

## **Appendix 1: Definitions of institutional process and outcome variables used in review**

Below, we provide additional information on the institutional processes, or conditions, and social and ecological outcomes used in this review. We include definitions of each of the concepts with examples and sources from the literature, and the criteria for how each was coded. The inclusion and exclusion criteria for each of the institutional processes were first identified and defined deductively from the literature and further refined using an iterative and collaborative process of individual and joint coding of the cases in the review. The coding structure also was used to isolate segments of text that reported social and ecological outcomes. These codes and concepts were developed based on the sustainable livelihoods framework and ecology parameters as defined by Plummer and Armitage (2007) and DfID (1999). Each case was read in entirety and coded for institutional processes as present, absent, or missing (1, 0, and n/a, respectively). Outcomes were coded as positive, negative, mixed, or missing (1, 0, mixed, and n/a, respectively). The “absence” of any variable was only coded as such if reported as absent; variables that were not reported in each case were coded n/a, i.e., failure to report was not interpreted as evidence of absence.

### **Institutional Processes**

We developed coding criteria for a sub-set of institutional processes from the adaptive co-management, adaptive governance, and CBC literature used in our conceptual framework. These have been considered as “conditions” that lead to successful outcomes in CBC initiatives. Variables were coded as dichotomous (presence/absence; yes/no). Cases that did not report on these were coded as n/a, or missing, to identify gaps. We first provide some detail about each of the institutional processes with examples from the literature, followed by Table A1 which provides definitions of each, and the specific criteria used to code as present or absent.

1. **Established—Established/Not Established:** Conservancies that are less than 10 years old are not established, while conservancies older than 10 years are. This is defined by  $>$  or equal to 10 years since conservancy started and date of study. This code is consistent with several studies that suggest successful CBC initiatives, and adaptive-comanagement (A-CM), take time to develop (e.g., Seixas and Davy 2008; Seixas and Berkes 2010; Armitage et al. 2009), and from studies in our database that mentioned the year of establishment was an important social variable to consider (e.g., Gandiwa et al., 2013; Naidoo et al. 2011; Collomb et al. 2010).
2. **Leadership—Present/Absent:** This code refers to whether key players and/or leaders were instrumental in catalyzing the development of a CBC initiative. This characteristic is considered an “ingredient” for successful CBC projects in Seixas and Davy (2008), and is highlighted in the comanagement literature (e.g., Olsson et al. 2007; Plummer 2009; Plummer et al. 2013; Armitage et al. 2009; Plummer and Armitage 2007) as an important condition for successful comanagement projects. In this sense, leaders as “agents of change” provide the windows of opportunity to catalyze the development of CBC initiatives, where they, for example, create value through pulling elements and people together (e.g., technical, funding, and/or political support), express a clear and compelling vision centered around common values and trust, and facilitate an open and interactive dialogue among stakeholders. While strong leadership is considered an important characteristic for the initiation of CBC’s and throughout the tenure of a CBC, we use this code to refer only to the presence of strong leadership with these characteristics at the inception of the CBC. This is because the process of collaboration (see collaboration code) captures many elements of leadership, and lack of leadership, once the CBC has been established, including for

example, elite capture, lack of openness and inclusiveness in dialogue and transactive decision-making regarding CBC initiatives and management.

