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Title: Avoiding a post-truth world: embracing post-normal conservation

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Abstract

In response to unexpected election results across the world, and a perceived increase of policy decisions that disregard scientific evidence, conservation scientists are reflecting on working in a 'post-truth' world. This phrase is useful in making scientists aware that policy-making is messy, and multi-faceted, but it may be misused. By introducing three different scenarios of conservation decision-making, this perspective argues that a mythical era of 'science or truth conservation' has never existed. Since an 'extended peer community' of decision-makers (policy-makers, practitioners, stakeholders) are present in multi-layered governance structures, conservation has always been 'post-normal'. To decrease the chances of 'post-truth' decision-making occurring, the perspective encourages scientists to think carefully about scientific workflows and science communication. Developing a conservation narrative which does not see values, beliefs, and interests, as key parts of modern functioning democracies risks upholding a perception of the disconnected ivory tower of science. Rather, co-productive relationships should be established with decision-makers, and we should harness the power of storytelling to engage people on a personal level. This perspective encourages scientists to take heed of research on stakeholder engagement and storytelling, and to embrace workflows suited to post-normal conservation, rather than trying to deny that a post-normal world exists.

Keywords: evidence-informed policy; post-normal science; post-truth; science communication; science-policy

1. INTRODUCTION

Conservation scientists, alongside the wider scientific community, have reacted with dismay to the rise of a so-called 'post-truth' politics (e.g. Tollefson *et al.* 2016; Hayhoe in Gewin 2017; Wilsdon 2017). In the aftermath of unexpected election results in the UK and USA, and threats to pull out of international environmental agreements, the science community has

53 struggled with a decision-making environment that seems to undervalue the importance of
54 scientific evidence. Selective, or biased, use of evidence may be enhanced by the rise of
55 nationalistic governments across the globe (Ross and Jones 2016), who put forward
56 arguments in favour of their own citizens, even in the face of the global science-based
57 accords such as the Paris Climate Change Agreement (Tollefson *et al.* 2016). According to
58 some reports, decisions about the environment can also be post-truth (Begon 2017) as policy-
59 makers selectively use, or ignore, scientific evidence to support political arguments. Indeed,
60 at the British Ecological Society Annual Meeting in December 2016, a conference attended
61 by 1200 ecologists from fifty countries, the phrase 'post-truth' was repeated so frequently
62 that one delegate added it to a 'plenary bingo-card' as a key theme of note. The resurgence of
63 Japanese whaling is one such issue in which conservationists argue that senior policy-makers
64 are ignoring scientific evidence for their own gain (WDC 2017).
65 Here, I present a spectrum of conservation decision-making along which the influence of
66 science varies (Figure 1). I argue that policy conservation policy and practice has never had a
67 'truth phase' (Scenario 1) where policy was based purely on scientific evidence. Since
68 conservation is never just a technical, scientific issue, we gain little from reminiscing about a
69 mythical bygone age where conservation decision-making was based on scientific evidence
70 alone (see Sarewitz 2017 for a broader analysis).
71 Rather, there is more to be gained from accepting the reality that conservation policy has
72 always demanded a post-normal science (Scenario 2 – see Funtowicz and Ravetz 1993).
73 Since conservation decision-making is often highly uncertain, and the impacts of
74 interventions have significant consequences for communities, science has never been enough
75 to shape decisions (Francis and Goodman 2010). Instead, values, justice, pragmatics, and
76 stakeholder interests, need to be considered alongside knowledge of all forms (scientific, lay,
77 and indigenous) (Sterling *et al.* 2017). Thus, conservation decision-making has always

operated within a post-normal reality, and we should embrace this scenario to prevent us from moving towards a post-truth world where science is not at all influential.

Although one might consider recent political events to have shifted policy-making closer to a 'post-truth' phase[i] (Scenario 3), studies in policy analysis have shown that science has had profound impacts on decision-making over long timescales, even if it appears to be seldom influential (Owens 2015). To limit the chances of a 'post-truth' phase of decision-making from occurring, conservation scientists could find more effective ways of working in the 'post-normal' reality. In accepting the reality that scientific evidence has always rightly been considered alongside other factors, the quality of science communication may be improved. Firstly, we should accept that there is a need to engage decision-makers[ii] of all kinds in conservation, including policy-makers, practitioners, and local stakeholders who have the right to make decisions on matters affecting them. By deploying scientific evidence in a persuasive way alongside other factors, it may improve the chances of evidence-informed decision-making. This perspective encourages conservation scientists to take heed of existing advice about how to do this.

