



RESEARCH REPOSITORY

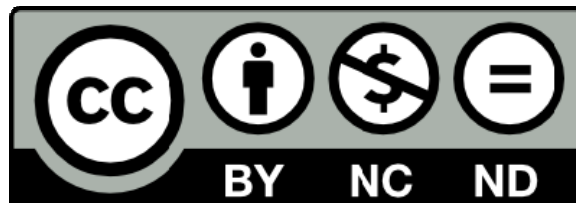
This is the author's final version of the work, as accepted for publication following peer review but without the publisher's layout or pagination.

The definitive version is available at:

<http://dx.doi.org/10.1016/j.geoforum.2015.11.011>

Buizer, M. and Kurz, T. (2016) Too hot to handle: Depoliticisation and the discourse of ecological modernisation in fire management debates. *Geoforum*, 68. pp. 48-56.

<http://researchrepository.murdoch.edu.au/29373/>



Copyright © 2015 Elsevier Ltd.

Too hot to handle: Depoliticisation and the discourse of ecological modernisation in fire management debates

Marleen Buizer^{a,b,†}, Tim Kurz^c

^a Centre of Excellence for Climate Change Woodland and Forest Health, School of Environmental Science, Murdoch University, Australia ^b Land Use Planning Group, Wageningen University, The Netherlands ^c Psychology, College of Life & Environmental Sciences, University of Exeter, United Kingdom

Abstract

The management of fire within landscapes is a topic of increasing contestation. This is particularly the case in relation to the practice of ‘prescribed burning’, which aims to exercise a form of control of wild fires through the application of science-based techniques that putatively reconcile the conservation of biodiversity with the protection of human life and property in particular places. The belief in possibilities to solve environmental problems by scientific approaches and in outcomes that do not involve harm or vulnerabilities is an element of a trend called “Ecological Modernisation” (EM). Various studies have shown how discourses of EM have come to dominate the ways in which many contemporary environmental problems are approached. We argue that highlighting the presentation of such discourses as neutral and non-politicised precludes a critical examination of the ways in which the knowledge claims upon which they rest can be seen to reinforce only particular sets of constructions of the relationship between humans and the natural world. Through an analysis of knowledge claims made in relation to recurring topics such as the use of fire by Indigenous Australians and the adaptation of species to fire, we illustrate that behind the discourse of ecological modernisation sit deeply engrained variations in terms of where people locate vulnerability in relation to the pressing problem of wildfire and fire management. We argue that the depoliticisation of the topic sustains specific types of relationships between people and nature while delegitimising others and obscures the fundamentally different notions about relationships between humans and non-human nature upon which the debate ultimately pivots.

Keywords:

Vulnerability Fire management; Discourse; Ecological modernization; Depoliticisation

NOTE:

Thus, this copy is for personal use only, and differs in minor details from the published version. For the definitive version of this manuscript, please see the *GeoForum* online version at <http://www.sciencedirect.com/science/article/pii/S0016718515301834>

1. Introduction

Contemporary debates about humans' interventions in landscapes in response to environmental problems such as climate change have largely moved away from questions of whether ecosystems should be changed by the human hand, and towards questions of how and to which ends such interventions should happen (Hobbs et al. 2011, Buizer et al. 2012). The burns conducted by government authorities to prevent wildfires in fire-prone regions are a topic of particularly vigorous debate. The debate over what has been called 'controlled burning', 'hazard or fuel reduction burning' or 'prescribed burning' (the term that we will use) offers up varied positions on issues ranging from appropriate methods and amount of burning (if any) that should be conducted, its timing, evidence for its effectiveness, and (in the Australian context) the extent to which historical analyses of Indigenous fire regimes should provide guidance for current practice. Knowledge claims from both sides of the debate frequently appear in the media and within policy discussions, in both cases drawing upon scientific evidence to bolster arguments being made.

The sharp divisions within the debate about fire management seem to contrast with a concurrent trend in environmental planning and policy-making towards integrated approaches that reconcile economic growth with environmental protection. Such trends echo a belief in the potential of existing institutions to provide a way out of the environmental problems stemming from modernisation, in technological innovation and scientific progress as a means to achieve this integration, and the promotion of win-win or 'no-regrets' solutions. These are important elements of what has been coined by various researchers in the social sciences as Ecological Modernisation (EM) (Hajer, 1995; Mol and Spaargaren, 2000). The scope and relevance of EM, geographically, disciplinarily, and as a transformative and analytic concept, has broadened since the early 1990s (Mol et al. 2014). EM's popularity arguably stems from its capacity to serve as an umbrella concept. Firstly, it has offered a theoretical perspective with normative authority regarding the ability of modern society to 'green' its economy. In addition to providing a normative yardstick, EM has also offered an analytic lens, and it has been critically evaluated for distracting attention from some potentially fundamental environmental reforms. Here we use the concept

for analytic purposes in an exploration of how EM figures in the debate about prescribed burning. We examine how the knowledge claims reflecting EM sustain specific types of relationships between people and nature (such as fire management strategies that are based on efficiency or that draw on a specific, generally accepted evidence base), while delegitimising others. This approach draws upon Hajer's early critical analysis of the discourse of Ecological Modernisation in debates on the contentious topic of Acid Rain in the Netherlands and the UK in the 1990s, which offered an excellent example and precursor to several of such analyses (Hajer, 1995). Our aim is not to establish which knowledge claims are 'more true'. Rather, in the spirit of poststructuralist discourse analysis (Graham, 2011), we seek to question how some claims seem to have become taken for granted more than others.

EM has been considered a fruitful operationalisation of sustainable development and a cornerstone of Australian environmental policy (Curran, 2009) that supports Australia's energy intensive economy. However, by its emphasis on adapting the current economy rather than fundamentally altering it, EM has also been assessed critically for distracting from genuine reform (Horlings and Marsden, 2011), not least in the Australian context (Bulkeley, 2001, Coffey and Marston, 2013; Kurz, Augoustinos and Crabb, 2010). The discourse of EM determines what is interpreted as meaningful in a policy debate. When an orientation towards integrated solutions based on the expectation of "no-regret" options backed by policy-oriented scientific knowledge and accommodated by existing institutions is the norm, other orientations that do not comply with these characteristics are less likely to be articulated. That is, unless such orientations can be reframed in a language that is similar to that prevailing norm.

Indeed, in the debate about prescribed burning, proponents are optimistic about the efficiency of this instrument and have high expectations of the potential for scientific expertise to further develop its accuracy and precision to achieve outcomes involving no harm. In such a context of optimism, concerns around what is potentially vulnerable as a consequence of intensive prescribed burning, or the conflicting values and trade-offs involved, become less manifest topics. In this paper we present the findings of our exploration of the potentially conflicting, valuations underlying debates about fire management. We do so to gain a better understanding of what the

articulation of these differences might do to enable a form of peaceful democratic engagement about the topic of fire management. We draw on the writings of Chantal Mouffe, who defines this type of democratic engagement as ‘agonistic pluralism’. Mouffe argues that antagonism needs to be transformed into agonism, where the conflicting parties acknowledge the legitimacy of each others points of view and respect each other, without ending up becoming enemies or having to come to a consensus (Mouffe, 2005). Thus, agonistic pluralism argues that society can be organised in a different way to that espoused by ecological modernisation. Rather than postulating the possibility of an integration of environmental and economic objectives, agonistic pluralism means that conflict is ineradicable. Fundamental conflicts are acknowledged and constructively confronted, rather than muted by a discourse of integration (Mouffe, 2013). Thus, in this view, social division is acknowledged and final reconciliation is deemed impossible, yet such division is necessary for a form of peaceful democratic engagement (Metzger, Allmendinger, Oosterlynck, 2015).

