Review

Assessing the evidence for stakeholder engagement in biodiversity conservation

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Abstract

Engaging local stakeholders is a central feature of many biodiversity conservation and natural resource management projects globally. Current literature on engagement predominantly focuses on individual case studies or specific geographical contexts, making general conclusions regarding the effect of these efforts on conservation outcomes difficult. We reviewed evidence from the peer-reviewed and grey literatures related to the role of stakeholder engagement (both externally-driven and self-organized engagement) in biodiversity conservation at the local scale using both quantitative and qualitative approaches. We critically appraised and extracted data using mixed methods for case studies (n = 82) and meta-analyses (n = 31) published from 2011 to 2015. We conducted an inductive thematic analysis on background literature references published from 2000 to 2016 (n = 283). The quantitative analysis assessed multiple variables, and yielded no significant results, but suggested a possible relationship between success in producing attitudinal change towards conservation and four engagement factors. Our qualitative analysis identified six dimensions of engagement processes that are critical for successful outcomes when a project is externally-driven, and suggests that understanding of governance and social-cultural context plays an important role in all types of stakeholder engagement efforts. Finally, we reflect on the effectiveness of relying primarily on evidence available from published literature to understand links between conservation and stakeholder engagement, in particular with regard to self-organized engagement.

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1. Introduction

Despite at least four decades of calls for increased local stakeholder participation in biodiversity conservation, evidence on the efficacy of these efforts is only beginning to emerge (Reed, 2008, Brooks et al., 2013). Work to date has focused on how the process of engagement, such as group dynamics, communication styles, or transparency, is important to stakeholder engagement (Renn et al., 1995, Rowe and Frewer, 2000, Beierle, 2002). Less attention has focused on how stakeholder engagement impacts outcomes, in part because this can be difficult to evaluate, whether in terms of shifts in individual attitudes and behaviors or ecological effects.

Given continued and even increasing reliance on participatory approaches, the nature of the linkages between methods of engagement and conservation outcomes is a critical area in need of evidence (Danielsen et al., 2009). In order to help address this gap, we compiled, reviewed, and analyzed documented evidence from externally-driven and self-organized efforts around the world over the past 16 years to engage stakeholders at the local scale regarding biodiversity conservation goals. Our objective was to illuminate factors affecting the efficacy of stakeholder engagement for biodiversity conservation goals in order to inform both future research and practice.

1.1. Stakeholder engagement across disciplines

The literature on participation and local stakeholder engagement in decision-making processes spans fields such as business management, international development, community psychology, and natural resources management (Cooke and Kothari, 2001, Berkess, 2004, Hickey and Mohan, 2004, Miles, 2015). Here, we define stakeholders as the people and organizations who affect or are affected by a decision; stakeholders can be directly or indirectly involved in an endeavor (Freeman, 1984, Annan, 2008). In our analysis we distinguish between externally-driven engagement efforts and those that are self-organized. Externally-driven initiatives are those led by individuals or institutional stakeholders (such as regional or national government, national or international non-governmental organizations or researchers) who are organizing local stakeholders. Local stakeholders are individuals or groups (generally place-based) who directly rely on or impact the specific targets of resource management or conservation action (e.g. indigenous landholders, farmers, fishers, local non-governmental organizations, or local researchers). Self-organized efforts are led by local groups that have active control over resources and their management, such as indigenous leadership councils and citizen action groups. Self-organized indigenous peoples and local communities are important leaders in biodiversity conservation efforts, overseeing a significant proportion of the world’s biodiversity and carbon stocks (Kothari, 2013, Walker et al., 2014, WHRC and EDF, 2015). Therefore it is critical to understand how and why indigenous peoples and local communities engage with biodiversity conservation efforts (Ruiz-Mallén et al., 2015).

In the environmental and development sectors, the main arguments for the importance of local stakeholder engagement center on democratic and equity aims, such as: 1) reducing marginalization of those underrepresented in decision-making, 2) increasing stakeholder trust in and ability to act on decisions, 3) accounting for diversity of values across stakeholders, and 4) promoting social learning where stakeholders learn from each other and build new knowledge while developing new relationships (Reed, 2008, Fritsch and Newig, 2012, Young et al., 2013a, Birnbaum et al., 2015). Pragmatic arguments for stakeholder engagement include 1) the possibility that increased diversity in decision-making bodies may lead to higher quality decisions better adapted to the local social-cultural and environmental contexts, 2) development of common ground, trust, and reduction of conflict between stakeholders, 3) stakeholder ownership may increase support and successful implementation, and 4) the potential for reduced implementation costs (Richards et al., 2004, National Audubon Society, 2011). Yet there is a gap in the literature regarding evidence for which engagement approaches are most effective and under what circumstances (Webler, 1999, Beierle, 2002, Blackstock et al., 2012).

“Evidence-based” conservation, which emphasizes the importance of unbiased data gathered through systematic review protocols, is increasingly important in conservation decision-making (Pullin and Knight, 2001, Sutherland et al., 2004). Evidence-based analyses can help to shift conservation practice from often-unqualified assumptions to systematic collection and appraisal of a range of evidence (Haddaway and Pullin, 2013). These approaches in conservation are derived from the more established evidence-based medicine movement, where systematic reviews were developed as a rigorous method for aggregating findings from quantitative randomized control trials. In the field of medicine, evidence-based approaches have evolved to recognize the importance of non-quantitative evidence such as clinical expertise and patient preferences (Satterfield et al., 2009). Robust mixed methods and qualitative synthesis approaches allow for non-quantified evidence to inform policy and practice; synthesizing different types of evidence is particularly relevant when addressing complex questions (Dixon-Woods et al., 2005, Noyes and Popay, 2007).

In the case of conservation, since natural systems are connected to so many social-cultural domains, it is important for stakeholder engagement efforts to consider the social dimensions of conservation projects (Billgren and Holmén, 2008, Colvin et al., 2016). Given the integrated nature of conservation practice, in this paper we used a mixed methods approach to assess evidence from the published literature over the past 16 years regarding the contribution of local stakeholder engagement to outcomes in biodiversity conservation initiatives. We developed a search and review protocol to identify relevant, high-quality papers from the primary and grey literature. For a subset of these papers, we extracted information on multiple initiative variables and assessed the success of stakeholder engagement across four outcome domains (success in producing behavioral change, in producing attitudinal change, in conserving biodiversity, and in economic outcomes) drawn from the literature on participatory conservation (Reed, 2008, Brooks et al., 2013, Roe et al., 2015). Our choice of multiple variables reflects the design of many stakeholder engagement biodiversity conservation projects, in that they often use varying methods to achieve multiple goals (Baylis et al., 2016). The selected outcome domains are those commonly focused on by conservation organizations when seeking to assess the impact of a given participatory project (USAID, 2015).

