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Divergent approaches to resolving pressures on NRM and DRR programs: A case study of sustainable fire management training

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Abstract

In the contexts of natural resource management (NRM) and disaster risk reduction (DRR), landholders are increasingly expected to take responsibility for issues which extend beyond property boundaries. Numerous programs are being developed to train landholders to meet these expectations, however the ontological underpinnings, goals and outcomes of these programs can be radically different. Using sustainable fire management as a case study, we compare a modernist approach to training, which educates landholders in the scientific and legislative aspects of NRM and DRR with the aim of persuading them towards particular decisions, with a relational framework which aims to develop new ways of knowing and being that recognises the mutually entwined trajectories of embodied humans, fire and land. Each of these programs initially appeals to different landholders but we suggest that learning styles are malleable and that training has the potential to guide not only what landholders do with their land, but also their ways of 'knowing' human/fire/land relations. We discuss the circumstances in which each program might be most appropriate and conclude by emphasising the importance of explicit consideration of these issues by training organisations, funding bodies and policy makers.

Keywords

sustainable, fire, divergent, approaches, resolving, pressures, nrm, management, drr, training, programs, case, study

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4 DIVERGENT APPROACHES TO RESOLVING PRESSURES ON DRR AND NRM PROGRAMS: A CASE STUDY OF SUSTAINABLE FIRE MANAGEMENT TRAINING

This chapter is the article published as **Edwards A and Nicholas Gill N** 2015 *Divergent Approaches to Resolving Pressures on NRM and DRR Programs: A Case Study of Sustainable Fire Management Training* *Geoforum* 65 213-221. This Chapter explores how different fire knowledges are used and promoted by fire training organisations and to what effect.

ABSTRACT

In the contexts of natural resource management (NRM) and disaster risk reduction (DRR), landholders are increasingly expected to take responsibility for issues which extend beyond property boundaries. Numerous programs are being developed to train landholders to meet these expectations, however the ontological underpinnings, goals and outcomes of these programs can be radically different. Using sustainable fire management as a case study, we compare a modernist approach to training, which educates landholders in the scientific and legislative aspects of NRM and DRR with the aim of persuading them towards particular decisions, with a relational framework which aims to develop ways of knowing and being that recognises the mutually entwined trajectories of embodied humans, fire and land. Each of these programs initially appeals to different landholders but we suggest that learning styles are malleable and that training has the potential to guide not only what landholders do with their land, but also their ways of 'knowing' human / fire / land relations. We discuss the circumstances in which each program might be most appropriate and conclude by emphasising the importance of explicit consideration of these issues by training organisations, funding bodies and policy makers.

4.1 Introduction

Programs working with private landholders in the areas of natural resource management (NRM) and disaster risk reduction (DRR) come under conflicting pressures. On the one hand, they are expected to respond to increasing demands for landholders to conduct immediate, externally-prescribed, relatively large-scale activities in relation to issues which cross property boundaries, such as fire, floods, biodiversity and water quality. On the other hand, academics and natural resource managers are calling for landholders to develop greater sensitivity to more-than-human agency and the complexity of 'human / nature' relations through personal observation, experimentation, adaptation and reflection, beginning with small-scale, localised activities.

Using sustainable fire management (SFM) as a case study, this Chapter explores how two training programs in South East Australia, both of which work with landholders of settler heritage who have limited experience of managing land and fire, respond to these pressures. These programs are the Hotspots Fire Training Project, run by the Nature Conservation Council of New South Wales (NCCNSW) and the New South Wales Rural Fire Service (RFS), and the Traditional Land Management Practices (TLMP) program of Kosciuszko to Coast (K2C) which is supported by a range of government and non-government organisations. Very different conceptualisations of human/fire/land relations are embedded within these programs and we examine how these understandings influence recommendations for sustainable fire management and approaches to teaching and learning. We compare the modernist framework of Hotspots, which uses scientific argument to persuade landholders to adopt an abstract approach to SFM grounded in representations of nature derived from contemporary ecological and bushfire management frameworks, with the relational framework of K2C, which resists the separation of humans and 'nature' in teaching and learning and emphasises the mutually entwined trajectories of humans, fire and land. In examining the interactions between these programs and landholders, we ask whether it is possible for training to influence not only what landholders do with their land, but also their ways of 'knowing' land and fire. We

consider what each approach offers and how they differ before discussing the circumstances in which each program might be most appropriate. We conclude by emphasising the importance of explicit consideration of these issues by training organisations, funding bodies and policy makers.

4.2 Context

Following the Royal Commission into severe bushfires in Victoria, Australia, in 2009, there has been a push towards “shared responsibility” for community safety during bushfires. This has been variously defined but in the Commission’s words, “Shared responsibility would create a situation in which the State, municipal councils, individuals, household members and the broader community all contribute to mitigating bushfire risk... each of these groups must accept increased responsibility for bushfire safety in the future...” (Victorian Bushfires Royal Commission 2010:352). At the same time, following the dismantling of statutory marketing boards and other bodies that collectivised risk, governments in Australia have encouraged individual landholders to take greater responsibility for the management of issues such as soil erosion, water quality and ecological resources (Lockie and Higgins 2007). Thus in both DRR and NRM contexts, landholders are increasingly expected to take action and some degree of responsibility for issues which extend beyond property boundaries.

The complexities of these expectations as they relate to landscape fire cannot be underestimated. Fire sits within multifaceted relationships which operate across extraordinary spatial and temporal scales (see Chapter 2, Griffiths 2009, Howitt 2014). These complexities are currently being intensified by the changing demographics of communities in rural and peri-urban environments in Australia (Abrams et al 2012), as amenity-led in-migrants relocate from cities to places where the human influence on the environment is less immediately apparent. Many of these new landholders have limited knowledge, skills and experience with which to

make decisions about NRM and DRR issues that cross property boundaries (Eriksen and Prior 2011), and our interviews show that they may also lack the physical capacity at both bodily and infrastructure levels to address them. Numerous training programs have been developed to address perceived gaps in these areas.