Figure 1 here

1. - *(MIS)REMEMBERING 'TRUTH (OR SCIENCE) CONSERVATION'*

When using the phrase 'post-truth conservation', the prefix 'post' suggests a shift away from the 'truth' phase of conservation decision-making. In order to justify the use of 'post', we must therefore be able to identify a period in which decisions were based on truth, or more accurately on science if we follow the dominant discourse described in the following section (i.e. that the science community equates science with truth). Without dismissing the value of scientific evidence in decision-making – indeed it has always been important for policy and will continue to be so (Owens 2016) – scholars have long dismissed the idea of a linear relationship (see Owens 2015). In conservation, several academic studies have similarly

103 argued that scientific evidence has only ever informed decisions alongside a range of other
104 factors (Adams and Sandbrook 2013; Young *et al.* 2014; Rose 2015; Evans *et al.* 2017; Rose
105 *et al.* 2017). In fact, a recent essay discussing the need for ecologists to argue more
106 convincingly states that 'arguments in the public sphere are not won, and never will be won,
107 by those with the best evidence' (Begon 2017: 395).
108 Of course, there are examples which show the importance of scientific evidence for policy
109 (e.g. Montreal Protocol, see Lawton 2007; or 'Lawton Review' for UK conservation, see
110 Rose *et al.* 2016). While we should therefore not expect too much from science - since
111 decision-making is complex and multi-faceted - nor should we expect too little (Owens
112 2016). Technical, scientific rigour remains important.

113 **2. QUESTIONING 'TRUTH' AND EMBRACING A 'POST-NORMAL' WORLD**

114 In critiques of the rise of post-truth politics (Tollefson *et al.* 2016), including its potential to
115 affect ecology and conservation (Begon 2017; Wordley 2017), the importance of scientific
116 evidence for robust decision-making has been stressed. Perhaps what some conservation
117 scientists (e.g. Begon 2017; Sutherland and Wordley 2017; Wordley 2017) mean by the
118 phrase 'post-truth conservation' is actually 'post-science conservation', a subtle, but
119 important distinction. Often, the truth is associated with scientific evidence (Sutherland and
120 Wordley 2017), and it is considered irrational to oppose it. As Begon (2017: 395) writes
121 'public opinion is being driven not by facts or rational argument (the truth)'. The notion of
122 equating truth with science has been criticised in many areas of scholarship, including STS
123 and political ecology. Collins and Evans (2009) encourage us to 'rethink' what expertise
124 means since many studies have illustrated the value of experiential, local, or indigenous
125 knowledge for environmental management (e.g. Robbins 2000). Funtowicz and Ravetz's
126 (1993) work on post-normal science helps to problematize the notion of associating truth with
127 science. Their paper argues that there are a number of 'high stakes, high uncertainty'

problems facing modern policy-makers; in other words, problems which have wide relevance and consequences for society, but for which scientific evidence is intrinsically uncertain. Such problems have been described as 'wicked' (Rittel and Webber 1973; Head 2008), referring to a complex issue for which no simple solution exists. In the environmental sphere, pressing problems are increasingly wicked as they become ever-more unpredictable, extreme, and potentially catastrophic on a global scale.

Nature conservation is a good example of a wicked problem (Boyd 2010; Francis and Goodman 2010; Game *et al.* 2014; Hughes *et al.* 2013; Maron *et al.* 2016). Loss of biodiversity is likely to have significant consequences for humans, yet the rate and implications of a decline are difficult to predict with certainty. The implementation of conservation strategies also clearly has consequences for affected stakeholders, for example local people whose lives are changed by the establishment of Protected Areas. In light of the 'high stakes, high uncertainty' associated with conservation, decision-making has thus always been influenced by a variety of factors (Francis and Goodman 2010). In such a scenario, ecological and conservation science needs to be defined more broadly in line with Funtowicz and Ravetz's (1993) suggestion that an 'extended peer community' should be consulted.