2. Methods and analysis

This review followed an protocol adapted from the “Guidelines for Systematic Reviews in Environmental Management” developed by the
Centre for Evidence Based Conservation at Bangor University (Collaboration for Environmental Evidence, 2013). Our search method and analysis approach consisted of the following elements.

2.1. Search strategy

We determined search terms based on expert review and a scoping process and focused on peer-reviewed and grey literature spanning the previous 16 years. We carried out a pilot search and scoping exercise prior to the actual review in order to refine the search strategy. Searches were conducted between February 20 and March 13, 2015 and between September 26 and October 5, 2016 in five primary literature databases and six grey literature portals; for further detail see Appendix A. Due to the volume of literature available, and the changing landscape of engagement approaches and terminology in recent decades, the search was restricted to English language work published since 2000.

2.2. Inclusion/exclusion process and reference categorization

Inclusion criteria were as follows: 1) related to biodiversity conservation, 2) related to stakeholder engagement actions initiated by outside groups or by self-organized groups, and 3) interventions undertaken since 2000 at the local scale. References that did not meet these criteria based on title and abstract were excluded, and those that did were sorted into three categories: case studies, meta-analyses, and potential background literature that contained important contextually relevant information or definitions. This process was based on a sequential assessment, with two authors reviewing each reference. A Kappa analysis of the level of agreement resulted in a score of 0.6, above the 0.5 threshold recommended by the Collaboration for Environmental Evidence (CEE) guidelines (Collaboration for Environmental Evidence, 2013). In cases of uncertainty, three reviewers (EJS, ALP, EB) discussed and then resolved all conflicts. Where the same case study or meta-analysis was described in two or more papers, the most recent reference was selected. One reviewer (EJS) assessed the potential background literature using the above inclusion/exclusion criteria.

2.3. Additional relevance assessment and critical analysis

We conducted an additional relevance assessment of included literature based on the presence of conclusive evidence relevant to the aim of this review. Specifically, reviewers determined whether the case study contained evidence (quantitative or qualitative) to evaluate change, or lack of change, in the four outcome domains (behavioral change, attitudinal change, conservation of biodiversity, and economic outcomes), in the context of a stakeholder engagement effort. Upon review of the full text during this stage, reviewers could re-assign references to case study, meta-analysis, background reading, or exclude.

For included literature, we applied a critical appraisal framework that assessed the following four principles of quality (Appendix A): conceptual framing (i.e. Does the study clarify why this intervention is important? Does the study build upon prior work?); validity of study design (i.e. How defensible is the research design? How adequately has the research process been documented? Are the methods used to assess the effectiveness of the intervention appropriate/replicable? Does the study employ triangulation of methods to evaluate the intervention?); quality of data sources (i.e. Does the study describe the process by which data are assessed for quality? Are the methods used to evaluate the data defensible? Does the study provide the raw data?); and quality of analysis (i.e. How clear are links between data, interpretation, and conclusions? What extent does the author consider the study’s limitations and/or possible alternative interpretations of the analysis? Are confounding factors taken into account?). Case studies that did not rank highly in these four principles of quality were not coded.

2.4. Data collection

In line with CEE guidelines, we used qualitative research techniques in parallel with quantitative analysis to construct a more complete view of the evidence. Data analysis consisted of two processes: a mixed methods approach to assess evidence from case study and meta-analysis references published from 2011 to 2015 and a qualitative thematic review (Thomas and Harden, 2008) of 16 years of background literature. We collected data from 82 case studies and 31 meta-analyses. We extracted and tabulated 44 separate pieces of information for the case studies, including four outcome domains: success in producing behavioral change, in producing attitudinal change, in conserving biodiversity, and in economic outcomes (overall economic outcome success was determined by project success for at least one of the variables for economic benefit outcomes, specifically those with livelihood, direct payment, education, food security, and infrastructure benefits, including infrastructure investments for health and freshwater); for further details see Appendix A - Table A.2. For meta-analyses, we extracted 18 separate pieces of information, including three outcome domains: success in producing behavioral change, in producing attitudinal change, and in conserving biodiversity (economic outcomes were not assessed as the meta-analyses extraction did not include detail on the type of benefit outcomes; see Appendix A - Table A.3 for more information). We coded the outcome variables as successful (most or all evidence shows improvement as result of action/engagement), mixed success (some evidence shows improvement as a result of action/engagement), no success (no evidence for improvement); or no data available. For the qualitative review of both case studies and meta-analyses, we differentiated externally-driven stakeholder engagement from self-organized stakeholder action by how action/intervention was implemented (coded as: externally-driven throughout, self-organized throughout, co-created throughout). For the qualitative review of background references published from 2000 to 2016, we assessed success based on author’s self-description of success and extracted information via thematic analysis. Reviewers developed a suite of keywords based on recurrent themes and used these keywords to extract qualitative information facilitating the identification of similarities and differences across the studies and defining key concepts. Throughout the process, the list of keywords was adapted as new themes emerged.

After data extraction, two reviewers (EB, AS) reviewed all case studies and meta-analyses in the final dataset using a thematic analysis driven by grounded theory (Doolittle, 2010), using inductive logic to identify patterns arising from the evidence and distilling this into key themes captured in brief summaries. The summaries were then assessed by a second set of reviewers and triangulated with thematic analysis of background literature (EJS, ALP). The analysis focused on dimensions related to success or failure of an engagement project. In order to cross reference qualitative and quantitative results, reviewers noted whenever a case study or meta-analysis linked a specific engagement dimension with a particular outcome domain (e.g. success in producing behavioral change, in producing attitudinal change, in conserving biodiversity, or in economic outcomes).