In contrast with agonistic pluralism, EM’s focus on integration and the potential for scientific and technological advance leaves a place for considerations of vulnerability only to the extent that it is the consequence of technical failure or scientific inaccuracy in implementing prescribed burning. Such formulations do not explicitly acknowledge the possibility of irreconcilability between different valuations of vulnerability. Yet it is precisely these different valuations that seem to give rise to the contentions in the debate. We provide a brief outline of our understanding of vulnerability in section 2. Section 3 offers an account of the particular form of discourse analysis that we employed to identify how different notions of vulnerability feature in the debate on fire management. Section 4 presents our findings and reveals how appeals to ideas that can be characterised as expressions of EM discourse act to obscure multiple valuations of “reality”.

2. Vulnerability and Ecological Modernisation as Discourse

Different disciplines have taken an interest in the topic of vulnerability and acknowledge the commonalities *and* differences in how it has been conceptualized (Adger, 2006; O'Brien et al., 2007; Forsyth, 2003; McLaughlin and Dietz, 2008; Miller et al., 2010). For example, when conceptualizing vulnerability, a distinction is made between vulnerability as something real that can be assessed by geophysical methods, versus something resulting from the interactions between social structure, human agency and ecological conditions (cf McLaughlin and Dietz, 2008). The differences between outcome and contextual vulnerability is another key distinction, with the former focussing on the consequences of environmental pressures, and the latter on the conditions of specific actors that may make them more vulnerable to those pressures. Overlapping with the latter distinction has been the conceptualization of vulnerability as a twin concept of risk and responsibility. Some argue that the focus on responsibility of individuals and communities at risk has diminished the level of attention paid to the broader, structural conditions underlying their vulnerability (McLennan and Handmer, 2012). It has also been argued that vulnerability is on its way out of environmental speak, as terms like 'resilience' and 'adaptation' become more common, framing topics like climate change in a more optimistic way (McEvoy et al. 2013), that is perhaps more fitting with EM.

Our orientation towards vulnerability is of a social constructionist nature. We posit that, underlying a discourse of EM, some constructions of vulnerability have become more dominant than others. Moreover, in analysing the different constructions of vulnerability produced within debates around prescribed burning we seek to expose more fundamental divides in the ways in which the relationship between humans and nature is positioned within these formulations. Overall, we take vulnerability as a starting point for our exploration of different accounts in the debate around what stakeholders present as a 'correct' approach to fire management. We consider vulnerability as a dynamic and contestable dimension of landscapes, species, communities or individuals. This can be contrasted with the representation of vulnerability as a stable property sitting 'out there' to be assessed by experts, which has recently become popular in vulnerability assessments. Our study bears resemblances with Altangerel and Kull's (2013) analysis of framings of risks of

prescribed burning and the values evoked to justify views in submissions to a parliamentary inquiry on prescribed burning in South-eastern Australia. They argue that values are not necessarily fundamentally conflicting concerning priorities for nature or humans and their assets, with all submissions containing nuanced statements about the importance of striking a balance between protecting assets and human safety and biodiversity. They find that underlying the debate are different views on risk exposure and whether these are voluntary or involuntary. They argue for improving the evidence-base for making statements about the chances of effective prescribed burning and better deliberation about risks and measures to avoid risks. Although we arrive at markedly different conclusions in our analysis below, in much the same way that Altangerel and Kull viewed notions of risk as flexibly deployed social constructions, we view conceptions of vulnerability as being produced through discourse. We scrutinize how participants in the debate around burning practices locate vulnerability with regard to fire, and how such arguments are developed and utilised within the debate. We argue that EM, and particularly its element of reconciling economic and ecological objectives, has been able to gain traction as a dominant discourse precisely through its playing down of the differences in valuations of vulnerability.

Discourse-analytic approaches have proven useful in analysing situations of conflicting knowledge claims, where some claims become dominant over others (e.g. Litfin, 1995, or specifically on fire management in Australia: Ockwell and Rydin, 2006; Ockwell, 2008). Foucauldian discourse analyses are one, but not the only, form of critical discourse analysis (Arts and Buizer, 2009; Taylor, 2013). What distinguishes Foucault-inspired approaches from others is that they are not only concerned with exploring how certain ways of discursively constructing phenomena create a version of reality that becomes attributed with a greater degree of “truth”. They also go a step further to highlight what the particular way of constructing *does* in a socio-material sense: what it makes possible and what it does not. Hegemonic discourses influence what are perceived as possible solutions to a particular societal problem (Arts and Buizer, 2009). Thus, Hajer’s conceptualization of discourse extends the analysis from linguistic regularities to the *practices* through which these linguistic regularities are (re)produced (Hajer, 1995). One can think of the idea that fire management is a very complex phenomenon that is only really understood by

experts. This idea is expressed in language, but is also reproduced, for example, by institutionalising governmental research entities that are seen as the most authoritative source of knowledge about fire. This version of discourse analysis combines attention for the empowering effect of text and language with an appreciation of how specific meanings are more strongly embedded institutionally than others.

For example, the discourse of EM has empowered enterprises to provide their products or services with environmental, mostly scientifically-underpinned, arguments but it has also disempowered environmental activists who object to the very product or service, even if it has been ‘greened’. This form of discourse analysis, which is largely based on the works of Foucault, seeks to gain an understanding of *how* language and associated practices enable or restrict actors to pursue a certain course of action (Sharp and Richardson, 2001; Hajer and Versteeg, 2005).

Foucauldian discourse analyses often pursue an emancipatory agenda by questioning what is taken for granted and bringing to light that what is presented as ‘normal’ may only be so when viewed from a particular perspective that is, in fact, highly contextual and culturally determined. Discourse analysis may help to explain and account for the vigour of sentiments in relation to a topic and highlight why some courses of action become more easily accepted than others. The approach combines well with the approach of critics of depoliticising trends in society (such as Mouffe) who emphasise that there may be a genuine choice to make that, if obscured in the process of normalisation, will eventually reappear as insurmountable conflict where there is little respect for other points of view and where the confrontation of views is hostile.

3. Research Setting and Approach

To the extent that fire has mediated the co-evolution of humans and nature since humans arrived in Australia tens of thousands of years ago, it is difficult to strictly distinguish between ‘natural’ and ‘anthropogenic’ fire regimes. Indeed, the scale, intensity and harmfulness of human interventions involving fire in the Australian landscape are hotly debated (Bowman et al. 2011).

