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1 The role of trust in the resolution of conservation conflicts

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27

28 **Abstract**

29

30 Conflicts between biodiversity conservation and other human activities are intensifying as a result of
31 growing pressure on natural resources and concomitant demands by some for greater conservation.
32 Approaches to reducing conflicts are increasingly focusing on engaging stakeholders in processes that
33 are perceived as fair, i.e. independent and where stakeholders have influence, and which in turn can
34 generate trust between stakeholders. Hitherto, there has been limited empirical research supporting the
35 claim that conservation conflicts can be reduced by building trust through fair participation. Using
36 quantitative and qualitative empirical data from three case studies, we analysed whether fair
37 participation processes were directly related to conflict resolution and if this relationship was mediated
38 by trust. Our research provided empirical quantitative evidence that increased trust through fair
39 processes makes conflict resolution more likely. The qualitative analysis revealed caveats to this
40 finding, including the different understandings of the definition of conflict by stakeholders, the complex
41 nature of trust in conservation conflicts where most stakeholders have high levels of ecological
42 knowledge, and the atypical nature (i.e. presence of a local champion) of one of the case studies.
43 Building and maintaining trust with landowners and managers may be central to conserving
44 biodiversity. Such trust-building requires effort and resources, opportunities for appropriate dialogue
45 between stakeholders and a willingness to share power in terms of knowledge and policy
46 implementation, especially when local stakeholders are dependent on and knowledgeable about natural
47 resources.

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51 **Keywords:** Forestry; Local ecological knowledge; Moorlands; Natura 2000; Salmon; Stakeholder
52 involvement.

53

54

55 **Introduction**

56

57 Increased pressure placed on natural resources has resulted in a growing number of conservation
58 conflicts, or “*situations that occur when two or more parties with strongly held opinions clash over*
59 *conservation objectives and when one party is perceived to assert its interests at the expense of another*”
60 (Redpath et al., 2013: 100; see also Dickman, 2010; Henle et al., 2008; Niemela et al., 2005; Redpath
61 et al., 2015; Young et al., 2005, 2007, 2010). While such conflicts can have negative repercussions on
62 biodiversity and people, they can also be positive in terms of increasing democratic legitimacy and
63 public trust in politics and decision-making (Young et al., 2012). Here, we understand resolution of
64 conflicts not necessarily leading to a solution that all parties agree on, but instead creating a process
65 where people can share their opinions on conservation. Such a process may in turn lead to a better
66 understanding of different values, attitudes and goals, and the potential to seek shared solutions to
67 conflicts.

68

69 Building on the above definition of conflict resolution, having more people involved in conservation
70 issues, or more ‘public participation’, has been suggested as one way to resolve conflicts (Young et al.,
71 2013a). However, much of the existing work on public participation has focussed on the fairness of
72 participation processes (Chess and Purcell, 1999; Beierle and Konisky, 2001), rather than how effective
73 public participation is at producing outcomes like conflict resolution. There has, to date, been limited
74 empirical evidence to back the claim that conservation conflicts can be resolved through more or
75 effective public participation.

76

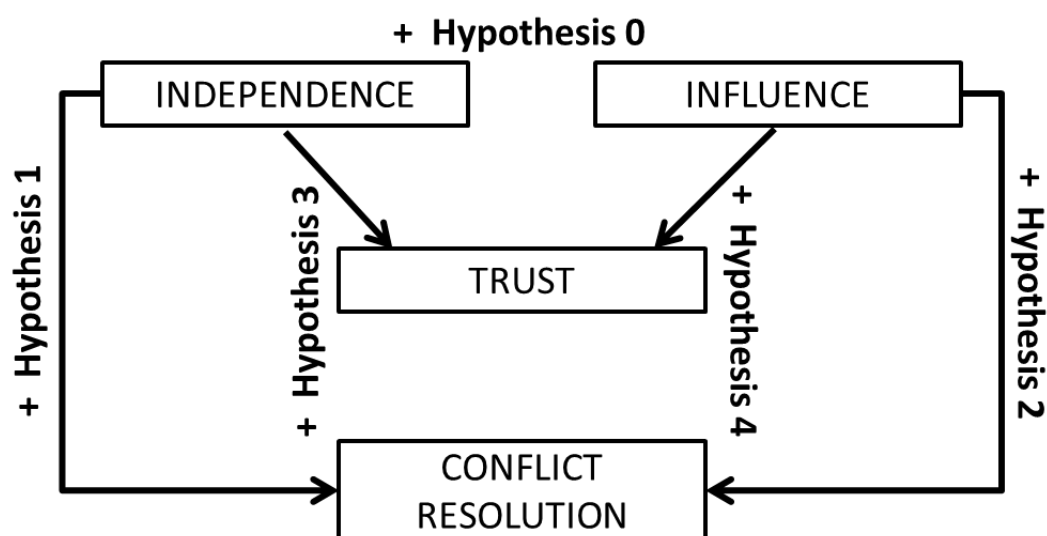
77 Fairness in public participation means that all those affected by certain decisions are represented and,
78 importantly, that procedures enable them to have an input into the format and content of discussions. In
79 situations where values or interests conflict, for example over conservation objectives, two aspects of
80 fairness have been highlighted as being important: ‘independence’ and ‘influence’ (Webler, 1995;
81 Rowe and Frewer, 2000; Young et al., 20013a, 2013b). In the context of conservation conflicts, we
82 define an ‘independent’ participatory process as one which is unbiased, i.e. where certain participants

