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**Understanding restoration volunteering in a context of environmental change: in
pursuit of novel ecosystems or historical analogues?**

Under review at Human Ecology

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Abstract

There has been much debate within the field of restoration ecology surrounding questions of how humans might or should act to ‘preserve’ or ‘restore’ landscapes. Examination of such issues does not merely involve scientific aspects of ecological processes, it is also highly bound up in social processes and values. There has been limited examination, however, of how interested non-scientists engage with such debates. In this paper, we examine how academic debates around what scientists tag as ‘novel’ or ‘historical’ ecosystems figure in the ideas and practices of members of the public who are actively engaged in environmental restoration as volunteers. In a study of volunteers in southwest Australia, we observed the expression of nuanced ideas about the state or future of ecosystems that could not be easily subsumed under a ‘historical’/ ‘novel’ dichotomy. Volunteers conceptualised the landscapes in which they worked in an evolutionary sense and as something that was learnt about gradually through their own experiences and experimentation. We discuss our findings in terms of implications for the process of knowledge exchange at the science-society interface.

Understanding restoration volunteering in a context of environmental change: in pursuit of novel ecosystems or historical analogues?

Introduction

The speed, scope and intensity of landscape-scale transformations in ecologically vulnerable environments around the globe has led various

government and non-government organizations to pursue what has been broadly termed ‘ecological restoration.’ Ecological restoration has been a contested issue for some time, with the question of *whether to restore* fundamental to the debate. Some authors argue against intervention altogether on the grounds that restoration is yet another expression of the arrogant idea that humans can dominate and control nature (Elliot 1982; Katz 2000; for a critique see Light 2000).

The question of *what to restore to* is a second contested domain. Some have suggested using advanced restoration technologies to restore damaged wilderness areas in a way that allows them to return to their pre-disturbance state (Throop and Purdom 2006). The idea of the contemporary existence of a ‘historical wilderness’ state to which one might endeavour to return degraded environments or ‘scarred landscapes’ is, however, being increasingly questioned (Collier and Scott 2009; Harris *et al.* 2006; Jackson and Hobbs 2009). Some speak of ‘the myth of the carbon copy’ - that is the impossibility of clearly defining a previous state to which an ecosystem can be restored (Hilderbrand *et al.* 2005). The ‘living museum’ is another metaphor that has been used, implying that although such kinds of restoration to historical states may be desirable for reasons such as keeping a public enthusiastic, they may not be desirable or even necessarily practical on a large scale due to the sheer magnitude of the task and the impossibility of recreating species assemblages in a highly disturbed landscape (Hobbs and Cramer 2008).

Over the past decade the concept of ‘ecosystem novelty’ has appeared with increasing frequency in the ecological restoration literature. Novel ecosystems are a result of both intentional and unintentional effects of human

interventions, such as clearing vegetation and the introduction of animals and plants. Ecological management through human intervention is held to be inherently and obviously necessary rather than questionable (Hobbs *et al.* 2006, Williams and Jackson 2007), thus bringing the question *how to restore*, or rather, *how to intervene* to the fore (Hobbs *et al.* 2011). From the perspective of this ‘intervention ecology’ landscape is seen more as potentiality than as memory (Onneweer 2009).

Choosing how (if at all) to intervene is not a simple task however, especially with climatic changes shifting the boundaries of the geographical ranges in which species occur - giving rise to new species combinations in specific locations (Parmesan 2006). The southwest of Australia has been experiencing an extensive reduction in rainfall in recent decades on top of various other anthropogenic changes that have radically altered this landscape over the past two centuries (Australian Centre for Biodiversity 2008; Lindenmayer *et al.* 2010; Pitman *et al.* 2004; Timbal *et al.* 2006). In these circumstances, the possibilities for future intervention outcomes are tempered not only by a recognition of the impossibility of returning already novel contemporary ecosystems to historical states, but also by an expectation that future climatic changes may, in many cases, render such historical landscapes obsolete.