Discussions about the increased occurrence of large wildfires, the question of how to

manage fires and their fundamental role in ecosystem processes have all become topics heavily debated in Western Australia (WA). The debate about fire and its management is further complicated by its relationship with climate change. Southwest Australia has begun to experience effects of climate change, such as increased drought (Laurance et al., 2011). Responses to wildfires within the sphere of fire management range from improving suppression techniques to preventative burning of undergrowth ('fuel') in forests and woodlands. Prescribed burning is the most fiercely debated of the potential remedies for wildfires in Australia (Pyne, 2006). Australia's policies differ from the policies in other fire prone countries where fires chiefly represent an object of suppression, rather than an instrument serving multiple purposes (Pyne, 2006). Southern Australian states have prescribed burning practices relatively firmly embedded in their public policies and some have called WA policy an exemplar for fire management (Burrows and McCaw, 2013).

By means of a discursive analysis (Hajer, 1995) one can explore what discursive repertoires participants in a debate draw upon to give meaning to a social object, in this case: fire in the landscape and prescribed burning in particular. There are no strict procedures for the conduct of a discourse analysis. This is not by definition a weakness, for it is a feature of Foucault's approach not to present a well-defined research method on the ground that "no matter how standardised the process, the analysis of language by different people will seldom yield the same result. This is not seen as problematic, for the aim of poststructural analysis is not to establish a final "truth" but to question the intelligibility of truth/s we have come to take for granted" (Graham, 2011:666). In our interpretive study, to gather primary material, we interviewed 25 people from government organisations, non-government organisations and universities that have been involved in discussions about fire management. We used a semi-structured interview format to allow time for the topics raised by respondents. We introduced each interview by emphasizing that the research did not aim to eventually take a position on prescribed burning and that the interviewer did not take in a particular position on the topic. Although researcher 'bias' can never be fully erased, we expected that articulating the aim of the research, namely to obtain the most encompassing overview of different viewpoints with regard to PB, helped establish an open atmosphere in which interviewees would speak openly about their points of view. Most interviews took between 1 and 1.5 hours and they were

transcribed to allow for the identification of key topics and quotes. The iterative process of interviewing, transcribing and open and focused coding led to the selection of two major points of attention in the argumentation of stakeholders: the ecological past of Australian species and adaptation to fire, and the role of Australia's Aboriginal past. In 14 of the 25 cases respondents provided written or photographed documentation that they used to further support their positions. In addition, other textual material that we used in our analysis included regional newspaper articles focused on fire and prescribed burning, coming out after the occurrence of major fires in Western Australia or when discussions inflamed when a Royal Commission or other kind of committee report was published. It was particularly after these events that opinions were voiced in the media. We also studied web-material such as websites of action groups and official policy documents. These materials gave an insight into the argumentations of particularly the more vocal participants in the debate. Because we could not put this into the table that we derived from coding the interviews, we categorised these data by source and tagged the material that we interpreted as most relevant. Similar to the coding of interviews, this became more focused when we had selected the two aforementioned focal points in the argumentation of stakeholders. Data were gathered in the period between 2009 and 2013, the interviews were conducted between 2010 and 2012. These searches served to gain insights into the range of knowledge claims made in the debate about fire.

4. Results and discussion

4.1 The discourse of EM in the debate about fire management

We started this paper with an introduction to general characteristics of the discourse of ecological modernisation and the preliminary observation that presentations of prescribed burning practices in Australia are a manifestation of this discourse. Yet we also noted that this somewhat universally deployed discourse might simultaneously mask the different valuations of vulnerability that partially underpin the contentions. We posited that the sharp divisions in the debate about fire in the landscape seem to contrast with elements of ecological modernisation such as the promise of technological solutions, no-regret and win-win outcomes. In the following sections

we will explore this possible tension further. First we examine how ecological modernisation is discursively manifested in the debate.

Although not explicitly referring to ecological modernisation, policy makers and scientists in Western Australia often account for the presence of prescribed burning in policy in such terms. This is particularly so when policy concerns the possibility of aligning objectives like protection of human lives and assets with the conservation of biodiversity values. A statement such as the following on the website of the Department of Parks and Wildlife of the Government of Western Australia that is currently responsible for managing fire on the land under its jurisdiction, exemplifies these explanations by emphasising the combination of objectives that it aims to achieve and the scientific underpinning: “The department has considerable knowledge of the relationship between fire and the environment, which is underpinned by scientific research. This understanding allows the department to apply fire under prescribed conditions to help maintain the state’s biodiversity and to protect life, property and community values from the damaging impacts of bushfires” (<http://www.dpaw.wa.gov.au/management/fire>, accessed 16th July 2015).

The science-based, putative commensurability of goals is also expressed on the public consultation maps that are used to indicate what kind of burns are to be undertaken in a particular season. On these maps, most burns are categorised as serving the dual purposes of strategic protection of lives and assets *and* biodiversity management. By pointing this out, we do not wish to refute that there is this possibility of harmonising objectives. Rather, we wish to highlight that this practice is a manifestation of the discourse of ecological modernisation that makes it harder to table arguments that question such commensurability or to emphasize potential vulnerabilities that may not be alleviated by such technologies. The expressed focus on simultaneously achieving multiple objectives, and its practical and institutional translation into policy instruments such as the consultation maps, has created the conditions that allay concerns, independent of whether these concerns centre on the vulnerability of human lives or assets or biodiversity.

In the following quote from an official of the Department of Environment and Conservation, currently the Department of Parks and Wildlife of the WA state

government, there is a clear sense that adding the ecological argument to fire management has been instrumental for its public acceptance.

“My view has changed in that I was very much a life and property person, that that should come first and anything else should be secondary, but my view now is that ecological fire management and community fire management, to give it that name, has to co-exist and you’ve got to be capable of achieving both of those things if you’re going to have long term sustainable support at a community level and at a government level for the management that we’re applying. So from a public interest point of view, there’s no question in my mind that our fire management has to be sensitive to [life and property] protection aspects, but also sensitive to ecological aspects and unless we can achieve both, we’re not going to be successful”.

There is also an acknowledgement of the controversy that is still present in spite of the implementation of these twin objectives but which, in the view of this respondent, is unwarranted.

“So there’s a very complex interaction [between species in ecosystems] and there tends to be, you know, huge generalisations and controversy about prescribed fire when there really shouldn’t be any, you know, DEC I think are (...) working from the very best scientific knowledge they can to balance under their legislative requirements the need to conserve biodiversity balanced against the need to conserve infrastructure”.

This quote illustrates the idea that scientific knowledge is cornerstone for balancing environmental and economic objectives. Positions like these were found to commingle with constructions of the general public as having too simplistic an understanding of the debate. The respondent situates scientific knowledge beyond generalisations and controversy. To uphold this view, other views need to be dismissed as unscientific or characterised as being based on less trustworthy logic, such as emotions. The respondent goes on to generalise about simplistic views of the public, and points at potential controversy between scientists.

“I get a bit annoyed when people they make ill informed statements like DEC burns the crap out of the forest”. And: “the general public don’t think hard enough, if you pull apart and get them to tease out (...) why they’re expressing the opinion that they are, quite often (...) it’s not based on anything, it’s just based on what they want to say like they want to rag on a Government department or they want to have a go at the greenies or they want you know there’s some kind of personal threat thing or but it’s not well thought out and I have to say I’ve even heard scientists on both sides of the debate make some idiotic statements that you think you really haven’t thought that through have you?”

