no clean way to group these services without also including services that have been considered elsewhere. (Chan, 2012: 14)

In ecosystem service discourse, human agency – the processes and practices by which societies produce 'a sensuous world' (Marx and Engels in Smith, 1997: 27) – are not thought of as cultural services, or any other kind of service. Yet cultural ecosystem services and many of the other types of service are surely co-produced and are influenced or altered by diverse socio-ecological practices and processes as human societies define, delimit and physically reconstitute nature (Castree, 2001) under manifold governance and management institutions – laws, beliefs, norms, rules.

In the ecosystem service framework, it is the ecological entities (the coral reef, ocean, wetland or forest, for example) that provide an array of benefits. Thus, environmental features serve as a stimulant to human experience or a source of inspiration to human systems of value, religion and aesthetics. In this externalizing configuration, 'Nature somehow is backdrop to, rather than co-creator of, human activity' (Sullivan, 2009: 23). There is then an inherent risk for indigenous land managers in the current conception of ecosystem services. It is conceivable that willingness to pay for ecosystem services provided by indigenous people will be confined to financial support for only those activities or functions that measurably improve environmental conditions and not the practices and relations that generate less tangible or non-observable ecosocial results. For indigenous peoples, country (or nature) is a sentient participant in the co-creative processes that, in a Mexican case presented by McAfee and Shapiro (2010), generate 'ecosocial systems', valued for their part in the subsistence economy, to local identities and beliefs, and as environmental commodities for sale. Is there a place for this human action, thought, belief and practice in the ecosystem service framework and could these socio-natural relations be reconfigured as a 'service' that recognizes human cognition, care and labor, as well as non-

human agency, in shaping and 'producing' the social nature from which other benefits are derived? Ecosystem service valuations that have tried to measure the human gain from a nonsocial nature have confronted the internal conflicts arising from the abiding modernist dualism, revealing how the essentialized categories break down when they are applied to 'inhabited nature or living ecososocial systems' (McAfee and Shapiro, 2010: 581; see also Ernstson and Sorlin, 2013). In the landmark Millennium Assessment, for example, scientists found the world's landscapes to be so differentiated through socialization that they were confounded in their attempts to value and compare ecosystem services:

> What they had learned in one ecosystem did not easily translate to another ecosystem, even if it seemed to be a quite similar ecosystem. Rather, the literature across seemingly similar ecosystems indicated many more differences than expected, many of them apparently due to different histories of human influence. Other scholars … have noted the contextuality of ecosystem service projects, and how each must be, and to some extent are, designed on their own terms. (Norgaard, 2010: 1223)

Returning to the Australian context, Australian science confronted this very problem over 30 years ago when it discovered that indigenous people had intentionally and actively changed aspects of their environment over millennia of controlled burning (Langton, 1998; Head, 1994). These and other insights into indigenous 'pyro-management' (Jones, 1969) generated a cascade of implications, not least the view that, given the importance of indigenous landscape burning in the co-evolution of human and natural systems, land managers must select what kind of 'natural' landscape to manage for (Bowman et al., 2001). In such a context, how should one characterize the activities that generate carbon off-sets under indigenous fire management regimes – as merely regulating services? No one appears to have made a case for recognizing these socio-ecological practices as cultural services – an observation that we find surprising given the amount of policy attention devoted to indigenous carbon abatement strategies, their governance and accounting systems and the social significance of indigenous burning and ceremonial smoking (see Russell-Smith et al., 2009; 2013).

A similarly powerful example of embedded socio-ecological 'cultural services', and one that relates to fire, is documented by Doohan (2008) in the context of the mediated co-existence of a sacred site and a large-scale diamond mine. Doohan (2008) examines the ways in which this relationship was, despite a violent and repressive colonial and postcolonial history, skillfully renegotiated by local peoples through the context of the *wirnan* – a concept they apply to symbolize the social relationships mapped across space and configured through 'economic, social, political and ritual arenas' (Doohan, 2008: 65). For example, Doohan describes how at a critical juncture of the newly negotiated relationship between the corporate mining company and the area's native title holders, the indigenous land owners of the Argyle Diamond Mine carried out a *manthe*, a local smoking and increase ceremony, at the entrance to a tunnel linked to the new underground mine (see also Doohan et al., 2012). As the women ceremonial leaders entered the tunnel they called out to the Barramundi spirit below ground and asked her not to be afraid of the miners, to let them tunnel and dig for they would not hurt her, they were only after her scales (diamonds) (Doohan, 2008: 138):

