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**Policy language in restoration ecology**

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Keywords:	policymaking, research implications, scientific communication, climate change



## Policy language in restoration ecology

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**Abstract**

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5 Relating restoration ecology to policy is one of the aims of the Society for Ecological  
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7 Restoration and its journal *Restoration Ecology*. As an interdisciplinary team of researchers in  
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9 both ecological science and political science, we have struggled with how policy-relevant  
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11 language is and could be deployed in restoration ecology. Using language in scientific  
12  
13 publications that resonates with overarching policy questions may facilitate linkages between  
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15 researcher investigations and decision-makers' concerns on all levels. Climate change is the  
16  
17 most important environmental problem of our time and to provide policy makers with new  
18  
19 relevant knowledge on this problem is of outmost importance. To determine whether or not  
20  
21 policy-specific language was being included in restoration ecology science, we surveyed the  
22  
23 field of restoration ecology from 2008 to 2010, identifying 1,003 articles, which we further  
24  
25 examined for the inclusion of climate change as a key element of the research. We found that  
26  
27 of the 57 articles with "climate change" or "global warming" in the abstract, only two  
28  
29 identified specific policies relevant to the research results. We believe that restoration  
30  
31 ecologists are failing to include themselves in policy formation and implementation of issues  
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33 such as climate change. We suggest that more explicit reference to policies and terminology  
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35 recognizable to policymakers might enhance the impact of restoration ecology on decision-  
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37 making processes.  
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45 **Key words:** policymaking; research implications; scientific communication; climate change  
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## Introduction

Relating scientific research to policy is a continual challenge. Restoration science can be useful in the making and refining of public policies, in addition to providing guidance to practitioners in the field (per Cabin et al. 2010). The Society for Ecological Restoration (SER) has targeted “advising international organizations with policy and legislation” (<http://www.ser.org/about.asp>) as one of its chief goals, and the Aims & Scope of the society's flagship journal, *Restoration Ecology*, places the journal “at the forefront of a vital new direction in science, ecology, and policy” (<http://www.blackwellpublishing.com/aims.asp?ref=1061-2971>). Restoration ecologists surveyed by Cabin et al. (2010) likewise identified developing political support for restoration science as a desirable SER objective. Yet looking at the articles published in *Restoration Ecology* from 2008 to 2011, few tackle policy as their main theme: only 18 articles out of 500 have any form of the words politics/policy in the abstract and only two have it in the title. Although instructions for the “Implications for Practice” section of articles ask authors to think about how practitioners could implement the findings, they do not ask authors to think about whether their findings might have implications in the policy realm (<http://www.wiley.com/bw/submit.asp?ref=1061-2971>) and thus this section generally contains only technical field recommendations. Although scientists may have particular policies in mind as relevant to their research, the pages of *Restoration Ecology* are not conveying this explicitly.

As an interdisciplinary team of researchers in both ecological science and political science, we have struggled with how policy-relevant findings could be deployed in restoration ecology. Pointing out the implications of scientific research for policy questions may facilitate linkages between researcher investigations and decision-makers' concerns on all levels, from local practitioners to regulatory agency specialists to interstate-level policymakers. Language

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2  
3 matters because scientific information will be incorporated into environmental policy only  
4  
5 when stakeholders perceive the information as credible (scientifically adequate), salient  
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7 (strongly relevant), and legitimate (respectful of the stakeholders' values and beliefs) (Cash et  
8  
9 al. 2003; Clark et al. 2006). Concepts such as “biodiversity” and “sustainable development”  
10  
11 have found their way into policy statements at national and international levels giving them  
12  
13 wide relevance (Noss 1995; Callicott et al. 1999), thus general policy concepts might provide  
14  
15 a common language forged between policymakers and scientists.  
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18  
19 Issue salience, which was first used by social scientists to explain voting behavior,  
20  
21 refers to how important an issue is for shaping a public policy agenda (Wlezien 2005; Clark  
22  
23 & Holliday 2006). Issues occupy points along a spectrum of saliency, ranging from high  
24  
25 visibility to not appearing at all (Pralle 2009). Once an issue has entered political discourse,  
26  
27 we can say that it did so because it has saliency, i.e., it is relevant to the decision-making  
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29 process—even though we may not understand how or why it gained that status without  
30  
31 further investigating the links between the ideas, social and political contexts, and media  
32  
33 coverage of the issue.  
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37 Linking the relevance and implications of research to salient issues using commonly  
38  
39 understood language is critical to increasing the impact of restoration research on policy. For  
40  
41 example, if research findings have implications for “ecosystem services” policies, the article  
42  
43 could indicate how the results are relevant. This does not mean that the scientist must  
44  
45 necessarily take a normative stand on a particular policy option, but rather could state how the  
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47 research is applicable to policy concerns. There has been extensive debate about the proper  
48  
49 role of scientists in conservation policymaking (e.g. Brussard & Tull 2007; Lackey 2007).  
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51 These authors caution that scientists must be careful to they present research so that it informs  
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53 policy but does not advocate one policy over another because doing so may raise questions  
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55 about the validity of the science. However, as Scott et al. (2007) note, scientific findings need  
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3 to be brought to the attention of policymakers. Scientists need to link policy problems to the  
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5 information that provides solutions (Cortner 2000).  
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8 Although some scientists may think pointing out the policy implications of research  
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10 findings is futile because policymakers do not consult research, studies of policymaking  
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12 behavior have shown otherwise (Amara et al. 2004; Rigby 2005; Rudd 2011). Policymakers  
13  
14 have been shown to use science in three ways: to identify new issues (conceptual), to identify  
15  
16 solutions to previously known problems (instrumental), and to support established positions  
17  
18 (symbolic) (Amara et al. 2004; Rudd 2011). The most extensive study of policymakers to  
19  
20 date, which surveyed 833 individuals at various Canadian governmental agencies, found that  
21  
22 over 40% of the respondents considered university research moderately important, very  
23  
24 important, or decisive in all three utilization categories (Amara et al. 2004). Studies also  
25  
26 indicate that policymakers are more likely to use research if it has an “actionable message”  
27  
28 aimed at the policy audience (Lavis et al. 2003; Rigby 2005). While big policy questions  
29  
30 cannot be entirely answered through individual research projects, systematic reviews  
31  
32 combining evidence can be particularly useful in high-level policy decision-making (Pullin  
33  
34 2009).  
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#### 40 **The case of restoration and climate change**

