Using social data in strategic environmental assessment to conserve biodiversity

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Integrating Social Data into Strategic Environmental Assessment of Land Use Plans to Improve Biodiversity Conservation

Abstract

Strategic Environmental Assessment (SEA) is increasingly used to assess land use plans in a way that is broader in spatial, temporal and conceptual scope than traditional Environmental Impact Assessment (EIA). Meanwhile, conservation scientists have recognised that successful biodiversity conservation relies on the social feasibility of conservation actions in addition to possessing information about biological priorities. SEA provides a framework for integrating information regarding the social feasibility of conservation actions with supporting environmental legislation in order to achieve enhanced conservation outcomes. In this paper we argue that data on the social context of land use plans are vital to ensuring effective biodiversity conservation outcomes that result from SEAs. We explore the Australian *Environment Protection and Biodiversity Conservation Act* (1999) (EPBC Act) as a case study of how the integration of these data can be practically achieved within an existing legal process. While a range of social data is relevant to this type of assessment, we focus on the use of spatially-referenced social data in the context of land use planning. When applied to the design and implementation of land use plans, this type of information can improve the acceptability of conservation actions, enhance environmental stewardship, and minimise land use conflict through taking stock of the values and attitudes (precursors to behaviour) that are relevant to proposed land use change and conservation action. Through exploring the integration of these data into each of the stages of SEA under the EPBC Act, we show that opportunities exist to strengthen the effectiveness of SEA in delivering conservation outcomes without altering existing legal processes.

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1. Introduction

Assessing the environmental impacts of land use is a standard policy approach of jurisdictions around the world. Environmental Impact Assessment (EIA) is the earliest form of this and is today a tenet of environmental regulation. Since the 1990's, however, Strategic Environmental Assessment (SEA) has increased in prominence (Tetlow and Hanusch, 2012). SEA extends the scope of EIA, moving beyond a focus on isolated actions to also include policies, plans or programs (Partidário, 2000, 1996) and shifts the assessment of impacts to higher orders of decision-making (Tetlow and Hanusch, 2012). For these reasons, SEA has been praised for its ability to consider multiple impacts over much longer time periods and influence the choice of alternative development options rather than simply documenting expected environmental decline (Partidário, 2000, 1996; Tetlow & Hanusch, 2012). This is particularly important for biodiversity conservation, as traditional individual project assessments have been criticised for their inability to account for cumulative impacts within a larger socio-political context (Partidário, 2000; Slootweg et al., 2001). In contrast to EIA, SEA can “identify threats and opportunities for biodiversity at an earlier stage in the decision-making process” (Treweek et al., 2005, p. 175). Many jurisdictions around the world have therefore adopted elements of SEA as a means of protecting species and environments of national significance that are threatened by large-scale human actions, such as regional plans for urban development or resource extraction (Ng and Obbard, 2005; Upreti, 2005).

Since the 1990s, the field of conservation science has also gained increased prominence. This field explores the ecological and socio-economic factors associated with conserving wild nature (Kareiva and Marvier, 2012). Recent conservation science literature has recognised that good outcomes often depend more on favourable social conditions that enable implementation of actions (including human values, attitudes, behaviours and political conditions), than on accurate ecological information (Ban et al., 2013; Knight et al., 2006, 2008; Knight and Cowling, 2007; Pretty and

53 Smith, 2004; Raymond and Brown, 2011). Much of this research has focused on conservation
54 planning (the identification and prioritisation of areas for conservation action) and direct
55 community actions, with little exploration of the role of legal instruments and policies which are
56 important drivers of biodiversity conservation. There is a need therefore to explore the capacity of
57 SEA to utilise insights from recent conservation research, through incorporating data on the social
58 determinants of biodiversity outcomes within the assessment process.