> They told her they were happy for mining to take place because the miners were 'coming good' (making a new agreement). The presence and attention of the Barramundi were evident in the density and movement of the smoke from the fire in and around the mouth of the tunnel, which eventually filled the tunnel … This strong presence of smoke was seen as definitive evidence of the Barramundi engaging with the local people and her positive consent for the underground work to begin. (Doohan, 2008: 138)

In bureaucratic practices and management settings, negotiations over land use and management are 'severely tested when an Aboriginal person describes the intentionality of country, and attempts to create opportunities for the country to persuade planners and decision makers' (Jackson, 1998: 280). Such encounters are further problematized when it is understood that knowledge of 'country' is owned, and that some knowledge will be private and not automatically available for sharing or transmission within a broader community of 'stakeholders' (Rose, 1996: 32). It needs to be accepted that in these negotiations, like in any negotiation, the onus is on the proponent to accept an unfavorable outcome, whilst at the same time doing everything possible to try to avert that possibility.

Elsewhere in the world, aboriginal Canadian legal scholar John Borrows (2002) argues that a useful starting point in the process of fostering a public culture of care and creating a notion of shared and multidimensional citizenship relating to environmental governance would be for non-indigenous peoples to recognize and incorporate the indigenous notion of 'landed citizenship'. He writes:

> Many Aboriginal groups have well developed notions about how to recognize the land as citizen. In the Ashinabek language, the land is animate and perceived as having rights and obligations in its relations with humankind. … Aboriginal values and traditions could help reframe the relationship within our polity. (Borrows, 2002: 146)

Indeed, in federations such as Canada, one finds that in the realm of 'daily, subconstitutional politics' (Tully, 1995: 28), it is often through environmental governance issues that indigenous peoples are starting to refashion their stake in the governing ideas and institutions of the broader regional, provincial and national polity (see Palmer, 2006). Here we draw on one example from northern Canada which further explicates Borrows's ideas regarding 'landed citizenship' to illustrate how a reconfigured ecosystem service concept might be institutionalized in contemporary intercultural natural resource management.

In 2002, a new agreement concerning hydro development and other resource extraction activities on indigenous Cree territory was struck with the Quebec government. Amongst other things, it significantly expanded the recognition given to the Cree Tallymen, the primary hunting stewards who are responsible under Cree law for overseeing environmental governance in each of the 300 Cree family-based hunting territories, or traplines. These traplines, which continue to be worked across the whole of Cree traditional territories, have been the subject of an innovative payment scheme to Cree hunters and trappers since the 1970s (see Feit, 2004).

The 2002 agreement extends upon this scheme by providing an implicit recognition and valorization of the role of Cree hunters and hunting practices in the provision and management of ecosystem services. Cree Tallymen now have an active decision-making role in planning for land-use developments, which has strengthened the autonomy of Cree governance at the same

time that it inserted the Cree notion of landed citizenship into the state-based environmental governance regimes. Although not conceived at the time as a payment for an ecosystem service, the Cree Hunters and Trappers Payment Program has grown into something which we contend can potentially be read as reconfiguring conventional ecosystem service model thinking: treating the socio-cultural relations between people and nature as the valued stock.

Conclusion

Neil Smith (2007: 38) has powerfully argued that '[c]apital is no longer content simply to plunder an available nature but rather increasingly moves to produce an inherently social nature as the basis of new sectors of production and accumulation'. Our argument recognizes these processes as they pertain to ecosystem services but sees, like Borrows (2002), possibilities for tacking in a different direction. Recognizing the dangers inherent in the shift toward a greater commodification of nature, we argue that this need not necessarily result in a push towards the greater privatization of property. Rather, we see the possibility of understanding ecosystem services in ways which make legible and enhance the possibility of recognizing, building and expanding upon the reality of indigenous social tenures and reciprocal social relations which create contextualized boundaries and exchange processes through co-produced socio-natures. While recognizing the need to engage with social change and the instability of meanings, we also suggest that our preparedness to value these relations, which include care and reciprocity as well as obligation, depends in part on our willingness to find meaningful ways of recognizing them in a late capitalist world.