Until recently, most of the fire training programs aimed at private landholders in SE Australia, and much research into relationships between non-indigenous communities and fire, framed fire primarily as a hazard (Eriksen 2014, Fleeton 1980, Marston 1983). The success rate of these programs has been limited; Andrew Stark, Chief Officer of the Australian Capital Territory Rural Fire Service (RFS), recently stated that the community engagement efforts of the RFS had been given a “big, fat F” by researchers funded by the Bushfire Cooperative Research Centreⁱ. In recognition of the limited success of previous efforts, and in line with increasing evidence of the co-evolution of fire and much of the Australian biota (Franklin 2006), several programs have sought to reframe training in ways that recognise the perceived benefits of fire, particularly in relation to the health of Countryⁱⁱ. The two fire training programs described in this paper work primarily with landholders who have little or no experience of using fire to manage land, with the intention of transforming knowledge and skills and encouraging pro-active use of fire to benefit flora, fauna (including humans) and the built environment. Participant landholders are located within broad metaphysical / epistemological traditions in their wider lives and are connected with fire through a range of domestic practices, the media, personal experiences, second-hand knowledge and so on (Eriksen and Prior 2011). Nonetheless, landholders inexperienced with managing and burning their own land are rarely steeped in knowledge or practice traditions relating to fire and land. Thus these programs play an important role in developing understandings of what it means to dwell (Heidegger 1971, Ingold 2011) within human / fire / land relationships. Yet despite their apparent commonality in purpose, there are considerable differences in the nature of the sustainable fire management (SFM) promoted by these two programs, and in the understanding of how people learn, and these differences are reflected in wider debates around human/nature relations as described below.

4.3 Fire, Land, and Learning

Around the globe there has long been conflict between fire management to reduce risk to people and the built environment, and fire management to reduce risks to the health of Country and to maintain biodiversity (Driscoll et al 2010; Morrison et al 1996). SFM works from the premise that it is possible to meet both DRR and NRM objectives (see, e.g. New South Wales Government 2003) however two distinct operational ontologies can be identified.

The first of these approaches is frequently referred to as prescribed burning, or the “scientific form of land management firing” (Verran 2002:731). This system applies a fire ‘prescription’ to an area of land based on fire-frequency thresholds which have been pre-determined for different types of vegetation (Bradstock and Kenny 2003, Kleijn et al 2003). In Eastern Australia, fire frequency thresholds are usually based on the Keith Classification System, within which the vegetation of New South Wales and the Australian Capital Territory (an area in excess of 800000 km²) has been organised into 99 broad vegetation classes within 12 formations (Keith 2004). Each of these has a corresponding fire frequency threshold stipulating a minimum and maximum interval between burning (Bradstock and Kenny 2003, Kenny et al 2003). For example, in sclerophyll grassy woodland, it is recommended that the minimum interval between fires should be five years and the maximum interval 40 years.

Although this approach is widely accepted within the scientific community, it is not without criticism. Concerns include the failure of fire frequency thresholds to incorporate variations in the intensity of fire (Doherty 2011), and of both vegetation classes and fire frequency thresholds to take into account influences other than fire, such as drought, grazing and flooding (Hunter 2006). Some researchers and land managers question the emphasis on vegetation classes at the expense of other kingdoms such as fungi (Bell 2011) and animals (Clarke 2008). One of the authors of the original guidelines for fire management expresses concern about the ways in

which they are being used and emphasises the limitations of focusing on the “numbers” involved in fire frequency thresholds. She explains:

“Limitations of the approach (the focus on flora, data gaps, data currency and reliability) were discussed in the report. As was the need to consider spatial extent, variability, other fire regime elements, local expert knowledge, regional variation, accurate fire history mapping, monitoring, and defining fire management goals” (Kenny 2013:1).

Nevertheless, many managers remain committed to fire management through these guidelines, notwithstanding recognition of gaps in the data. Further research is being done in order to address these gaps and it is the belief of some researchers that we are at a threshold in the scientific understanding of fire through the application of remote sensing, modelling and the aggregation of records (Bradstock 2011). However, a fundamental tension exists between this approach which seeks ever more data with which to produce abstract guidelines for management, and a relational approach that demands more intimate, localised, emergent human/fire/land relationships. For example, Victor Steffensen, creator of the Traditional Knowledge Revival Pathways program which seeks to record and strengthen the traditional knowledge of Australian Aborigines, believes that sufficient information to guide fire management already exists “in the land”. He advises land managers to “Get out there first and see what’s there: plants, animals, whether the land’s a little bit sick...” and explains, “When it comes to managing Country you can’t go, ‘Oh yeah, we’re gonna burn in six years’. You’ve got to be out there reading Country, out there every year”ⁱⁱⁱ. This situated approach to SFM is traditionally associated with indigenous peoples and is dependent on the development of an intimate relationship between individual humans, fire and an area of land over time and the recognition of other-than-human agency (Eriksen and Hankins 2014, Langton 1998, Miller and Davidson-Hunt 2010).