59
60 Although social and economic factors are increasingly being considered within SEA (Morrison-
61 Saunders and Fischer, 2006; Vanclay, 2004), when it comes to evaluating impacts to biodiversity,
62 SEA applications around the world remain focused on the physical determinants of environmental
63 damage with little consideration of how social factors might influence conservation outcomes.
64 Treweek et al. (2005) stress that biodiversity impacts "may be influenced by social, economic and
65 political factors" and that these "must be taken into account". This same sentiment was expressed
66 by The International Association for Impact Assessment (2002) which held that SEA should
67 address the interrelationships between biophysical, social and economic impacts rather than
68 focusing on environmental impacts alone. Relevant data on socio-demographic changes,
69 stakeholder values and behaviour or land use conflicts could help decision-makers identify both
70 opportunities for conservation gains within landscapes, and potential threats that may impede
71 conservation efforts (see Brown and Raymond, 2014; Ives and Kendal, 2014).

72
73 The widespread use, breadth and inherent flexibility of SEA approaches make for an ideal
74 opportunity to analyse how social data can be systematically considered alongside biophysical data
75 in land use policy. At present there are no standard guidelines regarding the methods that should be
76 used in SEA; each assessment should apply techniques appropriate to the context (Noble, 2012).
77 This flexibility is a strength of SEA, yet can also mean that practitioners are unsure as to how gather
78 and implement appropriate data (Noble, 2012). *Conservation feasibility* refers to the likelihood of

79 an action leading to an effective and sustained conservation outcome, and is a concept that is
80 increasingly referenced in the conservation literature. However, there is currently no guidance on
81 how social data on conservation feasibility might be included within SEA. This has implications for
82 the assessment of the social acceptability and feasibility of land-use policies which aim to mitigate
83 or offset the environmental impacts of new developments. We demonstrate here how spatially
84 mapped social data can fit neatly into existing methods for SEA, thereby addressing the “need for
85 more systematic methodologies with guidance on methods selection at different SEA tiers and in
86 different contexts” (Noble, 2012; p145).

87
88 In this article, we draw upon the Australian Strategic Assessment legislation (under the
89 *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*) as a case study of how
90 including social data in SEA can enhance conservation outcomes. Since SEAs have been most
91 frequently and successfully applied to land use plans (Tetlow and Hanusch, 2012), we focus our
92 discussion on spatial land use planning assessment, considering in particular how the mapping of
93 social values might enhance SEA in this context. Although the social impacts of plans are important
94 on social justice and democratic grounds (Vanclay, 2003), our concern is specifically how social
95 dynamics might affect *conservation* outcomes. The emphasis of this article is thus on how to
96 improve the ‘substantive effectiveness’ of SEA (see Chanchitpricha and Bond, 2013), measured by
97 tangible biological outcomes rather than the procedural or transactive outcomes (e.g. improvement
98 of policy process) that have been addressed by other authors (e.g. Sadler, 1996). After outlining
99 how SEA functions in Australia, we develop a framework for systematically considering social data
100 alongside potential impacts to nationally-listed threatened species. We conclude by discussing the
101 key lessons from this application and discuss general principles for considering social data in SEA.

102

103

104 **2. Australian Strategic Environmental Assessment in a Global Context**

105

106 The broad definition of SEA means that it takes different forms across a diversity of countries.
107 Despite a theoretical focus on strategic consideration of long-term scenarios and participatory
108 decision-making among stakeholders, application of SEA in Australia, along with many other
109 jurisdictions, is tethered closely to EIA philosophy and is motivated by legal requirements to report
110 on specific impacts) (see Lobos and Partidario, 2014). The legal weight behind SEA in Australia is
111 the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act). It provides
112 for both single project focus EIA (Parts 7, 8 and 9) and the broader approach of SEA (Part 10)
113 called ‘Strategic Assessment’. Under the EPBC Act, the delegated Government Minister has
114 ultimate power to approve or reject a development proposal likely to have a significant impact on
115 Matters of National Environmental Significance (MNES) (such as threatened species and ecological
116 communities).

117

118 The EPBC Act’s Strategic Assessment provisions differ from EIA in that they consider the impacts
119 on MNES from a *series* of proposals or developments across larger temporal and spatial scales,
120 rather than an individual project (DSEWPAC, 2012). This can permit development across a larger
121 area without further need for individual project assessments (DSEWPAC, 2012; Early, 2008). The
122 inclusion of Part 10 in the EPBC Act signified the first formal adoption of SEA into Australia’s
123 national environmental law (Early, 2008; Marsden, 2013) and is increasingly being used.