While we have focused on examples drawn mainly from indigenous Australia, our aim is much broader. We are interested in giving value to human agency and knowledge and the ways in which people cultivate their ongoing relations with co-produced socio-ecological worlds. To not countenance such a pathway is to relegate the centrality of human-nature relations to the marginal place occupied by women's domestic care and labor until the feminist turn of the late 20th century. The pressing need to value 'different ways of conceptualizing and enacting relationships with the non-human world' (Sullivan, 2009: 25) demands that our attention to these matters extends our analysis beyond those currently dominant expressions of anxious concern for enhanced environmental outcomes and/or poverty alleviation for marginalized peoples.

Across Australia, renewed interest in the history of Aboriginal burning practices, and awareness of the pace and severity of exotic weed and feral animal spread through remote regions, has made it clear that an empty landscape, a wilderness, is in fact destructive. Equally, our examples have indicated the valuable role of the customary economy in the midst of industrial diamond mining. Is it just possible that a revised conceptualization of ecosystem services, one that recognizes that the 'the space between nature and society is itself social' (Viveiros de Castro, 1998: 473), can create an opportunity to valorize the role of human relationships of management and care along with the diverse and amorphous ways in which they are embedded in communicative reciprocity with non-human nature?

Acknowledgements

Notes

1. Acronym for the Community Development Employment Scheme, which subsidized employment for many indigenous Australians for over 30 years until it was dismantled in 2012.
2. This concept derives from marketing concepts developed by the international Climate, Community and Biodiversity Alliance (CCBA).

References

Altman J (2005) Development options on Aboriginal land: Sustainable hybrid economies in the twenty-first century. In: Taylor L, Ward G, Henderson G, Davis R, and Wallis L (eds) *The Power of Knowledge: The Resonance of Tradition*. Canberra: Aboriginal Studies Press, 34–48.

Altman J (2012) People on country as alternate development. In: Altman J and Kerins S (eds) *People on Country: Vital Landscapes, Indigenous Futures*. Sydney: The Federation Press, 1–22.

Altman J and Dillon M (2005) Commercial development and natural resource management on the indigenous estate: A profit-related investment proposal. *Economic Papers* 24: 249–262.

Altman J and Jackson S (in press) Indigenous land and sea management: Recognition, redistribution, representation. In: Lindenmayer D, Dovers S and Morton S (eds) *Ten Commitments Revisited.* Melbourne: CSIRO Publishing.

Altman J and Kerins S (eds) (2012) *People on Country: Vital Landscapes, Indigenous Futures*. Sydney: The Federation Press.

Amin A (2006) The good city. *Urban Studies* 45(5/6): 1009–1023.

ANAO (Australian National Audit Office) (2011) *Indigenous Protected Areas* (Audit Report No. 14, 2011–12: Performance Audit). Canberra: Commonwealth of Australia.

Australian Government and NAILSMA (2013) Burning Business: A Step By Step Information Resource to Savanna Burning and the Carbon Farming Initiative, Final Version 2.7. Darwin: NAILSMA http://www.nailsma.org.au/sites/default/files/Burning%20Business_v2.7_notes.pdf, (accessed 31 May 2014).

Baker R, Davies J, and Young E (eds) (2001) *Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions*. Melbourne: Oxford University Press.

Bakker K (2007) The 'commons' versus the 'commodity': Alter-globalization, anti-privatization, and the human right to water in the Global South. *Antipode* 39(3): 430–455.

Bakker K (2010) Neoliberalizing nature? Market environmentalism in water supply in England and Wales. *Annals of the Association of American Geographers* 95: 542–565.

Baldwin A (2009) Carbon nullius and racial rule: Race, nature and the cultural politics of forest carbon in Canada. *Antipode* 41(2): 231–255.

Bauman T, Haynes C and Lauder G (2013) *Pathways to the Co-management of Protected Areas and Native Title in Australia* (Research Discussion Paper No. 32). Canberra: Australian Institute of Aboriginal and Torres Strait Islander Studies.

