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## Empowering Indigenous peoples' biocultural diversity through World Heritage cultural landscapes: a case study from the Australian humid tropical forests

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Australian humid tropical forests have been recognised as globally significant natural landscapes through world heritage listing since 1988. Aboriginal people have occupied these forests and shaped the biodiversity for at least 8000 years. The Wet Tropics Regional Agreement in 2005 committed governments and the region's Rainforest Aboriginal peoples to work together for recognition of the Aboriginal cultural heritage associated with these forests. The resultant heritage nomination process empowered community efforts to reverse the loss of biocultural diversity. The conditions that enabled this empowerment included: Rainforest Aboriginal peoples' governance of the process; their shaping of the heritage discourse to incorporate biocultural diversity; and their control of interaction with their knowledge systems to identify the links that have created the region's biocultural diversity. We recommend further investigation of theory and practice in Indigenous governance of international heritage designations as a means to empower community efforts to reverse global biocultural diversity loss.

**Keywords:** biocultural diversity; Aboriginal; Indigenous; rainforest; heritage

### Introduction

Cultural landscapes represent the interface between nature and culture and exist due to the complex interactions between people and the environment over time (Rössler 2005). Since 1992, the World Heritage Convention has provided for inclusion of cultural landscapes that are of outstanding universal value<sup>1</sup> within the World Heritage list (Aplin 2007). Adoption of the World Heritage Cultural Landscape (WHCL) designation marked a new approach to traditional management systems and customary law, recognising these as appropriate forms of protection for globally significant heritage. The initiative clearly had the potential to empower the transmission of Indigenous<sup>2</sup> cultural diversity, traditional knowledge and biocultural resources to future generations (Rössler 2004). Indigenous peoples at Tongariro National Park (New Zealand) and Uluru-Kata Tjuta (Australia), the first two WHCLs designated

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for associations with living Indigenous cultures, used the recognition to empower some of their aspirations (Lennon 2006). Anangu people developed an information management system that facilitated better integration of their customary law (Tjukurpa), further empowering their roles in joint management with the national government's agency, Parks Australia, at Uluru-Kata Tjuta (Lennon 2006, Ross *et al.* 2009). The paramount Indigenous leader of Tongariro, Tumu Te Heuheu, became Chairman of the World Heritage Committee, and facilitated dialogue that empowered international understanding of customary law (Metge 2008). However, WHCL processes have not universally empowered Indigenous and local peoples. Listing of the rice terraces in the Philippines' Cordilleras as a WHCL has not enabled local people to obtain the financial and institutional support necessary to continue their labour-intensive traditional maintenance practices (Villalón 2005). Rainforest Aboriginal people in the Australian Wet Tropics World Heritage Area (WTWHA), currently only recognised as globally significant for its natural values<sup>3</sup> (Figure 1), are pursuing listing as a Cultural Landscape to strengthen their Indigenous culture, rights and interests. The contribution of this initiative to theory and practice regarding the capacity of international designations to empower biocultural diversity forms the focus of the co-research reported in this paper.

Biocultural diversity, defined as the total variety exhibited by the world's natural and cultural systems, denotes three concepts: (1) diversity of life includes human cultures and languages; (2) links exist between biodiversity and cultural diversity; and (3) these links have developed over time through mutual adaptation and possibly co-evolution (Loh and Harmon 2005, Maffi 2007). Interrogations of global patterns of biocultural diversity have shown that correlations exist between areas of high biodiversity and high cultural diversity—and that the current species extinction crisis is paralleled by a related extinction crisis affecting linguistic and cultural diversity (Loh and Harmon 2005, Maffi 2005, Bradshaw *et al.* 2009). The notion of WHCL closely aligns with concepts of biocultural diversity, explicitly recognising the relationship between biological and cultural diversity, and between tangible and intangible cultural heritage (Rössler 2005, ICOMOS 2009). WHCL designation acknowledges the role of people in creating biodiverse landscapes and provides a mechanism for explicit recognition of that role.

The process of world heritage listing, however, can be mysterious and alienating to local people and Traditional Owners (TOs),<sup>4</sup> creating high potential for misunderstanding and hostility (Sullivan 2004). Community-based approaches to heritage nomination, listing and management are gaining recognition as key to overcoming these risks of alienation and conflict (McIntyre-Tamwoy 2004, Kato 2006, Greer 2010). However, world heritage nomination is still largely top-down, without clearly established means of enabling local ownership—most focus has been on engaging the community after the site is listed (Sullivan 2004, Cullen *et al.* 2008). These engagement processes continue to be seriously challenged by fundamental critiques that conservation management undermines local peoples' rights and interests and requires re-modelling from the ground up, involving local governance, networks and linkages across various institutions (Berkes 2007, Smith 2007). In this context, our research, which presents and interrogates an Indigenous-driven heritage nomination process, is timely and useful.