Restoration Ecology: science, policy and society

In discussing ‘restoration ecology,’ Hobbs (2004) writes: “setting realistic restoration goals is essential to the planning process. Yet, these goals are often determined by preconceptions or misconceptions that place more value on particular ecosystem states or on how the ecosystem was, or might have been,

at some particular time...Thus, [restoration ecology] faces an important challenge in tackling the societal expectation of ambitious restoration goals. A mix of scientific uncertainty, value-laden decisions, and unrealistic expectations can lead to costly and demoralizing failures” (p. 43).

The suggestion here is that while it is realism that is needed, ‘pre- and misconceptions’ are dominant ‘in society’ that one therefore needs to tackle (see also Hobbs *et al.* 2011). We argue here in order to address these ‘pre- and misconceptions’ and (unrealistic) societal expectations we need to investigate how interested citizens envision future ecological landscapes, how they relate to these ‘natures in the making’ through their practices and how they define their agency in relation to science and policy-making.

The potential roles of citizens in relation to science and politics have increasingly been emphasized, especially in relation to complex environmental problems (for an overview, see Bäckstrand 2003). Firstly, local or lay knowledge could complement abstract scientific knowledge and in so doing advance towards policies that align abstract facts and local meanings (Jasanoff 2010). Secondly, the uncertainty and risk engrained in environmental problems require a diversity of perspectives to avoid an early narrowing of (mainly technology-based) alternative policy options. Thirdly, citizens should have the opportunity to consider and deliberate the ethical dimensions of research and policy and how they impact their lives.

The importance of the ability of restoration or intervention ecology to speak to non-academics stems partly from the sheer magnitude of the practical tasks necessary to obtain any kind of significant ecological outcomes going forward. At present, volunteers undertake a large part of such on-the-ground

restoration work. An understanding of the ways in which such volunteers practice restoration and conceptualise their own activities is thus an important element for the design of effective interventions.

Volunteering

Key to many different definitions of volunteering, including that of the United Nations (United Nations 2001), is that volunteering involves unpaid activities that aim to benefit the environment or other people and that are carried out as an act of free-will. Formal volunteering involves membership of an organization or group, but in this study we also include informal volunteering (Volunteering Australia 2009). There has been a large body of research into individuals' motivations to volunteer, but very little that examines how knowledge moves and transforms in situations where decontextualized scientific knowledge comes into contact with contextualized volunteers' knowledge (Ellis and Waterton 2004; Lawrence 2009; Lawrence and Turnhout 2010).

A focus on knowledge as process is closely connected with a critical political ecology, which aims to disclose a range of possible definitions of environmental problems and explores how some definitions are imposed and implemented at the expense of others. Therefore, this approach focuses on transparency, legitimacy and participation (Forsyth 2003, 2005), offering a lens through which to examine the relationship between an academic debate about restoration and the practices of the non-scientific publics that are actively engaged in such activities on the ground.

By focusing on (the politics of) knowledge, our approach draws attention to the relationship between volunteers and scientists engaged in

ecological restoration. Volunteers are not only the workers whom scientists ask to carry out various activities without requiring much understanding or input and critical engagement. They also bring in different social values and are a source of local knowledge and insights. A critical political ecology perspective also argues that there is a need for “greater public participation in the formulation of environmental science” (Forsyth 2005: 278) and that ecological science is no longer to be viewed as the singular and neutral source of information that informs policymakers (see also Robertson and Hull 2003; Collier and Scott 2009).

In the analysis that follows, we explore environmental volunteers’ perspectives of environmental change and how they engage with these changes through their practices. We also examine what these perspectives and practices mean for the process of knowledge exchange between volunteers and scientists, and more generally for the relationship between science and society, particularly when this relationship involves making choices about interventions in a changing ecological environment.

Methods

A great deal of ecological restoration work in coming decades will be carried out by volunteers who thus are likely to develop an intimate relationship with, and knowledge of, the land and are therefore also likely to take an interest in decision-making about ecological restoration of that land. On the basis of interviews and group discussions with two groups of ecosystem restoration volunteers, we analyze how people talk about environmental processes and how they view their restoration activities in relation to them. However, because discourse is just one way by which ideas about ecological restoration are

represented, we also examine volunteers' hands-on practices and their outcomes. In particular we are interested in ways that the environmental knowledge of volunteers and scientists may differ.

