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Ecosystems based enterprise opportunities for Indigenous people in northern Australian savannas

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Literature review for the BNHCRC project on Payments for Ecosystem Services

Ecosystems based enterprise opportunities for Indigenous people in northern Australian savannas

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Abstract

We provide an economic perspective of the role of Indigenous communities in managing savanna natural resources i.e. their duty of care for country, their use and value of these resources and related capabilities. This study addresses the main ecological, economic and social issues, and the related challenges, associated with current development proposals for Australia's northern savannas. To connect these issues, we propose a savanna ecosystem services (ES)-economy framework based upon people's connections with their country, and apply Sen's capability approach to understand the importance of such connections for indigenous wellbeing. Currently the role of many, especially intangible ES, for indigenous wellbeing is greatly underestimated and misunderstood. We outline payments for ES (PES) opportunities that will enhance livelihoods of rural indigenous communities while providing them with culturally appropriate employment. We evaluate current Government-funded environmental programs that mostly address ecosystem management, in comparison to PES programs. Our framework emphasizes the importance of regional PES programs for developing long-term sustainable economies that provide culturally appropriate benefits for local communities, as well as for the wider Australian public.

Key words: ecosystem services, payments for ecosystem services, indigenous people, indigenous wellbeing, capability approach, northern development.

Introduction

The major Australian political parties, Labour and the Liberal-National Coalition, have again recently pledged support for enhancing 'Northern Development', albeit following a history of limited success over the past six decades. These mainstream political parties perceive northern Australia as a vast, but essentially undeveloped, landscape (~2 M km^2) with abundant natural resources, providing an ideal niche for 'monetized' economic development. Current Government documents (a Green paper released by Department of the Prime Minister and Cabinet 2014 and a White paper by the Australia Government 2015) portray 'northern development' from a typical economic-utilitarian perspective for: enhancing choices/opportunities; providing access to, and utilization of, resources; providing infrastructure and facilities for people and financial returns for the larger Australian economy. The political perception of 'Northern Development' is mainly about generating money for the Australian economy through establishing agriculture, pastoral, mining and other businesses, with little understanding of development opportunities that may be meaningful for local, especially Indigenous, communities.

Available scientific evidence suggests that conventional political-economic development approaches will lead to cascade of failures if sustainable options are not carefully evaluated (Dale et al. 2014; Davidson 1998; Grice et al. 2013). Most importantly, such development approaches (of the Department of the Prime Minister and Cabinet 2014 and the Australian Government 2015) do not address regional Indigenous issues and aspirations. Northern Australia supports a population of 1.3 million, of which 19% is Indigenous, with Indigenous majorities in many remote rural locations (the Australian Government 2015). Regrettably, there is little mention on how these people could be engaged in the process of 'Northern Development' (e.g. Northern Territory Government's response to the Green Paper; Northern Territory Government 2014).

Current development plans do not realistically account for the role of Indigenous people in managing land and sea 'country', and of the range of socio-cultural services that savanna ecosystems provide to the local and the wider Australian public. Many Indigenous communities can and do contribute to managing savanna ecosystems while living on outstations, out of a duty of care and responsibility for their traditional estates. Current government initiatives do not recognize these cultural obligations but, rather, suggest that Indigenous people are simply making lifestyle choices' by living on remote outstations (The Australian, dated 11 March 2015).

Land and sea management enterprise opportunities can afford new pathways for culturally appropriate economic development where currently few mainstream job opportunities exist (e.g. working in mining and pastoral sectors, or service industries). This paper highlights the economic importance of 'duty of care for country', and offers an alternative integrated, culturally appropriate, sustainable perspective on 'northern development'. We provide a review of global PES programs, and of some recent Australian Government-funded environmental initiatives. Our emphasis is on seeking cost-effective solutions to enhance economic capacity, people's capabilities and overall wellbeing while maintaining natural assets and the delivery of a range of socio-cultural services from savannas.

Background

Australian tropical savannas cover an area of 1.9 million km^2 i.e. a quarter of the Australian land mass (Fig.1). The savannas comprise a diverse array of landscape features ranging from savanna grasslands, woodlands and open forests, to monsoon rainforests, Acacia shrublands and wetlands supporting a rich diversity of flora and fauna with high endemism (Woinarski et al. 2004, 2010, 2011).

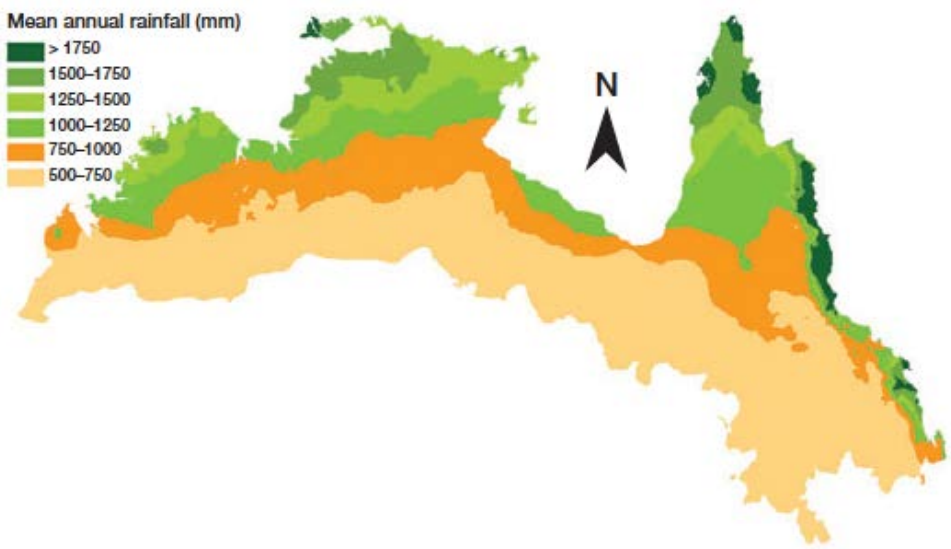


Fig. 1. Savanna region in Australia with different rainfall isohyets for the period 1969-2008 (Source: Russell-Smith et al. 2013)

In terms of human resources, the savanna region is sparsely populated. Of the total regional population of ~1 million, the major centres (Cairns, Townsville, Mt Isa (Queensland), Darwin, Palmerston, Katherine (Northern Territory), and Broome (Western Australia)) support about 751,000 people (Australian Bureau of Statistics; ABS census 2012, Russell-Smith et al. 2015a). Mostly, Indigenous people (~190,000) live in remote outstations and have low level of employment (ABS 2012, 2012-13, 2013). Savanna socio-economic development issues affecting remote Indigenous communities are highlighted by Dale (2014), Russell-Smith et al. (2009), Russell-Smith and Whitehead (2015), Whitehead et al. (2014), Whitehead and Oliver (2014), amongst others. A main concern for development in the region is how to enhance employment or business opportunities that are culturally appropriate, sustainable and provide long-term benefits to the Indigenous people.