We calculated descriptive statistics on case studies and meta-analyses; for case studies, we conducted bivariate analysis. Specifically, we performed the log likelihood ratio (G-test) test of independence with Williams’ correction (to account for small sample size) in order to assess any significant relationships between the case study properties with nominal variables (Table 1) and the four outcome domains. For ordinal categorical data, we performed the Goodman-Kruskal’s gamma test to determine any relationship between the measured project factors and the outcome domains. To account for multiple statistical tests, a Bonferroni correction was applied that considered an adjusted alpha of 0.003 per test. All analyses were conducted using R statistical computing (R Core Team, 2015).
Table 1
Key project factors that were assessed quantitatively, grouped by category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Key factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context and control factors</td>
<td>Who initiated the action/intervention(^a)</td>
</tr>
<tr>
<td></td>
<td>Who implemented the action(^a)</td>
</tr>
<tr>
<td></td>
<td>Presence of a charismatic leader(^a)</td>
</tr>
<tr>
<td>Process-related factors</td>
<td>Type of action/intervention of engagement</td>
</tr>
<tr>
<td></td>
<td>Method of engagement</td>
</tr>
<tr>
<td></td>
<td>Time frame of engagement</td>
</tr>
<tr>
<td></td>
<td>Time frame of study(^a)</td>
</tr>
<tr>
<td></td>
<td>If the project and related decision-making were transparent</td>
</tr>
<tr>
<td></td>
<td>If trust between stakeholders and planners was increased</td>
</tr>
<tr>
<td></td>
<td>If efforts were made to build social capital</td>
</tr>
<tr>
<td></td>
<td>Equitable distribution of benefits(^a)</td>
</tr>
<tr>
<td></td>
<td>Type of benefit outcome(^a)</td>
</tr>
<tr>
<td></td>
<td>Whether or not there was conflict and if it was resolved</td>
</tr>
<tr>
<td>Stakeholder inclusion factors</td>
<td>If stakeholder knowledge and values were synthesized into decision-making(^a)</td>
</tr>
<tr>
<td></td>
<td>Level of stakeholder input throughout the project</td>
</tr>
<tr>
<td></td>
<td>Level of stakeholder involvement at start of project</td>
</tr>
<tr>
<td></td>
<td>Trend in stakeholder involvement in decision making from start to end of project</td>
</tr>
</tbody>
</table>

\(^a\) Key project factors drawn from the methodology of Brooks et al., 2013. All other factors emerged from other dataset and background readings.

3. Results

The volume of search returns was extensive, with total hits of over 150,000; sorting and relevance assessments reduced the total to 2954 references, which was reduced to 2520 upon removal of duplicates and spurious hits. Following the inclusion and exclusion decisions based on title and abstract-level reviews, the dataset included 276 case studies, 70 meta-analyses, and 453 background references. Following full text review, the final dataset included 82 case studies, 31 meta-analyses, and 283 background readings (Fig. 1).

3.1. Analysis of quantitative evidence

3.1.1. Descriptive statistics

We coded 82 case studies for the purposes of this study. The case studies spanned 52 countries with geographic distribution predominantly in Africa (33%) and Asia (23%); followed by the Americas with 13% of cases from North America and 10% from South America. All other geographic regions comprised fewer than 10% of the cases analyzed. The number of case studies covered in a meta-analysis ranged from 2 to 146. For an overview of all descriptive statistics performed on the case studies and meta-analyses, see Appendix B.

3.1.2. Bivariate analysis of case studies

We performed bivariate statistical analyses on the codeable case studies (n = 82) to assess the relationship between 17 evaluated factors (Table 1) and four project outcome domains (success in producing behavioral change, in producing attitudinal change, in conserving biodiversity, and in economic outcomes). When a Bonferroni correction was applied to account for multiple statistical tests (p < 0.003), no statistically significant results were found. However, some have argued against running such a correction, as it reduces statistical power and can limit the generation of novel hypotheses (Nakagawa, 2004). If we apply this thinking and use an unadjusted p-value of 0.05, the analysis suggests a relationship between attitudinal change and the below four results (see Appendix C for further detail):
Table 2
Dimensions associated with success and failure by engagement type.

<table>
<thead>
<tr>
<th>Engagement type</th>
<th>Engagement and action dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Externally-driven stakeholder engagement</td>
<td>Identifying stakeholders&lt;br&gt;Timing and degree of stakeholder engagement&lt;br&gt;Recognizing and respecting stakeholder values and institutions&lt;br&gt;Stakeholder motivation for engagement&lt;br&gt;Effective leadership&lt;br&gt;Effective partnerships</td>
</tr>
<tr>
<td>Self-organized stakeholder action</td>
<td>Autonomous governance and recognized rights&lt;br&gt;Retaining sovereignty while obtaining access to outside resources&lt;br&gt;Local and traditional ecological knowledge&lt;br&gt;Social, cultural, and political contexts&lt;br&gt;Management strategies</td>
</tr>
<tr>
<td>Both externally-driven stakeholder engagement and self-organized action</td>
<td>Engagement and action dimension</td>
</tr>
</tbody>
</table>

3.2. Analysis of qualitative evidence

For the synthesis of extracted information from case studies (n = 82) and meta-analyses (n = 31) mapped against themes developed from the background literature, we identified dimensions associated with success and failure relating to externally-driven stakeholder engagement, to self-organized stakeholder action, and to both self-organized and externally-driven engagement (Table 2). Below we provide summaries of each dimension illustrated by case examples.

3.2.1. Externally-driven stakeholder engagement

3.2.1.1. Identifying stakeholders. In externally-driven engagement, results show that engaging too large a group can dilute outcomes. Büscher and de Beer (2011) noted that striving for all-inclusiveness forced the discussion towards broad, conceptual, and vague terms that fostered consensus but did not provide good guidance for action. Gray et al. (2012) modeled integration of knowledge across stakeholders and found that diverse sources of knowledge increased structural understanding of the system and increased the amount of recognized complexity. However, this higher level of recognized complexity potentially made it difficult for decision makers to choose between different proposed decisions.

Stakeholder involvement requires resources and time and can cause social conflict if poorly executed. Mbaiwa and Stronza (2011, Murenna et al., 2012, Such, 2013). Frequently outsiders try to engage “communities” without effectively understanding how and with whom those individuals interact, manage resources, or make decisions (Cullman, 2015). Communities are constantly shifting and define themselves differently depending on the context (Zulu, 2012, Curtis et al., 2014). Consequently, Reed (2008) and de Vente et al. (2016) emphasize the importance of developing a stakeholder engagement strategy early on that defines and sets priorities for actors and actions and determines whom to involve when.