124

125 Application of SEA in Australia is interesting in the international context for two reasons. First, the
126 location of Strategic Assessment provisions within the EPBC Act means that the impact
127 significance of a proposal is measured entirely against impacts to MNES, although the Minister
128 must consider economic and social factors related to the proposed action (Macintosh, 2009). This
129 narrow focus on environmental concerns is similar to New Zealand practice where The Resource

130 Management Act is concerned primarily with assessment of environmental impacts of projects. This
131 differs from the UK and many European countries that typically consider broader sustainability
132 concerns (Jones et al., 2005). Second, there is no legal requirement for a Strategic Assessment to be
133 undertaken. This differs from most European countries where an SEA is mandatory for land use
134 plans under the European Union Strategic Environmental Assessment Directive. However, the steps
135 that constitute a Strategic Assessment in Australia once entered into are formalised and more highly
136 regulated than the flexible approach taken in other countries (e.g. Canada) (Tetlow & Hanusch,
137 2012; Jones et al., 2005).

138

139 Many applications of SEA are strongly intertwined with public consultation and participation
140 (Gauthier et al., 2011; Rauschmayer & Risse, 2005) and may incorporate Social Impact Assessment
141 (Vanclay, 2003). However, this is not formalised in the Australian context as a result of Strategic
142 Assessment originating from within more traditional EIA legislation. Different countries
143 incorporate public participation at different stages of the SEA process, for example plan
144 development (New Zealand), screening and scoping (Ireland) and after the report has been prepared
145 (UK) (Jones et al., 2005). What we propose in this article is different from participatory approaches
146 where stakeholders are directly included in the decision-making process. While we recognise the
147 importance of public participation within impact assessment, it is sometimes difficult to initiate for
148 practical and political reasons. Instead we focus here on how quantitative social data on
149 conservation feasibility might be included in SEA processes that are data-driven and largely
150 positivist in their approach. We aim to strike a balance between what may be an ideal
151 operationalisation of SEA and what is practically achievable. Our approach does not exclude the
152 use of participatory approaches or SIAs, but may be used alongside these existing methods. We
153 outline here a novel way of incorporating social data related to conservation outcomes into every
154 stage of an SEA process, thereby enhancing the protection of biodiversity without requiring
155 dramatic transformation of current legislated processes.

156

157 **3. How does a Strategic Assessment Work?**

158

159 Under the EPBC Act, Strategic Assessments are undertaken within the broad framework of a
160 standard SEA process (UNEP, 2002). These stages are outlined below and summarised graphically
161 in Figure 1.

162

163 < Figure 1 >

164

165 *3.1 Screening*

166 Strategic Assessments are a collaborative process where a relationship is developed between the
167 consent authority administering the EPBC Act (i.e. the federal environment department acting on
168 behalf of the Minister) and the assessment partner (or proponent). Such collaboration starts at the
169 earliest stages where screening is undertaken to assess whether a particular policy, plan or program
170 should be subject to a Strategic Assessment (Early, 2008), based on a pre-determined set of criteria
171 for identifying likely significant impact on MNES.

172

173 *3.2 Scoping*

174 The scoping stage is undertaken collaboratively to negotiate a formal agreement between the
175 Minister and the assessment partner as well as the terms of reference for the assessment process
176 (Marsden, 2013). This stage identifies important issues, how to examine them, and which guidelines
177 to reference (DSEWPAC, 2012). Here, the assessment partner assists in developing common
178 expectations, key issues and matters for protection, availability of information, resourcing, timing
179 and governance arrangements.

180

181 *3.3 Impact analysis and assessment.*

182 This stage is an iterative process of assessing impacts of a policy, plan or program on MNES. A
183 policy, plan or program and Strategic Assessment Report are developed by the assessment partner
184 and refined in consultation with the consent authority. The Strategic Assessment Report analyses
185 the potential impacts and outcomes of the policy, plan or program on MNES as well as any other
186 items listed in the terms of reference, such as state and regional issues (DSEWPAC, 2012). It
187 identifies potential alternatives to the proposal, and can also include elements of comparison
188 between these alternatives.

189

190 *3.4 Consideration of mitigation measures*

191 Once the scale of impact of the policy, plan or program has been determined, the assessment partner
192 and consent authority collaboratively look for ways to reduce the identified impacts to acceptable
193 levels. This could include avoidance, mitigation or compensatory actions, such as environmental
194 offsets (Macintosh, 2013).