Firstly, if conservation scientists are unable to identify unequivocal truths about an issue, other forms of knowledge should be consulted (Montana 2017). Inspiration for a multi-disciplinary approach to knowledge production can be found in the work of Gibbons *et al.* (1994) on 'Mode 2 Science'. Knowledge generated in this mode is problem-driven and contextual, arising from pressing issues identified on the ground. It seeks the perspectives of researchers across different disciplines, and this brings a plurality of views into a project. This contrasts with 'Mode 1 Science' which refers to a more traditional style of knowledge production in which projects are initiated, and led, by an investigator within the confines of a particular discipline.

153 Several papers in conservation have illustrated the value of multi-disciplinary collaborations,
154 including with groups external to academia (Margles *et al.* 2010; Cheruvelil *et al.* 2014).
155 Keeler *et al.* (2017), for example, argue that the scientific community needs to put people at
156 the centre of environmental science by seeing the knowledge produced by other academic
157 disciplines (e.g. social science, arts, humanities), and local, community-based knowledges, as
158 relevant in decision-making (see also Colloff *et al.* 2017). Knowledge that has traditionally
159 been viewed as non-scientific can in fact be powerful and rich, grounded in practice away
160 from the disconnected, artificial laboratory (Rose *et al.* 2018). Furthermore, the
161 implementation of successful conservation strategies depends on working with stakeholders,
162 who are entitled to shape decisions that affect them (de Vente *et al.* 2016; Reed *et al.* 2017;
163 Amit and Jacobson 2018). There is thus a danger of equating truth with scientific evidence. In
164 defining truth narrowly, conservation scientists are missing other useful ways of knowing,
165 and further marginalising groups who have knowledge, but who are alienated by an elitist
166 view of knowledge production.

167 **3. STRATEGIES TO AVOID 'POST-TRUTH CONSERVATION'**

168 One way of avoiding a shift towards a 'post-truth' world (Scenario 3), where scientific
169 evidence has no influence, is to embrace more effective ways of working in the multi-faceted
170 decision-making reality illustrated in Scenario Two. As Lawton (2007: 465) argues ecologists
171 need to enter the messy world of politics 'with their eyes open'. In order to ensure that
172 scientific evidence is influential alongside a range of other factors, several strategies have
173 been proposed in the literature. Here, I focus on two important themes; firstly, methods of
174 engaging with decision-makers of all kinds, and secondly, how to argue persuasively for
175 nature conservation.

176 One of the most important strategies is to embrace collaborative working (Wyborn 2015;
177 Beier *et al.* 2017). As shown in Scenario 2, it is clear that scientific truth cannot solve

problems alone; thus, a broader definition of truth should emerge that encourages decision-makers to be valued and included in conservation projects. Working in inter- and trans-disciplinary ways, and collaborating with decision-makers of all kinds, will move conservation science beyond the siloed truths of academia (Jarvis *et al.* 2015; Colloff *et al.* 2017; Keeler *et al.* 2017), and towards a more inclusive scenario of knowledge production. Of course, this is challenging in an academic context where publishing is still worth more than tangible impacts (Tyler 2017), and where budgets may be limited (Sutherland *et al.* 2017), but it is not impossible.

Although conservation is context-specific (Waylen et al 2010), and thus the same strategies will not work everywhere, several common principles of good engagement with policy-makers and other stakeholders have been identified (see Beier *et al.* 2016; de Vente *et al.* 2016; Reed *et al.* 2017; Sterling *et al.* 2017). These include, for example, the need to include all stakeholders in a way that empowers communities (Reed *et al.*, 2009), rather than reinforcing existing power imbalances or inequalities (Chambers 1997; Cooke and Kothari 2001; Kleiber *et al.* 2014). Non-scientific participants should feel that their values and knowledge are being listened to by researchers, and the engagement process should be trusting, transparent, and reciprocal (de Vente *et al.* 2016; Reed *et al.* 2017; Lacey *et al.* 2018). Through sustained two-way dialogue from project conception through to implementation and beyond (Young *et al.* 2014), conservation decisions may be better informed, taking account of diverse worldviews, cultures, and interests. There may be less resistance to knowledge produced by researchers if a trusting relationship has been established. Knowledge brokers and boundary organisations tend to be influential figures in facilitating these two-way dialogues (Cvitanovic *et al.* 2015). Ultimately, studies have illustrated that outcomes have been more successful where researchers have genuinely

202 reached out to stakeholders (Fraser *et al.* 2006; Lazos-Chavero *et al.* 2016; Amit and
203 Jacobson 2018).