We write this paper as a team of Indigenous and non-Indigenous scholars and practitioners (within a university, a government and a non-governmental organisation) involved in supporting processes to achieve recognition of Indigenous peoples'

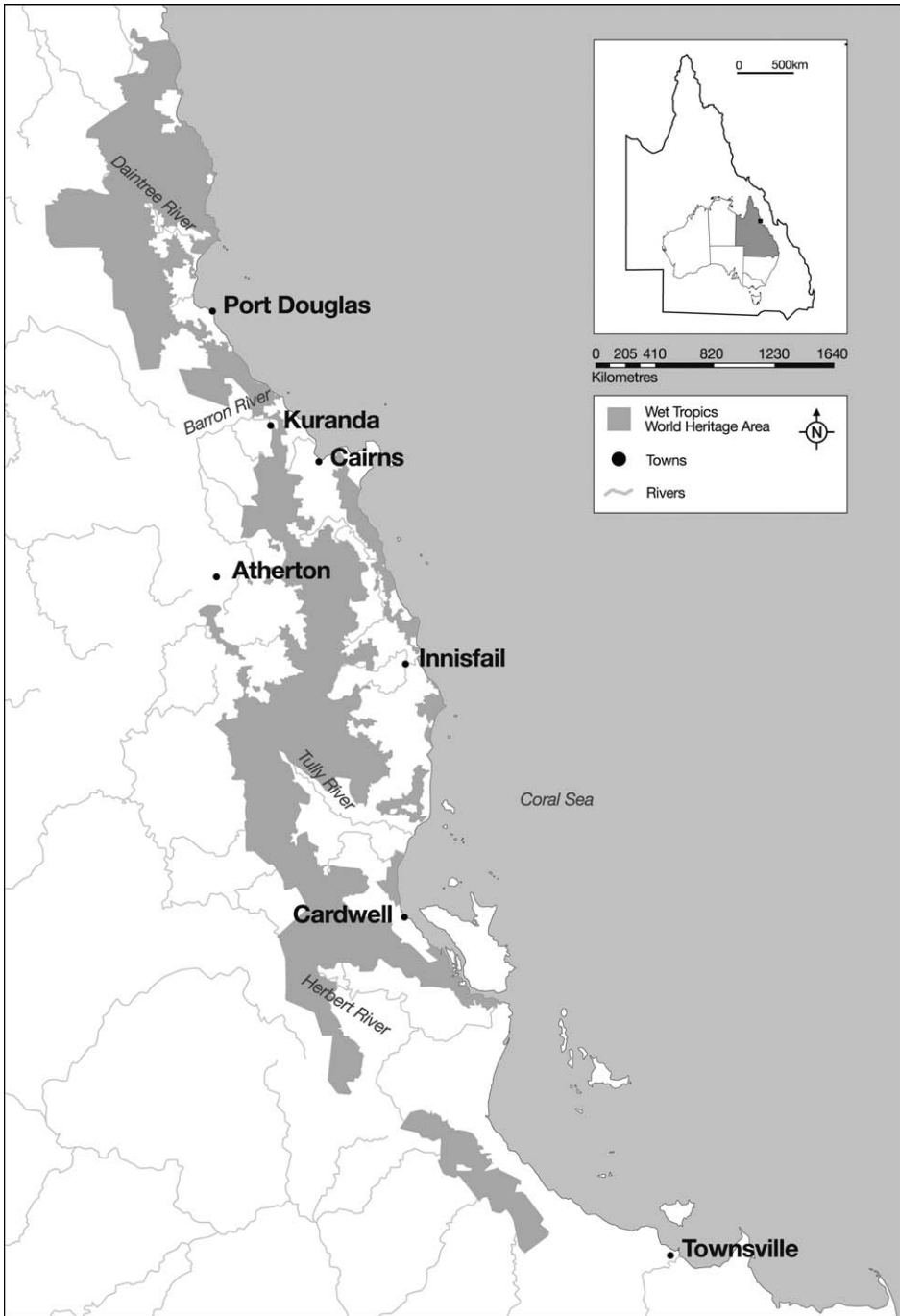


Figure 1. Wet Tropics World Heritage Area.

biocultural diversity within the WTWHA. The paper investigates whether the heritage nomination process towards re-listing the WTWHA as a cultural landscape has empowered community efforts to reverse the loss of biocultural diversity.

### **Biocultural diversity and Indigenous governance: key issues and definitions**

The concept of biocultural diversity is gaining recognition; a recent global survey highlighted linkages between cultural practices and biodiversity in 45 case studies encompassing six continents (Maffi and Woodley 2010). However, the characteristics of linkages between culture and biodiversity are not yet well elucidated, and clear conceptual frameworks for assessment remain elusive (Persic and Martin 2008). Where correlations exist between cultural and biological diversity, studies have not yet identified whether this has arisen from co-evolution, asymmetric causation (e.g. human-modified landscapes) or by other factors that affect both (e.g. division of habitat types and socio-ethnic territories by mountains, islands or climatic conditions) (Zent 2009).

Furthermore, culture and linkage to place are both contested concepts (Silverman 2011). The ideal of distinct local communities linked to their local environment through homeostatic feedback loops has not withstood scholarly scrutiny: communities are now recognised as contingent and dynamic, resulting from interactions between social actors at multiple scales, generating diversity within communities that affects heritage values and management (Leach *et al.* 1999, Chirikure *et al.* 2010, Singh *et al.* 2010). Indigenous culture itself is best understood as a dynamic process of transcultural exchange with critical and complex processes of intercultural hybridisation in which Indigenous and local peoples are key actors and drivers of change (Cocks 2006). A clear means of recognising these tensions is required to ensure that research into 'biocultural diversity' does not reinvigorate a colonising scholarship or reinforce networks of power relations that control Indigenous interests and futures for the purposes of others (Hemming and Rigney 2010). We situate our research within an adaptive governance theoretical framework, to recognise the multiple regimes of credibility pertaining to the different contexts in which Indigenous people, scientists, practitioners, decision-makers, community members and other actors work (Persic and Martin 2008).