83 are not imposing their interests at the expense of others. We define ‘influence’ as a process that allows
84 those involved to have an input that has a genuine impact on the process and outcomes of participation,
85 one potential outcome being conflict resolution. The interrelation between independence and influence
86 is poorly studied, although one hypothesis (see conceptual framework: Figure 1, hypothesis 0) is that
87 the more independent a process, the more influence stakeholders have. As mentioned earlier, there is
88 limited empirical evidence to back the claim that fair participatory processes (i.e. processes that are
89 independent and where those involved have influence) are more likely to lead to the resolution of
90 conservation conflicts (see conceptual framework: Figure 1, hypotheses 1 & 2).

91

92 **Figure 1.** Conceptual model illustrating how conflict resolution is affected directly and indirectly, via
93 trust, by the independence and influence of participatory processes

94



95

96 Closely linked to fairness is the notion of trust, both in institutions (institutional trust) and the
97 individuals (inter-personal trust) involved in a participation process (Davenport et al., 2007). The
98 common assumption is that trust among and between actors can become an outcome of participation,
99 which in turn, helps alleviate conflict (see Figure 1, hypotheses 3 & 4). Conversely, unfair processes
100 can lead to distrust (Rousseau et al., 1998). Trust is therefore a key feature of the participation and
101 conflict literatures, but also other fields such as social psychology, risk, peace studies and political
102 science.

103

104 Trust is an abstract and context-dependent concept, but is a fundamental aspect of social relationships
105 (Möllering, 2006) whereby people “*accept vulnerability based upon positive expectations of the*
106 *intentions or behaviours of others*” (Rousseau et al. 1998: 395). Trust develops through repeated
107 interactions between parties, and may be an important driver of collaboration (Stern & Coleman, 2015)
108 and may reduce harmful conflict by building relationships through sharing of knowledge and values
109 (Cvetkovitch and Winter, 2003). This has led authors to identify lack of trust, for example with
110 conservation agencies (McCool, 2000) as “*often the most fundamental barrier to the negotiation and*
111 *construction of natural resource management plans*” (Lachapelle & McCool, 2012: 322) potentially
112 leading to non-compliance and opposition to conservation initiatives (Stern, 2008; Heemskerk *et al.*,
113 2015). Building or maintaining trust therefore appears central to biodiversity management (Davenport
114 et al., 2007), and has been highlighted in a range of literatures relevant to conservation, linked to
115 invasive species management (Estevez et al. 2015), the success of restoration projects (Metcalf et al.,
116 2015), pro-environment behaviours (Wynveen & Sutton, 2015), building social capital (Hunt et al.
117 2015) and conservation psychology (Clayton and Myers 2015). The notion of trust, however, still
118 remains unclear with the lack of evidence on the role of institutional and inter-personal trust in
119 conservation cited as a knowledge gap (Davenport et al., 2007), with subsequent effects on conflict
120 resolution.

121

122 Although much has been written about participation, fairness and trust, and the potential links with
123 conflict management, no empirical study has yet explored the extent to which fair participation
124 processes are directly related to conflict resolution and the extent to which this relationship is mediated
125 by trust (see Figure 1). This study addresses these important knowledge gaps, providing empirical
126 evidence for the role of trust in conservation conflict resolution, and outlines the implications of these
127 findings for future biodiversity conservation efforts.

128

129 **Research design and methods**

130

131 Three case studies were selected for this study and are described more extensively in Young et al.,
132 (2013a,b) and Scottish Natural Heritage (2004; 2007). Whilst all three case studies were based in
133 Scotland, they encompass a breadth of habitats (coastal, riverine, forest, farmland, moorland), a range
134 of stakeholders (NGOs, private and public land owners and managers, scientists) and objectives
135 (conservation, forestry, hunting, fishing) that are common in conservation conflicts globally. The main
136 criteria for case study selection were the existence of a conservation conflict, and the existence of a
137 *management plan* that required, at some stage of its development and/or implementation, the active
138 participation of a range of local stakeholders. The management plan was linked to the European
139 ‘Habitats Directive’ (92/43/EEC, the Directive on the conservation of natural and semi-natural habitats
140 and of wild flora and fauna), which aims to “*enable the natural habitat types and species’ habitats*
141 *concerned to be maintained or, where appropriate, restored at a favourable conservation status in their*
142 *natural range*” (Habitats Directive, Article 3(1)). In order to achieve this aim, a network (the Natura
143 2000 network) is made up of Special Protection Areas (SPAs) set up under the auspices of the Directive
144 on the Conservation of Wild Birds (79/419/EEC, colloquially known as the ‘Birds Directive’), and
145 Special Areas of Conservation (SACs) to comply with requirements under the ‘Habitats Directive’
146 (Evans, 2012). Article 6 of the Habitats Directive states that Member States are required to “establish
147 the necessary conservation measures”, for example management plans, statutory, administrative or
148 contractual measures (Article 6 (1)) with the early involvement in a bottom-up approach of local
149 stakeholders that live or depend on those areas (European Commission, 2000: Annex II).