Research area and participants

Over roughly the last 200 years, human intervention has considerably changed the landscape in the southwest of Western Australia. The resulting ecosystems, according to the criteria of some restoration ecologists, are 'novel' (Hobbs *et al.* 2006) because they have been changed to such an extent that they are now degraded, invaded or abandoned environments with new species combinations.

One group of volunteers came from the rapidly-expanding city of Mandurah, a city of roughly 85,000 people, located approximately 80 km south of the equally rapidly growing capital of the state, Perth (1.7 million people). The other group of volunteers came from within and around the small regional town of York, located about 100 km to the east of Perth with a more rural character. Here, clearing for agriculture has been the main driver behind ecosystem transformation. In both areas, there are various ongoing restoration projects taking place on both public and private land. Unlike the volunteers residing in and around York, the Mandurah-based volunteers were involved in the 'academic' restoration trials in the nearby Yalgorup National Park and the (slightly more remote) Ludlow Tuart Forest.

Our initial interviews were with a group of women who frequently assisted the restoration ecologist in our team. We also asked an official of the state government Department of Environment and Conservation to connect us with some of the volunteers with whom she worked. Other contacts were

obtained through a 'snowball-method' (Babbie 1992). The research team participated in 15 field activities, which provided the opportunity to observe the volunteers in their normal 'routines'. The participants in these field activities were often, but not always, the same people as the ones interviewed. On some occasions, the interviewees would organize separate field visits to show us their restoration work. We also conducted two group discussions, one with ten of the previously interviewed volunteers and the other with a larger group that attended a presentation of findings at a meeting of the nursery and tree-planting organisation, Men of the Trees. Most, but not all, of the volunteers were affiliated with one or more volunteers' organizations, such as Men of the Trees (most of them), Birding Australia or the Nature Conservancy.

Qualitative research methods

Research was conducted between November 2009 and December 2010. The 21 interviews took from 1.5 to 2.5 hours each (13 women, 8 men). They were semi-structured to allow for the opportunity for volunteers to bring up their own concerns or questions. These interviews and the group discussion were transcribed verbatim. All names that appear in the analysis are pseudonyms. When volunteers preferred to talk while showing us their 'sites', we have kept a reflexive journal (Lincoln and Guba 1985) or conducted an interview before or after the field trip.

The field activities mostly lasted a half or full day. They often provided concrete points of reference during the interviews, for example, when talking generally about what changes were observed or more specifically, about what species would grow well in a certain location and not in others. Roughly half

of the field activities consisted of participation in the science restoration trials. The restoration ecologist initially involved the volunteers in this work because she needed their assistance in planting and monitoring. The group remained select, as the restoration ecologist was concerned that the work be in accordance with scientific standards, in a highly controlled environment with as little as possible variation between the replicated plots. The volunteers gradually came to be recognized more as the producers of different kinds of knowledge, rather than mere workers and receivers of knowledge. In the process, trust evolved and the volunteers spoke more freely about the future of ecological restoration. In addition to the interviews, group discussions were organized in which volunteers spoke with each other more broadly about their activities, in particular their own agency in relation to ecological restoration (see below) and expressed a more critical attitude towards what was experienced by some as governments' underutilized potential to further facilitate their activities.

Volunteers and their future landscapes

We were particularly interested in how volunteers talked about the past and present landscapes, how they saw the relationships between these and how that affected their restoration practices. We examine their ideas about notions of novelty and historicity in the face of environmental change and what this implied for their relationship with the broader practice of ecological restoration.

The relevance of the past in terms of native species

In the interviews we discussed what kinds of landscape respondents would envision as their preferred result of ecological restoration. Rather than invoking emotional accounts of historical versions of 'their' landscape, various

respondents framed their preferences in relation to the endemic nature of particular plants. There was a clear sense of ‘correctness’ in the views of most of the respondents:

Sheila: “Well you need to try and really plant things that used to grow in that area because they’re acclimatised to that area and so you need to really collect the seed from that area if possible”.

Paul: “I do not think three degrees or two degrees will worry native species to this area. If we put other species in which come from different areas and different temperatures, it’s going to be a worse scenario than putting in the endemic species”.