3.2.1.2. Timing and degree of stakeholder engagement. Early engagement can lead to success, but it is also necessary to strategize when and how to engage stakeholders across the stages of a given program or conservation initiative (Reid et al., 2009; see Discussion). Strong initial engagement followed by unilateral decision-making can frustrate stakeholders and undermine their support (Gaymer et al., 2014). Degree of participation matters, and some studies found that more collaborative, participatory processes led to better results (Beierle, 2002, Reed, 2008, Brooks et al., 2013), while reliance on predominantly low-quality participation (e.g. passive listening) rather than active involvement may reduce effectiveness (Pollini and Lassioie, 2011, Minter et al., 2014). Stakeholders often reject the legitimacy of a system if they have not been part of negotiating objectives and parameters, or if they do not understand how they will be affected (Petursson et al., 2011, Gaymer et al., 2014). Less recognized barriers to participation (such as power inequities, inadequate funds to support participation, and language barriers) also inhibit a true collaborative process (Minter et al., 2014). “Engagement fatigue” can hinder projects, particularly those where individuals are not actively involved in decision-making but are brought in for consultation or opinions (Curtis et al., 2014). de Vente et al. (2016) found that fatigue can be mitigated with regular feedback on progress towards outputs and outcomes and careful consideration of selective engagement with stakeholders across a project.

3.2.1.3. Recognizing and respecting stakeholder values and institutions. There are multiple dimensions to consider in order to successfully address stakeholder values, such as acknowledging both inter- and intra-group variation, as well as respecting existing structures and institutions. Interventions framed around the perceptions of one stakeholder group may not appeal to all groups and could lead to disengagement, making it important to consider a diversity of stakeholder values. For example, women and men in Namibia had different human-wildlife conflict risk perceptions, suggesting mediation framed in terms of male-oriented viewpoints could lower participation by women (Gore and Kahler, 2012). We also noted multiple examples of value disconnects between project planners and local stakeholder groups across the literature, which can erode communication and trust if unaddressed (Ruiz-Mallén and Corbera, 2013, Curtis et al., 2014, Rist et al., 2016). For instance, a review of engagement efforts in Mexico and Jamaica found that low-income local communities and their advocates possess a much broader definition of biodiversity and its purpose than policymakers and managers in state-led development initiatives based on economic logic (Fuentes-George, 2013). Further, a case study in Uganda noted the importance of empathizing and relating with local community perspectives; planners who did not caused negative attitudes towards conservation efforts (Karki, 2013). Awareness and respect for differing worldviews could help managers design more appropriate projects.

Outside efforts towards participation and engagement may unknowingly undercut existing organizational and decision-making structures in a given community, which in turn can affect outcomes. For example, creation of community based conservation areas in northern Kenya led to intra-community conflict over changes in land tenure that had essentially overturned prior informal regulation by community elders (Greiner, 2012). When working with existing institutions, facilitators should carefully consider which power dynamics and decision-making structures they are endorsing (Mahanty and Russell, 2002).

3.2.1.4. Stakeholder motivation for engagement. The effectiveness of projects can be enhanced by identifying significant predictors or motivators for participation (Hobbs, 2012, Greiner, 2015). In many studies with positive outcomes, economic and/or social factors were major motivations or disincentives for participation (Gonzalez and Jenoff, 2011, Mbaiwa and Stronza, 2011, Elliott and Sumba, 2012). Designing...
programs to appropriately address different stakeholder incentives may lead to increased levels of participation (Moon and Cocklin, 2011). Initiatives should also consider community-level contextual factors (such as population size), as motivating factors do not operate solely on the individual scale (Gurney et al., 2016).

Economic benefits, such as direct payments in revenue sharing programs or other mechanisms, are one type of motivator (and when effective, can be an indicator of project success). Economic, market-based programs such as those focused on sustainable harvesting can help to engage stakeholders, support conservation, and increase livelihoods. Payment for ecosystem services (PES) is a type of economic incentive structure in which stakeholders are compensated for managing resources in order to provide an ecological service; this approach often entails not using or harvesting a resource. While such programs can yield positive outcomes (e.g. reduced lion killings due to a livestock compensation scheme), drawbacks can range across physical, socio-economic, and normative factors (Wegner, 2016) and can include creating a cycle of dependency and privileging resource owners, potentially exacerbating inequality (Anyango-Van Zwieten et al., 2015). Market-based programs can also lead to increased pressure on target resources (Solomon et al., 2012), and negative impacts such as decreased dietary diversity and food security and loss of environmental knowledge (Ibarra et al., 2011). Ingram et al. (2014) note that the demand-driven nature of market-based programs makes them vulnerable to external economic forces; for instance, a successful turkey hunting program in Guatemala saw a significant decrease in demand after the 2008 global financial crisis. Further, PES approaches often fail to resolve larger systemic issues, such as human-wildlife conflict and its related drivers (Anyango-Van Zwieten et al., 2015).

Economic benefits are most effective when reliable and sustained (Pilgrim et al., 2011, MacKenzie, 2012, Rambe and Johnsen, 2013). Incentives must be appropriate and sufficient to maintain stakeholder participation over the medium- to long-term (Suich, 2013). In an analysis of two community-based natural resource management (CBNRM)1 initiatives in place for over 10 years in southern Africa, Suich (2013) found that benefits were generally insufficient, reaching too few people, or not substantial enough to make a meaningful difference to local people’s lives, thus discouraging participation. Even minor oscillations in benefits can cause stakeholders to drop out of collaborations (Layzer, 2008). Provisioning of economic benefits should adequately consider program feedbacks as well; for example, in some cases local people suffer negative impacts from successful conservation outcomes, such as higher wildlife populations that increase human-wildlife conflict (Suich, 2013).