We acknowledge concepts of multi-scalar interaction, complexity, uncertainty, dynamism and evolution that respond to the contested definitions of culture and nature discussed above are encapsulated in the theory of adaptive co-management (Armitage *et al.* 2007, Hill *et al.* 2010). Adaptive governance builds on this by adding the dimension of accounting for Indigenous peoples' explicit claims to a distinct and separate political status (United Nations 2008, Hill and Williams 2009). Indigenous governance encapsulates the processes by which Indigenous people make decisions and share power, define their culture, their biocultural diversity and means for cultural sustainability (Folke *et al.* 2005, Sveiby 2009, Hemming and Rigney 2010). Indigenous governance played a key role in the conduct of the co-research outlined in this paper, and was integral to the nomination process interrogated.

### **Wet tropics context: from a natural to a biocultural landscape**

During the period of territorial acquisition and settlement of Australia by the British, the wet tropical rainforests were viewed by the nascent nation-state primarily as a barrier to progress. By the 1930s, following extensive clearing for agriculture, the rain-

forest came to be valued as an important source of timber resources (Valentine and Hill 2008). The inscription of the Wet Tropics onto the World Heritage List in 1988 for its natural values signalled a shift towards valuing the rainforests as a natural landscape of global significance. The era of timber extraction ended, although unprecedented rates of population growth and urbanisation continue to drive contestation about environmental, economic and cultural values, and the relative roles of local, state and national governments in its management (Stork *et al.* 2008). At the time of inscription, Rainforest Aboriginal groups were divided between those who supported the listing because of links between cultural maintenance and rainforest protection, and those who opposed it as a limitation on their rights (Horsfall and Fuary 1988).

Since 1988, Rainforest Aboriginal peoples have engaged in a struggle for recognition of their roles in the WTWHA (Pannell 2008a). This struggle has been promulgated through three parallel strategies: seeking recognition of rights, involvement in environmental management roles and legitimization of cultural values. Figure 2 illustrates how three strategies together aim to achieve reconciliation between the Aboriginal and settler societies. The ultimate goal is to transform perception and management

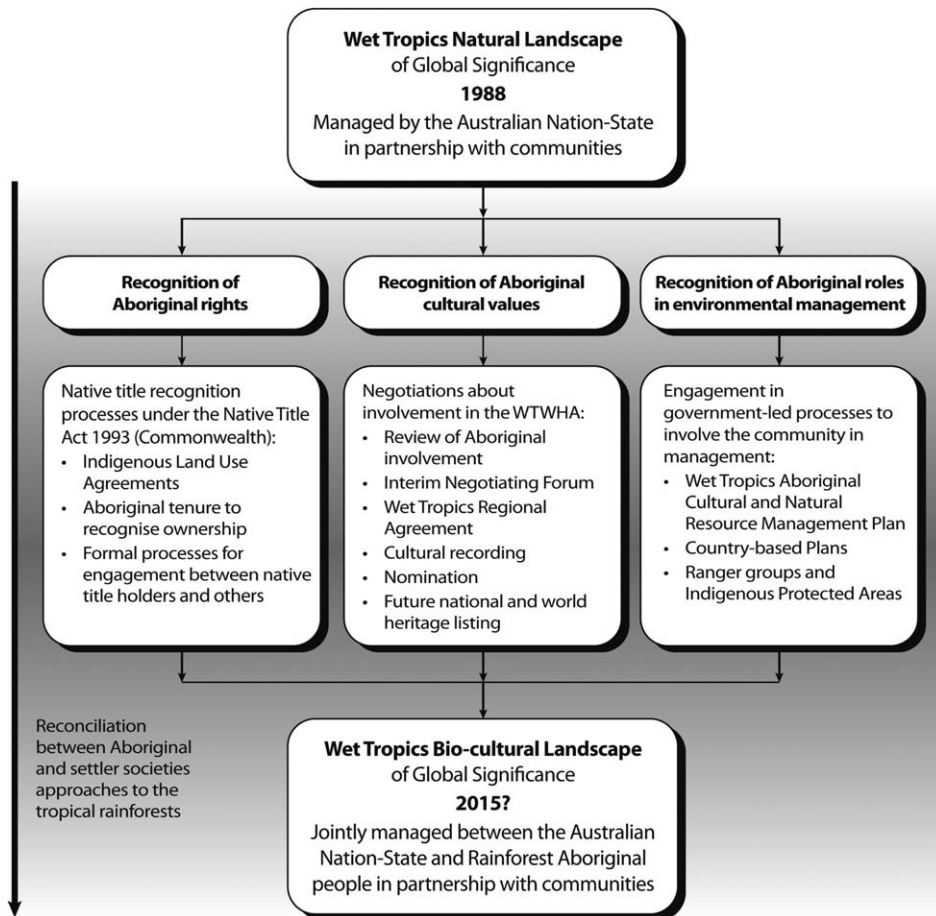


Figure 2. Parallel processes of recognition of rights, cultural values and roles in environmental management. The ultimate goal is to transform perception and management of a natural landscape into perception and management of a bio-cultural landscape.