Currently, pastoralism (beef cattle production), mining, followed by conservation, tourism and subsistence production (fishing, hunting or other Aboriginal activities) are the main land-use based economic opportunities. Economic returns on investment for these land uses, except for mining, are minimal (e.g. pastoralism – only 0.3-2% average over a decade; McCosker et al. 2010, and Griener 2014). The cattle industry in the NT in 2013-14 was worth $328.8 million (63% of the total value of $521.2 million of rural industries) followed by horticulture $107.7m (21% of the total value of rural industries) (Overview and Outlook report 2014), suggesting little diversity in land use. Other minor industries i.e. fisheries and mixed farming constituted only 16% of the total value of rural industries. A Meat and Livestock Australia (MLA) report by McCosker et al. (2010) particularly emphasized an increase in on-site costs in the recent years for the northern beef industry. Most importantly, all the major industries reported about 18% decrease in 2013-14 compared to the previous year (Overview and Outlook report 2014). Currently, lack of diversification in rural industries makes the savannah rural people particularly vulnerable to external conditions such as fire regimes, changes in climate and global market.

Given limited potential for land uses (e.g. intensive agriculture, grain-fed pastoralism) that could reduce fire risks in fire-prone savannas, most of the landscape indeed requires active fire and intensive management. On average, ~20% of the savannas (300,000 - 400,000 km^2) are burnt each year (Fig. 2: Russell-Smith and Whitehead 2015). The impacts of contemporary savanna fire regimes are discussed by many researchers (Edwards et al. 2013a-b; 2015; Fisher

and Edwards 2015; Russell-Smith et al. 2009, 2012a-b and 2013, and 2015a; Whitehead et al. 2013, amongst others). Edwards et al. (2015) highlighted fire impacts on ecological assets and processes that have ramifications not just at local scales, but also at regional and national scales.

Fire management is critical for preventing offsite impacts of fire, weeds and pests and their related costs, to prevent loss of biodiversity, and to maintain flow of ecosystem services (ES) for the local and wider Australian public. Indeed, fire management is crucial for establishing new businesses as proposed in the 'Northern Development' plan (Green paper; Grice et al. 2013 on agri-businesses).

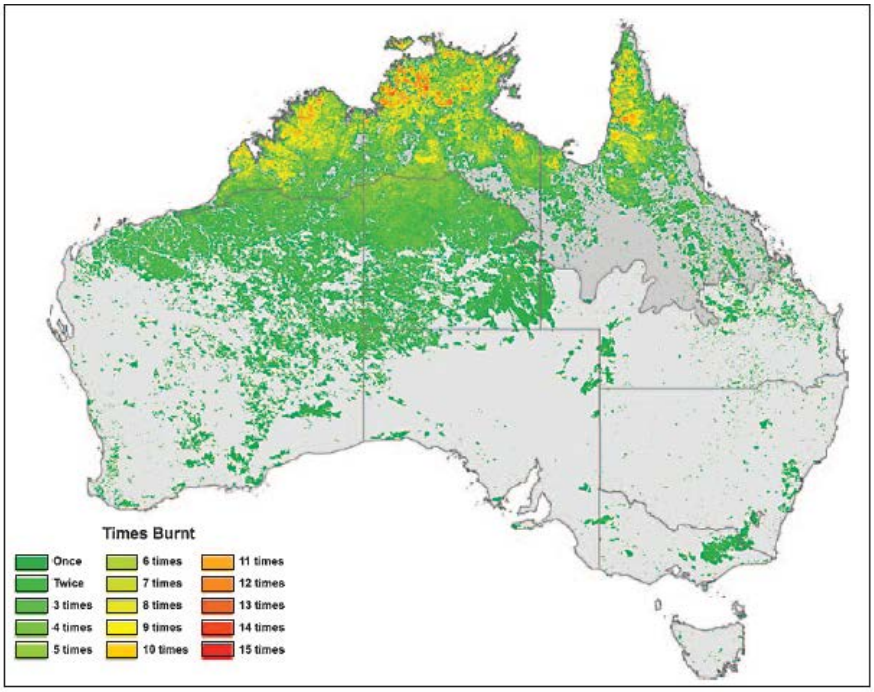


Fig. 2. Frequency of large fire affected areas (>2-4 km^2) from 1997-2011 suggesting many areas in the savanna region (a line in the north) are burnt >7 times compared to the area in rest of Australia (source: Russell-Smith and Whitehead 2015).

From a savanna land management context, remote Indigenous communities can play a significant role in maintaining landscape values. There are about 1200 remote communities (approximately 120,000 people) comprising 30% of total indigenous population who live on outstations in Queensland, Western and South Australia, and in the NT (Altman 2006). In the NT alone, about 10,000 Indigenous people live on 500 outstations. Many of these people, especially elders, have traditional knowledge for managing their land (Altman and Kerins 2012; Russell-Smith et al. 2009; Grieves 2009; Sangha 2005, 2007 and Sangha et al. 2011, 2015). However, due to lack of suitable opportunities in these remote areas, these people largely depend upon welfare payments for living.