These divergent approaches to SFM reflect wider debates around human / ‘nature’ relations. Researchers working within posthuman / relational paradigms in NRM have criticised the dominant environmentalist approach, or *Caring for Country*, for

adopting a controlling perspective in which humans assume themselves to be at the helm of complex socio-ecological systems as they take on the role of protector of an environment which has become “an *object of concern*” (Ingold 2006:19, original italics). These researchers seek to dissolve the separation between humans and ‘nature’, privileging concepts such as co-emergence and complexity. They challenge NRM theory and practice to direct more attention to other-than-human agency and to recognise the mutual well-being of humans and Country, thus encouraging an ethic of Caring *as Country* through which “we live, think, act and attend as part of the world, rather than distinct from it” (Suchet-Pearson et al 2013:188). Similar developments are taking place within the field of DRR. For example, in seeking to enhance human survival during bushfires, Griffiths (2009) recommends that local knowledge and local residents be empowered, whilst Howitt calls for recognition of the “messy boundaries between human and non-human others” as we re-imagine coexistence with fire “in terms of recognition, respect, adaptation and a shift in how we think about the terms on which human societies coexist with things” (Howitt 2014:61). Evidence for the benefits of developing a relational understanding of risk is given by Kulatunga (2010), who reports on how embodied understandings of more-than-human agency, positioned within current and historical human / ‘nature’ relationships, enabled members of the Moken community in Thailand to make the life-saving decision to move away from the sea immediately before the Indian Ocean Tsunami in December 2004.

Relationships between humans and their environment are also being examined in the field of knowledge and learning. Here, researchers working within relational paradigms have challenged the modern acquisition model of learning through which abstract knowledge is seen to be incorporated or transferred into the rational mind of a human individual isolated from an external nature before being applied to the world (Plumb 2008, see also Archer 2000). Many scholars criticise the failure of this model to recognise the human collaborative context within which learning takes place (Lave and Wenger 1991, Schusler et al 2003), suggesting that a social model more accurately represents the process of learning. However, whilst theories of social learning acknowledge human social, economic and political forces, they rarely

reference the geographical, physical or artefactual environment within which learning takes place (Preston 2005:374) and which itself may be altered during the learning process (Ingold 2011). This more-than-human context is important to the theory of learning-as-dwelling (Heidegger 1971, Plumb 2008), in which learning is not seen as an accumulation or assimilation of knowledge but occurs as we:

“..attune our skills and sensibilities to the forces and powers of our material and social world. As we weave ourselves into existence, we detect when our thoughts, our words, our movements, and other deeds run against the grain of the world demanding recalibration and adjustment...” (Plumb 2008:76)

According to adherents of learning-as-dwelling, these recalibrations and adjustments leave traces in the physical and social worlds, extending learning from within the rigid boundaries of a single individual or exclusively human social environment and repositioning humans within ‘nature’ by acknowledging the reciprocal relationships involved in their mutually evolving trajectories. Moreover, the model pushes understandings of experiential learning (Kolb 1984) to fully embrace changes in bodies, including neurological systems (Ingold 2011, Plumb 2008). This requires a shift from the notion of learning as a cerebral process which involves “a type of *‘dialogue’* between people and the landscape over time” (Cooke and Lane 2015:44, our italics) towards a perspective in which an embodied, enminded being-in-the-world learns through engaging with and in an environment which is simultaneously coming-into-being (Ingold 2011).

We now outline the methods used in our research, before describing two sustainable fire management programs and highlighting how positioning around the human/‘nature’ dualism influences their approaches to SFM and to teaching and learning.

4.4 Methods

This research was conducted as part of a PhD project from March 2011 to August 2014 which was initially commissioned to conduct an in-depth evaluation of the Hotspots Fire Training Project (Hotspots). This evaluation combined a review of Hotspots literature, two detailed case studies (one in Palerang and one near the NSW / Queensland border), participant observations of two other workshops and staff training days, interviews with committee members and a survey. Further details on methods and research participants can be found in Chapter 1 and Appendix 1.

The case studies involved participant observations of the two workshop days at each location. These observations focused on engagements between humans, and between human and other actors (such as fire, plants, weather and paper and other resources) in the context of learning. In addition, semi-structured interviews were conducted with landholders around one month before and after their attendance at Hotspots workshops, and on one occasion only with landholders who chose not to attend. Initial interviews with landholders were usually conducted whilst walking around the interviewee's property in order to encourage landholders to identify issues and relationships which *they* viewed as important to land and fire management. Two of the agency staff, one of whom was also a landholder, were interviewed at their place of work. The second interviews focused on the Hotspots training and its impact and landholders were initially asked to share any information which they felt would be relevant to the evaluation before being guided by more structured questions. Interviewees were randomly selected from a list of people whom Hotspots had invited to attend the workshops and all agreed to be interviewed. Table 1 shows the number and gender of interviewees. Landholders ranged in age from 40 to around 70 years and all had lived locally for at least 5 years. The median area of land managed by interviewees was around 100 hectares, although two females managed less than 2 hectares and 2 males managed over 1000 hectares.

Table 1

Number of interviewees and Occasions on which they were interviewed

Case Study	Type of Interviewee	Interviewed Pre-Hotspots	Interviewed Post-Hotspots	Interviewed on another occasion
Palerang	Hotspots Participant Landholder	4 Female 3 Male	4 Female 3 Male	1 Male ¹ 1 Female
	Hotspots participant landholder and agency staff member	2 Female 1 Male	2 Female 1 Male	
	Hotspots non-participant landholder	2 Male		
NSW / Queensland border	Hotspots Participant Landholder	2 Female 5 Male	2 Female 4 Male	
	Hotspots agency staff member		1 Male	
	Hotspots non-participant landholder	1 Male	1 Male	
Total		20 (8F, 12M)	18 (8F, 10M)	

¹The male interviewee was interviewed for a third time, and the female for the first time, several months after the second interview because a demonstration burn had subsequently taken place on their property.