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42 Climate change is currently considered by many to be *the* environmental issue of the 21<sup>st</sup>  
43  
44 century, since the climate is changing rapidly and environmental consequences may be  
45  
46 significant (IPCC 2007). Climate change-related declines in species populations are  
47  
48 increasingly common (Thomas et al. 2004), and climate change may become the greatest  
49  
50 global threat to humans and biodiversity within the next few decades (Leadley et al. 2010).  
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52 An enquiry in the database Web of Knowledge (<http://apps.webofknowledge.com/>: Topic =  
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54 climate change, Web of Science Categories = environmental sciences, excluding publication  
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3 year 2013) shows that the percentage of papers published in environmental sciences on the  
4  
5 topic climate change increased substantially over a decade: from 2% in 2000 to 14% in 2012.  
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7 Considering the importance of framing ecological research within contemporary efforts to  
8  
9 address climate change and the role that scientific articles may play in linking science with  
10  
11 policy, we more closely examined whether or not climate change policy was visible within  
12  
13 the scientific literature of restoration ecology.  
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15

16 Do restoration ecologists use language that might resonate with climate change  
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18 concerns in order to bolster linkages with policy formulation, implementation or adaption?  
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20 Using the list of journals targeting restoration from Aronson et al. (2010) and the authors'  
21  
22 knowledge of the field, we screened for potential journals with restoration articles in the  
23  
24 period 2008–2010. We identified 18 journals that had more than 10 articles containing  
25  
26 “restoration” in the abstract, resulting in a set of 1,003 articles (Table 1). Although containing  
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28 the word “restoration” in the abstract did not guarantee that the article was *about* restoration,  
29  
30 it meant that the author identified restoration as an important component of the research. All  
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32 searches were performed using each journal’s web hosting search engine, which allowed  
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34 searching only the abstract.  
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38 We identified a subset of articles that include the term “climate change” or “global  
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40 warming” in the abstract (57 articles). Looking at those papers more closely, practitioners  
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42 appeared to be a common target audience, with papers focused on restoration techniques  
43  
44 appropriate under climate change, such as seed banking, marsh reconstruction, and fire  
45  
46 management. Formal policies were named in only two cases: the EU Birds and Habitats  
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48 Directive and Natura 2000 network (Verschuuren 2010); and the global conventions on  
49  
50 Biodiversity, Climate Change, and Desertification (Blignaut et al. 2008). In these two cases  
51  
52 where specific policy instruments are named, the lead researchers were not restoration  
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54 ecologists: Verschuuren is a specialist in international public law and Blignaut is an  
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3 environmental resource economist, although Blignaut had one restoration ecologist as a co-  
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5 author. How policies might be developed or modified in light of climate to incorporate the  
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7 latest ecological restoration science is essentially absent. Although restoration scientists may  
8  
9 not have findings relevant to setting overarching policy on CO<sub>2</sub> emission totals, they likely to  
10  
11 have results that should affect how measures like the EU Water Framework Directive and  
12  
13 Convention for Biodiversity Aichi Targets are implemented in light of climate change, but  
14  
15 this kind of implication is not brought into focus in the articles. While climate change policy  
16  
17 and adaption to climate change at everything from local to global levels is discussed openly in  
18  
19 other venues, particularly journals targeted at the social sciences, restoration scientists are not  
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21 often bringing their specific ecological knowledge into those discussions.  
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### 27 **Making the message clear**