195

196 *3.5 Reporting*

197 The reporting stage has three main priorities: (i) to document the findings of the assessment, the
198 proposed alternatives and predicted impacts, (ii) to serve as a basis for consultation, and (iii) to
199 provide recommendations for decision-makers, based on preferred alternatives and measures for
200 avoiding, minimising, mitigating and compensating for unavoidable impacts. Typically, the draft
201 policy, plan or program is released for comment by the assessment partner at the same time.
202 Following completion of public comment, the policy, plan or program and the Strategic Assessment
203 Report are finalised by the assessment partner. This process must take into account the comments
204 from the public and any advice from the consent authority.

205

206 *3.6 Review*

207 This stage is designed to act as a check on the adequacy of the information collected as part of the
208 Strategic Assessment process, including identification of bias, uncertainties and contradictory
209 findings. Once finalised to the satisfaction of the consent authority, the policy, plan or program and
210 the Strategic Assessment Report are submitted to the Minister for consideration (DSEWPAC,
211 2012). Endorsement occurs when the minister is satisfied that the policy, plan or program and the
212 associated Strategic Assessment Report adequately identify and address impacts on MNES, meets
213 the terms of reference and provides for any modifications recommended by the Minister. Although
214 endorsement does not always equate to an approval decision, it is a necessary step towards
215 approval.

216

217 *3.7 Decision making*

218 Following consideration of the matters raised in the Strategic Assessment, the Minister may
219 approve the taking of actions, allowing activities under the policy, plan or program to proceed
220 without the need for further federal approval of individual development proposals (Ashe and
221 Marsden, 2011). However, conditions may be attached to an approval if the Minister considers them
222 necessary. Critically, any decision must also take account of any relevant economic *and* social
223 matters of the plan, policy or program (EPBC Act, s146F).

224

225 *3.8 Monitoring and environmental auditing*

226 Monitoring and auditing is conducted by the assessment partner in relation to the mitigation
227 measures agreed to with the consent authority. This takes place beyond the decision-making stage
228 to ensure that the protection of MNES is upheld throughout the life of the Strategic Assessment
229 agreement (DSEWPAC, 2012). This can include monitoring both social and ecological change and
230 the performance of agreed mitigation measures.

231

232 **4. Social data relevant to Strategic Assessment of land use plans**

233

234 Social data are relevant to Strategic Assessments for their ability to inform the likelihood that
235 biodiversity matters will be threatened as a result of a proposed plan (for example wildlife
236 populations under pressure from increasing nearby urban populations) (Guerrero et al., 2010), or the
237 feasibility of undertaking conservation actions on the landscape (such as establishing a biodiversity
238 offset reserve). These can be classified into three categories: (1) the individual determinants of
239 conservation actions such as demographic characteristics, values, perceived risk, knowledge and
240 access to income support (see Pannell et al., 2006; Raymond and Brown, 2011; Ticehurst et al.,
241 2011); (2) how social interactions (e.g. social networks) collectively influence biodiversity
242 protection (Guerrero et al., 2013); and (3) the socio-political context in which decisions are made,
243 such as laws and policies which regulate environmental action, or economic incentives and capacity
244 building programs to affect behaviour change (Ban et al. 2013; Mills et al. 2013). Despite the
245 importance of these data, they are not typically included in Strategic Assessments.

246

247 Data on the distribution and types of values that individuals assign to places is increasingly relevant
248 to environmental decision-making. Such values are referred to as assigned, social or landscape
249 values (Brown, 1984; Bryan et al., 2011; Ives and Kendal, 2014; Seymour et al., 2010). Knowledge
250 of the composition of values for specific locations (such as recreational, aesthetic, or conservation
251 values) can be used to infer relative social importance of these places and the degree of social
252 acceptability of conservation or other land use activities (Brown and Raymond, 2014; Brown and
253 Reed, 2012). Such data have been used to guide land-use decisions (Brown, 2012) and is known to
254 shape conservation behaviours (Seymour et al., 2010). Land-use or development preference is an
255 additional proxy for the feasibility of conservation because it reflects a desired end-state or future
256 use of a particular area (e.g. use of land for residential, industrial, or tourism development), which
257 may align with or oppose conservation efforts (Nielsen-Pincus et al., 2010). If local communities

258 prefer development in or near an area of biological importance, the feasibility of future protection
259 of biodiversity in this area is low if decisions are made based upon social acceptance or political
260 grounds; in contrast, the feasibility of conservation is high if social values for conservation align
261 with these biologically important areas (Whitehead et al., in press). Public Participation GIS is one
262 effective and increasingly utilised method of assessing assigned values and development
263 preferences (Brown, 2012; 2005).