We propose that Indigenous people living in the remote areas can play a critical role in the success of proposed new agri-businesses and in the management of land and sea resources under the current Government's north development plans. Moreover, Indigenous people can be actively engaged in employment through land and fire management activities that benefit the Indigenous and non-Indigenous people at local, regional and national scales. Developing land management enterprise opportunities (focused, for example, on fire, weed, and pest management), whilst at the same time enabling ongoing cultural practices, has many potential

additional benefits, including:

1. Maintaining and enhancing the provision of ESs for local and regional communities;
2. Protecting biodiversity, ecosystem function and processes, thereby reducing broader societal costs for environmental management (e.g. soil and water conservation; weed and pest management);
3. Enhancing community cultural identity, wellbeing and self-esteem;
4. Savings to Government expenditure on welfare services;

A vision for 'northern development'

Globally, many researchers have emphasised the need to revamp the current economic development model by incorporating the intrinsic role and value of natural systems (Costanza et al. 1997, 2012 and 2014, de Groot et al. 2012, Daly 2005, 2013, Millennium Ecosystem Assessment (MA) 2003, 2005a-c). Additionally, there is also a need to consider people's socio-cultural values, and their overall wellbeing for the real meaning of developed economies. According to the Nobel Laureate, Professor A. Sen (1993, 1999a&b), the basic objective of economic development should be to create an enabling environment where people can enjoy long, healthy and creative lives. He proposed a Capability Approach (Sen 1993) that recognises valuing cultural activities—for example, in the instance of Indigenous savanna residents, recognising the importance to individuals of being able to visit traditional country, perform cultural ceremonies, practice and teach traditional skills and capabilities (e.g. traditional ecological knowledge) to younger generations. .

In developing a sustainable development model there is an evident need to credit such knowledge and capacities. As suggested by Altman et al. (2006, 2011) and others, natural resource- and capability-based arrangement needs to underpin 'inclusive and appropriate development' of the north. Moreover, limited human and infrastructural resources, limited economically sustainable land use options and lack of culturally appropriate opportunities constraint development options in the northern savannas (Russell-Smith et al. 2015). Various studies indicate that Indigenous wellbeing is positively enhanced through the implementation of culturally appropriate land management activities (Gilligan 2006, Hunt 2010 and Russell-Smith et al. 2009). Garnett et al. (2008), Burgess et al. (2009) and the Australian Human Rights Commission (2008) have shown clear linkages between health outcomes and Indigenous people living and working on their traditional lands. Many of these values that people derive from living on land are non-monetised. Based upon available literature (Grieves 2007 and 2009; Altman et al. 2006; Sangha 2005, 2007; Sangha et al. 2011 and 2015; Taylor 2008 and others), we present a holistic framework for indigenous wellbeing that integrates natural, social, cultural and economic values (Fig. 3) and provides multiple monetary and non-monetary benefits..

As an economic analogy, the current Government spends about AUD 43,449/head/year for Indigenous well-being which is more than double that for non-Indigenous well-being (i.e. AUD 20,900/head/yr; Steering Committee for the Review of Government Service Provision (SCRGSP) 2014). More than 50% of this expenditure is targeted towards safe communities, health and economic participation with policy emphases to close the gap between Indigenous and non-Indigenous well-being. To improve Indigenous well-being, it is critical to understand the role of country in people's socio-economic well-being by applying a holistic well-being framework as proposed in Fig. 3. We propose to match the indigenous welfare expenditure with non-Indigenous but by providing Indigenous people an enabling environment such as security and access to country, and culturally appropriate economic opportunities through Payments for Ecosystem Services (PES). Using PES mechanisms, about 50% of the welfare expenditure can

be traded-off to enable people to live and work on country that will provide culturally appropriate economic opportunities for future development.

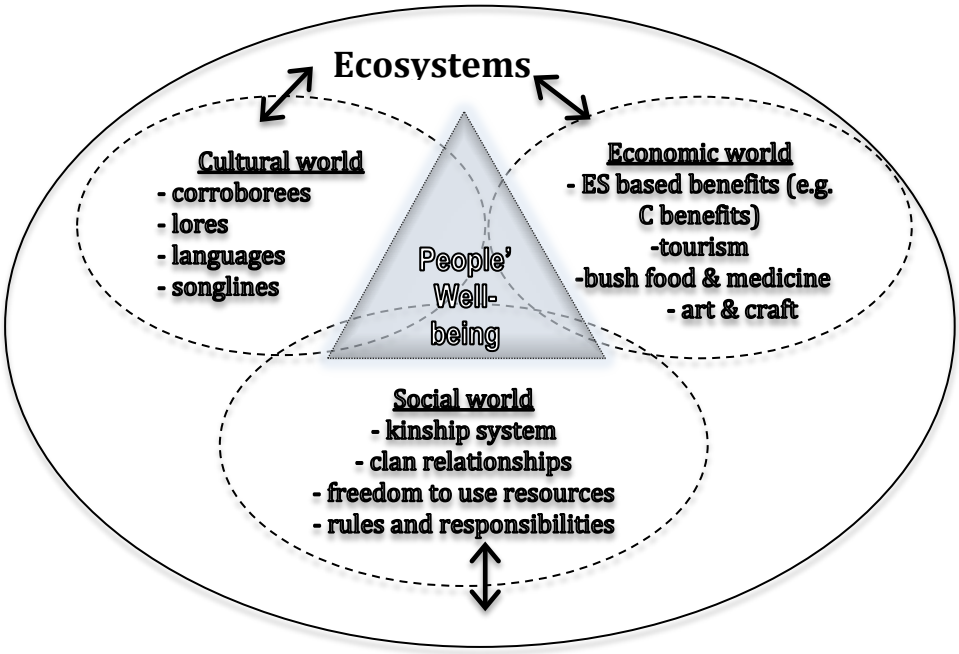


Fig. 3. Wellbeing framework linking people's social, cultural and economic relationships with their traditional country (or, as described here, with the ecosystem) (source: Sangha et al. 2015).

A way forward: Payments for ecosystem services (PES)

Sustainable use and management of natural resources and their services can contribute significantly to provide a long-term solution for developing the north (Russell-Smith et al. 2015a-b; Whitehead and Oliver 2014). Savanna ecosystems deliver many ES in the form of various tangible ($) and intangible (non-$) benefits that comprise important component of the local and regional economy. The main savanna ES are categorized in Table 1, following the Millennium Assessment (MA 2003) framework:

Table 1: Main ES of savanna ecosystems.