of the WTWHA as a globally significant natural landscape into its perception and management as a globally significant biocultural landscape. The first strategy, rights-recognition, has been pursued through the Australian native title legal system, which has resulted in formal Indigenous Land Use Agreements under the Native Title Act 1993 (Commonwealth) (Hill 2006). The second strategy of seeking roles in management has focused on the Australian government's Natural Resource Management (NRM) programmes, using initiatives including Aboriginal Management Plans, Ranger groups and Indigenous Protected Areas to propel the adoption of Aboriginal-driven environmental management (Pannell 2008b). The third strategy, recognition of cultural values, has been pursued through entering into negotiations with the Australian and Queensland governments about involvement in the WTWHA. A formal review of management arrangements put in place at the time of listing led to the establishment of an Interim Negotiating Forum. This included representatives of the 18 Traditional Owner groups recognised in the WTWHA, and both Australian and Queensland governments (Lawson 1998, Cochrane 2003). A Regional Agreement was finalised in 2005, committing the Australian and Queensland governments to work in partnership with these 18 groups, generically termed Rainforest Aboriginal peoples, including through seeking cultural heritage listing.

Rainforest Aboriginal peoples established the Aboriginal Rainforest Council (ARC) in March 2003 as an independent decision-making organisation to represent their strategic interests in the WTWHA and subsequently the Regional Agreement. The ARC constituted a new regional element within a contemporary multi-level Indigenous governance system with nested governance arrangements, including at sub-regional (e.g. Girringun Aboriginal Corporation), local (e.g. Djabugay Tribal Council) and extended family scales (e.g. Bana Yarralji Bubu Incorporated). The Regional Agreement recognised the ARC as the entity charged with establishing and maintaining the authority to represent the views of Rainforest Aboriginal people regarding management of the WTWHA (WTRA 2005).

However, the Aboriginal Rainforest Council as a formal incorporated organisation no longer exists. It was disbanded in 2008 following problems with administration and funding. Rainforest Aboriginal peoples are now developing alternative structures to provide the necessary coordination of their multi-level governance responsibilities. Ongoing Indigenous governance responsibilities are exercised without a formal organisation, and ensuring adequately resourced arrangements for their coordination at the regional scale remains a challenge. The slow response by governments to these resourcing needs is testimony to the ongoing marginalisation of Indigenous peoples from the NRM arrangements of the Australian nation-state (Hill and Williams 2009). We return to a consideration of the impact of this issue on the empowerment of community efforts to reverse biocultural diversity loss in the conclusion.

### Co-research methods

Our co-research approach occurred within the processes of nomination of the Aboriginal cultural values of the wet tropics for heritage listing. In 2006, the ARC and Girringun Aboriginal Corporation (Girringun), in partnership with Terrain NRM, a non-governmental organisation with a focus on natural resource management, obtained funding for a cultural heritage mapping project. This project had two goals: (1) to enable local TO groups to record, store and apply their cultural heritage information in relation to the management of their traditional country; and

(2) to prepare a document to support nomination of the wet tropics as a cultural landscape for national and, subsequently, world heritage listing (Hill and Williams 2009). A co-research framework was developed iteratively with the Rainforest Aboriginal governance arrangements.

The three initial partners to the cultural mapping project—ARC, Giringun and Terrain—identified that further expertise was required to ensure preparation of the heritage nomination document. Relevant potential co-researchers were invited from James Cook University (JCU) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO), supported by funding through the Australian Government's Marine and Tropical Science Research Facility. Participation of the proposed co-researchers was approved at a meeting of the 18 Traditional Owner groups hosted by ARC, whereby JCU and CSIRO became project partners. The core co-research team included four scientists working closely with six senior TOs, supported by a coordinator, and a heritage officer from the Wet Tropics Management Authority (WTMA), the government agency responsible for the WTWHA. This approach recognises that the co-generation of knowledge by Indigenous peoples and scientists, through research, can be used to build knowledge with credibility in both domains (Cullen *et al.* 2008, Maclean and Cullen 2009). The co-research team met many times during the preparation of the nomination, which occurred between July 2006 and December 2007. Subsequent interrogation and analysis to consider the question of empowerment of community efforts for biocultural diversity conservation through the heritage nomination process was undertaken by four members of the original team, in consultation with TO groups through their multi-level governance structures.

Data sources included the nomination document itself, documents compiled to prepare the nomination (academic and popular articles and books, policies, plans, media releases, project proposals and annual reports), minutes of meetings, digital videodisc (DVD) recordings, and workshop and consultation reports. Analysis of the data followed qualitative techniques of theme identification, grouping and matrix formulation (Robinson 1998). We strengthened the validity of our analysis through application of frameworks drawn from comparable international practice. Biocultural Community Protocols (BCP) provided the framework for analysis of how the heritage listing process had empowered community efforts (UNEP 2009). The UNESCO list (Persic and Martin 2008) of 'areas of interdependence between biological and cultural diversity' provided the framework for analysis of how the nomination content had empowered the inclusion of evidence about biocultural diversity.