264

265 Data on spatially referenced landscape values offer four advantages if used together with the
266 biophysical information typically considered in SEAs: (1) identification the level of compatibility
267 between scientifically assessed conservation areas and areas of local value and concern; (2)
268 prediction of potential conflict zones whereby different types or incommensurable values overlap;
269 (3) allocation of resources to areas of highest biodiversity and community importance, and (4)
270 visual representation of the feasibility of plans to protect species of national importance (Raymond
271 and Curtis, 2013).

272

273 **5. Opportunities for the application of social data in the Australian Strategic** 274 **Assessment process**

275

276 Below are ways in which social data can be used within the eight stages of Strategic Assessment
277 (outlined in section 3) to enhance conservation outcomes.

278

279 *5.1. Screening and scoping (Stages 1 and 2)*

280 At present, social investigation within the Strategic Assessment process is generally limited to
281 expert consultation and engagement pertaining to the physical requirements of particular MNES,
282 with relatively little emphasis on broader community values. The screening and scoping phases
283 could be enhanced by utilising data on how social behaviours, attitudes, values and priorities relate

284 to MNES, the proposed development and its anticipated environmental impacts (e.g. Curtis et al.,
285 2005). For example, Raymond and Curtis (2013) used mail based surveys to identify key issues and
286 opportunities with respect to regional sustainability planning in the Lower Hunter Valley in NSW,
287 Australia. Such tools can provide baseline contextual information for drafting, negotiating and
288 progressing the Strategic Assessment terms of reference. Moreover, understanding how people
289 value and use species (e.g. for fishing) and habitats (e.g. wilderness recreation) is a critical first step
290 to identifying socially-meaningful conservation priorities within an area (Ives and Kendal, 2014).

291

292 *5.2 Impact analysis and assessment – consideration of mitigation measures (Stages 3 and 4)*

293 During this phase social data can provide a benchmark against the terms of reference to identify
294 community values and activities that are either beneficial or detrimental to protection of nationally
295 protected species. While the persistence of biodiversity will in large part be due to physical factors
296 such as habitat patch size, other social values, attitudes, behaviours (e.g. management regimes) and
297 political/organisational structures are likely to exert great influence. For example, areas of ethno-
298 biological significance, traditional hunting value, scenic quality, recreational importance and social
299 well-being may relate positively to the protection of MNES, and should feature in the assessment
300 report. Similarly, certain land use preferences, recreational activities, employment types and
301 resource uses may conflict with conservation outcomes. Data on these positive or negative social
302 influences can be collected via maps of aboriginal cultural landscapes (Ridges, 2006), visitor
303 perceptions of park experiences, environmental impacts, and facilities (Brown and Weber, 2011),
304 social values for natural capital and perceived threats (Bryan et al., 2011), and willingness of
305 landholders to steward natural resources (Pasquini et al., 2010).

306

307 The assessment of impacts stemming from a proposed plan should consider indirect changes to
308 biodiversity resulting from alteration of the social factors discussed above. For example, shifting
309 demographic profiles arising from proposed development (e.g. an increase in residential density or

310 the number of young families present within a region) could change how people interact with areas
311 of significant biodiversity, such as regional parks. Also, disruption of land management regimes
312 (e.g. hunting or fishing behaviours) can lead to ecological degradation, even though the
313 development associated with a proposal itself may not directly influence habitat. In terms of
314 mitigation and offsetting of impacts, social data such as willingness to sell for conservation
315 (Guerrero et al., 2010) and willingness to pay for environmental improvements (Brouwer et al.,
316 2010), can also assist in developing options that will be biologically favourable and socially
317 sustainable.