150

151 In the Bladnoch case study, the “River Bladnoch SAC Atlantic Salmon Catchment Management Plan”
152 was commissioned by Scottish Natural Heritage (SNH) in 2004 and produced by the Galloway Fishery
153 Trust in 2007. Its objectives were to identify potential or actual negative impacts on the SAC; to assess
154 existing management; and to identify and prioritise further measures required (Scottish Natural
155 Heritage, 2007). A conservation conflict existed between stakeholders with fishery and forestry
156 interests. Fishery stakeholders, mainly fishermen and businesses promoting fishing, perceived that

157 forestry practices were contributing to the continued acidification of the river Bladnoch, which in turn
158 was leading to a decline in salmon returning to and spawning in the river (Young, 2010).

159

160 In the Moray Firth case study, the “Moray Firth Seal Management Plan”, covering seven Special Areas
161 of Conservation for bottlenose dolphin (*Tursiops truncatus*), common or harbour seal (*Phoca vitulina*)
162 and Atlantic salmon (*Salmo salar*), was developed in 2005 to address the conflict between seal
163 conservation and salmon fisheries. This conflict centred on the uncertainty over the extent that seals
164 were responsible for the decline of salmon and salmon fisheries. Seal conservationists perceived that
165 seals had little impact on salmon fisheries, whilst fishermen and netsmen were concerned that seals
166 were contributing significantly to the decline of salmon (Young et al., 2012).

167

168 In the Forth and Borders moorlands case study, the “Forth and Borders Moorlands Management
169 Scheme”, centred on 12 protected areas, aimed to “*maintain and improve the habitats and species*”
170 (Scottish Natural Heritage, 2004: 2) associated with these protected areas. The most contentious conflict
171 was between stakeholders with interests in raptor conservation and those with interests in grouse
172 management (Thirgood et al., 2000). Many moorlands in England and Scotland are managed for red
173 grouse (*Lagopus l. scoticus*) which are a prey species of raptors such as hen harrier (*Circus cyaneus*),
174 peregrine falcon (*Falco peregrinus*) and golden eagle (*Aquila chrysaetos*). Stakeholders with an interest
175 in grouse management fear reduced income and job losses if the raptor populations are uncontrolled,
176 whereas stakeholders with interests in raptor conservation strive to protect raptors.

177

178 Qualitative and quantitative data were gathered in this study to test the following hypotheses (see also
179 introduction and Figure 1):

- 180 - H0: The perceived independence of a process of developing a management plan has an effect
181 on the influence stakeholders have on a management plan.
- 182 - H1: Conflict resolution is affected directly by the perceived independence of a process of
183 developing a management plan.

- 184 - H2: Conflict resolution is affected directly by the perceived influence stakeholders have on a
 185 management plan process.
- 186 - H3: The perceived independence of a process of developing a management plan influences
 187 perceptions of conflict resolution indirectly through perceived increased trust between
 188 stakeholders.
- 189 - H4: The perceived influence stakeholders have on a management plan affects perceptions of
 190 conflict resolution indirectly through perceived increased trust between stakeholders.

191

192 In terms of the qualitative data collection, a total of 59 in-depth semi-structured interviews were carried
 193 out (January to July 2009) with stakeholders involved in the development and/or implementation of the
 194 three management plans (see Table 1).

195

196 **Table 1.** Distribution of interviewees according to background (GA=Government Advisers; SA=
 197 scientific advisers; BU=Biodiversity users) and case study (B=Bladnoch; M= Moray Firth; F=Forth and
 198 Borders).

Interviewee background	Bladnoch	Moray Firth	Forth and Borders Moorlands
Representatives of the Scottish Government or government departments	BGA1- BGA5	MGA1-MGA4	FGA1-FGA6
Scientific advisers	BSA1-BSA2	MSA1-MSA6	FSA1-FSA4
Biodiversity users	BBU1- BBU12	MBU1-MBU10	FBU1-FBU10

199

200 All interviews, excepting three, were face-to-face. Evidence gathered from documentary data enabled
 201 the selection of initial interviewees, who then identified further contacts within the stakeholder network
 202 associated with each of these sites through a process of ‘snowball’ or chain referral sampling (Lewis-
 203 Beck et al., 2004). To reduce any potential bias in the selection of interviewees by interviewees, the
 204 snowballing sample was checked against the groups and individuals that were known to have taken part
 205 in the development of the management plan. No groups or individuals were found to be missing.

206

207 All stakeholders interviewed had detailed knowledge at the local scale of the process of developing the
208 management plan, and of the conflicts in each case study. The stakeholders interviewed were divided
209 into three social groups. The first group comprised local government and government department
210 representatives responsible for implementing or regulating biodiversity policy (referred to as GA in
211 later quotes). These stakeholders had knowledge of the process of developing and implementing the
212 management plans, and the socio-economic contexts of the case studies. The second group comprised
213 scientific and technical advisers external to governmental bodies (e.g. university, independent research
214 organisations) (SA). This group had knowledge of the process of developing and implementing the
215 management plans, and the ecological contexts of the case studies. The third group comprised
216 biodiversity users, i.e. local stakeholders such as farmers, fishermen, fishery managers, foresters and
217 local businesses owners who were affected by or involved directly in the management of the target
218 species/habitats in the protected areas (BU).