Although Paul uses the terms native and endemic alternately, these participants both base their choice for native species (Paul) and for ‘what used to grow’ (Sheila) on ecological arguments. They both express an expectation that these species will adapt more easily and survive better and Paul suggests that the translocation of species into the area from elsewhere involves risks.

In some instances, participants provided a slightly looser criterion for their preference for planting local species:

Sandra: “I don’t worry what I’ll put in the ground as long as I feel that well it has to be the correct species for that area obviously [...] The one that grows locally. I wouldn’t be very happy about planting pines at all.”

By invoking the example of pine trees, which are not endemic to Western Australia, Sandra opens up the possibility of a variety of options between ‘the one that grows locally’ and ‘planting pines’. However, all three accounts express a sense of relevance of the past in evolutionary/ecological rather than sentimental terms, and are connected to a discourse of local

provenance, which implies that seeds should be collected only from a specified range.

Provenance discourses

Although, less-involved members of the public would probably not use a term like provenance, we found a majority of our respondents actively used it. When we talked about ecosystem changes in more depth in interviews or while in the field, many volunteers became more specific about exactly what kind of intervention they thought would be realistic. Even if they preferred plantings of local provenance they also emphasized how the landscape had already changed to such an extent that always using local species might no longer be a sensible option:

Dorothy: “There are some people like even Judith¹ was coming around to this, that have said okay we’re here now, there used to be all these things here, they can’t regrow now because of the clearing and the rainfall and salinity changes and the creeping salinity and the global warming whatever, perhaps we should look a bit further out where it’s always been a bit harsher and bring them in and grow them here.”

Other participants also mentioned animals in their narratives of a changed environment to provide justification for why alternative ways of restoration should be developed:

Julie: “I do think it’s impossible that we go back to pre-European days, too much is altered dramatically. The animals aren’t there or any of that stuff that needs to have evolved to that stage.”

¹ Dorothy refers to Judith (another local volunteer) because she is known as very strict about specific provenance.

The impact of recent extreme temperature events in the region was also cited by participants as a reason for more adaptive and creative approaches to ecological restoration. For example, Sally and Patrick told us that although they “do try to grow what naturally grows in the Peel area and the Swan Plain, there’s a lot of plants that grow in the Peel Region and they might not be local to here, but they’ll grow (here).” Patrick and Sally spoke at some length about how shocked they were to see scorched trees whilst travelling to an area that had had a couple of days of temperatures above 40°C:

Patrick: “And then you’ve got to start thinking oh okay we’ve got to look at different sorts of trees, plants and whatever to try and counteract if this is what may happen.”

Thus, discourses of provenance were tempered by ‘realist’ discourses that were bound up with observational experiences of these environmental changes and how they might be relevant and important for restoration choices.

Translocation and risk

Although the volunteers’ conceptualisations of the ‘appropriateness’ of species for restoration were quite fluid and dynamic, the possibility of translocation of species in a context of environmental change elicited expressions of concern from most of the volunteers about impacts on the ecosystem as a whole and how changing species in one area may not remain an isolated intervention:

Sheila: “Well, if you start trying to bring in more northern species, the thing is you’re going to change the whole thing because all the creatures here from all the insects or birds or the animals the lizards, they are all geared towards this and you see a lot of our plants and things here are fertilised by birds and

insects and moths and all these sorts of things and little creatures, so if you started getting rid of all that, then you're going to change the whole system altogether aren't you?"

Dorothy: "We try and get the local things to grow and we've collected seed and we have got some interesting things growing from local seed, but I'd be inclined to think that things a bit further out in the harsher climate we can bring them in here."

(...)

Barbara: "[but] if you bring in a plant that isn't local and the local birds aren't geared to using it..."

(...)

Harry: "But also they adapt too much and cause all sorts of problems."

Dorothy: "Yeah too many of them proliferate."

Harry: "Too many of them or the wrong sort or crowding out local species and possibly local feeding. I don't know enough about that but well we've had this problem with South Africa, all the boats that came out to Australia in the early days brought things from South Africa."

Barbara: "They're all our major weeds now."

Harry: "And all our major weeds and rabbits, ((inaudible)) and foxes."