Provisional services	**Regulating services**	**Cultural services**
Pasture production*	Climate (C) regulation*	Ceremonies/Corroborees
Mining*	Cyclone/storm protection	Identity values
Tourism*	Flood regulation	Spiritual values
Bush food and medicine	Water regulation	Songlines and Language (in relation to land/sea)
Art and craft materials		Recreation
		Social activities e.g. hunting
		Education/Traditional Ecological Knowledge (TEK)

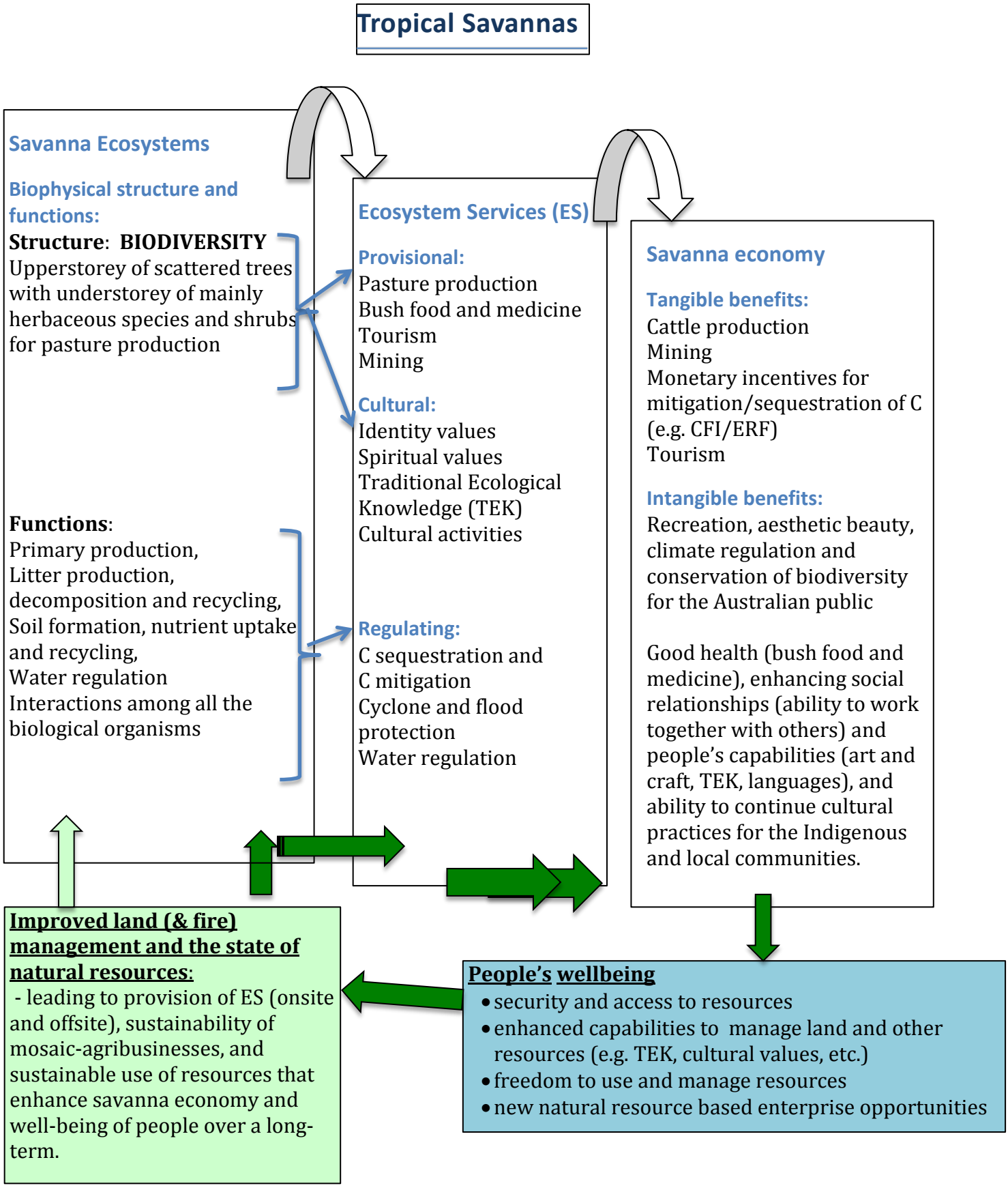
*ES with Monetary value; Climate regulation provides $ benefits for C sequestration and mitigation on some Indigenous properties that are registered under the Emissions Reduction Fund (ERF) or CFI (Carbon Farming Initiative))

All the other ES have non-monetary values:

- Cyclone and flood protection – an important service to the northern region that is prone to frequent cyclone events
- Flood protection – a substantial service to the northern region due to its susceptibility to floods
- All the cultural services (although the importance of these services is well recognized in Indigenous wellbeing).

The value of intangible services (listed in Table 1) is either under-estimated or not considered in the current north development model (Department of the Prime Minister and Cabinet 2014). A total value of new land and sea management opportunities could be assessed from saving/reducing the costs of welfare expenditure, weed and pest management, and of health and other associated social issues (drinking, smoking, etc.), apart from the long-term non-monetary benefits of building skills and capacities in land and sea management. It is also important to note these services benefit not just local communities but also the wider Australian public. To understand the importance of these services in the savanna regional economy, we propose a savanna ES-Economy framework linking various ES to the economy (Fig. 4).

Fig. 4. ES-Economy framework for savannas linking ecosystems and economy.



Many researchers (Dale 2014, Edwards and Russell-Smith 2009, Edwards et al. 2013a-b, 2015, Russell-Smith et al. 2009, 2013, 2015a-b, Russell-Smith and Whitehead 2015, Walsh et al. 2014, Whitehead et al. 2014, Whitehead and Oliver 2014, and others) have highlighted the severe impacts of fire, weed and pest species that can seriously damage the northern economy. The current rough estimates on the costs of fire management - AUD 18/ha (Riggs 2015; Manager, Mataranka Station, NT), weed and pests management - AUD 100/ha for each weed species (Natural Resources Division, Department of Natural Resources, Environment, the Arts and Sport, 2010) and AUD 46/ha per species (Murray et al. 2013) for each pest species, suggest that these can cost about 27.74 billion per year, using the conservative estimates for weed and pest management (1 species, each) for the savanna region alone. It is important to note that there are 16 species each, weeds and pests, that require serious management efforts (Natural Resources Division, Department of Natural Resources, Environment, the Arts and Sport, 2010). Given the lack of human resources, and lack of land and fire management in remote areas, a faster spread of several notorious weeds and pests in savannas is inevitable. In addition, there will be many off-site negative impacts of fire, and of weed and pest species, if savanna landscape is not managed properly. To save the costs of land, fire, weed and pest management, rural Indigenous communities living on country provide a solution that can help to manage country as well as to ensure ecosystem benefits to the Australian society. For this, we need to engage people in the management of their country by providing them benefits through PES.