219

220 Semi-structured interviews sought to document interviewees' experiences of developing the
221 management plan and their perceptions of outcomes. Interviewees were asked to discuss and then score,
222 on a scale from one to five (where 1 was the lowest score and 5 the highest), different criteria (see Table
223 2) relating to the process of developing the management plan and the resulting social outcomes. The
224 qualitative data analysis required all interviews to be transcribed verbatim and coded using NVivo
225 qualitative data analysis software (QSR International 2010). The coding used generic theory-based
226 criteria (Rowe and Frewer, 2000) and social and environmental outcome criteria (Beierle and Konisky,
227 2001) derived from the public participation literature (Table 2), focussing on general perceptions of the
228 conflict by the stakeholders involved, and their perceptions of independence, influence, trust and
229 conflict resolution.

230

231 **Table 2.** Theoretical framework for the evaluation of conflict resolution based on theory-based and
232 social outcome criteria

233

Evaluation focus**Criteria measured***Procedural evaluation*

Independence

Was the participation process carried out in an independent, unbiased way?

Influence

Did participant input have a genuine impact on the management plan?

Social outcome evaluation

Increased trust

Was trust increased between stakeholders?

Conflict resolution

Was conflict resolved among stakeholders?

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$$\text{conflict resolution}_i = a + b_1 * \text{trust}_i + b_2 * \text{independence}_i + b_3 * \text{influence}_i$$

255

$$\text{trust}_i = c + d_1 * \text{independence}_i + d_2 * \text{influence}_i$$

The quantitative links between these process and social outcome criteria were analysed using path analysis (Shipley 2002), which allowed for both direct and indirect effects of independence and influence on conflict resolution. The path analysis tested five hypotheses (see also Figure 1).

In total, a sample size of 49 sets of responses from local actors were analysed in the path analysis (we did not use all 59 responses due to missing responses for some of the criteria from some actors). These responses were the recorded scores, on an ordinal scale from one to five (where 1 was the lowest score and 5 the highest), for each of the criteria relating to the process of developing the management plan and the resulting social outcomes (Table 2). We quantified the strength of different pathways in the path model by calculating the product of standardised regression coefficients along each pathway of interest. Regression coefficients were assumed to be the same for all three case studies as responses from actors were pooled across case studies in the path analysis. Estimates for indirect pathways are presented with associated 95% confidence intervals generated by simulating from a normal distribution with a mean and standard error estimated from the path analysis. The path analysis was implemented using the lavaan package (Rosseel 2012) in R (R Core Team, 2014), where all variables in the model were treated as ordinal, modelled to have a latent normal distribution with unknown thresholds at the boundaries of each ordinal class. The path analysis was structured as a series of linear regressions, where each linear regression defined the relationship between different levels of the model for $i=1$ to 49 respondents:

256 $\text{influence}_i = e + f^* \text{independence}_i$

257

258 Using this approach (lavaan package in R) we were unable to include a structural random effect for the
259 influence of social group and case study that was previously identified as important (Young et al.,
260 2013a). It is possible to include this structural variable within the Bayesian framework, therefore we
261 also fitted the path analysis using the Bayesian framework to assess the influence of including a random
262 effect for social group and case study on model inference (Supplementary Material), albeit with the
263 response considered as continuous rather than ordinal. These analyses demonstrated that model
264 inference was best conducted with variables modelled as ordinal data, and that the influence of the
265 structural random effect was minimal (Supplementary Material), supporting a decision to work within
266 the limitations of the R package used. Therefore, all results presented here derive from the analysis of
267 ordinal variables using the lavaan package.

268

269 **Results**

270

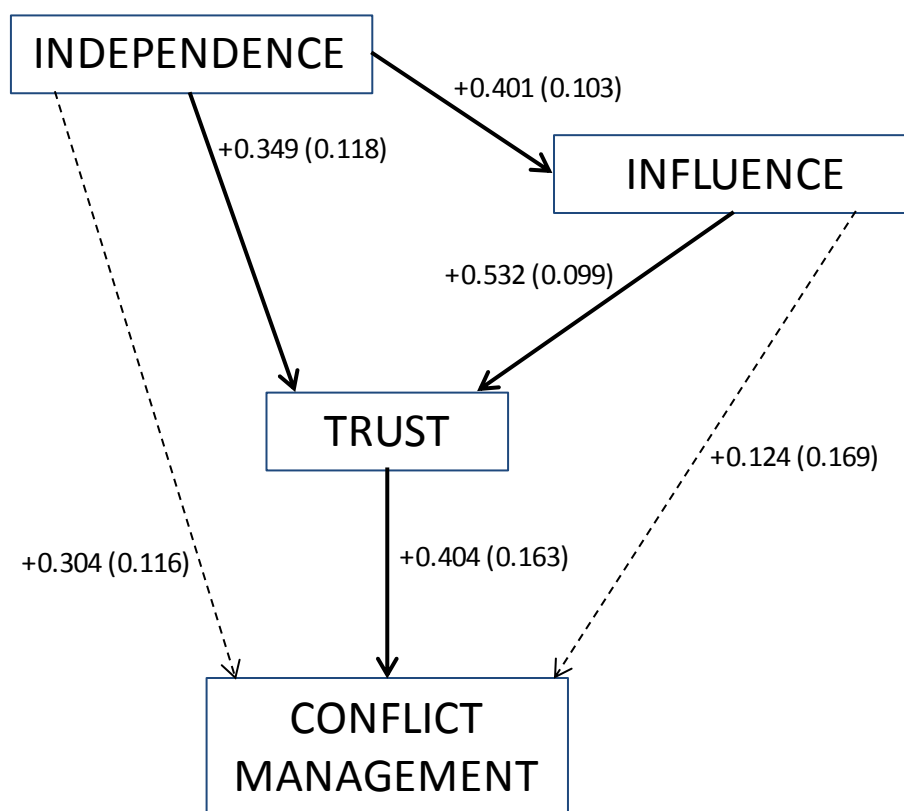
271 *The perceived independence of a process of developing a management plan has an effect on the*
272 *influence stakeholders have on a management plan (H0).*