3. **Bridging or Boundary Organizations—Present/Absent:** This code refers to the role of a particular organization/institution in linking communities across levels of organization, with the purpose of providing a range of services including “raising startup funds; institution building; business networking and marketing; innovation and knowledge transfer; and technical training” (Seixas and Berkes 2010: 183). The importance of these organizations is also emphasized in Berkes (2007), Olsson et al. (2007), Cash and Moser (2000), among others.
4. **Diverse and Multiple Partnerships—Present/Absent:** As per Seixas and Berkes (2010), the diversity and number of partnerships is cited as an ingredient for success. In this case, successful cases had between 10-15 partnerships at various scales. Therefore, cases that report >10 partnerships are coded as 1 (present), while those that report < 10 partnerships are coded as 0 (absent). We assume that if partnerships are listed, the list is exhaustive. N/A is used if the vertical/horizontal arrangements are not mentioned in the case study, or if the article happens to be a multiple case study and there is not enough information to determine the number of partnerships that are specific to each case. N/A is also used if the article mentions <10 partnerships, but also mentions “among others”, “etc.” or something to that effect.
5. **Collaboration—Present/Absent:** This refers to the communication and negotiation, and transactive decision-making, where emphasis is on shared understanding, diverse inputs, and equity in decision making. This code is used to delineate segments of text that address the ways in which particular governance arrangements are functioning and the collaboration (or not) within CBCs and between organizational levels. It addresses issues of power, elite capture, corruption, transparency and accountability, equity/empowerment in decision making and participation among groups, etc. This was adapted from the comanagement (Plummer and Armitage 2007; Berkes 2009; Armitage et al. 2009) and the CBC-specific literature (e.g., Berkes 2007; Berkes 2004).
6. **Social Learning (including Monitoring & Assessment)—Present/Absent:** Social learning refers to the role of experimental and experiential learning (learning by doing), monitoring, and modifying plans/objectives in a reflexive framework. This definition is adapted from the Plummer and Armitage (2007) comanagement framework, and is emphasized in several other comanagement and CBC-specific literature as an important process in CBCs (e.g., Berkes 2004, 2007, 2009; Armitage et al. 2009; Seixas and Berkes 2010).
7. **Devolution or rights to local community—Yes/No:** This code was used if rights/responsibilities have been devolved to local community members. For instance, in Namibia, conservancies are recognized by the Nature Conservation Amendment Act of 1996, whereby wildlife rights are devolved to communities on communal land. An example from Mburu and Birner (2007) emphasizes how management arrangements can differ; Wildlife Partnerships in Kenya are controlled by the Kenya Wildlife Service, while other arrangements in Kenya develop local county councils where management is devolved to local institutions. Finally, in some cases, the CBC governance model could have provided some rights to local communities to allocate funds to building physical infrastructure, but were described overall as top-down and prescriptive, which limited options of local communities to take control of management decisions (e.g., Marks 2001).

8. Monetary Incentives—Yes/No: This code (and nonmonetary incentives) is derived from Berkes (2004) and Seixas and Berkes (2010), in addition to several other studies that discuss the benefits and detriments of direct incentives (those incentives that are given directly to household members and/or participating members of the CBC) and indirect incentives (those incentives that support community development; e.g., Saarinen 2010; Silva and Mosimane 2012, 2014; Gibson and Marks 1995). Some emphasize one over the other, for example the importance of providing direct incentives will deter the free-rider problem, while indirect incentives will offset cost of community members who do not benefit directly from conservation but bear much of the costs. Although CBCs are traditionally structured around the premise that community members protect wildlife/resources in exchange for economic (monetary) incentives, many community members do not consider these adequate incentives. Therefore, there is a mismatch between what conservationists consider sufficient benefits, and what communities do. In many cases, communities consider equal participation in decision-making processes, education/training opportunities, and land tenure arrangements as, if not more, important than direct benefits.
  
9. Non-Monetary Incentives—Yes/No: This code (and monetary incentives) is derived from Berkes (2004) and Seixas and Berkes (2010), in addition to several other studies that discuss the benefits and negatives of direct incentives (those incentives that are given directly to household members and/or participating members of the CBC) and indirect incentives (those incentives that support community development; e.g., Saarinen 2010; Silva and Mosimane 2012, 2014; Gibson and Marks 1995). Some emphasize one over the other, for example the importance of providing direct incentives will deter the free-rider problem, while indirect incentives will offset cost of community members who do not benefit directly from conservation but bear much of the costs. Although CBCs are traditionally structured around the premise that community members protect wildlife/resources in exchange for economic (monetary) incentives, many community members do not consider these adequate incentives. Therefore, there is a mismatch between what conservationists consider sufficient benefits, and what communities do. In many cases, communities consider equal participation in decision-making processes, education/training opportunities, and land tenure arrangements as, if not more, important than direct monetary benefits.
  
10. Conservation model in-line with cultural worldviews and practices—Yes/No: This code stems from Berkes' (2004) emphasis on incorporation of Traditional and Local Ecological Knowledge into CBC projects and developing a cross-cultural conservation ethic. In other words to ensure that CBC is compatible with cultural models and views regarding people-nature relationships, and in many cases developing CBCs for resource and wildlife sustainability in places/cultures where sustaining these resources and wildlife is consistent with cultural worldviews (e.g., establishing a Hippo Sanctuary in an area where local groups have taboos against killing Hippos, (Sheppard et al. 2010), and does not infringe on cultural/livelihood practices (e.g., Songorwa 1999; Dyer et al. 2014). This was expanded on by a recent article Gavin et al. (2015).