Bawaka Country (including Suchet-Pearson S, Wright S, Lloyd K and Burarrwanga L) (2013) Caring *as* country: Towards an ontology of co-becoming in natural resource management. *Asia-Pacific Viewpoint* 54: 185–197.

Bennett J (2010) *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press.

Birrell K, Godden L and Tehan M (2012) Climate change and REDD+: Property as a prism for conceiving indigenous peoples' engagement. *Journal of Human Rights and the Environment* 3: 196–216.

Borrows J (2002) *Recovering Canada: The Resurgence of Indigenous Law*. Toronto: University of Toronto Press.

Bowman D, Garde M and Saulwick A (2001) *Histories of Old Ages: Essays in Honour of Rhys Jones*. Canberra: Pandanas Books.

Braun B and Whatmore S (eds) (2010) *Political Matter: Technoscience, Democracy and Public Life*. Minneapolis: University of Minnesota Press.

Breckwoldt R, Boden R and Williams R (1997) *Contract Employment Program for Aboriginals in Natural and Cultural Resource Management (CEPANCRM): Evaluation for Biodiversity Group Environment Australia*. Canberra: Environment Australia.

Buchanan G and May K (2012) Indigenous rangers and the customary economy. In: Altman J and Kerins S (eds) *People on Country: Vital Landscapes, Indigenous Futures*. Sydney: The Federation Press, 65–81.

Bumpus A (2011) The matter of carbon: Understanding the materiality of tCO2e in carbon offsets. *Antipode* 43(3): 612–638.

Burke T (2013) Successful indigenous carbon farming fund projects announced, 24 April. Available at: http://www.environment.gov.au/minister/burke/2013/mr20130424.html (accessed 29 May 2014).

Campbell D, Davies J and Wakerman J (2007) *Realising Economies in the Joint Supply of Health and Environmental Services in Aboriginal Central Australia* (Desert Knowledge CRC Working Paper No. 11), September, Alice Springs.

Castree N (2001) Socializing nature: Theory, practice, and politics. In: Castree N and Braun B (eds) *Social Nature: Theory, Practice and Politics*. Malden, MA: Blackwell, 1–21.

Castree N (2007) *Neoliberal Environments: A Framework for Analysis* (Working Paper No. 04/07). Manchester: Papers in Political Economy.

Castree N (2008a) Neoliberalising nature: The logics of deregulation and reregulation. *Environment and Planning A* 40: 131–152.

Castree N (2008b) Neoliberalising nature: Process, effects and evaluations. *Environment and Planning A* 40: 153–173.

Chan K, Satterfield T and Goldstein J (2012) Rethinking ecosystem services to better address and navigate cultural values. *Ecological Economics* 74: 8–18.

Chapin M (2004) A challenge to conservationists. *Worldwatch Magazine* 17(6): 17–31.

Concu N (2011) *Developing an Effective Conservation and Sustainable Use Economy: Two Arnhem Land Case Studies*. Darwin: Charles Darwin University. Available at: http://www.nailsma.org.au/hub/resources/publication/developing-effective-conservation-and-sustainable-use-economy-two-arnhem (accessed 29 May 2014).

Cook G, Jackson S and Williams R (2012) A revolution in northern Australian fire management: Recognition of indigenous knowledge, practice and management. In: Bradstock R, Gill A and Williams R (eds) *Flammable Australia: Fire Regimes, Biodiversity and Ecosystems in a Changing World*. Melbourne: CSIRO Publishing, 293–306.

Corbera E, Brown K and Adger N (2007) The equity and legitimacy of markets for ecosystem services. *Development and Change* 38(4): 587–613.

Coombes B, Johnson JT and Howitt R (2013) Indigenous geographies II: The aspirational spaces in postcolonial politics – reconciliation, belonging and social provision. *Progress in Human Geography* 37(5): 691–700.

Costanza R (1991) Assuring sustainability of ecological economic systems. In Costanza R (ed.) *Ecological Economics: The Science and Management of Sustainability*. New York: Columbia University Press, 331–342.

Costanza R, d'Arge R, de Groot R, Farber S, Grasso M, Hannon B, Limburg K, Naeem S, O'Neill R, Paruelo J, Raskin R, Sutton P and Van den Belt M (1997) The value of the world's ecosystem services and natural capital. *Nature* 387: 253–260.