273

274 The quantitative analysis showed a strong positive direct effect of independence on influence
275 (standardised estimate: 0.401, standard error: 0.103, Z: 2.496, P: 0.013; Fig. 2).

276

277 **Figure 2.** Path analysis diagram for how conflict resolution is affected directly and indirectly by process
 278 variables (independence and influence) and social outcomes (trust) across the three case studies. All
 279 lines in the diagram represent a specific linear model. Thick solid lines represent strong evidence for an
 280 effect (P value < 0.05), dotted lines represent no clear effect. Standardised regression coefficient
 281 estimates are given with standard errors in parentheses. ‘+’ predicted positive relationship, ‘-’ predicted
 282 negative relationship. The width of the arrows is proportional to the estimate of effect size for all
 283 significant relationships.



298 The qualitative analysis demonstrated that two of the case studies, the Bladnoch and Forth and Borders,
 299 were perceived by interviewees as top-down or imposed, driven mainly by the country agency (in this
 300 case the Scottish Natural Heritage, SNH), who were seen by biodiversity users in the Bladnoch as
 301 “pushing [...] a lot really about what should go in and what shouldn’t go in” [BBU4]. Only in the Moray
 302 Firth case study did stakeholders refer to a bottom-up process, perceived as more independent. Results
 303 from the qualitative analysis highlighted that the influence stakeholders perceived they had on the

304 process of developing, and the content of, the management plan was linked to the perceived
 305 independence of the plan. As such, in the case of the Bladnoch and Forth and Borders plan, interviewees,
 306 especially biodiversity users who felt the plans were top-down, felt their influence was minimal. This
 307 led one fisherman in the Bladnoch to compare the situation to one whereby stakeholders doubted
 308 whether their input could actually make any difference: “*these power-that-be have their own opinion*
 309 *and they’re not really interested in other peoples’ opinions on how it should be run*” [BBU7].

310
 311 In the Moray Firth, the process was perceived as more independent, in part because the person leading
 312 the management plan worked for a District Salmon Fishery Board and was known by local stakeholders
 313 including fishermen, who were often resistant to seal conservation. Although one scientist voiced the
 314 concern that there was “*so little room for manoeuvring here [...] there’s very little influence they could*
 315 *have*” [MSA1], interviewees that were involved in the process felt that within these narrow confines
 316 they were broadly able to have an influence on the plan, voicing their views and concerns, resulting in
 317 greater sense of “*being in control and [...] in the lead*” [MGA2].

318
 319 *Conflict resolution is affected directly by the perceived independence of a process of developing a*
 320 *management plan (H1)*

321
 322 The quantitative analysis showed a weak positive direct effect of independence on conflict resolution
 323 (standardised estimate: 0.304, standard error: 0.116, Z: 1.844, P: 0.065; Fig. 2, Table 3).

324
 325 **Table 3.** Estimates of the strength of direct and indirect pathways by which independence affects
 326 conflict resolution in the three case studies. Indirect estimates are the product of the standardised path
 327 coefficients along each pathway of interest with associated 95% confidence intervals.

Impact of independence	Standardised estimate	95% Confidence Interval	Standard error	Z score	P value
Direct	0.304	-0.0172, 0.630	0.165	1.844	0.065
Indirect via Trust	0.141	0.000897, 0.355	-	-	-

Indirect via Influence and Trust 0.0862 0.00660, 0.214 - - -

328

329 The qualitative analysis highlighted a more nuanced link between independence and conflict resolution.

330 Whilst the Moray Firth was considered more independent than the Bladnoch and Forth and Borders

331 (see section 4.1), and most interviewees evaluated conflict resolution highly in the Moray Firth, this did

332 not mean that all stakeholders perceived the conflict as resolved.

