

'Right-way' science: reflections on co-developing Indigenous and Western cross-cultural knowledge to support Indigenous cultural fire management

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Summary Contemporary Indigenous cultural fire management facilitates opportunities for Indigenous peoples to connect to and manage their Country, as well as providing scope for research. Right-way science is defined as collaborative process of bringing Indigenous and Western scientific knowledge and methods together to create ethical, productive and mutually beneficial research. Five key requirements of right-way science emerge from the literature, including: building relationships and trust; formal research approval processes; co-development of research; acknowledging challenges; and ethical, productive and mutually beneficial research. This article explores the question: *how can right-way science enhance Indigenous cultural fire management?* By reflecting on research collaborations between Western scientists and Indigenous ranger groups of New South Wales (Banbai) and the Northern Territory (Yugul Mangi), this paper, firstly, describes the methods we used to explore right-way science around cultural fire management. Secondly, it synthesises key findings of the research projects, including how we addressed the five key requirements of right-way science elicited from the literature. Thirdly, we provide insight on how right-way science can be applied more broadly to enhance Indigenous cultural fire management. We found that increasing opportunities for Indigenous peoples to care for their Country, supported by right-way science, places them in a unique position to contribute to solving some of the ongoing challenges and research questions associated with fire management. Western scientists have an important role to play, as supporters and followers of Indigenous research partners, and advocates of right-way science.

Key words: biocultural diversity, cross-cultural science, cultural burning, decolonising research, Indigenous knowledge, knowledge co-production, two-way science.

Introduction

Globally, for millennia, Indigenous peoples have maintained relationships with their environments and managed resources through complex cultural systems (Rose 1996; Berkes 1999; Morrison 2020). Ongoing declines in biocultural diversity have prompted many initiatives and policies from global to local levels to increase opportunities for Indigenous people to engage in contemporary and traditional caring for Country practices (Ens, *et al.* 2015; Leiper, *et al.* 2018). 'Right-way' (also known as 'cross-cultural' or 'two-way') science is an emerging scientific approach that weaves Indigenous

and Western approaches (Tengö, *et al.* 2017), and often complements caring for Country management programmes (Yunpingu & Muller 2009; Ens 2012). This approach attempts to overcome poor research practices that have been exploitative, extractive and assimilative of Indigenous peoples (Nadasdy 1999; Stephenson & Moller 2009; Muller & Hemming 2019). Right-way science focuses on transdisciplinary, participatory, decolonising and Indigenous research methods that build understanding, while also supporting objectives of capacity building, empowerment, self-determination and strengthening of Indigenous knowledge as strategic endpoints (AIATSIS 2020;

Chapman & Schott 2020; Hill, *et al.* 2020; Woodward, *et al.* 2020). Right-way science aims to maintain and build social-ecological resilience through ethical, productive and mutually beneficial relationships (Bohensky and Maru 2011; Ens, *et al.* 2012).

Fire management is evolving as an area of significant progress towards mutually beneficial, collaborative, biocultural conservation (Russell-Smith & Whitehead 2009; Nikolakis & Roberts 2020). Fire management is an escalating issue globally, with economic, environmental, social and cultural consequences (Bowman, *et al.* 2011; He & Lamont 2019; Ward, *et al.* 2020). Over millennia, Indigenous peoples used,

and in many places still use fire for subsistence purposes as well as a wide variety of social, cultural, spiritual and environmental reasons (Pyne 1991; Lake 2007; Gammage 2011; Russell-Smith & McCaw 2020). However, in many contexts, traditional Indigenous burning practices were disrupted due to colonisation (Eriksen & Hankins 2014), changing land uses and politics (Schmidt & Eloy 2020). Indigenous cultural fire management takes a different approach to Western society's fire management strategies of fire exclusion, suppression and hazard reduction (Eriksen & Hankins 2014; Eloy, *et al.* 2019). The primary purpose of Indigenous cultural fire management often focuses on the maintenance of cultural protocol, ceremony, Lore (traditional Indigenous law) and responsibility for Country, with the desired outcome to maintain the health of Country, including plants, animals, soil, water, weather and spiritual and kinship connections (Standley 2019). Supporting Indigenous-led fire management can assist with reviving cultural practices while protecting human communities from increasingly severe wildfires, enhancing biodiversity and increasing ecosystem heterogeneity (Hoffman, *et al.* 2021).