Davies J, Higginbottom K, Noack D, Ross H and Young E (1999) *Sustaining Eden: Indigenous Community Based Wildlife Management in Australia* (Evaluating Eden Series No. 1). London: International Institute for Environment and Development.

Dempsey J and Robertson M (2013) Ecosystem services: Tensions, impurities, and points of engagement within neoliberalism. *Progress in Human Geography* 36(6): 758–779.

Dikeç M (2005) Space, politics and the political. *Environment and Planning D: Society and Space* 23: 171–188.

Doohan K (2008) *Making Things Come Good: Relations Between Aborigines and Miners at Argyle*. Broome: Backroom Press.

Doohan K, Langton M and Mazel O (2012) From paternalism to partnership: The Good Neighbour Agreement and the Argyle Diamond Mine Indigenous Land Use Agreement in Western Australia. In: Langton M and Longbottom J (eds) *Community Futures, Legal Architecture: Foundations for Indigenous Peoples in the Global Mining Boom.* London: Routledge, 211–250.

Ernstson H, and Sorlin S (2013) Ecosystem services as technology of globalization: On articulating values in urban nature. *Ecological Economics* 86: 274–284.

Feit H (2004) James Bay Crees' life projects and politics: Histories of place, animal partners and enduring relationships. In: Blaser M, Feit H and McRae G, *In the Way of Development: Indigenous Peoples, Life Projects and Globalization.* London: Zed Books, 92–110.

Ferraro P (2011) The future of payments for environmental services. *Conservation Biology* 25(6): 1134–1138.

Foley R (2011) Indigenous carbon markets and standards. Paper presented at the AIATSIS Native Title Conference, June, Brisbane. Available at: http://www.aiatsis.gov.au/_files/ntru/RowanFoley.pdf (accessed 29 May 2014).

Gerrard E (2008) *Impacts and Opportunities of Climate Change: Indigenous Participation in Environmental Markets* (Issue Paper No. 13). Canberra: AIATSIS.

Gibson-Graham J-K (2006) *A Postcapitalist Politics*. Minneapolis: University of Minnesota Press.

Gómez-Baggethun E and Ruiz-Pérez M (2011) Economic valuation and the commodification of ecosystem services. *Progress in Physical Geography* 35(5): 613–628.

Goodman M and Boyd E (2011) A social life for carbon? Commodification, markets and care. *The Geographical Journal* 177(2): 102–109.

Grieg-Gran M, Porras I and Wunder S (2005) How can market mechanisms for forest environmental services help the poor? Preliminary lessons from Latin America. *World Development* 33: 1511–1527.

Griffiths T (2007) *Seeing 'RED'? 'Avoided Deforestation' and the Rights of Indigenous Peoples and Local Communities*. Forests Peoples Programme. http://www.forestpeoples.org/sites/fpp/files/publication/2010/01/avoideddeforestationredjun07eng_0.pdf (accessed 29 May 2014).

Harvey D (1996) *Justice, Nature and the Geography of Difference*. Cambridge, MA: Blackwell.

Haynes C (2013) Seeking control: Disentangling the difficult sociality of Kakadu National Park's joint management. *Journal of Sociology* 49: 194–209.

Head L (1994) Landscapes socialized by fire: Post-contact changes in Aboriginal fire use in Northern Australia, and implications for prehistory. *Archaeology in Oceania* 29(3): 172–181.

Head L and Gibson C (2012) Becoming differently modern: Geographic contributions to a generative climate politics. *Progress in Human Geography* 36(6): 699–714.

Heckbert S, Davies J, Cook G, McIvor J, Bastin G and Liedloff A (2008) *Land Management for Emissions Offsets on Indigenous Lands*. Townsville: CSIRO Ecosystem Sciences.

Heckbert S, Russell-Smith J, Reeson A, Davies J, James G and Meyer C (2012) Spatially explicit benefit–cost analysis of fire management for greenhouse gas abatement. *Australian Ecology* 37: 724–732.

Higgins V, Dibden J and Cocklin C (2012) Market instruments and the neoliberalisation of land management in rural Australia. *Geoforum* 43: 377–386.

Hill R, Pert P, Davies J, Robinson C, Walsh F and Falco-Mammone F (2013) *Indigenous Land Management in Australia: Extent, Scope, Diversity, Barriers and Success Factors*. Cairns: CSIRO Ecosystem Sciences.