333

334 This finding was due to different understandings of the definition of conflict by stakeholders in all case

335 studies. In the Bladnoch, government advisers referred only to “*challenges*” [BGA3] and “*tensions in*

336 *terms of pace of change, those sorts of things*” [BGA5], whilst biodiversity users identified a conflict

337 between “*the fishery boys [...] trying to improve the river and the forestry just want to get on with the*

338 *forestry*” [BBU3]. In the Forth and Borders, a government adviser outlined the difficulties in

339 determining “*what the conflicts are - it also depends on what’s perceived as conflicts*” [FBGA1]. In the

340 Moray Firth, the government advisers referred to inter-personal conflicts, i.e. “*a conflict between*

341 *salmon fisheries, both the rod angler and the netsmen and seal conservation interests*” [MGA2]. The

342 scientific advisers saw the conflict around misperceptions about seals, with one scientist explaining that

343 “*the conflicts with the DSFB and the problems with seals that were in the estuaries have been resolved*

344 *- they don’t shoot seals in the estuaries anymore. Huge conflict resolved. That’s gone, that’s massive*”

345 [MSA6]. The netsmen, and fishermen to a lesser degree, perceived conflict as being intrinsically linked

346 to the issue of declining salmon stocks, and were, accordingly, disappointed with the process, which

347 although a step in the right direction in terms of bringing stakeholders “*together finding common*

348 *ground, agreeing common ground [... had not...] made a dent on what needs to be done*” [MBU9] in

349 terms of controlling seal populations. Finally, for those stakeholders outside the process, namely animal

350 welfare representatives, the conflict related to the numbers of seals shot. From their perspective, conflict

351 resolution in the management plan was “*an improvement on the current situation but only because*

352 *you’re starting from a completely unacceptable situation*” [MBU4].

353

354

355 *Conflict resolution is affected directly by the perceived influence stakeholders have on a management*
 356 *plan process (H2)*

357

358 The quantitative analysis provided no evidence for a direct effect of influence on conflict resolution
 359 (standardised estimate: 0.124, standard error: 0.169, Z: 0.804, P: 0.421; Fig. 2, Table 4).

360

361 **Table 4.** Estimates of the strength of direct and indirect pathways by which influence affects conflict
 362 resolution in the three case studies. Indirect estimates are the product of the standardised path
 363 coefficients along each pathway of interest with associated 95% confidence intervals.

Impact of influence	Standardised estimate	95% Confidence Interval	Standard error	Z score	P value
Direct	0.124	-0.177, 0.424	0.154	0.804	0.421
Indirect via Trust	0.215	0.0411, 0.417	-	-	-

364

365 The qualitative analysis provided some evidence of a link between influence and conflict resolution,
 366 but this was closely linked to the perceived independence of the process (see section 4.1) and the degree
 367 to which stakeholders felt their knowledge had fed into the process.

368

369 In the Bladnoch and Forth and Borders plan, interviewees, especially biodiversity users who felt the
 370 plans were not independent, felt their influence on conflict resolution was minimal. The perception of
 371 biodiversity users in the Forth and Borders was that they had valuable knowledge to feed into the
 372 process that could help resolve the conflict between raptor conservation and grouse management, but
 373 that their knowledge was being ignored. One gamekeeper commented on the fact that while it was
 374 important that “*the guys on the ground are actually listened to [...] I think keepers per se in Scotland*
 375 *feel that they’re not*” [FBBU4]. In the Moray Firth, however, the industry-led approach allowed local
 376 knowledge to be collected and integrated into the process of conflict resolution. As one scientist put it,
 377 “*One of the really exciting things that James [Dr Butler] managed to do was to get all the DSFBs to say*
 378 *how many seals they’d been shooting over the year, and normally nobody will say anything about that,*
 379 *they won’t tell*” [MSA6]. A situation was reached in which “*it was the salmon guys working directly*

380 *with the scientists and actually getting some robust data back*” [MBU1], thereby augmenting scientific
381 knowledge and strengthening the acceptance of the data by the fishermen and netmen, who could “*see*
382 *that the figures that are coming out are not just from conservationists who want to stop everyone taking*
383 *salmon*” [MBU1]. In turn, this dispelled certain beliefs, so that “*preconceived ideas of what was*
384 *happening have changed enormously*” [MSA6], and helped to clarify certain issues. For example one
385 fisherman acknowledged that “*one of the bits of research which I accept as probably being correct is*
386 *that certain seals predate salmon and others don't*” [MBU2]. The gathering and acceptance of scientific
387 and local knowledge was instrumental according to some interviewees in enabling conflict management
388 to focus on those seals causing the most damage. Whether this was sufficient in terms of conflict
389 resolution was still up for debate for other interviewees (see also section 4.2).

390

391 *The perceived independence of a process of developing a management plan influences perceptions of*
392 *conflict resolution indirectly through perceived increased trust between stakeholders (H3)*

393

394 The quantitative analysis showed a strong positive link between perceived independence and trust
395 standardised estimate: 0.349, standard error: 0.118, Z: 2.111, P: 0.035; Fig. 2, Table 3) and a strong
396 positive effect of trust on conflict management (standardised estimate: 0.404, standard error: 0.163, Z:
397 2.445, P: 0.015; Fig. 2, Table 3). There was consequently a strong positive indirect effect of
398 independence on conflict resolution via trust (standardised estimate 0.141, 95% confidence interval: -
399 0.000897 – 0.355, Table 3).