In northern Australia, a contemporary cross-cultural savannah burning programme has grown since the late 1990s, based on methods emulating customary Indigenous fire management, using contemporary tools (Yibarbuk, *et al.* 2001; Russell-Smith, *et al.* 2009; Ansell & Evans 2019). This programme operates at a landscape scale, with 32 Indigenous-owned and operated projects covering an area over 17.9 million ha of northern Australia (Indigenous Carbon Industry Network 2021). In southeast Australia, many Indigenous communities aspire to re-establish and grow cultural fire management (The Victorian Traditional Owner Cultural Fire Knowledge Group 2019), but various socio-economic and political barriers have prevented widespread application of cultural burning (Maclean & Robinson 2018; Smith, *et al.* 2018; McKemey 2020). The impacts of the southeast Australian 'Black Summer' (2019–20) bushfires (wildfires) magnified public and government interest in Indigenous cultural fire management (Mawson 2020), with government-driven bushfire inquiries recommending

increased government commitment to Aboriginal land management and cultural burning programmes, and further research (Binskin & Bennett 2020; Owens & O'Kane 2020). Increasingly, advocates are arguing that to adequately address the potential for Indigenous fire management to inform policy and practice, scientific approaches must be decolonised and shift from post-hoc engagement with Indigenous people and perspectives to one of collaboration between Indigenous communities and scientists (Fletcher, *et al.* 2021; McKemey, Neale, *et al.* 2021; Robinson, *et al.* 2021). While this aspiration is increasingly being supported, there is still a paucity of published collaborative fire studies, particularly in southeast Australia (McKemey 2020).

Translating the concept of right-way science into practice requires careful navigation of the complexities of knowledge co-production and delivery of mutual benefits, in order to achieve both independent and shared outcomes for cross-cultural partners (Maclean & Cullen 2009; Cullen-Unsworth, *et al.* 2010). Following a review of right-way science literature (McKemey 2020), five key requirements of right-way science emerged: building relationships and trust; formal research approval processes; co-development of research; acknowledging challenges; and ethical, productive and mutually beneficial research (Bohensky and Maru 2011; Ens, *et al.* 2012; AIATSIS 2020; Woodward, *et al.* 2020).

In light of these five key requirements of right-way science, this article aims to share our experiences of applying right-way science and explores the question: *how can right-way science enhance Indigenous cultural fire management?* By reflecting on a seven-year cross-cultural research project on Indigenous fire management with Indigenous rangers in remote northern Australia and regional southern Australia, this paper aims to: (1) describe the methods we used to establish and undertake right-way science around Indigenous fire management; (2) synthesise results to elucidate how we addressed the five requirements of right-way science and (3) provide insight and reasons why right-way science can and should be applied more broadly in the pursuit of research and management.

Methods

Here, we explore application of the five key requirements of right-way science by reflecting on a collaborative research project which operated from 2014 to 2021, by PhD candidate and lead author McKemey and her supervisors (including co-authors Costello, Hunter, Ens) who aimed to conduct collaborative mutually beneficial research on Indigenous fire management in two different Australian contexts: in remote northern Australia with the Yugul Mangi rangers and regional southern Australia with the Banbai rangers (also co-authors). In the results section, we describe these two case studies and reflect on the actions that were taken to explore application of the five key requirements of right-way science elucidated from the literature. Reflective practice is used in education and medical research and is emerging as an important part of science practice (see McIntosh 2010). Hill and others have stated that reflective practice is particularly important in collaborative research with Indigenous people, as an adaptive process to improve outcomes (Carter 2008; Hill 2011; Cullen-Unsworth, *et al.* 2012).

Results

Case study 1: Yugul Mangi Rangers, South East Arnhem Land (SEAL) IPA and scientists

We have a lot of PhD students come to work with us, Michelle is the latest one. We show her our way of doing our traditional science, looking after Country. If you look after the Country, it will provide bush food, air that we breathe, water that we drink... People like Michelle come in and it opens the door for her to see how we see our landscape through our traditional eyes.

W. Thompson, Senior Yugul Mangi Ranger

The SEAL IPA was declared in 2016 covering an area of 19,170 km² on the south western edge of the Gulf of Carpentaria in the Northern Territory and

conserving extraordinary natural and cultural values (Gambold 2015). The Indigenous *Yugul Mangi* (meaning 'all of us', i.e. the many Indigenous clans of South East Arnhem Land) rangers were formally established in 2001 and manage the southern region of SEAL IPA in partnership with the Numbulwar Numbirindi rangers who manage the north. Through participatory action research on Country, the Yugul Mangi rangers shared their Indigenous biocultural knowledge, in order to develop the *Yugul Mangi Faiya En Sisen Kelenda*, the Yugul Mangi Fire and Seasons Calendar (McKemey, Yugul Mangi rangers, Ngukurr Community and Ens 2019). Traditional Owners, Elders and language speakers at Ngukurr Language Centre were engaged to provide specialised knowledge and language expertise (Fig 1). The Yugul Mangi rangers shared culturally appropriate content, which was collated by McKemey and drafts of the calendar were discussed, amended, finalised and published (Fig 2). The calendar used both Indigenous and Western knowledge systems to produce information to guide fire management in the SEAL IPA. The calendar was positively received by the SEAL IPA community and aimed to improve the evolving fire management practices of Indigenous land managers, while also providing an effective communication tool to increase awareness of Indigenous savannah burning and transfer intergenerational cultural knowledge (McKemey, *et al.* 2020).