Analysis of interviews, observations and Hotspots literature was an iterative process which involved moving from one form of data to the other as themes relating to learning within human / fire / land relationships emerged. Interviews were audio-recorded and transcribed. These were listened to five times and transcripts were read 5 times, as it was considered important to understand each landholder's "whole story". Audio and video recordings of workshops were also listened to and / or watched five times. On the basis of recurrent explanatory categories which emerged from our deep engagement with the data, relevant discussions from the workshops were transcribed and both these discussions and interview data were coded using NVIVO 10.

The survey could be completed on paper or online, using Survey Monkey. Invitations to complete the survey were sent by Hotspots to over 500 landholders participating in workshops across New South Wales between 2010 and 2013, however several of these were returned to sender due to incomplete or incorrect email or postal addresses. 167 completed questionnaires contained sufficient information to be included in the analysis, which represents a response rate of just over 35 % of

around 470 participants believed to have received a request to complete the survey. The survey was analysed using Microsoft Excel.

As the evaluation of Hotspots proceeded, we became aware of the K2C TLMP project, which also seeks to engage landholders proactively with fire and operates within a very different conceptual and operational framework, and considered that this alternative approach to training could offer a useful comparison with Hotspots. Due to funding constraints, our engagement with the TLMP program was limited to a review of project literature, interviews with the voluntary former president and the paid facilitator of K2C, participant observation of a workshop, and individual and group discussions with the workshop leader and 6 participating landholders. As a result we are not in a position to offer a detailed evaluation of the K2C program. However, our research concerning this program enables us to illuminate better some of the underlying assumptions, operational constraints and potential outcomes of different training approaches.

4.5 Description of Projects

The Hotspots Fire Project

The Hotspots Fire Project, jointly managed by the NCCNSW and the RFS, is steered by a Committee which includes representatives from a range of organisations including government agencies, member organisations (such as New South Wales Farmers) and academic institutions. The general purpose of Hotspots is to “assist private landholders and public agencies in managing fire for the protection of life and property while at the same time ensuring healthy, productive landscapes in which biodiversity is protected and maintained” (Hotspots Fire Project, Undated). This assistance is provided in the form of a training program for landholders conducted on two days which are held one to two months apart. The majority of the participating landholders are of settler heritage but Hotspots has also worked with Aboriginal land councils and first generation immigrants.

On the morning of the first day, landholders are greeted at a built venue, usually a rural fire-shed or community hall, which is decorated inside and out with Hotspots

and RFS signs. Several uniformed people are present, including employees from Hotspots, the RFS and local agencies such as the Forestry Corporation of NSW and the NSW National Parks and Wildlife Service. Following refreshments, landholders are invited to sit at desks to watch Powerpoint presentations introducing Hotspots before walking or driving to one to three field sites. One of these sites is a potential demonstration burn-site for which a detailed ecological site story outlining flora, fauna, cultural values and fire history has been prepared in advance by a Hotspots Ecologist. Landholders then return to the indoor venue for another Powerpoint presentation which relates to principles of fire ecology and is more or less generic across New South Wales. After lunch they are provided with an aerial photograph of their property and guided through the completion of individual fire management plans. These plans require landholders to mark the photograph or overlays with features such as infrastructure, water, fire history and vegetation (categorised by Keith class and identified through remote sensing with help from Hotspots staff and representatives from agencies such as the National Parks and Wildlife Service). Landholders then partition their land into “management units” and identify management actions for these units based on the fire frequency thresholds determined for the vegetation classes on their property.

The morning of the second day begins with presentations on fire behaviour and the legislation required to conduct burns. Participants then travel to the demonstration burn-site where Hotspots and agency staff present the fire management plan for the site and demonstrate tools for assessing weather, fuels and topography. In the afternoon, weather and other fire-related conditions permitting, the landholders observe a planned burn on the demonstration site. If the burn cannot take place, workshop leaders describe fuel loads, weather and other aspects of prescribed fire in more detail.

Hotspots seeks homogeneity and standardisation across all workshops. Through a 110 page *Guide to Facilitators*, workshop leaders are given step-by-step instructions on how to prepare and deliver each of the two day workshops. This guidance is very detailed, with precise timings and, in parts, advice on what facilitators might say. For

example, the document suggests that, on handing out information kits, the Facilitator should describe the publications thus:

“This is your take home record of the information provided at today’s training day. The details on RFS regulations are outlined in the two RFS publications included in your kit... The site story sheets are your record of what we looked at in the field this morning. The Forests NSW maps of the district are your record of the available documented fire history in the region” (Hotspots Fire Project 2011:28).

Training is delivered across New South Wales by three facilitators and two ecologists.

The Traditional Land Management Project run by Kosciuszko to Coast

An alternative approach to fire training is taken by the Kosciuszko to Coast (K2C) project. K2C is managed by 13 partners including government agencies, community and membership groups, and a not-for-profit business. However, K2C employs just one ongoing member of staff, the Facilitator. K2C contracts a Ngarigo elder, traditional land manager and scientist (Mason et al 2013), to share his knowledge, skills and experiences through the Traditional Land Management Practices (TLMP) Project, thus setting an understanding of fire within the wider context of traditional indigenous approaches to land management. Rather than working with different communities for two days, this project works with the same group of landholders over two years, moving from property to property to discuss different aspects of land management, including fire. More than 50 properties were visited between 2012 and 2013 and, again, the majority of the landholders are of settler heritage.

Landholders attending a K2C fire management workshop drive directly to the private property on which the burn is to take place. Here, the contracted elder, the K2C facilitator and landholders engage in discussion around the practical and spiritual history of fire, current practical considerations and its particular purpose at this property. All people present are then invited to participate in lighting and controlling

the fire or fires. Burns are conducted slowly, sometimes just one plant at a time, and repeated burns may take place in the same area within the same year, to facilitate activities such as seeding or weed management. There is an emphasis on the different needs of individual plants; for example, it is advocated that bark is singed off or removed from smooth bark trees above grass height.