Howitt R and Suchet-Pearson S (2006) Rethinking the building blocks: Ontological pluralism and the idea of 'management'. *Geografiska Annaler. Series B, Human Geography* 88: 323–335.

Ingold T (2006) Rethinking the animate, re-animating thought. *Ethnos* 71(1): 9–20.

Ingold T (2011) *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge.

Jackson S (1998) *Geographies of co-existence: Native title, cultural difference and the decolonisation of planning in North Australia*. PhD thesis, Sydney, Macquarie University.

Jackson S (2006) Compartmentalising culture: The articulation and consideration of indigenous values in water resource management. *Australian Geographer* 37: 19–32.

Jackson S, Finn M, Woodward E and Featherston P (2011). *Indigenous Socio-economic Values and River Flows*. Darwin: CSIRO Ecosystem Sciences.

Jackson S and Langton M (2012) Trends in the recognition of indigenous water needs in Australian water reform: The limitations of 'cultural' entitlements in achieving water equity. *Journal of Water Law* 22: 109–123.

Jackson S, Finn M and Featherston P (2012) Aquatic resource use by indigenous Australians in two tropical river catchments: The Fitzroy River and Daly River. *Human Ecology* 40: 893–908.

Jackson S, Finn M, and Scheepers K (2014) The use of replacement cost method to assess and manage the impacts of water resource development on Australian indigenous customary economies. *Journal of Environmental Management* 135: 100–109.

Jacobs J (1996) *Edge of Empire: Postcolonialism and the City*. London: Routledge.

Jones R (1969) Fire stick farming. *Australian Natural History* 16: 224–231.

Katz C (1998) Whose nature, whose culture? Private productions of space and the preservation of nature. In: Braun B and Castree N (eds) *Remaking Reality: Nature at the Millennium.* New York: Routledge, 46–63.

Kerins S (2012) Caring for country to working on country. In: Altman J and Kerins S (eds) *People on Country: Vital Landscapes, Indigenous Futures*. Sydney: The Federation Press, 26–44.

Kosoy N and Corbera E (2010) Payments for ecosystem services as commodity fetishism. *Ecological Economics* 69: 1228–1236.

Lane M (2002) Buying back and caring for country: Institutional arrangements and possibilities for indigenous lands management in Australia. *Society & Natural Resources* 15: 827–846.

Lane M and Williams L (2008) Color blind: Indigenous peoples and regional environmental management. *Journal of Planning Education and Research* 28: 38–49.

Langton M (1998) *Burning Questions: Emerging Environmental Issues for Indigenous Peoples in Northern Australia*, Darwin: Centre for Indigenous Natural and Cultural Resource Management, Northern Territory University.

Langton M, MaRhea Z and Palmer L (2005) Community oriented protected areas for indigenous peoples and local communities. *Journal of Political Ecology* 12: 23–50.

Latour B (2009) Perspectivism: 'Type' or 'bomb'. *Anthropology Today* 25(2): 1–2.

Lawrence D (2000) *Kakadu: The Making of a National Park*. Carlton: The Miegunyah Press, Melbourne University Press.

Liverman D (2004) Who governs, at what scale and at what price? Geography, environmental governance, and the commodification of nature. *Annals of the Association of American Geographers* 94(4): 734–738.

Lockwood M and Davidson J (2010) Environmental governance and the hybrid regime of Australian natural resource management. *Geoforum* 41: 388–398.

Luckert M, Campbell B, Gorman J and Garnett S (eds) (2009) *Investing in Indigenous Natural Resources Management.* Darwin: CDU Press.

Mansfield B (2007) Introduction: Privatization: Property and the remaking of nature–society relations. *Antipode* 39(3): 393–405.

Martin-Lopez B, Gomez-Baggethun E, Lomas P and Montes C (2009) Effects of spatial and temporal scales on cultural services valuation. *Journal of Environmental Management* 90: 1050–1059.

Marx K and Engels F (1970) *The German Ideology*. New York: International Publishers.

McAfee K and Shapiro E (2010) Payments for ecosystem services in Mexico: Nature, neoliberalism, social movements, and the state. *Annals of the Association of American Geographers* 100(3): 579–599.