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29 As currently written, restoration ecology articles are scholarship that communicates primarily  
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31 with other scientists and restoration practitioners. Although intra-scholarly community  
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33 communication is vital to research development, restoration outcomes are greatly influenced  
34  
35 by social and political pressures (Baker and Eckerberg, 2013). Restoration scientists have  
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37 important messages for those who shape climate change and other policies, but they may not  
38  
39 be making that linkage as explicit as they could in their journal articles.  
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43 In a recent editorial piece, Holl (2010) pleaded with authors submitting articles to  
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45 *Restoration Ecology* to consider why an international audience would be interested in their  
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47 work. She outlined five questions to consider when “framing” papers, focusing on how work  
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49 in one specific locality can be made relevant to those working in other geographies,  
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51 ecosystems, and sociopolitical contexts. The results of our survey suggest that the “framing”  
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53 also needs to include policy implications. The “loading-dock” model of science, in which  
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55 scientists produce knowledge and deliver it with the expectation that users will find and use it,  
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3 seems inadequate in a rapidly changing world where there is increasing need for science-  
4 informed policy (Cash et al. 2006). While we recognize that publication in a scholarly journal  
5 is not the only or even the best way to reach policymakers with research results, clear  
6 identification of politically salient issues like climate change is, frankly, an easy way to  
7 increase the likelihood of science-informed policies. Referencing specific policies or laws  
8 related to the research is an even more direct way of speaking to policy concerns.  
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16 Funding structures for research already encourage this kind of thinking. Many grant  
17 sources such as EU Framework Programme 7 require applicants to explain the social  
18 relevance of the research, just as “broader impacts” must be detailed in proposals to the U.S.  
19 National Science Foundation. Some scientists may be treating these sections of applications  
20 as a necessary evil, or they may be less interested in communicating their findings to a policy  
21 audience than to their scientific peers. The connections to policy issues become weaker as the  
22 scientific process moves from grant application to scholarly publication, but this need not be  
23 the case.  
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34 We are not saying that *all* restoration ecology science has an “actionable message” for  
35 policymakers—practitioners and other scientists are legitimate audiences—but we believe  
36 there are more policy-relevant recommendations already inherent in ongoing restoration  
37 research that could be highlighted. One practical suggestion would be for *Restoration Ecology*  
38 as the leading venue of scientific work on restoration to create a special section or paper  
39 category dedicated to policy issues, which would perhaps spur more two-way communication  
40 with policymakers and encourage policymakers to look more often at restoration science for  
41 guidance on policy making, implementation, and adaption. Another suggestion is to  
42 encourage authors to focus one of the “Implications for Practice” items on policy implications  
43 if it is appropriate. Restoration ecologists should be encouraged to work more collaboratively  
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3 with colleagues in the social sciences to identify policies that could be affected by their  
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5 scientific results.  
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8 Although social interest in environmental issues is high, natural scientists continue to  
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10 face difficulties providing information to the public and decision-makers in ways that resonate  
11  
12 with their understandings of important issues. Groffman et al. (2010) encourage ecologists to  
13  
14 become active communicators, specifically turning to new communication tools outside of  
15  
16 academia to reach target groups. At a more basic level, we believe restoration ecologists need  
17  
18 to be aware of the language they use in scientific communication and actively identify how  
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20 their research findings could affect policies in the face of climate change.  
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### 23 24 25 **Implications for practice**

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27 • Restoration ecologists should be aware how their scientific results could and should be  
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29 incorporated into policy decisions.  
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- 31  
32 • Working collaboratively with social scientists would aid in identification of specific local,  
33  
34 regional, and even global policies that could be affected by restoration science.  
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- 36  
37 • Restoration ecology scientific publications could better incorporate policy-relevant  
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39 concerns such as climate change.  
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- 41  
42 • Journals interested in restoration should encourage two-way communication between  
43  
44 scientists and policymakers to help integrate scientific results into policy practices.  
45

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**Table 1.** Journals identified as containing at least 10 articles with “restoration” in the abstract, 2008–2010.

Journal Name	Articles
<i>AMBIO</i>	13
<i>Biological Conservation</i>	70
<i>BioScience</i>	16
<i>Conservation Biology</i>	24
<i>Ecological Applications</i>	68
<i>Ecological Economics</i>	20
<i>Ecological Engineering</i>	62
<i>Ecological Management &amp; Restoration</i>	25
<i>Ecological Restoration</i>	73
<i>Environmental Management</i>	50
<i>Forest Ecology &amp; Management</i>	108
<i>Freshwater Biology</i>	34
<i>Frontiers in Ecology and the Environment</i>	14
<i>Journal of Applied Ecology</i>	72
<i>Journal of Arid Environments</i>	34
<i>Journal of Environmental Management</i>	24
<i>River Research and Applications</i>	51
<i>Restoration Ecology</i>	245