### **Preparing the heritage nomination**

Our co-research identifies that the heritage nomination process empowered community efforts to reverse the loss of biocultural diversity. The conditions that enabled this empowerment included: (1) Rainforest Aboriginal peoples' governance of the process; (2) their shaping of the heritage discourse to incorporate biocultural diversity; and (3) their control of interactions with their knowledge systems to identify the links that have created the region's biocultural diversity.

### **Empowerment of community efforts through Rainforest Aboriginal governance**

The heritage nomination project worked from the principle that Traditional Owners should take control of knowledge production concerning their culture. Through their recording activities, TOs are in a better position to ensure that co-management of

the WTWHA effectively addresses their cultural values, knowledge and practices. The ARC appointed an Indigenous Intellectual Property Sub-committee (IPSC) to guide the nomination process, reporting back to TOs through meetings (hosted by ARC) that included representatives from all 18 TO groups. A Memorandum of Understanding (MoU) between the ARC and other organisations ensured Indigenous governance of the process. Figure 3 was developed by ARC (2006) as part of the MoU, and illustrates the complex arrangements established to ensure that Rainforest Aboriginal peoples were the decision-makers and governed the process. The technical and administrative complexity of heritage processes required engagement of many groups. Government organisations with an advisory role, were clearly part of a ‘Technical Group’, which was led by the WTMA, whose officer provided ongoing support to the co-research team. Organisations that employed members of the co-research team were identified as ‘Project Partners’. TOs were clearly identified in both the ‘top’ decision-making role and the ‘bottom’ action role. These arrangements ensured multi-level empowerment of Rainforest Aboriginal people as both decision-makers and on-ground actors in the heritage nomination process

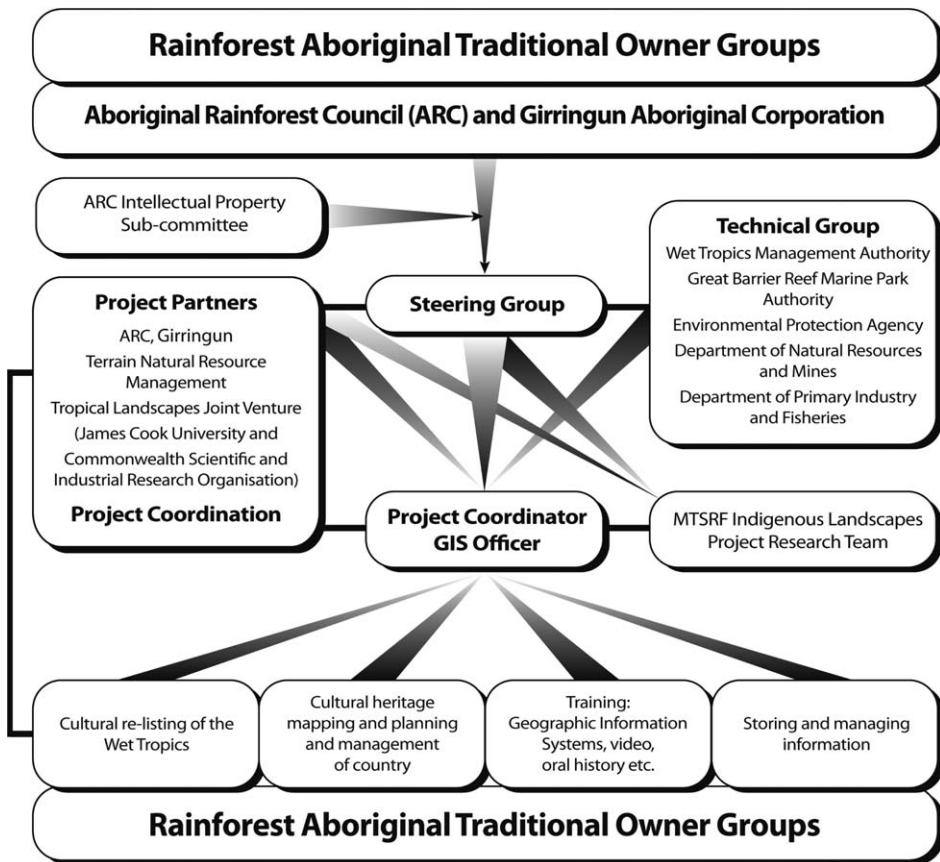


Figure 3. Rainforest Aboriginal governance arrangements for the heritage nomination process (ARC 2006).

### **Empowerment of community efforts through Rainforest Aboriginal heritage discourse**

The ARC IPSC began the heritage nomination process by examining documents previously prepared to scope out a potential nomination. They directed that the archaeological, anthropological and historical aspects be supplemented with a greater emphasis on living cultural traditions. A number of Elders made DVD recordings in which they explained the global significance of their living cultural traditions. They emphasised that this globally significant landscape had been created by their ancestral beings, was maintained by their ongoing connections, and therefore their culture was also globally significant. In effect, they argued that if the 'bio' aspect of a globally significant biocultural landscape was significant, then the 'cultural' part must also be. An Expert Panel was hosted during the Australian International Council on Monuments and Sites (ICOMOS) conference held in Cairns in August 2007 at which Rainforest Aboriginal people presented their draft 'statement of significance' to national and international cultural and natural heritage experts. The Expert Panel advised that the biocultural significance argument would not meet current heritage criteria. The Panel suggested the ARC focus on the uniqueness of Aboriginals' long occupation of rainforest, and associated innovative food processing and fire technologies, while including information about Aboriginal cultural connections. The Panel also emphasised the need for published material to support the claims. The DVDs would be useful illustrative material, but would not hold weight in the assessment of the nomination.