These quotes from a scientist illustrate the construction of potential tensions in prescribed burning as being potentially solvable by rigorous scientific practice. Inherent in such a formulation is the notion of scientific knowledge as neutral and value-free. Furthermore, it invokes the idea of an objectively definable ‘best outcome’. Alternative formulations, such as the idea that there are multiple and potentially conflicting outcomes that different people will evaluate on different terms, is at odds with the idea of an objectively definable best outcome. Within such a view on the neutral role of science in the alignment of nature conservation and human protection purposes, a ‘best outcome’ is only possible if value conflicts are negated. This respondent dismisses other knowledge claims as random, ill-informed, personal or emotional (in the case of the ‘general’ public) or as ‘not well thought through’ (in the case of other scientists). This rejection of other views as unscientific or ‘value biased’ is a well-known mechanism in the ways scientists talk about science (Gilbert and Mulkay, 1982). The focus on the multiple purposes served by the governments’ scientifically-underpinned fire management practices was often connected with an emphasis on enhancing public understanding of the importance of prescribed burning. The assumption is that if people could become more knowledgeable about the scientific rationale for prescribed burning then their arguments to resist it will fall apart. A WA fire ecologist recently argued in a scientific paper that *“Social and political factors can significantly influence the conduct and effectiveness of prescribed fire programs, and effective engagement with the community during planning, implementation and post-fire monitoring phases is essential to ensure that the role of prescribed fire in land management is properly recognised and*

understood” (McCaw, 2013). It is implied here that there is a ‘proper’ way of understanding the role of prescribed fire in land management. However if, as we will elaborate in the following sections, there are indeed specific notions of vulnerability underlying different knowledge claims around prescribed burning, then it is contestable what a ‘*proper*’ recognition and understanding of the role of prescribed burning might be.

It has been argued that one of the key outcomes of EM has been to put knowledge and its production centrally into policy-making processes (Giddens, 2009). The role of science thus changed from being focused only on predicting and assessing the *effects* of developments to one of contributing directly to decision-making about the different *solutions* to environmental problems. As such, the role of science has arguably shifted somewhat from the policy input side to the centre of decision-making (Hajer, 1995). In Western Australia this is exemplified in the ways in which fire ecology is embedded in the environmental department as an in-house science division and its relationships with the main research centres, such as the federally funded Bushfire Cooperative Research Center (CRC). As has been argued in one of the reports coming out of this CRC, a great part of this research is directed towards enlarging the “evidence base” (thus contributing to the present emphasis on evidence-based policy). It is directed to enhance the predictability of fire behaviour, and aims to enhance the level of control that humans may have over it. It is also oriented towards quantification (Bosomworth et al. 2012). In such a context, displaying the (hardly quantifiable) ambivalences, indeterminacies and controversies behind knowledge claims does not contribute to the formulation of unequivocal solutions that are suited for a ‘proper’ understanding. Such uncertainties also provide a tension with ecologically modern thought and its emphasis on scientific discourse. Ecological modernisation sits more comfortably with a solid evidence base than it does with an acknowledgement of multiple values. Litfin’s warning “the prevalence of scientific discourse should not delude us into the common misconception that politics will (...) become more rational and less conflict-ridden” (1995: 277) is a case in point. In fact, debates on fire management are highly contentious. Presenting some knowledge claims as more true than others may hide from view the different values that constitute the basis of decision-making about fire management.

We argue that a seemingly neutral statement about the need for evidence or a proper understanding may prioritise specific relationships of humans and nature over others. Providing evidence implies the existence of a truth, and indicators for such truth are often sought and presented by means of quantitative data. However, some relationships of humans with nature can much more easily be quantified than others. Carbon, for example, in the scope of global climate policy, has been a recent global calculative project that has prioritised one public good – carbon – over others (Buizer and Lawrence, 2014). In this domain, scientisation has brought advantages, but it has also narrowed the scope of debate. How, for example, can spiritual values be quantified? Or how does one take into account the broader range of values involved with fire management, values that may be affected in opposite ways? An evidence base often reflects a narrower set of values than all those involved with fire management and because it is selective, it can also be put to a different effect.

In this section we have presented some examples of how there are elements of ecological modernisation in the argumentations behind prescribed burning. The assumption is that based on scientific evidence, outcomes can be achieved that protect life and property whilst simultaneously serving conservation purposes. One might, at this point, question why such a finding needs to be approached critically. After all, there may seem to be nothing wrong with this ecologically modern ideal that reconciles objectives. As we will elaborate in the following sections, however, constructions of what constitutes a ‘good’ fire are arguably based on values rather than simple ‘evidence’, and that evidence can be deployed in a multitude of ways to support a multitude of different sides of the debate. As we will illustrate, however, some valuations have obtained more credibility in the context of ecological modernisation.

4.2 Adapted or exapted to fire

An argument often used in the debate about prescribed burning is the extent to which Australian species have adapted to fire. In different ways, participants in the debate often acknowledge fire having influenced the presence or absence of species. However, the details of this evolutionary history and what this means for fire management decisions is contested. Of relevance here is how, irrespective of their

degree of truth, some arguments find more fertile ground than others in the context of EM.

There is a continuous search for evidence of the historical frequencies and intensities of fire in the Australian landscape, the scale of its effects and the (historical) role of humans (Bowman et al., 2011). One of the key questions raised is whether fire has been the *only* ‘trigger’ of new growth of plant species, meaning that plant species are not only adapted to fire but also *dependent* on it for their conservation and dispersal. A group of renowned scientists argued that there was not sufficient evidence of plants generally having adapted to fire, presenting as an alternative the option that species have developed the traits enabling them to cope with fire through ‘exaptation’. Exaptation means that these plants developed traits commonly associated with fire in response to other factors, such as nutrient-poor soils (Bradshaw et al. 2011a).

In the debate following the publication of the article on exaptation, the authors emphasised that they felt that the assumption of adaptation was used inappropriately: “our concern is that poorly unsubstantiated claims of adaptation to fire made by many fire managers (and some ecologists) without adequate evidence are used to justify burning across a range of regimes with impunity” (Bradshaw et al. 2011b: 405). In response, their critics protested that “[the paper] uses evolutionary arguments to draw conclusions about appropriate fire management decisions” (Keeley et al 2011: 410), arguing that whether a plant has exapted or adapted to fire has no relevance for its current ability to cope with fire and is, thus, not of interest for fire managers. Bradshaw and colleagues then contend with these points, arguing that they did not want to draw definite conclusions about plants being adapted or exapted to fire. They stated that they only wanted to see evidence – in case fire management decisions were recommended on the basis of the statement, in this case, of plants being adapted to fire - putting the “burden of proof” (Bradshaw et al. 2011b: 405) on their opponents’ shoulders. Without going into the technical details of this debate, it suggests that the main problem is one of lack of evidence. However, taking as a starting point the discourse-theoretical idea that some environmental concepts and explanations (such as exaptation or adaptation), can be described as more dominant and as prioritizing some interventions above others, we come to a different conclusion. Reducing the dispute to a lack of evidence and burden of proof displaces value-conflicts

surrounding different assessments of where vulnerability is located in relation to fire management to the periphery of attention, assigning ever more importance to the continuous search for evidence, and ignoring that what is at stake are in fact socio-political valuations of vulnerability.