318

319 *5.3 Public consultation and reporting stage (Stage 5)*

320 Public consultation can be modified to include evaluation the accuracy and adequacy of the social
321 data (collected at stages 1–4). Participatory mapping and modelling methods can also be used to
322 facilitate community engagement, accounting for the needs of multiple individuals or groups of
323 individuals (Lesslie, 2012; Voinov and Bousquet, 2010). The visualisation of impacts through
324 mapping data is particularly useful for this purpose.

325

326 *5.4 Review & decision-making (Stages 6 and 7)*

327 Social information can inform the endorsement decision and the application of any necessary
328 approval conditions. For example, an approval condition for a development impacting a threatened
329 ecological community might include capacity building for the establishment of an Indigenous
330 peoples bush foods industry, thereby creating a synergy between economic development, species
331 protection and social licence to operate.

332

333 *5.5 Monitoring and environmental auditing stage (Stage 8)*

334 In addition to direct monitoring of legally protected matters, there is potential for ongoing
335 evaluation of the social factors (individual or collective) that may indirectly influence their

336 persistence. For example, understanding the management capacity of local councils or nature
337 reserve staff can provides assurance to the Minister that conservation outcomes for threatened
338 species will be achieved. Finally, social data can be used to broadly assess the outcomes of Natural
339 Resource Management (NRM) instruments used for avoiding, mitigating and offsetting
340 environmental impacts (e.g. Curtis et al., 2008) and provide lessons for refining the current and
341 future Strategic Assessments.

342

343 **6. Potential barriers and challenges to the application of social data in Strategic** 344 **Assessment**

345

346 Although social matters are critical to achieving conservation success, there are a number of
347 challenges that could affect the application of social information to the Strategic Assessment
348 process.

349

350 *6.1 Data collection and integration*

351

352 The cost of data collection can pose an economic challenge to the use of social data in a Strategic
353 Assessment. Mail-based surveys are costly and time-consuming compared with the collection of
354 secondary data, such as that from publically available census databases. However, mail-based
355 surveys enable a targeted assessment of community attitudes toward particular issues related to
356 biodiversity conservation, such as the impact of regional demographic change and property turnover
357 on the adoption of natural resource management practices by landholders and the future viability of
358 agricultural industries (Mendham and Curtis, 2010; Mendham et al., 2012). Regional census data
359 only allows for extrapolations of the impact of developments on socio-demographic trends.

360

361 One way to overcome the cost of social data collection is to interpolate self-reported social impacts
362 in the study area from known biophysical characteristics in related regions (Sherrouse et al., 2011).
363 Spatial interpolation techniques are based on known correlations between biophysical features (e.g.,
364 vegetation cover, species distribution) and social data (e.g., attitudes toward residential
365 development, local values for conservation). However, the assumptions implicit in the application
366 of data from one region to another introduce uncertainty and error in analysis (Eicher and Brewer,
367 2001; Gotway and Young, 2002). An alternative is for multiple development and environmental
368 agencies to work together at the sub-regional or regional scale to collect social data within a
369 consistent methodology. The Australian Government's Strategic Assessment process enables the
370 assessment of development impacts at the regional scale, and if implemented elsewhere, presents an
371 opportunity for primary social data to be collected at the regional scale that is of interest to multiple
372 planning and environmental agencies.

373

374 Collection of social data should account for the fact that the effect of social dynamics will differ
375 according to the scale of analysis; the biodiversity of landscapes, catchments and properties will all
376 have different social drivers. Furthermore, some social issues may not have been revealed via
377 regional survey methods, and planning agencies may need to undertake more detailed analysis in
378 areas where developments are likely to have the highest social and/or environmental impact. Some
379 of these cross-scale issues can be overcome by state and national planning authorities working in
380 partnership with local government in order to link social data collected as part of municipal surveys
381 to social data collected through sub-regional or regional surveys.