204 It is worth asking ourselves here, however, whether existing forms of participatory
205 engagement in conservation are truly collaborative, if we take 'collaborative' to mean
206 working together in the co-production of knowledge. Critiques of public participation
207 exercises have questioned the fact that consultation events are often conceived, initiated, and
208 led by researchers or high-level decision-makers (see Rayner 2003; Chilvers and Kearnes
209 2016; Chilvers *et al.* 2017). Often, members of the public, usually termed stakeholders, are
210 invited to attend events to offer an opinion about a proposed issue. Usually, the questions
211 have already been framed before public participation occurs and it appears that the
212 stakeholders are not in charge (Rayner 2003). In the context of gene editing (Burall 2018) and
213 energy projects (Chilvers *et al.* 2017), critical scholars have asked us to re-think or 're-make'
214 (Chivers and Kearnes 2016) public participation. Why do we not, for example, map existing
215 networks of participation that may be informal, and then seek to question what discussions
216 are being led by publics in those settings? Why do we not seek to engage in these existing
217 spaces to discover what publics are concerned about and how they frame issues? These
218 questions, as well as the central point that stakeholders should be involved at an upstream
219 stage of project development (Wilsdon and Willis 2004) so that questions can be jointly
220 framed, are relevant to post-normal conservation. Part of this process may make use of
221 cultural theory, which Thompson (2003) uses to underpin his notion of 'clumsy institutions' –
222 such institutions would not seek to pick one worldview from a range of choices, but rather
223 seek not to exclude any views from the policy-making process.

224 There are some positive signs from within the conservation science community, although I do
225 think there is some way to go in developing truly participatory approaches. Keeler *et al.*,
226 (2017), for example, call for a new kind of science which is more inclusive of stakeholders,

227 mirroring calls elsewhere for a more 'public' (Robertson and Hull 2001; Scott 2015) or
228 'translational' (Chapin III, 2017) ecology. If conservation scientists are inspired to answer
229 calls for a new kind of science which engages people, then Chambers' (1997) work should
230 always be remembered. Chambers (1997) is considered to be a leading proponent on the use
231 of participatory methods in development. In one of this famous works, 'Whose reality
232 counts?' (1997), he argues that development is an activity that should be done *by*, or at least
233 *with*, communities, rather than something that is done *to* people. Where possible, therefore,
234 conservation actions should contribute to social justice and development. Above all, we
235 should adopt a mind-set that conservation should be done *by* decision-making communities,
236 rather than *to* them. This seems to be the only way of working in a post-normal conservation
237 world, particularly if we want to build trust in, and support for, science (thus limiting the
238 chances of Scenario 3 from happening).

239 Secondly, we need to ensure that scientific knowledge is deployed persuasively into decision-
240 making venues, which will allow it to compete alongside other factors. Lubchenco (2017: 3)
241 argues that scientists need to respond to a messy policy-making process with 'boldness,
242 energy, and creativity' (see also Begon 2017). In some ways, conservation scientists are able
243 to impose their moral values onto their work more than researchers elsewhere (Baumgaertner
244 and Holthuijzen 2017); although STS scholars such as Callon (1993), Latour (1987), and
245 Jasanoff (2004) would question whether any scientific research can be conducted without
246 being influenced by the societal values and norms in which it is created. Perhaps more so
247 than other fields, however, conservation biology is a mission-driven discipline (Soulé 1985)
248 in which many researchers are driven by a goal to help species on the ground. Although
249 engaging in honest science advocacy may blur the lines between science and policy (Rose
250 2014), it is arguably necessary in a post-normal world to move beyond scientific
251 argumentation to engage with emotion and values (Begon 2017; D'Ancona, 2017). This does

252 not mean that evidence should be distorted, but rather scientists may play the role of
253 storyteller to help people engage with issues on a personal level (Baumgaertner and
254 Holthuijzen 2017).