The adaptation argument has become widely accepted as the ‘true’ explanation for the ability of plant and animal species to cope with prescribed burning. A representative of an activist group who promote the more intensive use of prescribed burning, described his view of the resilience of the bush in the following terms.

“[T]he Australian bush is not some sort of fragile, delicate blossom out there that’s about to turn up its toes, it’s a tough environment, it’s an environment that’s survived thousands of years of temperature and drought and humidity and bushfires and it’s tough, you know it’s a survivor and a little whiff of smoke and a touch of fire now and again to the bush, the analogy I make is that to the bush a fire going through every now and again is like a wave going past seaweed in the ocean, it’s disturbed but it soon comes back to its equilibrium.”

The respondent describes a “wrong fire” in quite different terms:

“Wrong fires are high intensity, large, out of control fires in the middle of summer that sweep through the forest and through bushland and burn down houses and kill people.”

Vulnerability to wildfire, here, is constructed as resulting from a lack of control, while the Australian bush is constructed as tough. Inherent in the formulation is the notion that re-establishing that control in the form of ‘good fires’ will reduce these wrong fires that might endanger houses and people.

However, the adaptation argument has *also* become accepted as an explanation for the *inability* of species to cope with prescribed burning, for it was mobilized in the debate in two distinct, opposite ways. A representative of a local nature conservation lobby group, explains the *absence* of species by the fact that only the resilient ones have survived and uses this as an argument for the undesirability of prescribed burning.

“Now my hypothesis, and I keep trotting this out without being a scientist and waiting to get shot down, [...] [is] that the fire sensitive species have gone as a result [of frequent prescribed burning], except for random survival because the burning [...] could be fairly random either on private property or on land not managed by the Forest Department or on south or west facing slopes where they may have survived fortuitously, [...] so that now when they do their research, log and burn and say our flora and fauna are resilient, of course they are resilient because anything that is not resilient is gone.”

A representative of a local pro-prescribed burning lobby group, on the other hand, argues that the very *presence* of plants in the present time proves that they are able to live through fire and thus testifies for the desirability of prescribed burning.

“I firmly believe in prescribed burning for two reasons, one is that it helps us to control wildfires under extreme conditions, but secondly the Australian bush likes fire, it’s good for it and so we find that there are numerous plants that will only germinate when they’ve had a sniff of bushfire smoke and there are others that their seeds will not open unless they’ve been heated by fire and there are yet others who will not germinate unless the seeds fall into an ash bed and given the eons long history between fire and the environment, this is not surprising ‘cause any plant that is existing in the bush today must have been screened by thousands and thousands of bushfires over the years and if it couldn’t take it, it wouldn’t be there.”

We can see how an explanation like adaptation/resilience is used to support arguments for *and* against prescribed burning. A view of adaptation as the ability of species (including humans) to adapt to circumstances and move to a new equilibrium or a new stability in the ecological system sits well with ecological modernisation. It is an optimistic way of looking that permits a continuation of activities that, according to critics, should be abandoned to avoid environmental degradation (Forsyth, 2003). A focus on adaptation contrasts with a focus on disturbances and their potential impacts causing “non-equilibrium”. The thesis of exaptation brings about a higher degree of uncertainty because the assumed relationship between the presence of species and fire

is constructed as being more variable and context-dependent. In the presence of species that may be vulnerable to frequent prescribed burning, the application of a range of techniques to combat wildfire may be deemed necessary, at potentially higher cost, demanding a greater participation from a greater variety of actors and with potentially greater sacrifices in terms of economic development and where people are allowed to live. Clearly this is not necessarily a 'more true' version of reality. However, its recognition is less evident in a context of dominant ecologically modern discourse with its focus on efficiency, win-win solutions and scientific predictions. This may explain the virtual absence of exaptation, compared with adaptation, in the public debate. In sum, the popularity of the discourse of EM may well have provided the context in which a focus on the adaptedness of species found much more fertile ground than the possibility of exaptation, which is an alternative explanation of fire resistant traits in plants.

4.3 Climate Change, Aboriginal firestick-burning and Prescribed Burning

We have illustrated in section 5.2 how truth claims about fire and fire management in Australia often invoke elements of its ecological past. References to its history of human inhabitation are equally common. These references have recently become mingled with climate change as an argument in the debate. Similar to invocations of Australia's ecological past, we find that invocations of Aboriginal history contain elements of EM, particularly because there is a degree of optimism implied with regard to humans' ability to control and deal with fire and generate win-win outcomes. For example, references to a historical necessity and ability to use fires in ecologically sound ways are used to imply that there is a possibility in the present time to find a similar equilibrium of a sensible use of fire on the one hand and a continuation of present behaviours and lifestyle on the other.

Late in 2013, several wildfires of a truly alarming scale came threateningly close to Sydney's suburbs, and again to Adelaide in 2014. In the debate, climate change policy makers quickly linked these fires to global climate change. In the aftermath of the Sydney fires, the Executive Secretary of the UN Framework Convention on Climate Change (UNFCCC) stressed that global warming might have created the conditions for wildfires like these to be more frequent and intense. The Australian Prime

Minister Tony Abbott, who had just abolished the Climate Change Commission that had been installed by the previous government, dismissed these ideas on television, saying that the Executive Secretary

“was talking through her hat” [and that the fires] “were not a function of climate change, but a function of life in Australia”. (...) “Look, fire is a part of the Australian experience. It has been, since humans were on this continent. The Aboriginal people managed the landscape through various forms of firestick farming. It took us a long time to figure out that our landscape needed to be managed and at times burned” (22nd October 2013, Melbourne Radio Station).

By themselves, statements like these are difficult to refute. Fires have indeed always been naturally present in Australia. However by connecting historical Aboriginal burning practices, the reality of wildfires and (denial of a relationship with) climate change, Abbott appealed to sentiments of what it is to be Australian. By doing so, attention was diverted away from the possibility that the ecology of Australia has changed in such a way that renders its current vulnerabilities of a kind requiring more radical, structural changes to the Australian economy and its politics. In essence, the Prime Minister refers to Aboriginal practices in the past to head off critics’ attempts to use the extreme bushfires to argue that Australia needed to act more vigorously on climate change.

For tens of thousands of years, Indigenous Australians have used ‘fire-stick’ burns, mainly to facilitate hunting (Bliege-Bird et al., 2008). Discussion about the ecological effects of these historical interactions is on-going. Some propose that some 45 thousand years ago such hunting was primarily responsible for the extinction of the megafauna that were important for keeping the number of severe fires down, because these animals grazed what would otherwise have burned (Flannery, 2010). Others argue that drying of the climate contributed to the collapse of megafauna (McGlone 2012), and some emphasize how the fire stick burns used for hunting created fine-grained mosaics that benefitted small to medium mammals and simultaneously acted as buffers against larger fires (Bliege Bird et al., 2008).