The development of PES opportunities is central to developing a sustainable savanna economy. A commonly used definition for PES is “it is a voluntary transaction where a well-defined ES (or a land use likely to secure that service) is bought by a minimum of one ES buyer from a minimum of one ES provider” (The Department for Environment, Food and Rural Affairs, UK 2013). The basic principles of PES involve voluntary, conditional (setting standards for ES) or additional (in additional to the usual land use), beneficiary (ES beneficiaries pays the supplier) or direct transactions among the stakeholders, which are mainly the ES providers and ES beneficiaries. Potential PES mechanisms for savannas are:

1. Benefit transfer for environmental stewardship (ensuring continuity of ES or avoiding degradation of ES; transactions among the ES providers i.e. local/indigenous community and the ES beneficiaries i.e. public or any stakeholder);
2. Offsets (offsetting the negative impacts of any development related activity of the ES beneficiaries (i.e. mining, industry or agricultural companies) by paying the ES providers i.e. local/indigenous community);
3. Cap and trade of ES by establishing a limit on the amount of ES that could be exploited/compromised;
4. A combination of benefit transfer, offset or cap and trade mechanisms to ensure the continuity of ES and to reduce the impact of development activities for public interest.

For savannas, examples of ES beneficiaries include Government (i.e. the state) which pays to maintain/enhance ES on the behalf of public, mining or agricultural companies. ES providers include local and Indigenous communities (including land managers of grazing, sustainable farming or conservation areas etc.) who ensure the supply of ES. There could be private and/or public organisations involved in a PES program, with scientific organisations and universities playing an intermediary role in helping to establish such programs. The key steps to start a PES scheme (Heredia Declaration on PES in 2007; Farley and Costanza 2010) are:

1. ES measurement: to identify, measure, map, model and value ES
2. Sustainable funding: to identify the suitable and reliable beneficiaries and producers

3. Adaptive management: integration/update of information for measuring, valuing and managing ES
4. Efficient mechanism: institutional interface between the beneficiaries and producer

Over the past 10 years, there have been many examples of well-established PES programs, especially in Costa Rica and some other Latin American countries. The Economics of Ecosystems and Biodiversity (TEEB) – a global institute on valuing economic benefits of biodiversity and other services from ecosystems, provides a large database of various global PES studies, some are presented in Table 2, including a few from Australia.

Table 2: Summary of PES case studies worldwide and in Australia.

Case study	ES	PES- type of funding	Country
GLOBAL studies: mostly from TEEB			
TEEBcase by Cassorola (2010a): Conserving forests through periodic grants, Brazil	Preventing deforestation (protecting natural areas).	Endowment fund by the Government of Amazonas in collaboration with few NGOs (Non-Government Organizations)	Brazil
TEEB case study by Cassorola (2010b): PES for watershed conservation	Ensuring a regular and quality water supply to a metropolitan area.	Local government	Brazil
TEEBcase by Goldman et al. (2010): Linking people and nature through Watershed conservation	The upstream areas provided clean and ensured water supply (regular flow with reduced sedimentation) to the down-stream areas.	Water funds established through the public (city council) and private (The Nature Conservancy) partnership	Colombia
TEEBcase by Hack et al. (2013): Payments for hydrological ES in the Gil Gonzalez Watershed	Water quality, quantity and its flow for maintenance of hydrological services in the region.	A sugar company (CASUR), the local municipality and a German Development Cooperation (as a facilitator)	Central America
TEEBcase by Nishimiya (2010): Offsetting Industrial groundwater consumption through partnerships between industry and farmers	Locals demanded the company to re-pay for the extraction of water (Sony Semiconductor Kyushu used water for cleaning) and the co-operative farmers were benefitted for applying conservative water practices.	A company paid the farmers	Japan
TEEBcase by Pagiola and Arcenas (2013): Regional integrated silvo-pastoral ecosystem management project	Pasture-based cattle grazing generate high GHG emissions. PES was directed to pastoral systems for sustainable farming to improve ES, based on an ES index (level of ES). There were differential payments according to the level of ES.	Global Environmental Facility (GEF), World Bank, in collaboration with NGOs	Costa Rica, Colombia and Nicaragua
TEEBcase by Tongson and Balasinorwala (2010): Payments for ES, Sibuyan Island, Philippines	Water supply and reduced sedimentation to the downstream agriculture area.	Local Government Unit and World Wildlife Fund	Philippines
TEEBcase by Xiaoyun et al. (2012): PES in Xinjiang, Uyghur Autonomous region, China	To prevent degradation of natural forest areas for water regulation and provision of biodiversity.	Initial funding by the Government, and later by beneficiaries' salary cuts (categorized according to pay rate) to pay the providers	China

The Nature Conservancy (2006) report on ES (status and summaries)	This report lists various types of ES (water, biodiversity, reforestation, C sequestration, protection, recreation etc.) considered for PES throughout the world, without any case study from Australia.	The Nature Conservancy	World
AUSTRALIA: somewhat PES related and environment-targeted funding programs			
Biodiversity fund, Department of the Environment, Australian Government (started in 2011 with round one projects in 2011-12, round two projects in 2013-14)	It aims to assist the land managers to sequester carbon, enhance biodiversity and build greater environmental resilience across the Australian landscape.	Australian Government	Australia
Caring for Country (CfC) and Working on Country (WoC) program for Indigenous Australians (Caring for country 2015, Australian Government 2015)	CfC program (currently related to National Landcare program) manages natural resources for long-term benefits to people. WoC program aims to provide employment to Indigenous people for managing the country (currently employing about 680 Indigenous rangers throughout Australia).	Australian Government. National Landcare program costs $1 billion from 2015-2019. WoC program costs about $320 M from 2013-2018.	Australia
Auctions for salinity credits – Ecotender (Eigenraam et al. 2006)	To reduce salinity and improve water quality in central Victoria through improved land management. The tenders were conducted using an ES scorecard that the landholders filled to meet the set base criteria. The Department assessed the value of a bid in relation to ecological benefits offered by checking the scorecard against the cost of meeting those criteria.	Victorian Government	VIC, Australia
Griener, Gordon and Cocklin (2009)	Highlights cultural and biodiversity services from the Gulf of Carpentaria that could be targeted for payments.	No PES arrangement yet for any cultural or biodiversity service from the Gulf of Carpentaria	North Queensland, Australia
Nature Assist (Nature refuge) (Higgins et al. 2014)	Nature Assist program was started by the Queensland Government in 2006 to provide incentives to the landholders (graziers) through setting up Nature refuges.	Government funding. Nature Assist provided economic incentives worth $ 12 M to the landholders.	Queensland, Australia