Throughout the workshop, the leader challenges modern understandings of the human/nature dualism. For example he explains that, through the use of fire, humans can “remind the tree of who he is, remind him to grow straight” and that, through their behaviour, “the animals will tell (landholders) when to burn”. Indeed, the leader attributes *control* to non-human forces within human/fire/land relationships, writing that “these natural elements, wind, rain, fire...have, and always will have, control over all the land, its people and natural resources” (Parks Victoria, 2003:45).

The leader shares his learning and experience through story and observation, explaining that the workshops will include show-and-tell, with “more show than tell”^{iv}. There is no pre-arranged script and landholders are encouraged to find their own answers to fire management questions as described by one participant:

“Rather than tell us what to do, Rod posed two questions: which is the most flammable plant here, and do you burn the most flammable first or last? The issue is not what are the right answers to these questions but how you observe and learn the answers for yourself” (Goonrey 2012:7).

A booklet written to accompany the project emphasises that in traditional Aboriginal societies, “There is no distinction between Knowledge and Practice - Knowledge is learnt through Practice” (Mason et al 2013). In keeping with this philosophy, the workshops put greatest emphasis on “learning by doing”, encouraging landholders to actively engage with their land. For example, it is suggested that landholders might:

“... set a small fire and observe what happens. Then go on to set other small fires over several weeks which put into practice what you have observed.

These small fires cover only a few square metres at a time and it may take several weeks to burn the area in a pattern which makes sure the valuable plants and animals of the rocky knoll are not damaged. Burn and watch it; come back; watch what is there; learn about it. Then don't burn for a few years; just observe and learn" (Goonrey, 2012:7).

The low staffing and resource-dependency allows the K2C workshops to be quickly postponed to alternative dates if the weather or other material considerations prevent a burn. Whilst the workshops do share an identity through the style of knowledge-sharing, the lack of a fixed agenda means that all aspects of individual workshops can be tailored to the local situation.

4.6 Divergent Approaches

Both the Hotspots and K2C TLMP training programs are to some extent, 'top-down' approaches which are initiated and developed by agency staff and engage an 'expert', or 'experts', from outside the local community to facilitate landholder learning about fire. Neither program is explicitly committed to collecting information on the existing knowledge and / or practice of landholders (see Gaillard and Mercer 2012), but rather with sharing stories, cultures and practices embedded in contexts which are, to varying degrees, alien to the landholders with whom they are engaging. The programs share some similarities in that they seek to promote prescribed fire as a potentially positive force and the booklet designed to accompany the K2C project observes that it is not necessary to choose *between* traditional Indigenous practices or 'modern' land management practices (Mason et al 2013:15). Nonetheless, we suggest that there are considerable differences between the projects.

Whilst the Hotspots workshops seek to revive a practice – the use of fire as an integral part of land management – with roots in both pre-C18th Australia and earlier settler use of fire, they do so from within a very different framework. Viewing space remotely from above during the planning process renders 'nature' inert; as

Shaw et al explain, it “freezes complex spatial and temporal approaches into a two-dimensional plane that (can) be cellularized, enumerated and manipulated” (Shaw et al 2010:380; see also Dixon and Jones 1998). Floral and faunal diversity is amalgamated into large classes and, as aerial photography primarily focuses on canopy species, relationships are glossed over or extrapolated from abstract knowledge of ‘similar’ sites in different places. This is not to suggest that other-than-human agency and relationships are ignored within Hotspots workshops; as in all fire training programs, much discussion takes place around the roles of ‘fuel’ (vegetation), wind, humidity and temperature in fire behaviour. However, this recognition of agency is selective and pre-determined in advance, and within the workshops, “(T)he power of human cognition to eventually determine and predict the natural world is largely left unquestioned... the enlightenment assumption of human control over nature remains...” (Hinchliffe 2001:186).

This approach reflects the institutional context through which Hotspots has grown which prioritises immediate, decisive action in relation to wildfires, habitat destruction and high rates of species extinctions. One of the two managing organisations, the RFS, is described on its own website as “the world's largest volunteer *firefighting* organisation” (<http://www.rfs.nsw.gov.au/about-us/history>). As employees of the RFS, employed part-time on the Hotspots project and part-time in a regulatory capacity, the facilitators of Hotspots workshops are fire-fighters whose primary role is to control or contain fire and keep it away from people and built assets. Whilst individual facilitators do consider fire in its wider environmental context, and all are legally bound to attend to environmental considerations when burning, they are representatives of a fire-fighting organisation which has a particularly strong identity in the way that it works with, and against, fire.

This identity is evident in that, whilst requesting landholders to engage with the *idea* of fire, and with paper representations of land and fire, the RFS seeks to retain control over practical aspects of fire management both during and after the Hotspots workshops. This restricts landholder interaction with fire to observing expert demonstrations and landholders themselves are physically static throughout most of the workshops. Workshop leaders do encourage landholders planning burns

on their own land to look for organisms which might need protection from fire, such as hollow-bearing trees, but by recommending that burns planned are assessed and conducted by the RFS they remove the onus to identify such organisms from the landholder. Indeed, whilst it is not clear whether, or how often, this actually happens, it would be possible for landholders to go through the entire process of planning and completing a burn without ever actually visiting their land. Thus, the Hotspots workshops promote the idea that landholders can plan or make worlds before or without actually living in them (Ingold 2011).