References to Aboriginal firestick burning history are also common in the Western Australian debate about prescribed burning, particularly as an argument to intensify prescribed burning practices. In Western Australia, a contested study of fire rings on the Balga, a native “grass tree” that Aboriginal people burned as part of their land management practices concluded that, on average, these trees were burned as often as once per three to five years, which is much more often than after European settlement (Ward et al., 2001). Notwithstanding debate about the applied methodology (Enright et al., 2005), what rendered this study especially controversial was how the researchers extrapolated their findings to the present time, generalizing about the importance of frequent burning (ibid.). The often-quoted Balga study and the responses to it again illustrate how fact and value are interwoven in the debate about fire management. What may appear to be a factual study of countable rings on a Balga tree showing the frequency by which a particular tree had been burned actually revolves around value-laden questions, in particular the question whether one should take the history of Balga-burning as guidance for fire management. For instance, questions abound regarding such things as whether such extrapolations are sensible in a context of altered climatic circumstances and when there are also more people in the landscape than at the time of Aboriginal firestick burning. We do not emphasise the interwovenness of fact and value to argue against prescribed burning, but, rather, to again point to how these ‘factual’ references seem to conceal that there are, in fact, two competing discourses in play. One elaborates on the discourse of EM, where humankind is considered as being able to control nature, maintain a certain style of living and reduce vulnerability to fire by the use of fire in accordance with Aboriginal practices. The other discourse presents humans as co-responsible for having brought about a potentially vulnerable ecosystem that may not be able to survive large fires. In the Balga example, the reference to Aboriginal firestick farming presents fire in Australia as natural and reflective of a close relationship between (Indigenous) Australians and their environment, and invokes the ability of humankind to have control over their environment where needed.

We noted earlier that knowledge claims could be deployed in a multitude of ways to support different sides of the debate. Indeed, we see that opponents of prescribed burning also invoke Indigenous history as an argument. They praise Aborigines for a close connection with nature, but argue that present-day urban residents have become

disconnected from nature. A former forester and fire fighter who has stepped away from the profession and become an opponent of prescribed burning said:

Fire is an intrinsic part of this landscape and the ecology of the landscape and it's always been there caused by natural causes like lightening and since people have been in the landscape, people have used fire to modify the landscape for their food sources and their protection so [fire] is human created as well as natural created and we've come into the landscape with our infrastructure and our philosophy of protection of life, which means that we're very asset protection orientated. We've also become divorced, we live so much in cities, we're most divorced from the natural environment, so our decisions are based on the protection of life and property and because we're not in touch with nature it's harder for us to relate to nature in our decision making, so [...] the decisions about fire tend to be made from this asset protection but not in touch with nature way of being which is different from the Aboriginal way, they were in nature when the fire was a tool for protection and for their food and for ceremony. So quite different, 'cause we're not dependent on fire for our food, so we're divorced from it, so it's a different way of thinking.

Here the respondent's emphasis on the distance between nature and humans in the present time as compared with the Aborigines' dependence on nature for their living in previous times is used to dismiss, rather than embrace, the use of prescribed burning as we have seen in previous quotes. According to the respondent, contemporary prescribed burning practices mark the currently disturbed relationship between humans and nature, which the respondent clearly distinguishes from Aboriginal firestick burning that he sees as reflecting a closer relationship, with dependency on the bush for their food and ceremony. While the prime minister of Australia in the previous quote extrapolated directly from fire being a part of the "Australian experience" as a legitimization of current burning management, the respondent in the above draws on that same experience to substantiate his rejection of prescribed burning.

In sum, although claims like these both draw on Aboriginal history to bolster claims made, they hold opposite views of relationships between humans and their

environment. On the one hand, there is an emphasis on the resilience of nature and the importance of, and optimism about, a human hand in its management. By contrast, the alternative view sees the human hand not trusted for being able to deal with a landscape increasingly vulnerable to a disconnected people. Crucially, what is presented as fact and inevitable, actually revolves around notions of value.

5. Conclusions

In this paper we have adopted the lens of ecological modernisation to better understand arguments used in the debate about fire in the Australian landscape with the intention of adding to the variety of theoretically-informed empirical studies of Ecological Modernisation (as advocated by Mol et al. 2014). We argue that EM became manifest in the debate about prescribed burning in three notable ways. First, prescribed burning was presented as being motivated by the dual, purportedly compatible, objectives of protecting human lives/assets and ecological conservation. Second, proponents of PB assumed a high degree of technological control supported by scientific evidence while its opponents also took recourse to the logic of scientific argument to bolster their hesitance towards the practice. And third, arguments in favour of the practice left existing institutions and practices largely intact, with the Australian ways of production and living unchallenged.

We examined in greater detail two pronounced debates about knowledge claims, one relating to Australia's ecological history and the other to its history of human inhabitation. Both references have recently become entwined with debates around climatic change. Australia's ecological history and Aboriginal history were presented as providing legitimacy for positions against and in favour of prescribed burning in the debate about fire, or authors used ecological history or Aboriginal history to dispute legitimacy claims of opponents. However, we argue that these claims were simultaneously masking underlying, deeply engrained variations in terms of where vulnerability was located. On the one hand nature was constructed as vulnerable due to how humans interfere with the landscape in disconnected ways. On the other, humans and their assets were constructed as vulnerable due to the imposition of unnecessary restraints on humans' ability to interfere in the landscape via prescribed burning. Thus, although both locations of vulnerability are related to a specific form

of disconnectedness, the former pleads for less control, while the latter proposes stronger control by humans via prescribed burning.

Thus, opponents *and* proponents of prescribed burning invoke elements of Australia's ecological and Aboriginal past as scientific evidence but diverge concerning their construction of the exact nature of these histories and their putative implications for the vulnerability of nature and humans in the present time. However, we would argue that the optimism of proponents of prescribed burning sits more comfortably with the somewhat hegemonic logic of EM by suggesting that current modes of living can remain unchallenged provided that suitable investments are made in ensuring that the professionals conducting such burns continue to be well-trained and provided with sufficient resources. A focus on integration and the potential for scientific and technological advance only allows space for consideration of vulnerability to the extent that such vulnerability is the consequence of technical failure or scientific inaccuracy that leads to incorrect implementation of prescribed burning. The scepticism expressed by opponents of PB, on the other hand, does emphasize the potential vulnerabilities involved with current policy. It also draws on the idea that there needs to be more radical measures to alter how the Australian economy deals with natural values. For example, the possibility of adopting expensive approaches to fire management that are to the detriment of economic growth or might impinge on 'lifestyles' in other unwelcome ways. This pessimistic view, which emphasizes that both people and nature are vulnerable and that inevitable trade-offs result, does not resonate as well in a context of EM, which builds strongly on the rationale of simultaneously enhancing economic value together with other values.

One may ask whether this simply brings us back to the social theorists' critiques of EM of it being overly optimistic and naïve and failing to address the *structural* reasons for the inability of humans to embed ecological motivations more strongly into economic, cultural and political practices (see Mol et al. 2014). At this point we need to highlight what has become perhaps the most important purpose of our exploration, namely to explain what the presence of the discourse of EM *does* to the debate. By resorting to scientific arguments and seeking win-win outcomes, and in so doing concealing the highly different constructions of vulnerability, there has been a depoliticisation of the debate.