We can see here how a conversation that begins with a consideration of the possibility of translocation, ends with a reflection on the potential risk involved by referring to species that are now considered as pests. Again, we see the ways in which the volunteers' constructions of what is 'appropriate' were based in dynamic conceptualisations of ecosystems. Whilst species translocation in response to climatic change was discussed as an option, the appropriateness of such activities was inherently linked to considerations of the

functionality of the novel landscape that would be created by such measures and the ways in which this might be influenced by changes in climate.

An ongoing process of learning and experimentation

An important question in view of the possibility of a closer, reflective relationship between citizens and scientists, is how these volunteers were arriving at their conclusions and perspectives on the possible futures of their landscape. What emerged from our interviews and observations was that for most of them this has been a gradual learning process that has come about through their own experimentation, from reading and from what they have heard from other volunteers and practitioners whom they consider leaders in terms of their knowledge and experience:

Dorothy: “When we came to York (in 1987) we knew there were gum trees, there were different types of gum trees, but that was about the extent of our knowledge. We bought this empty farm paddock and we started off by planting anything that had a green leaf. And then we realised, hold on, we should think a bit more about that and we started to think what was here before, before it was bulldozed into a bare paddock. And so we started finding out about the local things (...). (The knowledge) sort of crept up on us. Anything that has big leaves is going to transpire moisture and it’s not sensible in this climate, when you look at the local things they’ve got narrow leaves and they hang down when it’s hot so they don’t transpire so it sort of gradually seeps in that you know there’s a reason for not having big juicy leafed things.”

Dorothy and Harry had not set out to create something conforming with a preconceived image of historicity or novelty. Instead, they share a more experimental approach that is based on direct observation. A farming couple

spoke of a similar orientation to their landscape and told us about the species they plant as they pointed them out to us:

Tracey: “Things that have survived here, that’s what we’re using. (...) The *Melaleuca hamulosa* grows naturally here and we’re looking for things that tolerate salt and water logging and that’s down in a very wet area and it grows there and it thrives and it does its own thing so I thought well that’s one.”

David: “What goes well we keep and what doesn’t go well we don’t worry about.”

Tracey: “We have made so much change and so much mess I don’t know that we can, we can’t go back to where we were.”

Here learning is again described as a gradual process in which they slowly discover, by way of experimentation, which plant species grow well (in a changing environment). When seedlings did not survive, or seeds did not germinate, volunteers accept this as a ‘fact of life’ and try something else. In summary, whilst some volunteers expressed a preference for ‘endemic’ species, for acclimatized species, or for what is ‘local,’ they had also learned in a ‘hands on’ way which species would do well and which would not. Sometimes this included the possibility that species from elsewhere, and derived from non-local provenance, might thrive better than native species.

The ‘hands on observations’ with regards to the plantings were often described as experiments, such as Dorothy and Harry’s ashbeds and direct seeding. They had also assisted in successful experiments to combat weeds with sugar. Sometimes these experiments fail or found to be unpractical for application on a larger scale. In these cases questions arise about the reasons for the failure in the context of the broader landscape:

Harry: “We got a box of 25 marri (...). We planted them all and they all flourished for a week or two or three or maybe a bit more and all but one died. They live on the other side of the river between here and Perth (...). It’s almost as though someone’s drawn a straight line down they won’t grow over here. You won’t see a native marri in York on this side of the river.”

On the basis of their experiments and observations, Harry and Dorothy have decided that soil type may be more important than local provenance in determining growth.

This kind of contextualised observation includes the effects of activities originating from other actors’ interests. Wendy, for example, showed us one of her restoration sites that a developer had dewatered for the installation of a sewage system and then put extremely saline water back into it. While for the restoration ecologist these activities may produce an unwelcome outcome for the comparability of their data, for some of the volunteers they are a part of their realities in which different interests meet and compete. Sometimes, Wendy explains, “people expect trees to just explode out of the ground.” She explains that the process of flora surveying, gathering seed, seed preparation and seeding experiments require a lot of patience. After seeding, “we spent the next three months on our hands and knees every week staring to see if anything was growing.” We see here a human-nature relationship reflecting a discourse of realism, rather than romanticism.