This one [calendar], that's the ranger group doing our seasonal chart with you [McKemey], making a lot of difference.

Clarry Rogers, Senior Yugul Mangi Ranger

Case study 2: Banbai Rangers (Wattleridge IPA, NSW) and scientists

When the Elders teach culture it is your responsibility to hold that knowledge and keep passing it on. It is very important that we teach culture and share it with anyone who wants to learn, white or black,

we are all in this together, we need to start learning how to manage Country as our old fellas did ... White and blackfellas, we have been working together for a while to learn from each other. If we don't start to move forward in this Country as one, we are still going to be fighting every day to push for these things, it is breaking down barriers, learning from each other.

Tremaine Patterson, Banbai Ranger

On the New England Tablelands of New South Wales, the Banbai rangers manage the 480 ha Wattleridge IPA for the conservation of biodiversity and cultural heritage (Patterson & Hunt 2012). Despite disruptions to their traditional practices (Sonter 2018), the Banbai rangers started to renew their cultural burning practices from 2014. The Banbai rangers initiated a cross-cultural monitoring programme alongside Western scientists (Fig 3) to monitor the impact of cultural burning on a cultural keystone species, the Short-beaked echidna (*Tachyglossus aculeatus*) and threatened plant species, the Backwater grevillea (*Grevillea scortechinii* subsp. *sarmentosa*¹), as well as the co-production of *Winba = Fire*, the Banbai Fire and Seasons Calendar (McKemey & Banbai Nation 2020; McKemey, Rangers, *et al.* 2021). Detailed ecological monitoring was also undertaken to consider fine-scale changes to vegetation communities caused by cultural burning. This study expanded the work conducted with the Yugul Mangi rangers and provided quantitative and qualitative evidence of some of the cultural, social, ecological and wildfire management outcomes of Indigenous cultural fire management. We found that cultural burning promoted regeneration (McKemey 2020), did not burn the canopy, reduced fuel

loads (McKemey, Banbai, *et al.* 2021) and had less impact on wildlife habitat (McKemey, *et al.* 2019) than other fires in nearby Warra National Park. Through this research project, the Banbai rangers were empowered to share their story of cultural fire renewal (Fig 4), which was undertaken by their community after traditional fire management had been altered since European settlement. Most importantly, this study with the Banbai rangers in regional southeast Australia demonstrated that Indigenous cultural fire knowledge and practice is alive, even in areas where the impacts of colonisation were severe, and is able to be renewed under supportive circumstances.

Exploring application of the five right-way science themes

Building relationships and trust

The initial idea for the PhD research project was conceived by Indigenous fire facilitator and co-author Costello. In both case studies (described above), research was initiated through invitations from Indigenous communities to work together via cultural or relationship brokers (Maru & Davies 2011; Robinson & Wallington 2012). Relationships and trust were built through introductions from long-term partnerships established by senior research team members (NT and NSW) and through ongoing involvement with Indigenous partners due to researchers living in the same local area as the study sites (NSW). Throughout the project, researchers kept in close communication face-to-face, via phone and email, and co-presented at conferences which further built relationships and trust.

Formal research approval processes

The research proposal was developed on the basis of the *Guidelines for Ethical Research in Australian Indigenous Studies* (AIATSI 2012) and was approved by the UNE Human Research Ethics Committee (approval numbers UNE HE14-182, HE19-068). Research permits were



Figure 1. Yugul Mangi ranger Julie Roy and ecologist Michelle McKemey meet with Elders and language experts Arnold and Ruth George at Ngukurr Language Centre, (SEAL IPA, Northern Territory, Australia) to discuss the development of the *Yugul Mangi Faiya En Sisen Kelenda* (photo: Celeste Humphris).



Figure 2. Meeting 'on Country' with Ngukurr Elders to discuss the *Yugul Mangi Faiya En Sisen Kelenda* at Yellow Water Billabong, Ngukurr (SEAL IPA, Northern Territory, Australia) (photo: Michelle McKemey).

obtained through the Northern Land Council, to enter onto Aboriginal land and engage in research activities with Aboriginal communities in the Northern Territory. Partner organisations agreed

to participate in writing, and prior, informed consent was received from individuals before research commenced. Permission was sought from participants before publication of research outputs.