We return, firstly, to the study of Altangerel and Kull (2013) on the construction of risk in the debate on prescribed burning. They argue that some analysts are wrongly trying to find fundamentally different valuations of nature, people or assets underlying different views on prescribed burning – and that instead explanations for diverging views on prescribed burning can be found in ideas of whether or not humans’ risk exposure is voluntary (chiefly providing arguments against prescribed burning in these submissions because similar to humans settling in the bush, prescribed burning was framed as a risk for wildlife) or involuntary (providing arguments in favour of prescribed burning). By looking for deeper layers of discursive structure behind the policy deliberations around prescribed burning, Altangerel and Kull have offered a helpful starting point for a better understanding of this debate. However, on the basis of our study, we disagree with them on two counts. First, as already mentioned, we argue that they found reconciliatory rhetoric precisely *because* of the hegemony of the discourse of EM that is resonating in the parliamentary submissions. Second, their plea for ‘more evidence’ risks a retreat to one of the core assumptions of EM that a value-free scientific endeavour can light the ‘right’ path in a way that negates the need to engage in serious debate about conflicting values. This implies a depoliticisation of the debate, a point we will now further elaborate.

We draw on Mouffe’s point that the eradication of antagonism (a key ingredient of ‘the political’, namely the fundamental disagreements that are constitutive of society) is both impossible and indeed undesirable, because “the specificity of pluralist democracy is precisely the recognition and the legitimation of conflict (...) What liberal democratic politics requires is that the others are not seen as enemies to be destroyed, but as adversaries whose ideas might be fought, even fiercely, but whose right to defend those ideas is not to be questioned” (Mouffe 2013:7). Agonism, according to Mouffe, is different from antagonism in that the latter is potentially violent, while the former may be democratically productive. We now argue that the eradication of antagonism is impossible in the debate about the role of fire in the landscape exactly because of the different valuations of vulnerability. But, it can be transformed into constructive agonism if there is a place for debate between adversaries (Mouffe, 2005). However, we have seen that in conforming to a discourse of ecological modernisation, notions of vulnerability are displaced by the presentation

of arguments as neutral and non-politicised, with elements of Australia's ecological or Aboriginal history providing varying forms of empirical legitimacy for current fire management decisions, that are hard to disagree with. As Metzger, Allmendinger & Oosterlynck (2015) recently put it: "The 'choice' at hand becomes one of detail not principle" (p.7). This assumed neutrality and the negation of the political is in contrast to the observation of fundamental differences regarding notions of vulnerability and, in relation to this, what would constitute 'responsible' actions in the current context.

Disregarding the fundamental differences regarding notions of vulnerability might avoid precisely that which is needed to transform unproductive antagonism into democratic agonism. As Mouffe (2005) suggests, "agonism is a we/they relation where the conflicting parties, although acknowledging that there is no rational solution to their conflict, nevertheless recognize the legitimacy of their opponents. They are 'adversaries' not enemies" (p. 20). Attempts to depoliticise the topic of PB may only remove it from the forefront of political debate and risk resigning it to the silos of technocratic, scientific debates that completely obscure the possibility that it ultimately turns on notions of valuations of vulnerability. Mouffe (2013) makes the case for a reinstatement of the political, where there is a place for pluralist democracy that acknowledges conflict and sees a role for pluralistic agonism (forms of peaceful democratic engagement). This leads us to suggest that there may well be a place for bringing into sharper relief the key disputes between sceptics and proponents of PB. Analyses such as ours can facilitate such endeavour, as can analyses based on Q-methodology. Ockwell (2008) demonstrated using Q-methodology how the positions underlying seemingly uniform policy proposals can actually fundamentally differ (Ockwell, 2008). For example, in spite of ubiquitous references to Aboriginal firing practices to legitimate existing policies, the discourse of "indigenous controlled land management" remained absent in the debate. We would argue that these types of analyses may also provide a space to interrogate some of the assumptions of EM as they become manifest in debates about fire management. They may also facilitate opening up more rigorous debate regarding notions of vulnerability and uncertainty (cf. Leach et al., 2010). This holds the potential to encourage genuine debate about what is potentially lost and gained with fires in the Australian landscape and with the different measures undertaken to address them.

Mol et al. argue that “among the paradigmatic assumptions of EM is the contention that scientific efforts to identify, analyse, understand and design new, more environmentally friendly and sustainable sociotechnical systems, institutions, policy arrangements and social relations are not only of key academic importance in themselves, but are central also to the identification and understanding of structural, anthropogenic drivers of environmental decay” (Mol et al. 2014: p. 24). This quote points at the significant role attached to scientific efforts and we are not denying this importance. However, we would add that academic effort can also be oriented towards uncovering how important differences in the ways people locate vulnerability may be displaced from the debate, leading to a form of depoliticisation that may be unhelpful. Moreover, academic scholarship should make a continued effort to identify, analyse, and help design, sites of ‘healthy contestation’. It should also seek to gain an understanding of the conditions under which such sites do not negate the political, but instead, help to highlight the difficult choices that may need to be made.

Acknowledgements

The research was conducted within the Western Australian State Centre of Excellence for Climate Change Woodland and Forest Health (funded by the Western Australian State Government). We thank our respondents for giving generously of their time for inter-views, and Eleanor O’Brien for a critical reading of our manuscript.

References

1. Adger, W. N., 2006. Vulnerability. *Global Environmental Change* 16(3), 268-281.
2. Altangerel, K., Kull, C. A., 2013. The prescribed burning debate in Australia: Conflicts and compatibilities. *Journal of Environmental Planning and Management* 56(1), 103-120.
3. Arts, B., & Buizer, M., 2009. Forests, discourses, institutions: A discursive-institutional analysis of global forest governance. *Forest Policy and Economics*, 11(5–6), 340-347.
4. Bliege Bird, R., Bird, D.W., Coddling, B.F., Parker, C.H., Jones, J.H., 2008. The "fire stick farming" hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics. *Proceedings of the National Academy of Sciences of the United States of America* 105, 14796-14801.
5. Bosomworth, K., Dovers, S., Handmer, J., 2012. Adapting to Climate Change: reflecting on our shared and uncommon knowledge, In: Thornton, R.P., Wright, L.J. (Eds.), *Proceedings of Bushfire CRC & AFAC 2012 Conference Research Forum 28 August 2012*, Bushfire CRC, Perth, Australia.
6. Bowman, D.M.J.S., Balch, J., Artaxo, P., Bond, W.J., Cochrane, M.A., D'Antonio, C.M., Defries, R., Johnston, F.H., Keeley, J.E., Krawchuk, M.A., Kull, C.A., Mack, M., Moritz, M.A., Pyne, S., Roos, C.I., Scott, A.C., Sodhi, N.S., Swetnam, T.W., 2011. The human dimension of fire regimes on Earth. *Journal of Biogeography* 38, 2223-2236.
7. Bradshaw, S.D., Dixon, K.W., Hopper, S.D., Lambers, H. Turner, S.R., 2011a. Little evidence for fire-adapted traits in Mediterranean climate regions. *Trends in Plant Science* 16, 69-76.
8. Bradshaw, S.D., Dixon, K.W., Hopper, S.D., Lambers, H. Turner, S.R., 2011b. Response to Keeley et al.: Fire as an evolutionary pressure shaping plant traits. *Trends in Plant Science* 16, 405.
9. Buizer, M., Kurz, T., Ruthrof, K., 2012. Understanding Restoration Volunteering in a Context of Environmental Change: In Pursuit of Novel Ecosystems or Historical analogues? *Human Ecology* 40(1), 153-160