382

383 It can be challenging to assess how strongly social matters influence biodiversity because of the
384 complexity of individual and group processes (Pannell and Vanclay, 2011). Strategic Assessments
385 may therefore need to make greater allowance for the complex associations between social values,
386 attitudes, behaviours and environmental outcomes, rather than rely on proven causal relationships

387 (Biggs et al., 2011; Johnson et al., 2013). This would provide a stronger role for self-reports of
388 attitude, impacts and risks in the assessment process. There is a risk, however, that focusing too
389 much on social data (that are often only indirectly associated with environmental outcomes) could
390 expose the consent authority to legal challenge, since the Government's legislated authority extends
391 only to the protection of MNES. We therefore do not argue that these social data should necessarily
392 be given equal weight as biophysical factors, but rather that their influence be applied
393 systematically in context of such factors.

394

395 *6.2 Organisational implementation*

396 The culture of proponent organisations and regulatory authorities is likely to influence how
397 successfully social data are incorporated into the Strategic Assessment process. Organisations that
398 are used to dealing predominantly with biophysical information can perceive that social information
399 is less useful for decision-making because it is 'soft' or imprecise (see for example Bojórquez -
400 Tapia et al., 2003). Resistance to the use of social data in assessing biodiversity impacts may need
401 to be combatted by addressing this perception (Brechtin et al., 2002; Robertson and Hull, 2001).
402 Good leadership and providing avenues for civil servants and proponents to express any concerns
403 can be proactive ways of bringing about cultural change.

404

405 As most SEA practitioners are used to evaluating biophysical impacts of a proposal, there may be a
406 lack of skills and expertise in integrating these with relevant social data. This could result in
407 misinterpretation of social data as it relates to biodiversity impacts, or the neglect of useful social
408 information altogether. This can be addressed through targeted training for both proponents and
409 assessment staff on (1) what kinds of social data are relevant for different assessments, (2) methods
410 on collecting social data, and (3) how to interpret social data as it relates to conservation outcomes.

411

412 Stakeholder engagement can be another potential challenge to successfully integrating social data
413 into the Strategic Assessment process. To avoid a number of the pitfalls associated with stakeholder
414 engagement (see Cooke and Kothari, 2001), the scope and purpose of the engagement need to be
415 articulated clearly to stakeholders at the outset of the project to ensure that societal expectations
416 regarding data use are accurate. Following data collection, translation of social data relevant to the
417 assessment to stakeholders and general public must be done carefully, with clear communication
418 about the implications of the information. If social data are not made accessible and understandable
419 to stakeholders and decision-makers they are unlikely to influence the decision-making process
420 (Biggs et al., 2011; Knight et al., 2006).

421

422 Finally, decision outcomes may not reflect the new information even if social data are integrated
423 well into reports and documents that form the Strategic Assessment. Macintosh (2013, p. 542) notes
424 that improved information alone may not generate better environmental decisions in EIA, since
425 decisions are largely the product of “values, power and incentives”. While the iterative and
426 collaborative decision-making approach of Strategic Assessment goes some way to address this,
427 ultimately the risk remains that little weight is given to social data in decision-making.
428 Nevertheless, addressing the points listed above is likely to ensure that social data more adequately
429 informs Strategic Assessments.

430

431 **7. General principles for considering conservation-relevant social data in SEA**

432

433 A number of general policy principles can be derived from our study of the Strategic Assessment
434 process in Australia that relate to SEA applications globally. There is great variation in SEA
435 legislation, methodologies and procedures internationally and it is beyond the scope of this paper to
436 review these here (but see Tetlow and Hanusch, 2012 for a discussion). Nevertheless, whether or
437 not SEA is perceived as a rational way of evaluating environmental impacts or a loosely

438 implemented framework for developing collaborative sustainability solutions (c.f. Tetlow and
439 Hanusch, 2012), most SEA contexts will contain opportunities to integrate social data in the
440 assessment of conservation outcomes.

441

442 *7.1 A stepwise approach to considering key social matters related to biodiversity in SEA practice*

443 A number of logical steps should be followed by both the parties preparing reports to be assessed
444 and those performing an assessment. First, it is important that SEA practitioners "consider
445 biodiversity values and uses within the plan area" (Treweek et al., 2005, p. 188). Once relevant
446 biodiversity matters are identified (either on social or biological grounds), the social determinants
447 of conservation within the landscape need to be considered (see Section 4 for examples). The next
448 consideration is then to understand how relevant social conditions are likely to change with the
449 implementation of a plan.