Timing of economic benefits can also be a key issue. A meta-analysis of 31 case studies found that when income from sustainable harvesting programs was received during the lean time of the year, and therefore provided a safety net, local communities were more likely to participate in and benefit from the program (Elliott and Sumba, 2012). Similarly, the inability to deliver funds at the appropriate time (Eke et al., 2014) and/or to sustain funds (Anyango-Van Zwieten et al., 2015) could reduce incentives for local participation. Inclusion of both short-term and longer-term benefits, so that a project’s benefits become visible early and are maintained over time, can also sustain motivation to participate (Fabricus and Koch, 2004, De Vente et al., 2016). This is important as consequences of conservation action may seem predominantly negative in the short term, whereas benefits of a restored ecosystem are often on a longer time frame (Birch et al., 2014).

Economic based approaches have not proven effective in protecting species of low economic value (Elliott and Sumba, 2012) and can undermine non-economic valuations of nature (Fuentes-George, 2013). However, they may promote trust and collaboration. In a meta-analysis of 39 community-based projects in Africa, Salafsky et al. (2001) found a significant association between non-cash benefits stemming from a community-based enterprise, such as enhanced community confidence, and conservation increases, but no association with the amount, timing, or breadth of distribution of cash benefits, nor with the strength of link-age between a given enterprise and local biodiversity or natural resources. They hypothesize that even when not directly linked to local natural resources, community-based enterprises may produce conservation gains by fostering trust and partnerships between local stakeholders and conservation agents, which in turn can increase motivation, receptiveness to outreach, and behavioral change.

Non-economic benefits are another important motivating factor. Some researchers have found that stakeholders, especially when self-selected, were most motivated by non-financial or intangible benefits including social factors such as personal well-being (Hobbs, 2012), conservation for future generations (Blackmore and Doole, 2013), or by providing a public environmental good (Blackstock et al., 2012). For example, interviews with participants from a range of wildlife monitoring programs in the UK found the most commonly listed benefits included learning, personal enjoyment and/or giving self-purpose, as well as health and wellbeing (Hobbs, 2012) while other studies discussed benefits such as increased self-esteem gained by working together (Bhatt, 2003). A study of 35 instances of participatory governance in North America and Europe over the past 30 years found that the most important factor for achieving environmental outcomes was the interests and goals of the involved actors (Fritsch and Newig, 2012). In some cases, stakeholders were unmotivated to participate because of previous negative experience with conservation or government agencies (Gonzalez and Jeniolf, 2011).

Psychological strategies for self-awareness fostered sustained motivation over time in some cases. For instance, Asah and Blahna (2012) found that helping volunteers to consciously reflect on why they are volunteering, and reinforcing those ideas throughout a project, not only positively affected recruitment to volunteer activities but also retention through time. Moreover, they found that volunteers were more motivated to participate by personal and social benefits than by environmental factors and were more likely to volunteer at their favorite stewardship organization for social reasons — to spend time with friends, meet new people with similar interests, etc. Peer pressure and social norms are important factors in stakeholder engagement and behavior change (Gurney et al., 2016). This is particularly true if peers are initially skeptical of an initiative and then decide to engage (Cooke et al., 2012). Finally, lowering the barriers to action can facilitate the translation of motivation into concrete behavior — for instance providing farmers with practical training in biodiversity management practices that are feasible and low cost (Lentijo and Hostetler, 2013).

3.2.1.5. Effective leadership. Effective leadership, charismatic leadership, and local champions are often hallmarks of success in conservation initiatives (MacKenzie, 2012, Young et al., 2012, Brooks et al., 2013, Sutton and Rudd, 2015). A review of natural resource management projects in Indonesia found a strong link between active community leaders and effective project implementation (Rambe and Johnsen, 2013). Basurto and Jimenez-Perez (2013) found that the presence of charismatic experienced leaders with long-term local ties (even if they were not from the region) and contacts in international arenas can be key to developing and supporting conservation action. These individuals were able to use their outside networks to secure stable sources of funding while developing capacity and vision at the local level. Interestingly, there may be a gap in reporting on leadership. Brooks et al. (2013), comparing results from published reports on community-based conservation project outcomes to subsequent targeted questionnaires for corresponding authors, found that the presence of a charismatic individual or group facilitating a project was underreported.

Fostering leadership is complicated, however, as in some community-based conservation efforts, traditional stakeholder leadership...
institutions can be undermined by parallel resource governance systems, new regulations, pressure from outside market forces, and conflicts over management (Ruiz-Mallén and Corbera, 2013). In addition, charismatic individuals and local elite concerns could skew groups, decreasing their representativeness (Mahanty and Russell, 2002). Also, attracting and retaining effective local leaders can be difficult in part because of overwork on the part of talented leaders or competing demands for time (Curtis and Sample, 2010, Curtis et al., 2014).

3.2.1.6. Effective partnerships. Successful collaborative projects were often those that developed out of sustained long-term relationships and social capital built over decades with strong two-way commitments to maintain relationships (Mbaiwa and Stronza, 2011, Mulrennan et al., 2012, Richard and Ratsirarson, 2013). A key finding in an analysis of a 37-year conservation partnership in southwest Madagascar was the importance of building long-term relationships and trust between local people and facilitators, despite the fact that this effort can be time-consuming (Richard and Ratsirarson, 2013). Importantly, social outcomes from stakeholder engagement, such as trust building, led to greater than expected conservation outcomes (Young et al., 2013b). Financial transparency is a critically important part of building trust (MacKenzie, 2012).

Effective communication and attention to perceptions and attitudes of local stakeholders build trust and enhance participation (Mbaiwa and Stronza, 2011, Lyons, 2013, Young et al., 2013a). In a local government initiative (in Florida, U.S.A.) to modify the state’s endangered species act, articulation of why a particular stakeholder’s opinion was not adopted increased transparency and allowed stakeholders to feel more invested in the process (Haubold, 2012). This reflects Hurlbert and Gupta’s (2015) argument that trust building results from early communication of uncertainties, joint knowledge production and shared responsibilities, and transparency in information sources and decision-making.

3.2.2. Self-organized stakeholder action

Our protocol returned a limited number of high-quality references representing self-organized resource management action: one meta-analysis that included self-organized projects (Ruiz-Mallén and Corbera, 2013) and four case studies (Lin and Chang, 2011, Shwartz et al., 2012, Sakata and Prideaux, 2013, Kaiser-Bunbury et al., 2014). We identified several themes across these references. Autonomous governance, rights, power, control, and decision-making by stakeholders appeared to support positive outcomes. A key success factor of a small community-led ecotourism project in Papua New Guinea was the community’s strong agency over the project, with local control over implementation and minimal leakage of economic benefits (Sakata and Prideaux, 2013). Successful self-organized groups make strategic decisions about when to solve problems internally and when to reach out to external actors, for technical, financial, or other resources, for example. External experts can provide benefits for self-organized groups including capacity development, new scientific knowledge, and increased trust as a result of working with cross-institutional arrangements (Ruiz-Mallén and Corbera, 2013). Support can also be provided by external scientists in translating the results of their research into practice and management at the community level (Kaiser-Bunbury et al., 2014).