255 Researchers have long made the case that it matters how we frame the environment (e.g.
256 Scheufele 1999; Lakoff 2010) and such work is often associated with the field of
257 environmental communication. Lakoff (2010) argues that fundamental material science of the
258 environment is not enough to change people's minds, citing the failure of the deficit model
259 promoted by Al Gore in the context of 'An Inconvenient Truth'. Rather, members of the
260 public require message framing to help them make sense of an issue (Scheufele 1999; Nisbett
261 and Newman 2015). Research has shown how environmental behaviour is affected by belief
262 systems and personal circumstances. Milfont *et al.* (2017), for example, found a positive
263 relationship between the level to which a person believe that humans should be dominant
264 over nature and anti-environmental behaviour. Furthermore, Baumgärtner *et al.* (2017) found
265 a link between income inequality and willingness to pay to protect the environment.

266 Lakoff (2010, 80) argues that 'truth must be framed effectively to be seen by all', and thus we
267 need to tell stories that rouse emotion and moral values, as well as being relevant to everyday
268 life. In order to gain support for conservation from an extended peer community, science
269 stories thus need to be convincing (Rose 2015). It should not be disengaged from the society
270 in which it is used (Nature Human Behaviour 2017).

271 As Schaller (2007: 46-47) argues, conservation needs to 'reach people through beauty, ethics,
272 spiritual, religious values, or whatever', the latter words showing that individuals will
273 respond differently to varying arguments (Mace 2014; Blicharska and Grandin 2015).
274 Although we are still learning about how to change the behaviour of people to care about the
275 environment, there are examples to follow. Feygina *et al.* (2009), for example, show how
276 framing concern for the environment as a patriotic behaviour increased support for climate

277 change from some groups in America. Other examples provided by Rose (2015) illustrate
278 how a flexible narrative toolkit can connect conservation to people on a personal, emotive
279 level (see also Sarkki *et al.*, 2013; Lawton and Rudd 2014). A growing movement in
280 conservation illustrates how positive, optimistic stories can garner support, instead of
281 presenting doom-laden scenarios (Balmford and Knowlton 2017; and see
282 https://conservationoptimism.com/). Overall, it is clear that we need a greater emphasis on
283 learning about the science of storytelling so that we may tell better science stories to
284 decision-makers of all kinds, including the public (Cairney and Kwiatkowski 2017; Jones and
285 Crow 2017).

286 **4. CONCLUDING REMARKS**

287 Conservation has always operated in a context where scientific evidence alone is not enough
288 to guide policy and practice. This perspective has shown that if we make time to pursue
289 strategies of working in the messy reality, instead of wishing we lived in a 'truth
290 conservation' world, then the chances of evidence-informed decision-making may be
291 improved; and in doing so, it will stop us from moving into a 'post-truth' scenario.

292 As part of a new social contract for conservation science (Lubchenco 1998), a first crucial
293 step is to embrace strategies suited to a 'post-normal' conservation context (scenario 2). By
294 recognising that values, worldviews, beliefs, and other factors are legitimate parts of modern
295 functioning democracies, conservation scientists are more likely to build constructive
296 partnerships. While such a view may be challenging to a 'mode 1' scientist, who favours a
297 traditional approach to knowledge production, it should not be as difficult for a conservation
298 biologist. The mission-driven nature of the discipline lends itself well to 'mode 2' science,
299 which requires scientists to reach out across disciplinary boundaries (and indeed beyond
300 academia) for help in solving problems. If we are to deploy science effectively into a messy
301 decision-making context, then collaborations need to be built outside of academia,

302 particularly with practitioner communities, and those stakeholders affected by conservation.
303 These collaborations should be truly participatory which may need us to re-make
304 participation. Gaining the support of these stakeholders is essential for the salience and
305 legitimacy of conservation science, and tailored, persuasive stories are needed to provide a
306 compelling call for action.