Table 1.1. Description of institutional processes, or conditions, and their sources.

| Processes/Conditions | Code            | Explanation   | Sources  |
|----------------------|-----------------|---------------|--|
| Year Established     | Established     | >10 years old | Seixas & Davy, 2008;<br>Seixas & Berkes, 2010;<br>Armitage et al., 2009;<br>Gandiwa et al., 2013 |
|                      | Not Established | <10 years old |  |

|  |         |  |   |
|--|---------|--|---|
| Leadership/Key players   | Present | At inception of a CBC  | Seixas & Davy, 2008; Olsson et al., 2007; Plummer, 2009; Plummer et al., 2013; Plummer & Armitage, 2007 |
|  | Absent  |  |   |
| Bridging/Boundary Organizations                                | Present | Links communities across levels of organization  | Seixas & Berkes, 2010; Berkes, 2007; Cash & Moser, 2000; Olsson et al., 2007                            |
|  | Absent  |  |   |
| Diverse/Multiple Partnerships                                  | Present | >10 partnerships   | Seixas & Berkes, 2010   |
|  | Absent  | <10 partnerships   |   |
| Collaboration  | Present | Transparency, equity, communication  | Armitage et al., 2009; Berkes, 2009, 2007, 2004; Plummer & Armitage, 2007                               |
|  | Absent  |  |   |
| Social Learning  | Present | Learning by doing, monitoring and assessment   | Armitage et al., 2009; Berkes, 2009, 2007, 2004; Plummer & Armitage, 2007; Seixas & Berkes, 2010        |
|  | Absent  |  |   |
| Devolution of rights to local community                        | Yes     | Rights/responsibilities devolved to local community  | Mburu & Birner, 2007; Marks, 2001   |
|  | No      |  |   |
| Monetary Incentives  | Yes     | Individual/household; financial capital  | Seixas & Berkes, 2010; Berkes, 2004; Silva & Mosimane, 2012, 2014                                       |
|  | No      |  |   |
| Non-monetary incentives  | Yes     | Individual and/or community; human, social, and physical capital   | Berkes, 2004; Saarinen, 2010; Gibson & Marks, 1995; Sliva & Mosimane, 2012                              |
|  | No      |  |   |
| Cultural Worldviews/Practices Considered in Conservation Model | Yes     | Links between local, traditional, and traditional ecological knowledge with; cross-cultural conservation ethic | Berkes, 2004, Sheppard et al., 2010; Dyer et al., 2014; Songorwa, 1999; Gavin et al., 2015              |
|  | No      |  |   |

### ADDITIONAL LITERATURE CITED

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### Social and Ecological Outcomes

Tables 1.2 and 1.3 define and provide examples of each of the social and ecological outcomes that were coded for in this review.

Table 1.2. Description of capital assets used to code social outcomes in the review (adapted from Plummer and Armitage, 2007 and DfID, 1999)

|   |  |
|---|--|
| Social Capital                              | Networks, connections, trust, shared values, leadership, common rules and sanctions, mechanisms for participation in decision-making, leadership, pride/emotional investment |
| Human Capital                               | Health, education, capacity to work, gain new skills, security <sup>+</sup>  |
| Physical Capital                            | Infrastructure, tools, technology, water, communications   |
| Financial Capital                           | Savings, wages, economic diversification, financial independence, poverty alleviation  |
| Equal Distribution of Benefits <sup>±</sup> | The benefits are evenly distributed across CBC members   |

+Security (from conflict due to e.g., livestock raiding, poaching) was added as it was found to be important in a number of cases

±Found to be important in some of the cases

Table 1.3. Description of parameters used to code ecological outcomes in the review (adapted from Plummer and Armitage, 2007)

|                      |   |
|----------------------|---|
| Components           | All living and non-living material, e.g., keystone species, vegetation communities  |
| Relationships        | Underlying processes and interaction to ecological patterns, e.g., biomass productivity, nutrient cycling, change in vegetation                               |
| Diversity/Redundancy | Species richness and diversity  |
| Memory/Continuity    | The ways species and processes are linked through space and time, e.g., edge effects, ecosystem/habitat integrity and connectivity, patchiness, fragmentation |