3.2.3. Dimensions relevant to both externally-driven engagement and self-organized action

3.2.3.1. Local and traditional ecological knowledge. Local and traditional knowledge has a fundamental role in achieving biodiversity conservation goals (Ruiz-Mallén and Corbera, 2013). In three case studies based in Canada’s Arctic, Armitage et al. (2011) note how knowledge co-production between indigenous groups, external scientists, and managers allowed for more effective adaptive management of fisheries. In a coastal British Columbia conservation area managed by the Heiltsuk First Nation, a research agenda in accordance with Heiltsuk customary law allowed for more effective grizzly bear management (Housty et al., 2014). In addition, traditional taboos, informal sanctions, and rituals and ceremonies can enforce behavior that supports natural resource management and conservation goals (Ruiz-Mallén and Corbera, 2013). In Indonesia, Papua New Guinea, and other areas in the Indo-Pacific, traditional ecological knowledge determined appropriate timing of inter-mittent reef closures and their subsequent re-opening, which led to positive biodiversity outcomes (Ruiz-Mallén and Corbera, 2013, Jupiter et al., 2014a).

3.2.3.2. Social, cultural, and political contexts. Contextual conditions vary across scales, from local to international levels; at the local level, stakeholder engagement is both embedded in and affected by broader scale dynamics (Sutton and Rudd 2015, Ekroos et al., 2016, Gurney et al., 2016, Ojha et al., 2016). Local and national governance regimes can impact the level of stakeholder engagement and ultimate success of a project (Bixler et al., 2015). For example, in Nepal, community-based conservation programs were heavily affected by the Mao insurgency, a national political conflict (Baral and Stern, 2011). However, Brooks et al. (2013) found that a well-designed engagement strategy can overcome unfavorable features of the local and national socio-political and economic context. Their multivariate analysis found that when socio-economic and governance variables were considered together, national context did not play an important predictive role in project outcomes, suggesting that conservation projects can succeed in challenging socio-economic and political circumstances. Brooks (2016) expands on this analysis to show that some key aspects of project design (capacity building, local participation, environmental education, and project age) can result in “win-win” outcomes, with alignment between success across social, economic, and/or ecological outcomes. The notion that a challenging context can be overcome with design is further supported by de Vente et al.’s (2016) robust study that analyzed empirical data from participatory projects across two different scenarios; one scenario included 11 projects with minor variation in local context but very different design while the other scenario included a range of social-cultural contexts across 13 similarly designed projects. The results of both scenarios showed that process design principles (including true representation of participants, professional facilitation, and dissemination of information to all participants) were more important than a project’s context for successful outcomes. Elite capture of resources and power undermines key project elements of transparency, trust, and equity (Ahebwa et al., 2012, Karki, 2013). Ruiz-Mallén and Corbera (2013) describe how corruption of a local leader damaged social trust and consequently the saisi (a local marine tenure system) was disputed, contributing to overfishing in Indonesia. Pollini and Lassoie (2011) found that a law designed to transfer rights to communities actually led to the transfer of these rights from a community that was the de facto manager of the resources to a separate group willing to implement state-designed management rules. Social equity, depending on type and context, can have a varying influence on conservation success; research suggests that the best conservation outcome often occurs in instances without perfect equity (Klein et al., 2015). The history of natural resource governance and use in a community offers important context, knowledge of which can help lead to better policy design and effectiveness (Walters et al., 2015).

3.2.3.3. Management strategies. Successful engagement is associated with adaptive management, and organizational and policy flexibility and coordination at all levels (Armitage et al., 2011, Curtis et al., 2014, Jupiter et al., 2014b). An analysis of 22 instances of adaptive management implementation (Fabricius and Cundill, 2014) found that most studies reporting successful conservation outcomes also reported having combined single-loop learning (improving existing practices) and double-loop learning (promoting reflection, evaluation, and innovative
goals, and address conflict (Solomon et al., 2012, Waylen et al., 2015). As an example, Tsouvalis and Waterton (2012) describe how farmers worked together to research lake management issues; they realized that water quality was not just a physical measure with a linear, technical solution but a complex problem whose solution involved addressing system change and the simultaneous creation of viable farming scenarios and a healthy lake. Allowing for collaborative exploration of values and future scenarios can overcome the problem that arises when pre-set environmental outcomes reduce emphasis on dialogue and the development of social norms (Curtis and Lefroy, 2010).

Investing in capacity development can result in attitudinal and behavioral outcomes (Brooks et al., 2013, Mountjoy et al., 2013). A study exploring the link between capacity and natural resource management plan implementation success as reported by practitioners among CBNRM groups in the United States, found that higher levels of group capacity led to greater perceived implementation success, which was viewed as a proxy for conservation outcomes (Mountjoy et al., 2013). Networking and sharing of knowledge and ideas across communities can be an effective way to achieve landscape-level natural resource management by building social capital and facilitating social learning (Ruiz-Mallén and Corbera, 2013, Curtis et al., 2014). Importantly, capacity development should transcend individual training. Investment in capacity development at both individual and institutional levels was directly linked to behavioral success in some studies (Green et al., 2011, Brooks et al., 2013).

Engagement efforts should have sufficient and sustained support (Green et al., 2011, Pilgrim et al., 2011, Richard and Ratsirarson, 2013). Lack of funding can often lead to failure of a program (Pilgrim et al., 2011, Lyons, 2013). In some instances, the formation of local trusts (Mbaiwa and Stronza, 2011) or community agreements (Filardi and Pikacha, 2007, Price et al., 2009) to manage resources that rely on endowed funds were effective strategies for biodiversity conservation.