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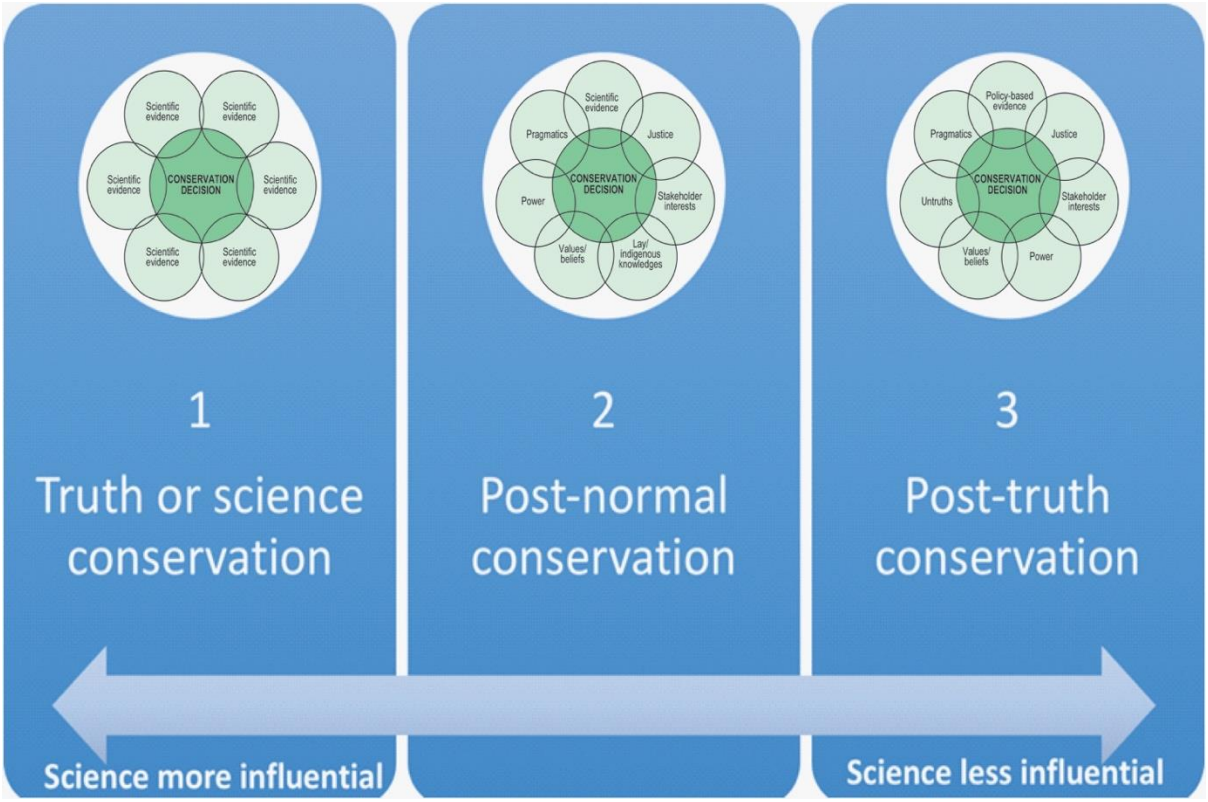

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509 Figure 1 – Three scenarios of conservation decision-making. (1) 'Truth or science conservation' where scientific
510 evidence is the only factor influencing decision-making in a technocratic scenario, (2) 'Post-normal
511 conservation' where scientific evidence influences decision-making alongside lay or indigenous knowledges,
512 and is also influenced by values/beliefs, power, stakeholder interests, justice, and pragmatics, (3) 'Post-truth
513 conservation' where decisions are based on values/beliefs, power, stakeholder interests, justice, beliefs,
514 pragmatics, untruths, and possibly policy-based, selective evidence (more selective than scenario 2, although
515 evidence may also be used selectively in scenario 2).

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517

[i] Although I would caution such a suggestion. If we look at the reaction of the intellectual community to recent election results in America, and related to Brexit in the UK, there has certainly been a rapid rise in articles and books on post-truth politics. Yet, there are also many examples of mistruths that have been told by politicians in previous elections, including in the UK. There were few people volunteering to write books on post-truth politics after similar lies were told in past election campaigns. One may question, therefore, whether the rise of a so-called 'post-truth' world, and a 'crisis of democracy', partially results from a rejection of political outcomes from intellectual communities.

[ii] From this point forwards, decision-makers will encompass policy-makers at all levels, conservation practitioners, and other stakeholders who are affected by conservation projects, and are thus entitled to take part in decision-making (see Reed *et al.*, 2009 on how to identify stakeholders).