Co-development of research

Key knowledge holders and practitioners were identified and invited to contribute to the development of key research questions, methods and desired outcomes of the project. The priorities of Indigenous partners were paramount and the research project was developed around these. The Yugul Mangi rangers indicated that they wanted to co-develop a fire and seasons calendar. The Banbai rangers also wanted to make a fire and seasons calendar, and establish monitoring programmes for a culturally significant animal and threatened plant on their IPA to assess the impacts of cultural burning. Indigenous research methods, such as tracking skills, appropriate use of Indigenous biocultural knowledge and 'yarning' through semi-structured interviews (Bessarab & Ng'andu 2010; Fredericks, *et al.* 2011; Walsh & Dobson 2013; Paltridge, *et al.* 2020), were used in both cases. Decolonising methodologies, such as enabling Indigenous approaches and leadership, cross-cultural knowledge sharing, time 'on Country' and collaborative research methods and practices were also employed (Smith 1999; David-Chavez 2019). Through multiple iterations of action learning cycles (Kearney & Wood 2013), research focus and methods were co-determined, data were co-collected and discussed within the research team at regular meetings at the IPAs and rangers' headquarters.

Acknowledging challenges

Working in the cross-cultural space is not easy and can have significant consequences if it fails, such as relationship breakdowns, perpetuation of injustices and failure to publish important research findings (see Cooke *et al.* this issue). We were able to avoid most challenges; however, we found that an overall lack of recognition of Indigenous knowledge by academic institutions hindered progress. For example, some institutional authorship and doctoral supervision policies did not adequately recognise Indigenous knowledge and cultural authority. There was limited information and advice



Figure 3. Banbai ranger Lesley Patterson sharing knowledge and undertaking observations at Wattleridge IPA (northern NSW, Australia) with ecologist Michelle McKemey for development of *Winba = Fire, the Banbai Fire and Seasons Calendar* (photo: Jamie Robertson).



Figure 4. Banbai rangers Mervyn Torrens, Lesley Patterson and Tremane Patterson being interviewed by Michelle McKemey during cross-cultural monitoring following bushfires at Wattleridge IPA (northern NSW, Australia) (photo: Sam Des Forges).

available to navigate the complex issues of Indigenous cultural and intellectual property, and copyright matters

(although see Janke 2003). For example, after seeking advice from various sources (with various levels of success) and

discussing within the research team it was determined that, for the fire and seasons calendars, authorship was shared, copyright was held by the relevant Aboriginal organisation and the publication was released under a creative commons licence (CC-BY-SA-ND) that allowed it to be shared but not stolen. A broader challenge was running a research project within the constraints of a society where dominant paradigms can include the cultural deficit model (Fogarty, *et al.* 2018; McKemey, Neale, *et al.* 2021), scepticism of Indigenous knowledge from conservative Western scientists (Barber & Jackson 2015) and general lack of support for Indigenous governance and land management, particularly in southeast Australia (Williamson 2021).

Ethical, productive and mutually beneficial research

Indigenous research ethics principles of mutual benefits and prior informed consent (AIATSIS 2012) were upheld throughout both case studies. Data from literature reviews and participatory action research were synthesised to develop a variety of tangible co-authored research outputs, including: fire and seasons calendars, plain English research outcomes, scientific papers, a doctoral thesis, media articles, conference presentations and field days. The information presented in two fire and seasons calendars, and findings from the research, were used by the Banbai and Yugul Mangi rangers to guide their adaptive management at Wattleridge and SEAL IPAs, respectively, and by the research team to share cross-cultural knowledge and increase awareness of Indigenous cultural fire management. Through these outputs, our research supported the rangers to share their work with a broader audience and raised the profile of right-way science on a national and international level, feeding back into a feeling of pride and fulfilment. As a result of these research methodologies, our project won the 2019 (Yugul Mangi) and 2020 (Banbai) Ecological Society of Australia National Prize for demonstrating outstanding 'Right-Way Science'.

Discussion

How can right-way science enhance Indigenous cultural fire management?