400

401 The quantitative analysis results were reflected in the qualitative analysis, where perceived
402 independence of processes impacted on trust between stakeholders, leading to a more likely positive
403 perception of conflict resolution. In the Bladnoch, the process of developing the plan had been helpful
404 in enabling stakeholders to understand different perspectives better. However, due to a perceived top-
405 down drive of the plan, for some interviewees, this increased awareness of the workings of government
406 departments emphasised their failings: “*it just makes your heart sink a bit when you get this sort of stuff*
407 *because you know the people whose job it is to sit in an office and produce all this and it's a very*

408 *different world from [...] people who are actually out in the real world actually doing things [BBU1]”.*
409 As such, some biodiversity users felt they trusted government departments less than at the beginning of
410 the process, despite or even because of increased knowledge of their workings. In the Moray Firth, the
411 fact that the person leading the process of developing the plan was perceived as independent, the way
412 in which he managed the process of including all stakeholders in the development of the plan, and the
413 focus explicitly on addressing conflict all contributed to increased trust between stakeholders and a
414 perceived improvement on the resolution of conflict. In the Forth and Borders, increasing trust between
415 land owners, managers and the country agency was seen to be dependent on who was implementing the
416 plans, resulting in a consultant commenting that “*some area officer just don’t know their farmers, they*
417 *don’t have the time and the history with them to [...] build a relationship with them*” [FBSA1]. So while
418 individual management plans, which sought to increase contact between SNH and land owners and
419 managers, resulted in a situation in which conflicts were addressed, compromises were reached and
420 trust was increased between individuals, this was highly dependent on who the area officers were,
421 stability in their post and the time they invested in getting to know land owners and managers. The
422 overall scheme, however, was perceived as having been largely unsuccessful in increasing trust between
423 the key stakeholders involved, and in turn addressing the more contentious conflict of raptor
424 conservation and grouse management.

425

426 *The perceived influence stakeholders have on a management plan affects perceptions of conflict*
427 *resolution indirectly through perceived increased trust between stakeholders (H4)*

428

429 The quantitative analysis showed a strong positive link between influence and trust (standardised
430 estimate 0.532, error: 0.099, Z: 5.964, P: <0.001; Fig. 2, Table 4). It follows, as in Section 3.3, that there
431 was a strong positive indirect relationship between influence and conflict resolution via trust
432 (standardised estimate 0.215, 95% confidence interval: 0.0411 – 0.417; Table 4).

433

434 In the Bladnoch and Forth and Borders case studies, scientific advisers, local land owners and managers
435 perceived a close-knit relationship between the government departments. This perceived relationship

436 led other stakeholders to view the process as a reflection of compliance rather than change, i.e. a process
437 where influence and trust were seen as low. In the Moray Firth, government and scientific advisers, and
438 biodiversity users trusted the person leading the process. Based on this trust, they felt they could have
439 an influence on the plan and its outcomes, including conflict resolution. The process of integrating more
440 science, exchanging information and organising training courses for the marksmen, had a number of
441 positive results, particularly in terms of increasing trust between certain stakeholders, such as the
442 fishermen and scientific advisers. One fisherman highlighted the fact that while sceptical initially, he
443 now had “*a good working relationship with [the scientists] and [...] [not] a bad thing to say about them*”
444 [MBU6]. Trust was also seen to have increased from the point of view of the Scottish Government and
445 government department representatives who perceived that this trust came from “*getting to know where*
446 *they’re coming from, that they’re not all mad axe-men and vice-versa, knowing that we’re not green-*
447 *wellied mad men*” [MGA2]. The effects of this increased trust between stakeholders were reflected in a
448 change in attitudes, so that “*it wasn’t a case now that they were going out and saying “there’s a seal,*
449 *let me shoot it”, they were going out and saying “there’s a seal in the river but is it actually causing a*
450 *problem?”* [MGA3]. This change in attitudes was also highlighted by an animal welfare group
451 representative, who commented on how “*some of the bailiffs I found had learned from it and were*
452 *educating others so there was definitely improvement there*” [MBU5]. However a number of
453 interviewees from the fishery boards and many netsmen were more cautious in their views on trust. To
454 explain this, one netsman referred to the fact that they could not be completely open during the process
455 because “*there could be SNH folk there that would take offence because it’s not everybody’s thing at*
456 *all [shooting seals]”* [MBU3]. Others placed a strong emphasis on the fact that the plan worked only if
457 all fishermen respected the arrangement, relying on the fact that no-one wanted to be responsible for
458 letting it fall through. Although some interpreted this as trust between all stakeholders, others perceived
459 it more as a threat from Government. One fisherman concluded by saying that although the process “*did*
460 *increase the trust [...] it depends on if you say “did you trust them?” - you didn’t fully trust them*”
461 [MBU10].

462

463

464 **Discussion**

465

466 Our research provides empirical quantitative evidence that increased trust through fair participatory
467 processes makes conflict resolution more likely. In addition to this quantitative evidence, the qualitative
468 analysis revealed three subtle, yet important, nuances.