450

451 Assessment of threats and opportunities for conservation that are associated with a policy, plan or
452 program is the perhaps the most significant stage within an SEA. This can be done by considering
453 three landscape categories. The first is existing protected areas, which are the cornerstone of most
454 conservation efforts. Questions that should be asked include (i) are they likely to persist in
455 providing conservation outcomes into the future? (ii) what is the current and likely future level of
456 social acceptability? and (iii) how threatened are they by shifting community attitudes and changing
457 behaviours? The second landscape category is biodiversity outside of formal protected area
458 networks. Questions to be asked of these areas include (i) what social capital (Pretty and Smith,
459 2004) exists to maintain and enhance biodiversity on private land? and (ii) how might this change
460 with the implementation of the policy, plan or program? If a large proportion of the biodiversity
461 being considered under a SEA is present on private land, answers to such questions may be crucial
462 to conservation outcomes. The final landscape category is newly created protected areas. This is
463 becoming increasingly important with the rapid adoption of biodiversity offsetting in SEA. The

464 capacity of new conservation reserves to meet biodiversity outcomes is dependent to a large degree
465 on their design, management and political and community acceptability. Moreover, creation of
466 formal reserves as offsets may not lead to better biodiversity outcomes as this shift in land tenure
467 may promote abdication of responsibility by landholders. An understanding of community
468 attachment and stewardship may be very useful in determining where to position such biodiversity
469 offset areas.

470

471 *7.2 Operational guidance*

472

473 One key recommendation for effective integration of social data with environmental data in the
474 SEA process is that both should be collected concurrently throughout the data collection stages as a
475 requirement of the proponent. The kind of social data collected will depend on the context of the
476 plan, with secondary data collection (e.g., review of grey and peer-reviewed literatures) possibly
477 sufficient in communities frequently surveyed by social scientists. However, the use of public
478 participation techniques to elicit social values (such as PPGIS) has the added advantage of
479 achieving other outcomes than simply enhancing biodiversity protection. These include learning
480 outcomes (both social and technical), governance outcomes (such as enhancing stakeholder
481 participation in decision-making), development outcomes (influencing the design of plans), and
482 attitudinal and value changes (promoting sustainability within the community) (Tetlow and
483 Hanusch, 2012). The analysis of social and environmental data together can also help identify
484 socio-ecological tipping points, where activities undertaken can cause phase changes to natural and
485 social systems. Such complex concepts will require the collaboration of interdisciplinary teams of
486 practitioners and the integration of conservation and social impact reports.

487

488 SEA practitioners should also look for existing opportunities in legal structures for the inclusion of
489 social data related to conservation outcomes, as this article has demonstrated for the Australian

490 context. Indeed, a robust analysis of social values provides decision makers with increased certainty
491 that decisions regarding protection of environmental assets are more legally defensible. Since the
492 overarching purpose and language of SEA is broad and inclusive of environmental, social and
493 economics elements of sustainability, most frameworks for the application of SEA contain relevant
494 clauses or operational practices that can support the inclusion of these data.

495

496 **8. Conclusion**

497

498 Incorporating social determinants of conservation success in SEAs of land use plans can strengthen
499 conservation outcomes. Failure to do so can lead to unforeseen negative biodiversity impacts
500 following changes in social dynamics that result from actions undertaken according to policies,
501 plans or programs. SEA as a policy mechanism offers great promise because of its widespread use,
502 broad scope (considering more diffuse upstream causes of environmental impacts) and flexible
503 administration. Although many questions remain about the practical application of social data to
504 SEA, our case study of the Australian Strategic Assessment process demonstrates that opportunities
505 exist within current legal processes for adjustments that will enable improved conservation
506 outcomes. Since it is widely accepted that successful conservation relies on the social feasibility of
507 conservation actions, legal mechanisms providing protection for biodiversity cannot afford to be
508 insular and restrictive, both for the sake of long term environmental conservation and the integrity
509 of the legislation. Stronger collaboration between conservation scientists and environmental
510 regulators is required to advance the contribution of social data to strengthen conservation outcomes
511 in legislated SEA processes both in Australia and internationally.

512

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519

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685 **Figure 1.** Strategic Assessment process under the EPBC Act (adapted from DSEWPAC, 2012).