Reef program, Wet Tropics and overall in the Great Barrier Reef (GBR) catchment (Terrain 2015 and Reef Programme 2015) Reef Rescue program (now called Reef program, as mentioned above) (Higgins et al. 2014)	To improve water quality in the GBR region by improving farming practices (e.g. sugarcane, banana, multi-cropping and diary industries). Reef Rescue program was started in 2008 to reduce soil sedimentation and improve water quality in the GBR catchments.	Government Single farm grants up to $30,000 and multiple farm grants up to $150,000, apart from small grants up to $5,000 and Mill area grants up to $150,000, in the wet tropics area. Reef Rescue provided economic incentives (based upon land management criteria) worth AUD 200 M (these were not regular payments).	Qld, Australia
Russell-smith et al. (2015a,b)	C abatement (may also include C sequestration) through fire management in rainfall zones >1000mm/yr and 600-1000mm/yr of tropical savannas. Potentially, a number of projects registered in this program.	CFI/ERF program commenced by the Federal Government except for WALFA project that is supported by ConocoPhillips Co.	Australia
Other specifically targeted environment programs	To save the red-tailed black cockatoo habitat conservation (the Department of Sustainability and Environment, VIC), To rehabilitate wetlands in NSW (Broadwater, rehabilitation of wetlands), To evaluate the potential benefits of PES in the Murray-Darling Basin – suggesting the bundle of ES from improved water supply (biodiversity, etc.) (Banerjee and Bark 2013).	Mostly funded by (or proposed for funding to) the State or Federal Government.	Various States, Australia

As evident from Table 2, many PES programs have been established worldwide only recently (MA 2005; Schomers and Matzdorf 2013) while in Australia, only a few PES schemes have been implemented until now.

Main differences between the PES and Government-funded environmental programs:

The Australian Government supports land management/environmental activities by providing economic incentives to land managers (farmers, Indigenous stakeholders, local communities) through various targeted programs (Table 2). However, most of these programs only aim for specific environmental outcomes, over a limited period. For example, the water-trading scheme in the Murray-Darling Basin focuses only on water credits (Commonwealth of Australia 2014) and a reef program mainly focuses on reducing the flow of sediments and chemicals to the reef systems (Reef Programme 2015). Whitten and Shelton (2005) suggested that Australian funding programs do not meet the definition of PES because often land managers are paid only for improving management practices to meet the set targets, over a limited tenure, without any long-term arrangements to ensure ES. There are no payments for those who already manage

their land well. Moreover, some of these programs are involuntary, with poorly defined ES, ES providers and buyers, and with little rewards to environmental stewards.

The main limitations of Government-funded programs are:

1. Limited in temporal tenure, usually short (2-5 years);
2. Limited in scope for addressing 1-2 problematic environmental issues;
3. Discouragement (lack of incentivizing) 'good' practices - rather, only providing incentives to those with problems.

In comparison, a PES program:

1. Encourages good environmental practice and pays the ES suppliers;
2. Sets up a pathway by means of a monetary transaction for fair distribution between ES beneficiaries and providers, at local, regional or global levels;
3. Can provide a long-term solution to set-up mechanisms for ongoing transactions;
4. Ensures the interests of the wider public as well as ES suppliers.

A brief comparative account of PES and Government-funded programs is presented in Table 3. We anticipate that substantial gains could have been achieved if the Australian Government had invested in setting up PES programs rather than various environmental programs separately (e.g. reef programme (2015) currently targets only for reductions in sediment and pesticide flow to the GBR, with little focus on a holistic approach to improve all the terrestrial area (agriculture and non-agriculture) next to the GBR).

Table 3: A comparative account of PES and Government-funded programs.

	PES	**Government-funded programs**
Main objective	To credit the environment stewardship. It aims to support sustainable and conservation practices and values.	To save/protect the environment by setting one or a few targets, especially when there is a threat to, or a loss of, environment values.
Approach	The buyers pay the seller for provision of ES. Government, private organisations (NGOs or local communities) or a mix of such organizations involve in transactions. So, there are mutual agreements.	Government provides funds to the stakeholders mainly for implementing improved management practices, to achieve the set targets or reduce threats. Mostly one party i.e. the Government, defines the agreements.
Mechanism	The seller (landholder) contracts the buyer (public, corporation, private land holders etc.) to ensure the supply of particular ES (e.g. clean water to the downstream population). The buyer pays money to the seller, based on the criteria chosen for meeting ES demand.	Usually, the Government provides funds to land managers to manage their land to meet required management outcomes. These management outcomes are usually one or a few specific targets without any specific criteria, mainly to improve environmental outcome or to reduce a threat.
Participation	Active involvement of the ES providers and the ES beneficiaries in the whole process of setting up transactions. It can lead to 'real' career opportunities for the ES providers e.g. Indigenous stakeholders and pastoralists.	These programs are mostly driven by the Government authorities' understanding, and often lack consultation with the stakeholders at the decision-making process (in setting up a funding program). Usually occasional, without providing any real career opportunities for the stakeholders.
Effectiveness	Relatively effective, especially, when the private organisations are involved with transactions conditional upon the provision of ES.	Depends upon the program and its standards/criteria, and the willingness of Government departments to implement the program.
Longevity	The PES arrangements are usually expected to continue and to resume automatic transactions between the supplier and the buyer, with little or no external inputs when these ensure a long-term supply of ES from the supplier to meet the needs of the buyers.	The specific targeted environmental programs are implemented usually for 2-5 years, and often these programs don't continue over a long-term.
Scope	Broad, in terms of ES as well as the number and kind of stakeholders. It could include a few or a bundle of ES for one or > one stakeholder.	Narrow. Generally, one or a few environmental targets to meet the required outcomes, mostly for one stakeholder i.e. the Government.
Disadvantage	The buyers may struggle for requiring to pay money for the ES benefits that they may have taken for granted in the past.	Often not targeted to encourage good practices rather, the programs provide incentives to the fixers (to implement change to improve the environment).