This approach sits within an acquisition framework through which learning takes place in formal settings where exposure to 'knowledge' is managed by an expert 'educator'. An abstract body of information is presented as a *fait accompli* in a cerebral approach to learning which separates human mind from body and from engagement in the world (Plumb 2008:67, see also Archer 2000). The guiding motivation for this approach is that when rational landholders are provided with objective facts about fire, they will absorb and process this information mentally and so form appropriate management decisions (see Plumb 2008:66).

In contrast, during the K2C workshops fire-planning emerges through engagement with the land itself and is spatially localised and temporally dynamic. Rather than freezing or objectifying Country, the workshop leader explicitly and repeatedly attributes powers of agency to non-humans, including animals, plants, wind and fire. The emphasis is on working *with* fire and the land, not from the privileged position of Controller but as one element within a dynamic, mutually dependent world of relationships. Learning is conceptualised as an emergent process through which both humans and the world are transformed by fire and guidance extends across species boundaries. Through the emphasis on learning by doing, landholders engage their bodies with the land, bending to inspect plants, raking around the bases of trees, and lighting, tending and extinguishing fires at different scales. These experiences are repeated as landholders move from property to property, working with fire in different places and conditions.

Plumb notes that, within the constraints of our genes, our bodies and neurological systems are sufficiently plastic to adjust and adapt as a consequence of physical engagements with the world, explaining that:

“Even at the level of our bodies, our engagements at one moment produce changes whose traces both constrain and enable our responsiveness in our next moment of engagement. Our bodies remember what has transpired before and this memory tunes our interactions” (Plumb 2008:76).

The TLMP project offers many opportunities to engage with fire throughout the lifetime of the project, which encourages continual growth and adaptation and the development of embodied skills and memories within landholders.

Landholders are not, however, “passive recipients” (Pannell and Vanclay 2011:29) of training programs and we now discuss some of the interactions between the two workshop programs and participants. It is outside the scope of this paper to offer a detailed evaluation of these programs, however interested readers may like to refer to the evaluation of Hotspots (Appendix 1) and the TLMP Project Summary (Mason, Robertson and Van Dyke 2013). Here we describe some general results before focusing on landholder interactions as they relate to understandings of human/nature relations.

4.7 Interactions with landholders

Changing practice in relation to controversial issues is an incremental process which can take many years (Measham 2013), however, in terms of their own objectives, both of these programs have already achieved outcomes. The survey of Hotspots participants reveals that amongst the 167 respondents, there is a net gain of at least 32 landholders applying for non-pile (or broad) burns to be conducted on their properties, 112 landholders developing, or actively planning to develop, fire management plans for their properties and 49 landholders contacting, or intending to contact, fire management agencies. Outcomes for the K2C project are harder to pin down, both because of our more limited engagement with this project and

because of the complexities of exploring the evolution of the entwined trajectories of human bodies, including neurological systems, and Country. However, it is significant that K2C initially expected to have nine to twelve interested land managers but over two years worked with the owners of more than 50 properties, with most sustaining their interest throughout the program. Whilst burns have not been conducted on all of these properties, fire has been a central feature of the training throughout (Mason et al 2013). Discussions with participants attending the observed workshop suggest that, although the approach is challenging, regular participants feel rewarded with increased understanding of the interrelationships between humans, fire and land and the ability to better “read Country”.

Both programs are voluntary, and therefore self-selecting, hence it is unsurprising that many participants are receptive to the messages they give. This is particularly true for the K2C project as a number of workshops were held initially in which it was explained that in signing up for the TLMP training landholders would be engaging with indigenous practices and knowledge systems and they might find some of the concepts challenging. Despite this, and the increased exposure to Aboriginal cosmologies and practices as they relate to land and fire in this area of Australia in recent years, the former president of K2C states that a small number of landholders struggle with the ontological shift required of them. He suggests that those who drop out of the program reject the approach as “unscientific” and find the language and concepts articulated to be too “foreign” to them (Geoffrey Robertson, pers. comm., February 2012).

Participants in the Hotspots program are more diverse. Whilst it is clear from promotional literature that the workshops will engage with SFM, the framework within which learning will take place is less clear. Furthermore, the shorter time commitment required by the project is likely to result in the participation of more landholders who are merely curious rather than actively committed to using fire to manage land. Evidence from the surveys suggests that the project is most effective for landholders who are relatively new to managing land and to the area in which they are now residing. For example, the median time living in the local area was in the range 6-10 years for those who intended to begin using fire on their land post-

workshop, compared with 16-20 years for landholders who had never burned and had no intention of burning after the workshops. For many of these people, it appears to be the simplicity of the Hotspots approach that is attractive and programs are particularly successful when focusing on a very specific goal, such as conserving a single endangered species (Appendix 1:35, John Allen, Hotspots facilitator, *pers. comm.* 2014).

More experienced landholders whose ways of knowing and inhabiting human / fire / land relationships are already attentive to local, dynamic more-than-human interactions appear to feel more challenged by the abstract, number-driven approach to fire management recommended by Hotspots. For some, these challenges primarily relate to the application of generic fire prescriptions to local situations. For example, Summer is a member of the local fire brigade but was passionately opposed to burning the demonstration burn-site at her workshop, stating, "I'm not against fire *per se*, I just think there are so many other disturbances (here)." Rachael was resistant to the same burn because she felt that the site offered good habitat for animals. She explained:

Rachael: (The burn site) was right next door to an area that was still recovering from a burn and the rest of it was up against houses – so it was quite a small patch but the only remaining bit that had decent cover in it. So in terms of invertebrates, lizards, frogs, all that sort of thing there was nothing over there for them and pretty soon there was going to be nothing over here for them...