Volunteers’ agency in experiments

Despite providing us with detailed descriptions of their hands-on observations and experimentation, there was a striking modesty in the volunteers’ accounts of their own activities that seemed to downplay their own

individual agency. This attitude reflects how science has more generally been positioned as being able to provide answers in environmental matters. In the early 2000s federally initiated Regional Forest Agreements (RFAs) were formed with the intention of bringing together conservationists and forest managers. The RFAs were to be “backed by science, science and more science”

(Commonwealth of Australia 2000, cited in Brueckner and Horwitz 2005).

However, advocates of opposing nature management ideas have *all* appealed to science to defend their positions, rather than adopting a more open mode of knowledge exchange in which different ways of knowing would be acknowledged (Brueckner and Horwitz 2005). This has created a culture and politics in which the science is expected to provide the answers that the public is expected to accept without question. This approach ignores the social values and dilemmas encountered in any approaches to environmental issues. Furthermore, and more important to this paper, it also contributes to a culture in which volunteers are perceived as predominantly helpers and not as co-creators of knowledge.

For example, the volunteer interviewee in charge of one of the largest re-vegetation projects in the state, describes her efforts as “just doing as we are told.” Another interviewee who often stressed her ‘ignorance,’ responded when we remarked that we considered her efforts worthy of note:

Sandra: “We just class ourselves as volunteers, as workers who go out and thoroughly enjoy it, but it’s not until you actually are asked a question when you’re out in the bush, will I do this or will I do this and you think oh God yeah I know that, I answer and you think ...mm that’s clever.”

Despite their modesty regarding their contributions, the volunteers both in interviews and particularly in group discussions, expressed concern about

governments' apparent unwillingness to extend the lessons of the restoration trials for broad scale re-vegetation, for instance in places where trees had recently died on a large scale.

While some volunteers emphasized their lack of knowledge more than others, they all independently carry out multiple re-vegetation experiments without being told what to do by scientists. Although different in design from the scientists' experiments in terms of the degree to which the environments can be controlled, volunteers' experiments are signs of their interest in similar questions. They are also often based on long-term involvement, a realistic stance of acceptance of loss, death and uncertainty, and an appreciation and close observation of local contexts. Through experimentation, they discover which 'historical' species still grow well, which novel features of a landscape might form a threat, and what mix of novel and historical is evolving. Yet, the self-image that most seem to have adopted is as mere helpers, part of an indispensable workforce that is needed to get restoration done (cf. Buizer and Turnhout 2011). This ambiguity seems relevant to the question of how volunteers and scientists could develop a more reflective interaction when they are dealing with questions about ecological restoration. By (self-) categorizing themselves as a workforce, the volunteers risk disempowering themselves and preventing the potential cross-fertilisation of knowledge between citizens and scientists.

Conclusion

Overall, our analyses of the discourse and activities of the volunteers we engaged with did not reveal misconceived, romantic, or sentimental attitudes to historical landscapes, as some within the ecological restoration field

may tend to assume. Instead, volunteers often talked about the evolution of landscapes in terms of local provenance of species. They frequently noted the intensity of the environmental changes that they observe. On the other hand, they also raised questions about translocation of species because of possible unforeseen consequences for ecosystems as a whole. The volunteers' awareness of the complexities of environmental change can be seen to stem from an ongoing process of learning through hands on observations and experimentation. Nevertheless, volunteers often continue to present themselves and their knowledge in modest terms that privilege scientists' knowledge above lay peoples' knowledge.

We hope to have offered a starting point for further explorations into the ways in which environmental restoration volunteers relate to questions concerning what and how to 'restore' landscapes in a rapidly changing environment. We have highlighted the need for an appreciation of the extent to which volunteers engage in experiments and make observations that may possibly be informative for the sciences and the importance of recognizing that volunteers seem entirely willing to, and capable of, addressing landscape restoration issues in ways that are not restricted to the creation of 'living museums.' As their numbers increase (Department for Communities of Western Australia 2009), greater recognition of volunteers as co-learners and co-producers of ideas about, and experience with, different ways to intervene in present-day ecosystems could lead to both scientists and themselves understanding and valuing the potential contributions of their day-to-day hands-on observations and experiments to the existing body of scientific environmental knowledge.

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