Proposed procedure to commence a PES scheme in savannas:

The PES potential to improve socio-economic conditions of remote Indigenous communities is well recognized, given the availability of suitable indigenous capabilities, remoteness, fire risk, and lack of human resources in savannas (Whitehead and Oliver 2014, Russell-Smith et al. 2015b and others). There are mutual benefits for the communities, the public and the Government, that can lead to culturally appropriate development options for Indigenous people. For savannas, activities such as mining, agriculture under the proposed development program may compromise ecosystem assets and their services, and will also require fire and land management at a regional scale, particularly intensive management will be required to protect mosaic agriculture projects (Grice et al. 2013).

Currently, the Australian Government, including the NT Government (Environmental Protection Authority) has generic environmental offset policies without any mandate to offset environment damage. Particularly, there are no specific policies for benefit transfer or cap and trade operations that could be applicable for indigenous fire and land management. The Government can play an important role in developing robust regulatory mechanisms to offset environmental damage, to transfer benefit for environmental stewardship, to assign a cap to limit the impacts of development activities, or to apply a mix of these approaches that can help transact money from the ES beneficiary to the provider. This demands a well-defined PES regulatory framework recognising ES stewardship and establishing a mandate to offset/cap environmental impacts, which are missing in the current policies (Whitehead and Oliver 2014). Government (at Commonwealth, and State/Territory, levels) can be instrumental in initiating such a framework to establish PES schemes.

To develop savanna PES policy framework, we propose to start at a local scale that can later be extended to a regional scale, applying and modifying the current federal Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, and/or related state/territory legislation such as the Environment Assessment Act 2013 in the NT (NT EPA), to include a mandate for environmental offsets or for the community or social benefits to value state's natural assets. The current legislation requires modifications to include PES mechanisms, somewhat similar to C Credit Act 2011. Alternatively, a new, uniform, PES policy framework can be developed to implement across the savanna region. Currently, there is some information available on PES legislation from IUCN (International Union for Conservation of Nature), World Resources Institute, and from an e-parliament PES website with most publications from Costa Rica suggesting to develop local scale frameworks. In savanna context, a local WAFMA (West Arnhem Fire Management Agreement 2006) and C Credits Act 2011 can be useful to develop a locally applicable PES policy framework.

To initiate the PES process, identifying, valuing and modeling ES is the first step (Farley and Costanza 2010). This can be conducted at property or regional levels, depending upon ownership and interest. A list of criteria concerning the current status or health of ecosystems and their component parts would need to be established to ensure delivery of key ES for regulatory purposes. These criteria could be presented as a scorecard for the ES supplier and beneficiary, with appropriate validation using on-ground (but expensive), Remote Sensing or Geographic Information Systems (at the later stages), approaches. Once ES values are identified and established, finding ES buyers (e.g. government, mining or agricultural or conservation companies) will be the next step that requires building trust and reliability among all the stakeholders. For savannas, identification and valuation of ES can be conducted concurrently while exploring potential ES stakeholders and the required policy instruments. Once a PES

scheme is established, auditing, monitoring, accreditation and sustainable funding are crucial to continue PES arrangements in the future. Ultimately, such projects will lead to improvements in the PES policy framework over time.

At present, there is a need for a strong commitment among all the stakeholders i.e. private, public and Government organizations, and an understanding of the fact that Indigenous stakeholders managing land and fire contribute to the development of the local and regional economy.

Some possible techniques to fund PES programs in savannas are:

- The Government and/or local institutions set up a common asset trust 'Savanna Trust' to collect levies/taxes from the developers (ES beneficiaries) and these funds could be used to pay the ES providers. Farley et al. (2015) proposed such mechanisms for managing natural assets at the state level in Vermont, US.
- A PES administrative body can be established to initiate ES transactions among the ES – providers and beneficiaries.
- The Australian public can contribute through current and/or new taxes to maintain ecosystem assets and their ES for the interests of present and future generations.
- Government can partially tradeoff current indigenous welfare expenditure for providing an opportunity to Indigenous people to live on homelands and manage their land while ensuring the maintenance of ecosystem assets and their services.
- Environment-outcome targeted Government funds can be used (re-directed) to set up PES mechanisms that are holistic and sustainable.
- NGOs (e.g. The Nature Conservancy, Bush Heritage Australia) or other private (development) organizations such as mining companies/industries may enter into an agreement with ES providers for transferring benefits (e.g. conservation/philanthropic NGOs) or for offsetting impacts (mining/agriculture companies) via PES mechanisms.

At this stage, a PES project funded through the Bushfire & Natural Hazards Cooperative Research Centre (BNH CRC), Darwin, NT, intends to evaluate the multiple ES benefits from land management projects at property and regional scales. After identifying and valuing ES, the project aims to explore payment opportunities in association with the stakeholders (ES – providers and beneficiaries) that could lead to the development of relevant policy framework and setting up of PES programs in the region.

Two case studies:
1. West Arnhem Land Fire Abatement project (WALFA), NT: This sets an example of PES–offset project that is monitored by the BNH CRC (Russell-Smith et al. 2013). The WALFA project started in 2006 on 28,000 km^2 area in the West Arnhem Land. It targets to reduce CO_2-e emissions and compensates indigenous communities for damage to their midden sites near Darwin Harbour that occurs (occurred) during the extraction of Liquefied Natural Gas by the ConocoPhillips Co (the firm involved in this enterprise). The project provides mutual benefits to Indigenous people (ES providers) and to ConocoPhillips Co. (the ES beneficiary) for mitigating CO_2-e emissions over the past 8-9 years (Russell-Smith et al. 2009, Russell-Smith et al. 2013 and annual WALFA reports). It currently abates 137,000 t of CO_2-e/year (an annual average 2007-2013) which are worth >1 million/year (depending upon C price). These benefits are about 77 times greater if C sequestration is also taken into account (mitigating and sequestering about 1.2m t CO_2-e/year). The project employs over 200 Traditional Owners and rangers for 9500 hours per year for fire management related activities (WAFMA 2013). This PES project enabled people to live on their country, work, earn and to practice their cultural ways. Although, its total benefits are yet to evaluate, the main benefits of the PES-WALFA project are:

- C income for the local indigenous community
- Mitigation of GHG emissions
- Protection of biodiversity from fire by implementing improved fire management practices
- Enabled people to live on land, to practice their cultural ways, to practice and enhance their TEK while building people's capabilities.