10. Buizer, M., Lawrence, A., 2014. The politics of numbers in forest and climate change policies in Australia and the UK. *Environmental Science & Policy* 35, 57-66.
11. Bulkeley, H., 2001. No regrets? Economy and environment in Australia's domestic climate change policy process. *Global Environmental Change* 11, 155-169.
12. Burrows, N., McCaw, L., 2013. Prescribed burning in southwestern Australian forests. *Frontiers in Ecology and the Environment* 11(SUPPL. 1), e25-e34.
13. Coffey, B., Marston, G., 2013. How Neoliberalism and EM Shaped Environmental Policy in Australia. *Journal of Environmental Policy and Planning* 15, 179-199.
14. Curran, G., 2009. Ecological modernisation and climate change in Australia. *Environmental Politics* 18, 201-217.
15. Enright, N. J., B. B. Lamont, Miller, B.P., 2005. Anomalies in grasstree fire history reconstructions for south-western Australian vegetation. *Austral Ecology* 30(6), 668-673.
16. Flannery, T., 2010. *Here on earth, an argument for hope*. Text Publishing, Melbourne, Australia.
17. Forsyth, T., 2003. *Critical political ecology; The politics of environmental science*. Routledge, London and New York.
18. Giddens, A., 2009. *The Politics of Climate Change*. Cambridge UK: Polity Press
19. Gilbert, G. N., Mulkay, M., 1982. Warranting Scientific Belief. *Social Studies of Science* 12(3), 383-408.
20. Graham, L. J., 2011. The Product of Text and 'Other' Statements: Discourse analysis and the critical use of Foucault. *Educational Philosophy and Theory* 43(6), 663-674.
21. Hajer, M. A., 1995. *The Politics of Environmental Discourse: Ecological Modernisation and the Policy Process*. Oxford: Clarendon Press.
22. Hobbs, R. J., Hallett, L. M., Ehrlich, P., Mooney, H. A., 2011. Intervention Ecology: Applying Ecological Science in the 21st Century. *BioScience* 61, 442-450.
23. Horlings, L. G., Marsden, T. K., 2011. Towards the real green revolution? Exploring the conceptual dimensions of a new ecological modernisation of

- agriculture that could 'feed the world'. *Global Environmental Change* 21(2), 441-452.
24. Keeley, J.E., Pausas, J.G., Rundel, P.W., Bond, W.J., Bradstock, R.A., 2011. Fire as an evolutionary pressure shaping plant traits. *Trends in Plant Science* 16, 406-411.
 25. Kurz, T., Augoustinos, M., Crabb, S., 2010. Contesting the 'national interest' and maintaining 'our lifestyle': A discursive analysis of political rhetoric around climate change. *British Journal of Social Psychology* 49, 601-625.
 26. Laurance, W.F., Dell, B., Turton, S.M., Lawes, M.J., Hutley, L.B., McCallum, H., Dale, P., Bird, M., Hardy, G., Prideaux, G., Gawne, B., McMahon, C.R., Yu, R., Hero, J.M., Schwarzkopf, L., Krockenberger, A., Douglas, M., Silvester, E., Mahony, M., Vella, K., Saikia, U., Wahren, C.H., Xu, Z., Smith, B., Cocklin, C., 2011. The 10 Australian ecosystems most vulnerable to tipping points. *Biological Conservation* 144, 1472-1480.
 27. Leach, M., Scoones, I., & Stirling, A. (2010). Governing epidemics in an age of complexity: Narratives, politics and pathways to sustainability. *Global Environmental Change*, 20(3), 369-377.
 28. Litfin, K., 1995. Framing Science: Precautionary Discourse and the Ozone Treaties. *Millennium - Journal of International Studies* 24, 251-277.
 29. McCaw, W.L., 2013. Managing forest fuels using prescribed fire - A perspective from southern Australia. *Forest Ecology and Management* 294, 217-224.
 30. McEvoy, D., Fünfgeld, H., Bosomworth, K., 2013. Resilience and Climate Change Adaptation: The Importance of Framing. *Planning Practice and Research* 28(3), 280-293.
 31. McGlone, M., 2012. The Hunters Did It. *Science* 335, 1452.
 32. McLaughlin, P., Dietz, T., 2008. Structure, agency and environment: Toward an integrated perspective on vulnerability. *Global Environmental Change* 18(1), 99-111.
 33. McLennan, B., Handmer, J., 2012. Changing the rules of the game: Mechanisms that shape responsibility sharing from beyond Australian fire and emergency management. *Australian Journal of Emergency Management* 27, 7-13.

34. Metzger, J., Allmendinger, P., Oosterlynck, S. (Eds), 2015. Planning against the political; Democratic deficits in European territorial governance. London and New York: Routledge.
35. Miller, F., Osbahr, H., Boyd, E., Thomalla, F., Bharwani, S., Ziervogel, G., Nelson, D., 2010. Resilience and vulnerability: Complementary or conflicting concepts? *Ecology and Society* 15(3).
36. Mol, A.P.J., Spaargaren, G., 2000. Ecological Modernisation Theory in debate: A review. *Environmental Politics* 9, 17-49.
37. Mol, A. P. J., Spaargaren, G., Sonnenfeld, D. A., 2014. Ecological Modernisation Theory: Taking Stock, Moving Forward. In S. Lockie, D. A. Sonnenfeld & D. Fisher (Eds.), *Routledge International Handbook of Social and Environmental Change* (pp. 15-30). London: Routledge.
38. Mouffe, C., 2005. *On the political (thinking in action)*. Abingdon/ New York: Routledge.
39. Mouffe, C., 2013. *Agonistics; Thinking the World Politically*. London, New York: Verso.
40. O'Brien, K., Eriksen, S., Nygaard, L. P., & Schjolden, A., 2007. Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy* 7(1), 73-88.
41. Ockwell, D., & Rydin, Y., 2006. Conflicting discourses of knowledge: Understanding the policy adoption of pro-burning knowledge claims in Cape York Peninsula, Australia. *Environmental Politics* 15(3), 379-398.
42. Ockwell, D., 2008. 'Opening up' policy to reflexive appraisal: a role for Q Methodology? A case study of fire management in Cape York, Australia. *Policy Sciences* 41(4), 263-292.
43. Pyne, S.J., 2006. *The still-burning bush*. Carlton North, Victoria: Scribe.
44. Taylor, S., 2013. *What is discourse analysis*. London: Bloomsbury Academic.
45. Ward, D. J., Lamont, B. B., & Burrows, C. L., 2001. Grasstrees reveal contrasting fire regimes in eucalypt forest before and after European settlement of southwestern Australia. *Forest Ecology and Management* 150(3), 323-329.