The research described in this paper provided qualitative and quantitative evidence of the benefits and challenges of Indigenous cultural fire management (McKemey, *et al.* 2019; McKemey, Banbai, *et al.* 2021). The right-way science approach addressed the five key themes identified through the literature, attempted to navigate the complexities of cross-cultural research and built understanding based on diverse knowledge systems, each of which contributed unique and invaluable information (Bohensky and Maru 2011). It empowered Indigenous partners to answer the questions that were most important to them while contributing to a broader scientific understanding of cultural fire management (McKemey 2020). The outputs of the research were applied in the adaptive management of the IPAs, and assisted the research partners in communicating important messages, such as the right time to burn according to biocultural indicators (McKemey, *et al.* 2020; McKemey, Banbai Rangers, Patterson *et al.* 2021).

Whereas early literature of Indigenous fire management was dominated by Western perspectives (for example, see Jones 1969), this research with the Yugul Mangi and Banbai rangers contributed literature that promotes Indigenous voices, and is part of the growing literature in this space (for example, see Pascoe 2014; Bourke & Atkinson 2020; Steffensen 2020; Williamson, Weir, *et al.* 2020; Fletcher, *et al.* 2021; Williamson 2021). Through right-way science, scientists are supporting Indigenous rangers to investigate issues that are significant to them, build evidence to demonstrate the benefits and challenges of cultural fire management, optimise their care of Country and share their story. The process of revitalising culture, caring for Country and co-producing knowledge, demonstrated through this study, is relevant for many Indigenous communities around the world (McKemey 2020).

More is needed to establish a two-way evidence base to support expansion of cultural burning, particularly in southeast Australia

Contemporary Indigenous cultural fire management in southeast Australia is characterised by localised, Indigenous-led grassroots movements (Maclean, *et al.* 2018; McKemey 2020; Smith & Neale 2021). There is substantial scope for expansion of Indigenous cultural fire management into larger, longer term programmes with ongoing resourcing, and to form partnerships with government agencies, non-government organisations and universities (Weir & Neale 2021). The Victorian State Government is an exception in committing long-term resources (\$22.5 million in 2021) to rein-vigorate Traditional Owner-led cultural land and fire management practices bringing together Traditional Owners and land managers in delivering local cultural fire plans (D'Ambrosio 2021). Key drivers for the expansion of Indigenous cultural fire and land management programmes include: Indigenous leadership, recent government bushfire inquiries and royal commissions (Binskin, *et al.* 2020; Owens & O'Kane 2020), public expectations, legislative changes and recognition of Indigenous land rights and the benefits of caring for Country programmes (The Victorian Traditional Owner Cultural Fire Knowledge Group 2019; Williamson 2021).

Few published collaborative science studies are available to support the expansion of cultural burning in southern Australia (McKemey 2020); however, research can play an important role in bridging the divide between science and practice. Further work is needed to develop a research agenda to increase our understanding of optimal mechanisms and biocultural outcomes of Indigenous cultural fire and land management (Neale, *et al.* 2020; Haynes, *et al.* 2021; Weir, *et al.* 2021; Williamson 2021). Relevant research could include studies that investigate: the socio-ecological benefits of cultural burning; barriers and risks; protection of important species, places and knowledge; and potential for cultural

enrichment, engaging youth and enabling Indigenous peoples to access and fulfil their cultural obligations to Country.

The role of Western scientists in right-way science

Cross-cultural, collaborative research provides an opportunity for Western scientists to play a role in supporting and following Indigenous research partners, and advocating for right-way science. Recent publications on best-practice guidelines for cross-cultural research (Robinson, *et al.* 2016; AIATSIS 2020; Cooke *et al.* this issue) provide clear direction for scientists wishing to engage in right-way science. The Bushfire and Natural Hazards CRC identified that future research should be supported by funding that is Indigenous-led, long-term, equitable and participatory (Weir, *et al.* 2021). There is growing literature describing case studies of right-way science (see papers in this special issue) and researchers now have greater opportunity to access guidelines on how to get involved in collaborative, cross-cultural projects (Moggridge & Betteridge 2019; Woodward, *et al.* 2020; Robinson, *et al.* 2021). Past practices of erasure and exclusion of Indigenous knowledge and peoples from research (Williamson, Markham, *et al.* 2020; Weir, *et al.* 2021) are not acceptable, and pro-active engagement and partnerships between Indigenous and Western research parties should be pursued.

Going forward

Right-way science is a new path for scientific research. In the last few years, increasing resources have been published to guide researchers through appropriate processes to engage in ethical, productive and mutually beneficial research with Indigenous partners. As post-colonial nation-states, such as Australia, mature and recognise their deep past, and cultural landscapes created by Indigenous peoples (Mawson 2020), the advantages of engaging in a plurality of knowledge will become increasingly evident. The benefits of right-way research extend well beyond the collection of data, and can contribute

to ecological, cultural and social justice, restoration and resilience.

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