Qualitative, dialogue-based understandings of environmental problems and potential solutions can improve facilitation. For example, in a cross-method comparison of community-based monitoring programs, Danielsen et al. (2005) found that group discussion techniques were effective in improving collaboration and participation among stakeholders in resource-use regulation. Effective facilitation is important for self-organized and externally-driven projects, given differing opinions, values, and motivations of individuals and subgroups (Reed, 2008, Waylen et al., 2015, De Vente et al., 2016).

4. Discussion

Our mixed methods approach included quantitative and qualitative analysis, which can provide more in-depth explanation and interpretation of complex phenomena associated with stakeholder engagement and project outcomes.

Overall, our quantitative results found no significant relationships after applying a Bonferroni correction. However, if we used an unadjusted p-value, we detected a relationship between attitudinal change towards conservation and four factors: synthesis of stakeholder knowledge and values in decision-making, the inclusion of stakeholder input throughout a project, transparent decision-making and increased trust between stakeholders and planners. Given the lack of significance we are hesitant to draw conclusions from this analysis. Perhaps similar future studies that draw from a larger sample size would be able to overcome this limitation.

Our qualitative analysis led to the identification of engagement dimensions important for different types of stakeholder projects. For externally-driven projects, we found that identifying the right balance and timing of stakeholder engagement is a critical first step. In particular, a focus on “key” (defined by focal stakeholders themselves as well as external organizers) stakeholders is important. In terms of timing, successful programs engage key stakeholders as early as possible and plan for an adequate period of engagement, while simultaneously considering the costs of engagement for local stakeholders.

There are many different levels, qualities, and degrees of stakeholder engagement, and the success of an approach will depend greatly on the context in which it is applied (Arnstein, 1969, Wilcox, 1994, Shirk et al., 2012, Bixler et al., 2015). Engagement approaches range from communication strategies where stakeholders passively receive important information (e.g. public information campaigns), to fully collaborative partnerships between different groups where knowledge is co-created (e.g., participatory action research projects). Arnstein’s (1969) ladder of participation conceptualizes multiple levels of citizen engagement in decision-making processes, ranging from “citizen control” (as the highest form of participation) to “manipulation” (a form of engagement that is in essence “non-participatory,” where select stakeholders serve as figurehead representatives but have no power to influence decisions or actions).

While such linear conceptual models have tended to frame more interactive types of participation as better, critics have pointed out that different methods may be appropriate in different settings and during different project stages (Richards et al., 2004, Tippett et al., 2007). It is common for project initiators to identify and rank stakeholders in relation to their power and interest (Colvin et al., 2016), which can help to determine who, when, and how to engage. Literature on stakeholder analysis notes that the practice of characterizing and classifying stakeholders can result in cognitive and institutional blind spots that lead to recurrent inclusion (and possible professionalization) of ‘usual suspects’ and under-representation of marginalized or less visible groups (Reed et al., 2009, Colvin et al., 2016). Reed (2008) suggests we need to replace the traditional “toolkit” approach, which implies there is a right tool to foster participation in each situation, with an approach that recognizes participation as a process of continual negotiation and decision-making. We conceptualize these engagements as iterative and non-linear, with different groups of stakeholders engaging in dynamic ways through various stages of a program or activity (see Fig. 2).

Understanding and recognizing diverse and multiple value systems is critical to engaging stakeholders at the right time and place and with the right methods. Successful engagement efforts are built from the value base and local context of stakeholders and involve context-appropriate decisions provided by or co-created with stakeholders. It is important to recognize that stakeholders have different motivations for participating in a program. Trust, reciprocity, exchange, and respect are critical variables in collaborations, and are dependent upon effective communication, transparency, outreach, explicit links between participation and benefits, and co-learning throughout the collaboration.

Strong leaders can also be important for program success, and leadership development can build capacity for effective engagement. However, we have found, in our own practice, that when leadership falls mainly on a few people, local leaders often face challenges in balancing attention to local activities with requests for engagement at national and international levels to share lessons learned and facilitate fundraising. Thus, effective stakeholder engagement may need to actively manage and mitigate conflicting pressures on local leadership and build leadership depth beyond a single leader or two.

For self-organized stakeholder action, social-ecological conditions relating to rights and governance play an important role in success. Self-organized stakeholder action also benefits from access to external support, resources, and strategic guidance, but this has to be balanced with the ability to retain control of the process and retain autonomy. Networking can be an effective way to scale across communities and build social capital and support social learning.

In both self-organized and collaborative community-based conservation initiatives, the consideration of multiple sources of knowledge, learning, and capacity building among stakeholders is critical to achieving successful outcomes.
in natural resource decision-making was a key factor contributing to successful conservation. The central role of traditional and local ecological knowledge in decision-making systems contributed to the resilience of broader social-ecological systems. Socio-economic and political contexts affect engagement success, but challenges can be overcome with well-designed strategies, in which flexibility, adaptive management, scenario development, and evaluation are key components. Highly skilled facilitation is a crucial part of effective communication that can help to set common goals and reduce conflict.

Given insufficient evidence, we were not able to systematically compare the engagement dimensions from our qualitative analysis with the outcome domains assessed quantitatively. The heterogeneous nature of the case studies, which covered a range of engagement actions, initiative goals, and assessed outcomes, made systematic comparison using predefined factors such as in the quantitative analysis inappropriate. However, when considering our qualitative results in light of the four specific outcome domains, certain engagement dimensions appear more closely associated with particular outcomes than others. For instance, capacity development (e.g. through activities such as training and educational programs) was associated with achieving both attitudinal and behavioral change. Another engagement dimension important for attitudinal and behavioral change was understanding stakeholder motivations, as projects that consciously integrated stakeholder motivations into project design were more likely to see positive outcomes in attitude and behavior. We also found the engagement dimension of strong local leadership seemed to be important for achieving conservation success, potentially reflecting better compliance with project guidelines.

4.1. The nature of the evidence

A key challenge for biodiversity conservation projects with a stakeholder engagement dimension is the emphasis on multiple outcomes, which makes data collection and evaluation of evidence complex (Baylis et al., 2016). A lack of ecological monitoring in many engagement projects contributes to our limited understanding of how they contribute to biodiversity outcomes (Young et al., 2013a). The abundance of confounding factors that affect outcomes over time may preclude before and after comparisons (or paired controls). Success may manifest itself at different spatiotemporal scales and results may vary across project goals and stakeholder perceptions. Evidence gaps may also exist because project outcomes have not been reported or due to a lack of post-project monitoring (Roe et al., 2015). Our search returns lacked long-term robustly designed evaluations, reflecting patterns Pullin (2015) noted in recent systematic reviews.