Some landholders questioned the prescriptive approach more generally, especially the credibility and usefulness of classification systems. For example, Andrew felt that "the idea of doing classification by vegetation types isn't really practical" because of the difficulties of slotting complex, living systems into pre-defined boxes (see Hearn et al 2011). In view of this, and the fact that changes in vegetation class can have dramatic consequences for recommended fire frequency thresholds, Andrew felt that it would have "been more useful to have learned more about plant, animal and microbial *relationships*".

These statements relate primarily to concerns about SFM operational approaches and reflect debates in the academic literature. However, another common area of disquiet for interviewees related to the limited attempts to encourage the development of a *living* relationship with fire during the workshops. At one of the case study sites, all of the interviewees bar one experienced burner agreed that active involvement in a small burn would have been preferable to watching a demonstration. As Tom put it, “I can see value in that. I can’t see value in the spectator sport side of it.” This suggestion was not explicitly explored in interviews in other areas but one agency staff member in Northern New South Wales and a local brigade captain in Palerang themselves volunteered the idea that the best way to learn about land and fire is to physically engage with burning. For example, Jack, who somewhat disparagingly described the Hotspots workshops as “science out of the classroom”, explained:

Jack: If you start small you get the understanding. And then go again. And if you need to go bigger, later, well go a bit bigger. After a period of time – it could be months, weeks, years – and you’d be quite happy if you saw the need – you could walk around a coupla hectares all by yourself and set it all alight because you’ve had that experience.

At first glance, these landholders might be understood to be making simple statements about their own preferred “learning styles” (Eriksen and Prior 2011:616, Kolb 1984). However, closer examination of the contexts within which these statements are situated shows that these interviewees view the Hotspots workshops as a missed opportunity to encourage *all* landholders to move away from predominantly cerebral learning towards a more practical, embodied understanding of fire. Such a shift would require plasticity within individual learning styles which is little explored in the NRM / DRR literature. However if, as Eriksen and Prior state, “LEK (Local Environmental Knowledge) is a way of construing the world rather than an accumulation of facts” (2011:613), then changes in LEK could be associated with changes in learning styles. This is supported by evidence from our interviews that with increased time living in a rural, fire-prone environment, landholders move away from more cerebral approaches to learning about land management, and

identification with particular communities (such as the “green” community), towards learning through physical engagement and experience (The Authors under review, Cooke and Lane 2015). In suggesting that landholders should have been encouraged to develop more active, physical relationships with fire, our interviewees appear to believe that it is possible to shift learning styles through training projects and that training programs should not simply reflect landholder learning styles but should also recognise their potential to guide landholders towards particular ways of knowing human/nature relations.

4.8 Discussion and implications

Despite sharing some similarities, there are considerable differences in the conceptualisation of the ‘human/nature’ dualism at the root of these two training programs, and these are reflected in, and promoted through, approaches to SFM and to learning. In the context of disaster risk reduction, and in particular ‘shared responsibility’ for bushfire safety, each of these programs might be considered to have advantages and disadvantages. Much research has been, and is being, conducted into the most effective types of, and channels for, emergency communications and warning messages to rural inhabitants (e.g., Martin and Rice 2012), and the extensive technology available to state emergency organisations will always be an important force in communications about potentially dramatic events. However, encouraging landholders to be self-reliant and ‘read’ Country, as they develop physical capacities and embodied memories relating to human/fire/land relationships, could ultimately empower them to work more creatively and productively with ‘nature’ during fire emergency situations. In contrast, a more prescriptive approach risks implying that successful co-existence with fire requires only a managed transfer of ‘objective’ information into the heads of rational landholders. This seems to go against evidence that landholder ‘knowledge’ of fire and natural resource management emerges with and through engagements with Country (see Chapter 3, Cooke and Lane 2015, Eriksen and Prior 2011). Focusing on representation and the transfer of information does little to develop the embodied,

enminded (Ingold 2011) memories and capabilities that would allow landholders to develop sensitivity and responsiveness to the agency of land and fire.

Changing relationships, developing physical and mental capacities and shifting learning styles take time, however. Many in-migrants are reluctant to engage immediately with fire-related issues on taking up tenure of a rural property and this situation can continue for several years (Eriksen and Prior 2011). Even when they do engage it can take years, if not decades, of observation, experimentation and adaptation to develop sensitive, responsive relationships with(in) Country. The median age of respondents to the Hotspots survey falls in the range 55 to 59 years and K2C participants at the observed workshop appeared to be of a broadly similar demographic. Our interviews suggest that many landholders of this age will move off property within the next decade or so due to ageing and associated difficulties managing large properties and / or increasing need for the services and infrastructure provided by towns and cities. Thus, just as some landholders are beginning to develop the capacities to engage in productive relationships with fire, they may move away from the environments through which these relationships have emerged.

In the meantime, there are risks to human lives and property. The Hotspots approach immediately increases the number of landholders preparing property fire management plans and the number of strategic burns conducted across relatively large scales. Furthermore, the approach to fire planning is consistent with that of much larger agencies. Fire management plans provide a material record of works done and Hotspots are currently developing an online system which will allow landholders to upload details of their plans and works which can be integrated into local and regional planning. Provided that these details are kept up-to-date, they will provide the Rural Fire Service with immediate information about possible emergency access routes. In the short-term, then, the Hotspots workshops may well reduce the risks to landholders from bushfire.

There are also immediate risks to the health of Country, including threatened habitats and species. For example, the northern population of the Eastern Bristle

Bird is extremely vulnerable; the Department of Environment and Heritage note that it is “likely to become extinct in nature in New South Wales unless the factors threatening its survival cease to operate” (New South Wales Government Online). Immediate, co-ordinated action is required in order to encourage habitat which would give this species a greater chance of survival. As mentioned, in many areas the ideal fire regime even for vegetation is often just a best guess, and the needs of animals are barely known at all. However, for certain species, such as the Eastern Bristle Bird, doing nothing will almost certainly lead to extinction. Moreover, the current recommended scientific prescriptions for burning bristle bird habitat are supported by third and fourth generation farmers, who testify that broadly similar burning practices up to the mid 1980’s coincided with greater numbers of target species. For this bird at least, encouraging large-scale prescription burning in the short-term may be the only path which offers any hope.