McCarthy J and Prudham S (2004) Neoliberal nature and the nature of neoliberalism. *Geoforum* 35: 275–283.

McDonald F (2013) *The Carbon Farming Initiative (CFI) and Indigenous community-based natural and cultural resource management: A case study of the Fish River Savannah Burning Methodology Project.* Unpublished Minor Masters thesis, University of Melbourne, Australia.

McElwee P (2011) Payments for environmental services as neoliberal market-based forest conservation in Vietnam: Panacea or problem? *Geoforum* 43(3): 412–426.

McWilliam A, Palmer L and Shepherd C (in press) *Lulik* encounters and cultural frictions in East Timor: Past and present. *The Australian Journal of Anthropology.*

MEA (Millennium Ecosystem Assessment) (2005) *Ecosystems and Human Well-being: Synthesis*. Washington, DC: Island Press.

Molitor M and Tilmouth T (2011) *Design of the Carbon Farming Initiative consultation paper.* Submission to the Department of Climate Change and Energy Efficiency on behalf of CarbonShift Advisory Pty Ltd. and the Aboriginal Carbon Fund, 12 January 2011. Sydney: CarbonShift Advisory.

Muller S (2008) Indigenous payment for environmental service (PES) opportunities in the Northern Territory: Negotiating with customs. *Australian Geographer* 39(2): 149–170.

Nielsen J and Sejersen F (2013) Earth system science, the IPCC and the problem of downward causation in human geographies of global climate change. *Geografisk Tidsskrift-Danish Journal of Geography* 112(2): 194–202.

Norgaard R (2010) Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecological Economics* 69: 1219–1227.

NAILSMA (2011) Submission to the Department of Climate Change and Energy Efficiency on the Carbon Farming Initiative, 8 April 2011. Darwin: NAILSMA.

Northern Land Council (2006) *Celebrating Ten Years of Caring for Country: A Northern Land Council Initiative*. Darwin: Northern Land Council.

Palmer L (2006) Nature, place and indigenous polities. *Australian Geographer* 37(1): 33–43.

Palmer L (2007) Interpreting nature: The politics of engaging with Kakadu as an Aboriginal place. *Cultural Geographies* 14: 1–19.

Palmer L (2010) Enlightening development: Water management in the post-conflict Baucau City, Timor-Leste. *Singapore Journal of Tropical Geography* 31: 357–370.

Palmer L (forthcoming) The 'environment' in Timor Leste. In: Hirsch P (ed.) *Routledge Handbook of the Environment in Southeast Asia*. London: Routledge.

Palmer L and Carvalho DA (2008) Nation building and resource management: The politics of 'nature' in Timor Leste. *Geoforum* 39: 1321–1332.

Pattanayak S, Wunder S and Ferraro P (2010) Show me the money: Do payments supply ecosystem services in developing countries? *Review of Environmental Economics and Policy* 4: 254–274.

Popke J (2006) Geography and ethics: Everyday mediations through care and consumption. *Progress in Human Geography* 30: 504–512.

Povinelli E (1993) *Labor's Lot: The Power, History, and Culture of Aboriginal Action*. Chicago: University of Chicago Press.

Putnis A, Josif P and Woodward E (2007) *Healthy Country, Healthy People: Supporting Indigenous Engagement in the Sustainable Management of Northern Territory Land and Seas: A Strategic Framework*. Darwin: CSIRO.

Robertson M (2004) The neoliberalization of ecosystem services: Wetland mitigation banking and problems in environmental governance. *Geoforum* 35: 361–373.

Robinson C, Gerrard E, May T and Maclean K (2014) Australia's indigenous carbon economy: A national snapshot. *Geographical Research* 52(2): 123–132.

Rose D (1988) Exploring an Aboriginal land ethic. *Meanjin* 47(3): 378–386.

Rose D (1996) *Nourishing Terrains: Australian Aboriginal Views of Landscape and Wilderness*. Canberra: Australian Heritage Commission.

Rose D (2005) An indigenous philosophical ecology: Situating the human. *The Australian Journal of Anthropology* 16(3): 294–305.

Rose D (2011) *Wild Dog Dreaming: Love and Extinction*. Charlottesville, VA: University of Virginia Press.