The perspective of authors presenting evidence, drawing conclusions, and writing reports and articles frames outcomes (Barbour and Schlesinger, 2012), and the perception of success or failure of an endeavor can greatly vary depending on who is doing the evaluation (Nadasdy, 2003). Project facilitators often hold significant power and responsibility, and are under pressure to deliver and report on goals that may not align with those of local stakeholders. As several authors have noted, failure in conservation is under-documented in the literature (Redford and Taber, 2000, Knight, 2006).

While it is impossible to eliminate or even identify all biases, it is important to be cognizant of potential sources of bias and their impacts. With an exclusive focus on published sources, our Tier 1 search strings may have limited the resulting literature to certain disciplines and perspectives. For example, the term “stakeholder” is contested in many of the critical social science literatures (Friedman and Miles, 2006), where it is less likely to be used as a keyword than for studies published in conservation journals. Similarly, limiting the search to English language publications likely excludes findings from certain countries.

Self-organized engagement perspectives were difficult to capture for this review, as these efforts are generally under-represented in written literature for several reasons. First, self-organized approaches are often inseparable from the social-cultural dynamics of a community (i.e. cultural norms that regulate hunting practices) and are not necessarily framed as “conservation efforts” by those engaged. Second, lessons learned from such approaches are communicated in ways not often recognized in the conservation literature, such as through knowledge-practice-belief complexes passed down from generation to generation (Berkes, 1999). Finally, even when participants in such systems recognize the value of sharing their experiences to academic or professional audiences, they may not have the time, resources, capacities, or access to write and publish their work.

This being the case, for topics such as the effectiveness of stakeholder engagement, there is a need to find additional ways to access the perspectives, stories, and knowledge not typically represented in conservation literature. We believe that engaging with varied academic, professional, and lay perspectives and seeking to learn from other types of knowledges will help us to better understand what works and what could be improved in stakeholder engagement in biodiversity conservation. Thus, while we present evidence from a subset of the peer-reviewed literature, which we believe provides important insights into the issue, we recommend that other types of evidence be synthesized in future assessments (see Fig. 3).

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**Fig. 2.** Intensity of engagement for different stakeholder groups varies across the different phases of a project or program. Phases are depicted around the circle, starting at the upper right. The strength or degree of engagement increases as stakeholders move towards the center. The central square represents stakeholders and organizers who provide project framing and guidance that is central to decision-making throughout the cycle. Other shapes represent diverse stakeholder groups who are engaged at different times and degrees of intensity. The entire process can be iterative with different core decision makers and stakeholders over time. In the above hypothetical example, the square could be a local elder who co-leads the project, the circle could represent a women’s civic engagement group, the heptagon could represent a researcher, and the triangle a neighboring community.
For multifaceted, human attitude, and behavior-related topics such as the subject of this review, conservation planners may want to take “evidence-informed” approaches, sensu Adams and Sandbrook (2013), in order to ensure the inclusion of voices and perspectives not currently found in the literature. These approaches draw from a broad evidence base that includes the peer and grey literatures but also various forms of expert local knowledge and other sources of validated evidence, where validation stems from systems internal to the relevant knowledge system, reflecting the reality that conservation is embedded in complex, multi-scale social contexts where policy and power can influence decision-making (Ekroos et al., 2016). These approaches can also account for data that require subjective interpretation amidst complex and difficult-to-understand patterns of causality (Nilsson et al., 2016).

Better documentation of both successes and failures in engaging stakeholders in biodiversity conservation will also undoubtedly aid understanding of which approaches are likely to be effective or not effective in a variety of contexts. More investments should be made to learn how to synthesize across knowledge systems, ensuring that the best available, appropriately validated evidence is brought to the decision-making process (Tengö et al., 2014). Similarly, strengthening “evidence informed” reviews and the ability to synthesize across data types involves establishing and communicating effective quality assessment criteria for inclusion or exclusion of qualitative and quantitative research. For example, much high quality qualitative research relies on sample sizes that would be unacceptable for quantitative research (Drury et al., 2011). In this study we developed a system for assessing quality by four criteria (Appendix A), but future work could expand or refine our method.

5. Conclusion

Many aspects of the role of stakeholder engagement in biodiversity conservation outcomes remain poorly understood. This may be in part because it is such a complex, multidimensional, and multiscale endeavor. More work needs to be done to gather robust evidence on outcomes, as well as on effective project design and methods for engaging stakeholders. This is an important time for conservation practice. The conservation community is examining fundamental assumptions about how conservation should be carried out, and how it should be integrated with other spheres of human endeavor. The value of systematic reviews is in their ability to synthesize across case studies and develop recommendations based on multiple strands of evidence. We advocate for expanding the types of evidence assessed in reviews of complex topics to more fully and rigorously integrate qualitative research. In our case, this approach has led to a set of richer, more multifaceted findings than the quantitative approach alone. We believe implementing an evidence-informed approach, which can incorporate knowledges from sources other than the published literature, in future reviews will bring the field another step forward towards developing strategies that are effective and responsive to the diverse and dynamic local conditions in which biodiversity conservation operates.

Acknowledgements

This work was made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of its requisition number REQ-EGAT-12-000014 (Measuring Impact) implemented by Environmental Incentives, LLC; Foundations of Success; and ICF International. Measuring Impact has been issued under contract number AID-OAA-C-12-000078 and supports the same program objectives as described in RFP number SOL-OAA-000050. The Measuring Impact initiative is funded and managed by the USAID Office of Forestry and Biodiversity/Bureau for Economic Growth, Education and the Environment. The authors’ views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government. Portions of earlier analyses of this work are summarized in a USAID Brief, Stakeholder Engagement for Biodiversity Conservation Goals: Assessing the Status of the Evidence (http://pdf.usaid.gov/pdf_docs/PA00M2M6.pdf). We are grateful to Joe McCarter for comments and input, Nadav Gazit for graphic design, and Trisha Gopalakrishna and Kelley Roberts for contributions to data collection and analysis. Two anonymous reviewers provided comments that improved an earlier version of this manuscript.


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