Each threatened species is set within wider relationships, however, and the complexities, limitations and costs of single species conservation approaches are well documented (Flather et al 1998, Courchamp et al 2003). One risk with the prescriptive approach to sustainable fire management is that in order to prevent the immediate loss of known threatened species and to reduce risk to human life and property, programs will continue to propagate the view of humans as Controller of ‘nature’, and ‘nature’ as consisting of objects that can be rearranged according to human whim (Ingold 2006:14). In the past this approach has failed both DRR and NRM. For example, in the late C20th farmers near the Border Ranges National Park were strongly advised by scientists and land managers to stop burning bristle bird habitat in the belief, based on evidence from other regions, that long breaks between burning were required to maintain this vegetation type. It is now thought that in this very productive area, the ideal interval between fires may be much lower than initially believed and these farmers are now being asked to reinstate their practice, often by the very same scientists or land management advisors who asked them to stop in the first place. Unfortunately, some of the farmers interviewed for this research fear that it is now too late to start burning again as the cessation of fire

has resulted in large-scale weed invasions and the potential of fire to get out of control as there are no longer sufficient breaks to prevent it escaping.

Assessing what approach to take when developing and delivering NRM / DRR training can involve difficult political decisions. In some circumstances it may be considered desirable to differentially target different landholders. With younger people, or those who are likely to have long-term relationships with(in) Country, it may be more important to challenge the 'human/ nature' dualism and develop new ways of knowing and being. With older people, or those more likely to be only temporarily immersed in local assemblages, it may be considered more appropriate to simply provide management prescriptions. Targeting different approaches to different situations may be considered unpalatable, not least because there are clear implications for community cohesion. However, it is important to note that in the current situation programs already have divergent operational ontologies, the implications of which have not necessarily been considered by funders and policy-makers.

It is important to note also that there are wider political implications of adopting 'modern' approaches to sustainable fire management training. For example, Eriksen and Hankins warn that a dynamic, relational view of burning practice, through which both land and people are transformed and which is central to indigenous human/fire relations in Australia and North America, is currently threatened by "Eurocentric, hierarchical and patriarchal colonial notions" (2014:1289) of fire management. Certainly this is not the intention of Hotspots staff members – project partners are involved elsewhere with efforts to revive Aboriginal fire practice – however, it is a potential side effect of a program which encourages participants to view 'nature' as inert and separate from humans rather than encouraging them to physically engage in the tangle of relationships found in a dynamic, interdependent world.

4.9 Conclusions

In both DRR and NRM contexts, landholders are increasingly expected to take action and some degree of responsibility for issues which extend beyond property boundaries and numerous programs are being developed to train landholders to meet these expectations. Our case studies suggest that the ontological underpinnings, and thus the goals and likely outcomes, of these programs can be radically different. Some work within a modern framework to educate landholders in the scientific and legislative aspects of NRM and DRR with the aim of persuading them towards particular decisions, whilst others aim to develop new ways of knowing and being which position humans *as* nature and recognise the importance of physical interaction with(in) Country. Whilst each of these programs initially appeals to different landholders, we suggest that learning styles are malleable and that training has the potential to guide landholders towards particular ways of knowing human/nature relations.

Each of these programs has advantages and disadvantages in terms of reducing risks to humans, property and land. It is difficult to argue against the benefits of a locally informed citizenry that is alert and responsive to the needs of both humans and Country. However, when financial and human resources are limited, and the human population of rural areas transient, it may be perceived that the priority is to reduce the immediate risks through prescriptive approaches. It is important that practitioners and their funders consider their priorities in different circumstances and recognise the implications and potential outcomes of the different ontological foundations to NRM and DRR programs.

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Table 1

Number of interviewees and Occasions on which they were interviewed

Case Study	Type of Interviewee	Interviewed Pre-Hotspots	Interviewed Post-Hotspots	Interviewed on another occasion
Palerang	Hotspots Participant Landholder	4 Female 3 Male	4 Female 3 Male	1 Male ¹ 1 Female
	Hotspots participant landholder and agency staff member	2 Female 1 Male	2 Female 1 Male	
	Hotspots non-participant landholder	2 Male		
NSW / Queensland border	Hotspots Participant Landholder	2 Female 5 Male	2 Female 4 Male	
	Hotspots agency staff member		1 Male	
	Hotspots non-participant landholder	1 Male	1 Male	
Total		20 (8F, 12M)	18 (8F, 10M)	

¹The male interviewee was interviewed for a third time, and the female for the first time, several months after the second interview because a demonstration burn had subsequently taken place on their property.

ⁱ Andrew Stark, Chief Officer, ACT Rural Fire Service in response to a question asked at The Future of Fire, The second public forum in the "Energy, Fire, Climate, Water - Fenner Fora 2014" series, 7th August, 2014, Australian National University, Canberra.

ⁱⁱ Country is a term which is commonly used by Aboriginal Australians but is also used by some Australians of settler heritage. It is used here to expand the meaning of land, or the environment, to embrace people, stories, memories, plants, animals, land-forms, seasons and ephemeral phenomena such as weather and fire.

ⁱⁱⁱ Victor Steffensen, Traditional Knowledge Revival Pathways Program: Bushfire in the Landscape Conference speech, 23 June 2011, Teachers Federation Conference Centre, Sydney.

^{iv} All quotes from workshop observations unless otherwise credited.