The members of the ARC made a decision to align the nomination document with this advice, but to include their DVD recordings, as well as substantial material explaining their understanding of the biocultural values of the WTWHA. The nomination document focused on the living cultural practices that have created and maintained the wet tropics landscape, and addressed current heritage criteria – this amalgam produced a new Rainforest Aboriginal heritage discourse focused on biocultural diversity. The nomination was submitted in December 2007, and is currently being assessed by the Australian Government through the Australian Heritage Council, who recently announced that a decision is imminent.

### **Empowerment of community efforts through Rainforest Aboriginal knowledge systems**

Empowerment occurred through the compilation of the heritage nomination document, led by Rainforest Aboriginal people. They explored and revealed the interactions between their culture and nature that have produced wet tropics biocultural diversity. In addition to preparation of the nomination document, the cultural heritage mapping project enabled local TO groups to record, store and apply their cultural heritage information. Through this process, Rainforest Aboriginal people gained access to resources that enabled them to spend time on their traditional country, recording traditional knowledge and language systems, and interacting with these landscapes through cultural management practices. The cultural recording process reinvigorated intergenerational transfer of knowledge, renewing respect by the younger generation for the role of the Elders.

Table 1. Analysis of Rainforest Aboriginal Peoples' strategies in the nomination process according to the framework provided by the Biocultural Community Protocol (UNEP 2009).

Biocultural Community Protocol Framework	Rainforest Aboriginal peoples' strategies in the nomination process
Self-definition of the group and its leadership and decision-making	Nested regional (Aboriginal Rainforest Council), sub-regional (e.g. Giringun), local (e.g. Jabalbina) and extend family (e.g. Bana Yarralji) scale contemporary arrangements provide Rainforest Aboriginal peoples' self-definition and decision making structures (Hill and Williams 2009)
Links between customary laws and biocultural ways of life Spiritual understanding of nature How they share their knowledge	Wet Tropics Regional Agreement, Aboriginal Natural and Cultural Resource Management Plan, Country-Based Plans (WTAPPT 2005) See 'belief systems' in Table 2
What constitutes Free Prior and Informed Consent to access their lands or knowledge	Leadership role in systems to protect Intellectual Property through: 1993 <i>Julayinbul Statement on Indigenous Intellectual Property Rights</i> (Rainforest Aboriginal Network 1993); 2007 Aboriginal Rainforest Council Intellectual Property Sub-Committee established Agreement-making under the Native Title Act through Indigenous Land Use Agreements (Hill 2006), and Indigenous Protected Areas are gaining acceptance as appropriate means of FPIC (WTAPPT 2005)
Local challenges	Colonial legal arrangements under Queensland legislation currently present barriers to empowerment of biocultural diversity (Hill 2006)
Rights according to national and international law	Wet Tropics Regional Agreement recognised that these rights may exist, but the agreement itself has no legal status and has therefore not bound either Queensland or Australian Governments to respect these rights
Call to stakeholders for respect	The Regional Agreement is such a call to all stakeholders for respect.

**Application of analytical frameworks from comparable international practice**

The Bio-cultural Community Protocols framework was applied to analyse the heritage listing process (UNEP 2009; Table 1). A BCP is a protocol that is developed through community consultation to outline core ecological, cultural and spiritual



Photo 1. Telika Greenwall processing *wukay*, a traditional food, under instructions from Rainforest Aboriginal Elders. Photograph: S. Nowakowski. Reprinted with copyright permission from Eastern Kuku-Yalanji people.



Photo 2. Cedric Friday painting crocodile and fish, important animals in Rainforest Aboriginal peoples' biocultural diversity. Photograph: S. Nowakowski. Reprinted with copyright permission from Eastern Kuku-Yalanji people.



Photo 3. Rainforest Aboriginal Elder Agnes Burchill passing on cultural knowledge to the younger generation at Cape Kimberley, northern wet tropics. Photograph: S. Nowakowski. Reprinted with copyright permission from Eastern Kuku-Yalanji people.



Photo 4. Darren Caulfield, a Rainforest Aboriginal Traditional Owner, involved in contemporary management of biocultural diversity. Photograph reprinted with copyright permission from the Wet Tropics Management Authority.

values and customary laws that relate to traditional knowledge and resources. The BCP establishes the basis for terms and conditions to regulate access to these resources and knowledge. Analysis of international applications has identified that BCPs that enable the community to empower its role in maintaining biocultural diversity address eight elements presented in Table 1: (1) self-definition of the



Photo 5. Cassowary plum (*Cerbera floribunda* K. Schum.), recognised by Rainforest Aboriginal people as a vital food source for cassowary. Photograph reprinted with copyright permission from the Wet Tropics Management Authority.

group and its decision-making; (2) links between customary laws and biocultural ways of life; (3) spiritual understanding of nature; (4) ways to share knowledge; (5) what constitutes Free Prior and Informed Consent; (6) local challenges; (7) rights according to national and international law; and (8) a call to stakeholders for success (UNEP 2009; Table 1). We analysed the processes underpinning this heritage nomination against the framework for BCPs from other international applications (Table 1). Rainforest Aboriginal peoples' three parallel strategies—pursuing recognition of rights, culture and management roles—ensured that all the elements were included. BCPs that contain all these elements have been found to be effective drivers of conservation and sustainable use of biodiversity in ways that support Indigenous livelihoods and traditional ways of life, confirming the importance of embedding the heritage nomination process in this wider set of activities (UNEP 2009).