469

470 The first was the differences in terms of interviewee understanding of what the conflict was about and
471 in turn what he/she understood as conflict resolution. In all three case studies, the different groups had
472 a different views of what the conflict was about, or indeed whether there was a conservation conflict at
473 all. In some cases there was a reluctance on the part of scientific adviser and government actors to
474 acknowledge perceptions of conflict by local actors, preferring instead to see them as challenges or
475 tensions. Current literature on conflict management emphasises the need to understand conflict as
476 perceived by different groups (Redpath et al., 2013; Redpath et al., 2015a,b). According to our
477 qualitative analysis, this principle may not have filtered down yet to those country agencies responsible
478 for managing conflicts, in part due to a reluctance to acknowledge conflicts, but also perhaps due to
479 lack of trust towards local stakeholders. The lack of acknowledgement of conflict led to increased
480 frustration from other stakeholders. Whilst the different understandings of the conflict and its resolution
481 may have affected institutional trust, it did not appear to affect interpersonal trust. In the Bladnoch and
482 the Moray Firth case studies, levels of trust towards specific individuals was still very high. Such scale
483 mismatches between institutional and interpersonal trust are not uncommon (Stern & Coleman, 2015).

484

485 The second was the complex nature of trust in conservation conflicts where stakeholders have high
486 levels of ecological knowledge. Based on the qualitative data, institutional distrust highlighted in all
487 case studies may not have only been due to lack of shared values as a basis for trust, as suggested by
488 Cvetkovitch and Winter (2003), or to procedural fairness (Lind and Tyler, 1988) but more importantly
489 linked to high levels of knowledge held by biodiversity users dependent on natural resources. There is
490 widespread recognition of the importance of integrating different types of knowledge in the
491 management of natural resources, as established in international policy (Article 8(j) of the UN

492 Convention on Biological Diversity; the Aarhus Conventions and associated EU Directive on public
493 participation), and the academic literature (e.g. Carmen et al., 2015, Charnley et al., 2007; Failing et al.,
494 2007; Raymond et al., 2010; Taylor et al., 2012; Turnbull, 1997). Much work has been developed on
495 the need to integrate local ecological knowledge, defined as “*the body of knowledge held by a specific*
496 *group of people about their local ecosystems*” (Scholz et al., 2004: 336), through more inclusive and
497 fair approaches so that decisions are socially better and politically accepted (Harrison and Burgess,
498 2000; McCool et al., 2000), and may contribute to conflict resolution (Close & Hall, 2006; Young et
499 al., 2010).

500

501 Despite the widespread acceptance of multi-stakeholder knowledge bases, concerns are frequently
502 expressed by scientists and government organisations regarding the integration of such local knowledge
503 in the management of natural resources (Wynne, 1992; Innes and Booher, 2010). This is often linked
504 to perceptions that local knowledge is somehow lacking in scientific rigour or merit (Close & Hall,
505 2006; Failing et al., 2007), or broader issues of power-sharing between state and non-state actors (Taylor
506 et al., 2012). Whilst in all case studies biodiversity users felt they had high levels of ecological
507 knowledge to integrate in the management plans, only in the Moray Firth (perceived as a fair process),
508 was there an aim to integrate such knowledge, values and interests. This meant that many stakeholders
509 felt their knowledge was acknowledged, and thus more readily accepted the information emerging from
510 the process.

511

512 The results of this study suggest that integrating local ecological knowledge was highly dependent on
513 fair processes aiming to build trust. Such trust did not appear to emerge simply through increased
514 interactions (interpersonal trust) but from a genuine willingness to share power, in terms of knowledge
515 and decision implementation, especially in situations where local stakeholders are dependent on and
516 knowledgeable about natural resources (Davenport et al., 2007; Butler et al., 2015). This finding
517 highlights that confounding factors may prevent trust and intended behaviours to lead to action, in this
518 case conflict resolution (Stern & Coleman, 2015). If such willingness is absent, we argue that trust and
519 potential subsequent conflict resolution may be difficult to achieve.

520

521 The third nuance was the rather atypical situation in the Moray Firth case study with an industry-led
522 approach, focussed on conflict resolution, championed by an individual trusted by scientists,
523 government advisers and local stakeholders. In this case study, many stakeholders had high levels of
524 affinitive trust towards this individual, with a perception of social connectedness and shared values
525 (Stern & Coleman, 2015). Although this situation led to an environment where conflict resolution
526 through increased trust was more likely, such a local champion may not be present in all conservation
527 conflict situations. Indeed, the situation in the Bladnoch and Forth and Borders, where the process of
528 developing management plans was led by country agencies may be more typical, potentially leading to
529 issues over perceived fairness, potential mistrust and conflicts that are either not acknowledged by
530 certain stakeholders, or not addressed and resolved.

531

532 **Conclusion**

533

534 Our research highlights the importance of building and maintaining institutional and interpersonal trust
535 between stakeholders where conservation conflicts occur. As a first step this requires state country
536 agencies responsible for implementing biodiversity policy, such as protected area designation and
537 management, to acknowledge that conflicts exist but are a healthy indicator. Conservation conflicts can
538 be viewed as an opportunity to build interpersonal and institutional trust with stakeholders, potentially
539 liaising more or better with those ‘on the ground’ with perceived legitimacy. Building and maintaining
540 procedural trust and strong working relationships with landowners and managers may be the most
541 important aspect for country agencies responsible for managing and sustaining biodiversity. Such trust-
542 building requires effort and resources however, as well as developing opportunities for appropriate
543 dialogue between stakeholders to identify shared problems and in turn shared solutions. Importantly, it
544 may also require a willingness to share power, in terms of knowledge and decision implementation,
545 especially in situations where local stakeholders are dependent on and knowledgeable about natural
546 resources.

547

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549

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552

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