Roth R and Dressler W (2012) Market-oriented conservation governance: The particularities of place. *Geoforum* 43: 363–366.

Russell-Smith J, Whitehead P and Cooke P (eds) (2009) *Culture, Ecology and Economy of Fire Management in North Australian Savannas: Rekindling the Wurrk Tradition*. Melbourne: CSIRO Publishing.

Russell-Smith J, Cook G, Cooke P, Edwards A, Lendrum M, Meyer C and Whitehead P (2013) Managing fire regimes in north Australian savannas: Applying Aboriginal approaches to contemporary global problems. *Frontiers in Ecology and the Environment* 11 (online issue 1): e55–e63.

Shepherd C (2013) *Development and Environmental Politics Unmasked: Authority, Participation and Equity in East Timor*. London: Routledge.

Smith N (2007) Nature as accumulation strategy. *Socialist Register* 43: 19–41.

Smyth D (2011) *Indigenous Land and Sea Management – A Case Study* (Report prepared for the Australian Government Department of Sustainability, Environment, Water, Population and Communities on behalf of the State of the Environment 2011 Committee). Canberra: DSEWPaC.

Stevens S (ed.) (2014) *Indigenous Peoples, National Parks and Protected Areas*. Tucson: University of Arizona Press.

Strang V (2013) Conceptual relations: Water, ideologies, and theoretical subversions. In: Chen C, Macleod J and Neimanis A (eds) *Thinking with Water*. Montreal: McGill-Queen's University Press, 185–211.

Sullivan S (2009) Green capitalism, and the cultural poverty of constructing nature as service provider. *Radical Anthropology* 3: 18–27.

Sullivan S (2010) Ecosystems service commodities: New imperial ecology? Implications for animist immanent ecologies, with Deleuze and Guattari. *New Formations* 69(6): 111–128.

Taussig M (1980) *The Devil and Commodity Fetishism in South America*. Chapel Hill: University of North Carolina Press.

Tuana N (2008) Viscous porosity: Witnessing Katrina. In: Alaimo S and Hekman S (eds) *Material Feminisms*. Bloomington: Indiana University Press, 188–213.

Tully J (1995) *Strange Multiplicities: Constitutionalism in the Age of Diversity*. Cambridge: Cambridge University Press.

Van Dam C (2011) Indigenous territories and REDD in Latin America: Opportunity or threat? *Forests 2*: 394–414.

Vatn A (2010) An institutional analysis of payments for environmental services. *Ecological Economics* 69: 1245–1252.

Viveiros de Castro E (1998) Cosmological deixis and Amerindian perspectivism. *Journal of the Royal Anthropological Institute* 4: 469–488.

Whitehead P, Purdon P, Russell-Smith J, Cooke P and Sutton S (2008) The management of climate change through prescribed savanna burning: Emerging contributions of indigenous people in north Australia. *Public Administration and Development* 28: 374–385.

Winer M, Murphy H and Ludwick H (2012) *Payment for Ecosystem Services Markets on Aboriginal Land in Cape York Peninsula Potential and Constraints* (Occasional Paper 6). Geneva: United Nations Research Institute for Social Development (UNRISD).

Woodward E, Jackson S, Finn M and Marfurra McTaggart P (2012) Utilising indigenous seasonal knowledge to understand aquatic resource use and inform water resource management in northern Australia. *Ecological Management and Restoration* 13(1): 58–64.

Wunder S (2005) *Payments for Environmental Services: Some Nuts and Bolts* (Occasional Paper No. 42). Bogor: Center for International Forestry Research.

Yanner M (2013) A proving ground for proud carers of country. *Canberra Times*, 13 May. Available at: http://www.canberratimes.com.au/comment/a-proving-ground-for-proud-carers-of-country-20130512-2jg1s.html (accessed 29 May 2014).

Young E, Ross H, Johnson R and Kesteven J (1991) *Caring for Country: Aborigines and Land Management*. Canberra: Australian National Parks and Wildlife Service.

Zander K (2013) Understanding public support for indigenous natural resource management in northern Australia. *Ecology and Society* 18(1): 11.

Zander K and Garnett S (2011) The economic value of ecosystem services on indigenous-held lands in Australia. *PLoS ONE* 6(8) (e23154): 1–6.