The UNESCO framework of 'areas of interdependence between biological and cultural diversity' provided the basis for our analysis of nomination content (Persic and Martin 2008). Table 2 presents this framework of seven major categories, each with several sub-categories, that must be included to describe the multiple culture–nature links underpinning biocultural diversity: (1) language and linguistic diversity; (2) material culture; (3) knowledge and technology; (4) modes of subsistence; (5) economic relations; (6) social relations; and (7) belief systems (Persic and Martin 2008; Table 2). We found that the nomination document provides insight into all the categories of linkages between nature and culture recognised in this global framework (Table 2). Rainforest Aboriginal peoples' exploration and revelation has therefore empowered an understanding that is likely to encapsulate the set of complex interactions between their culture and nature that constitutes the biocultural diversity of the WTWHA.

### Concluding remarks

We use this example in the Australian humid tropical rainforests to demonstrate how international heritage designations can empower community efforts to reverse the loss of biocultural diversity. The conditions that enabled empowerment included Rainforest Aboriginal peoples' governance of a heritage nomination process; their



Table 2. Analysis of Rainforest Aboriginal Peoples' documentation of the links between cultural and natural diversity according to the framework provided by Persic and Martin (2008).

Area of interdependence between biological and cultural diversity	Wet Tropics examples <sup>1</sup> (Aboriginal Rainforest Council Inc. 2007)
<i>1 Language and linguistic diversity</i>	
Language terms concepts and categories relating to nature	The ancestral being Gulibunjay made that part of the country to be Yidinji country through his journey in which he named places after species in Yidinji language (Dixon 1991)
Linguistic diversity relation to biological diversity	'Our songs link us to the rainforest and also to the sounds of the rainforest – the scrub turkey song sounds like a scrub turkey, as do songs about cassowaries' (Dixon and Koch 1996)
<i>2 Material culture</i>	
Material culture objects created from and/or representing biodiversity	Unique bicornual (two-cornered) baskets, bark blankets, decorated tree buttress shields, huge wooden swords, slate grindstones with cut grooves, nut-cracking rocks, T-shaped stone implements known as 'ooyurkas' and large edge-ground axes (Horsfall 2003)
<i>3 Knowledge and technology</i>	
Technology and techniques related to natural resources	Toxic food processing techniques (Cosgrove et al. 2007)
Traditional and local knowledge about natural resources, ecological relationships etc.	Specialist fire management practices (Hill and Baird 2003) 'Our seasonal calendars link environment to our cultural practices: the call of the green cicada announces the arrival of the stormy season' (Davis 2001); 'dropping of a certain flower in the river signals that fresh water mussel are ready for harvest' (Hill et al. 2004)
Transmission of knowledge between generations	Knowledge is transferred from the older generations to the young ones through going out on country together to hunt, gather, light fires and tell stories (Hill et al. 2004)
Mechanisms for traditional knowledge revitalisation	Cultural mapping projects that empower Rainforest Aboriginal people to use digital technology are proving effective mechanisms for knowledge revitalisation (Roder 2008)
Mechanisms for the adoption of new knowledge	Oral traditions and poetry now record new knowledge about the arrival of 'waybala' (European people) and the history of clearing e.g. through the song 'A bulldozer nosing into Guymaynginbi' (Dixon and Koch 1996)
<i>4 Modes of subsistence</i>	
Natural resource livelihoods	Indigenous knowledge of country and culture is the basis of contemporary tourism businesses of Yalanji, Tjapukai, Ngandongji and other Rainforest Aboriginal people (Zeppel 2002)
Land/sea use and management	Tracks served to connect the rainforest uplands to the coastal plains and facilitated the movement of people to harvest seasonal resources, attend ceremonies, visit story places, avoid tabu sites and maintain kin and affinal relations with other groups (Pannell 2008a)

Table 2. (Continued).

Area of interdependence between biological and cultural diversity	Wet Tropics examples <sup>1</sup> (Aboriginal Rainforest Council Inc. 2007)
Plant/animal domestication and selective breeding	Growing evidence that Aboriginal aboriginal practices have, over the space of thousands of years, selected for certain floral species and hybrids (Pannell 2008a)
Supplementing economies through sustainable harvesting	Fish are an important supplement food source; traditional plant materials are used in running water, as opposed to still water, to stun fish and allow collection in nets without killing the fish (Worboys 2002)
<sup>5</sup> <i>Economic relations</i>	Aboriginal people's trade of rainforest products with miners enabled them to live independently of government control after European settlement (Anderson 1983); major rainforest tracks associated with substantial trade in material culture (e.g. shell, beeswax) are in use as roads and highways today (Pannell 2008a)
Economic relations through partnerships based on natural resources	Indigenous techniques for harvesting materials including fish, wood, bark, grass, and lawyer cane are important to ensuring sustainable use of the rainforests, and linked to ecological knowledge of seasonal indicators (Hill and Williams 2009)
Management of common property resources	
<sup>6</sup> <i>Social relations</i>	Rainforest Aboriginal peoples relate to the land in a holistic sense as a living cultural landscape (Hill 2008)
Attachment to place	'Social relationships with our Elders, old people and ancestral creators that co-exist with us in our country continue as forms of social memory in the landscape and form part of our traditions and practices' (Talbot 2005).
Social relations with natural resource	'Marra [cycad nuts] comes from the Ngjukura, from the beginning of time. Marra is a woman's thing. The two sisters, they made marra' Dolly Yougie, Kuku Yalanji woman (Hill <i>et al.</i> 2004)
Gender relations with natural resource	Land ownership and tenure systems reflect interrelationships between different language, clan and family groups, and links to rights and responsibilities on country (Pannell 2008) <sup>a</sup> or b
Political relations with natural resource	Law/Lore originates from ancestral beings in the creative epoch, the Buluru, Ngjukurra and Jujaba
Legal institutional e.g. customary law regarding resource use, access	Our dances like the cassowary dance also link us to the rainforest (Hill <i>et al.</i> 2004)
<sup>7</sup> <i>Belief systems</i>	
Rites and rituals	