2. Fish River Fire Project (FRFP): This fire management project is an example of benefit transfer mechanism. It was commenced in 2012-13 on a 1781 km^2 property to the south of Darwin, NT. It was the first project to be set up under the Indigenous CFI. Currently, the project abates ~13,000 t CO^2-e/yr and sequesters 27,067 t C/yr, which is worth AUD 560,748/yr at a C price of AUD 13.95/t of C (generating AUD 183,163 for mitigation and AUD 377,584 for sequestration). In addition, there are multiple on-site benefits (e.g. protecting biodiversity values, cultural heritage sites) and off-site benefits (e.g. preventing the costs of fire, weed and pest spread) that are important for the Australian public and for the regional economy.

PES offers a genuine solution for many Indigenous people who wish to live on country and their role will be vital in managing land and sea resources in remote locations where many non-Indigenous people may not like to live. Such PES arrangements could significantly contribute towards northern economic development through appropriate land management activities that provide multiple social and cultural benefits.

Discussion

Understanding the values provided by ES to local and regional northern Australian savanna communities, and the nation generally, will provide an informed platform for the development

and establishment of novel PES opportunities in the decades ahead. The current 'northern development' paradigm is concerned solely with utilitarian economy to maximize the benefits to promote development or overall monetary gains.

Many researchers (Burgess et al. 2009; Garnet et al. 2008; Grieves 2007 and 2009; Russell-Smith et al. 2009; Sangha et al. 2011; Taylor 2008 and others) have highlighted the importance of 'country' to indigenous wellbeing and for people's capabilities in managing land. If Indigenous people can work on their country to carry out their cultural and other (weed/pest/fire) management activities, this will benefit them in terms of building their capabilities and enhancing wellbeing. They will be able to earn for living, to develop their capabilities for cultural practices and TEK, and to lead healthy and creative lives. This will enhance people's self-esteem and will empower them to develop new enterprises (Winer et al. 2012). Sen's Capability Approach (1999) suggests an innovative and feasible solution for northern development. He argued that 'development' is about enabling people to lead their healthy and creative lives while providing them an appropriate environment. We suggest that the proposed PES mechanisms can provide an enabled environment for Indigenous people. Such an environment will enable Indigenous people to claim credits for their environmental stewardship while reducing the costs of fire, weed and pest management and of welfare expenditure. Moreover, these initiatives add value to the proposed mosaic-agriculture projects; indeed, the role of indigenous land management should be evaluated for such new initiatives at a landscape scale. The PES mechanisms can provide a win-win situation for Indigenous people, new agri-businesses, Government and the broader public. However, these require setting up regulatory PES frameworks as well as a change in current thinking about development beyond the usual 'utilitarian-economic' concept.

A scoping study on PES in the Cape York Peninsula, Qld by Winer et al. (2012) suggested that PES is crucial for improving social outcomes for Indigenous communities. It can enable Traditional Owners to fulfill their cultural responsibilities by caring for country and maintaining the health of their country. Russell-Smith et al. (2015b) suggested a number of multiple benefits that savanna people can derive from their country through C markets and improved fire management that indeed provide PES opportunities in the region. There has been a few studies conducted in the region on wider non-Indigenous people's willingness to pay (WTP) for the value of ES on Indigenous-held land (Zander and Garnett 2011), people's WTP for the value of ES from the tropical rivers (Zander and Straton 2010), and on understanding the demand for PES (Zander et al. 2013). These studies strongly recommend that PES is a way forward to enhance natural and social capitals, especially for empowering Indigenous communities in the region.

PES programs can provide many offsite-benefits for non-Indigenous people in terms of enhancing educational, recreational and cultural values, apart from saving the costs of fire, weed and pest management. Moreover, such mechanisms will help non-Indigenous people to recognize the role of Indigenous custodians for their environmental stewardship. Overall, it can help bridge the gap in our society and bring harmony for the present and future generations.

In conclusion, PES enterprises for savanna development truly matches with the 'Hybrid Economy' as proposed by Altman (2006). There are emerging opportunities for both, private and public organisations. As proposed in Fig. 5, savannas, through their diverse range of ES, can contribute significantly to the state, market and customary sectors of the economy. In these new initiatives, Government can play a significant role through establishing robust and simple

regulatory policy frameworks that can lead to investment in supporting PES projects in the region.

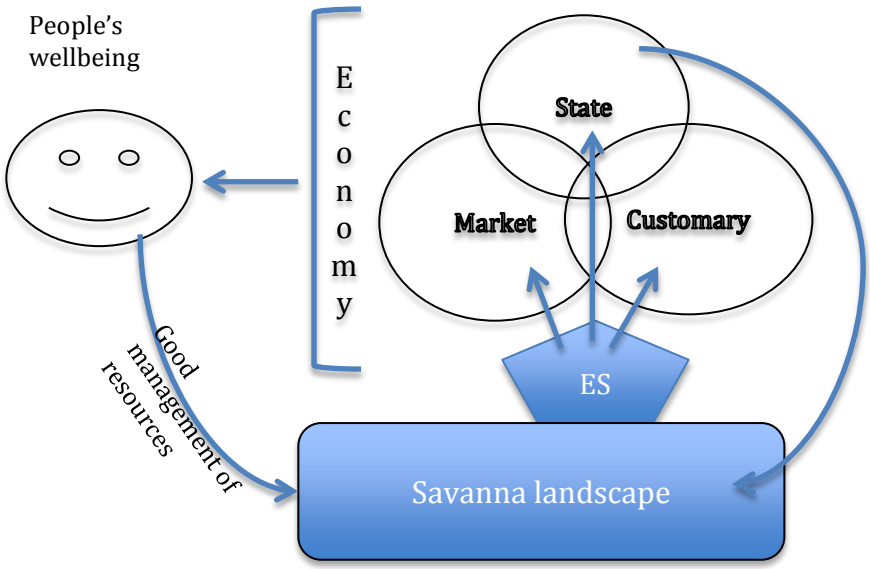


Fig. 5. Role of savanna ES in overall economy including people's wellbeing, applying the Hybrid Economy model.

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