(Continued)

Table 2. (Continued).

Area of interdependence between biological and cultural diversity	Wet Tropics examples <sup>1</sup> (Aboriginal Rainforest Council Inc. 2007)
Sacred sites (landscapes)	Numerous sites: story places, birth, burial and conception sites; ceremonial grounds, occupations sites some people are named after camping grounds and regard these places as part of themselves (Dixon 1972)
Mythology, worldview, cosmology	Bulumu or Story time brothers, Guyala and Damarri, are central ancestral figures responsible for providing the plant foods in the rainforest, instituting the laws and customs; the supine body of Damarri can be seen in the contours of the Barron River and Redlynch valley, and the surrounding hills and outcrops (Pannell 2008a)
Identity with the natural world e.g. totems	'Our moiety and section systems create inter-linkages between rainforest species and ourselves: in Kuku Yalanji society the two moiety names walarr and dabu refer to the open forest and rainforest bee respectively, while the walarr totem is birrimba the white cockatoo and the dabu totem kunurrbina the black cockatoo' (Patz 2002)

Note: <sup>1</sup>The nomination form completed by the Aboriginal Rainforest Council for heritage listing cited numerous published and unpublished accounts of these links; in the interests of brevity, a selected few only are supplied for those interested in scholarly pursuit. Direct statements from the nomination form are in quotation marks.

shaping of heritage discourse to incorporate their concept of biocultural diversity; and Indigenous control of interaction with their knowledge systems to identify the links between culture and nature that have created the region's biocultural diversity. The concept of biocultural diversity appears capable of encapsulating the ontological and epistemological differences between Indigenous and other forms of knowledge, recognising the viewpoint that only knowledge that is Indigenous-governed can be Indigenous knowledge (Agrawal 2002). We suggest that the actual reversal of the loss of biocultural diversity in this landscape depends on the delivery of joint management arrangements between the Rainforest Aboriginal People and the Australian nation-state. Joint management based on recognition of rights, cultural values and roles in management, as sought by Rainforest Aboriginal people (Figure 2), will encompass all the elements identified in the international BCP framework as necessary conditions for community empowerment (Persic and Martin 2008; Table 1). Rainforest Aboriginal people in such a joint management partnership could then find the means to renew and strengthen language, fire regimes and the multiple other components of biocultural diversity (Figure 2).

Our co-research confirms the findings by Hemming and Rigney (2010) that Indigenous-driven regional research, planning and development are the means of transforming heritage practices to empower Indigenous peoples. The approach requires collaborative research practices, and significant ongoing work in local, regional, national and international contexts. In the Wet Tropics, Indigenous-driven regional research relied on an organisation to coordinate the governance responsibilities of the 18 TO groups, the Aboriginal Rainforest Council, which as noted earlier no longer exists. While alternative structures for this coordination role are emerging through alliances, Aboriginal people are undertaking this work largely on a voluntary basis, in addition to responsibilities from roles in paid employment. This lack of resources greatly limits their capacity to engage and reflects ongoing marginalisation of Indigenous peoples from funding and support through the Australian NRM arrangements (Hill and Williams 2009). We suggest that national governments need to support Indigenous organisations and their roles in enabling Indigenous knowledge systems for any chance of successful reversal of the loss of biocultural diversity. We commend further investigation of the theory and practice of Indigenous governance as a means to empower community efforts to reverse global biocultural diversity loss.

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### Notes

1. 'Outstanding universal value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity' (UNESCO 2008, p. 14).
2. The concept of Indigeneity is highly contested in the academic literature. This article is guided by Martinez-Cobo's (1986, United Nations Permanent Forum on Indigenous Peoples E/CN.4/Sub.2/1986/Add.4) working definition, essentially 'Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them.' In this article, we use the term 'Indigenous' generically to refer to peoples whose origins fit this description, and the word 'Aboriginal' for wet tropics people, according to their own convention.
3. The World Heritage Convention lists places as either natural, cultural, or joint cultural/natural properties. At the time of listing a cultural landscape was not an available option for the Wet Tropics, and the Australian government chose not to pursue a mixed site.
4. Traditional Owners is the term adopted for Rainforest Aboriginal people who hold rights and interests over land and cultural practices according to traditional law and custom.

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