Models for the collaborative management of African protected areas

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29 **Abstract**

30 Africa's protected areas (PAs) are under severe and growing anthropogenic pressure.
31 Resources for PA management are a small fraction of what is necessary in most countries,
32 and many PAs are failing to fulfil their ecological, economic or social potential as a result.
33 Collaborative management partnerships (CMPs), where non-profit organisations partner with
34 state wildlife authorities, have the ability to improve PA management by facilitating long-
35 term financial and technical support. While many have demonstrated success, there are
36 barriers to setting up CMPs, including concern among some states that some partnerships
37 may undermine sovereignty or appear an admission of failure. We interviewed 69 experts
38 from state and non-profit partners about 43 PAs covering 473,861 km^2 in 16 African
39 countries and analysed responses with principle component analysis to identify how
40 partnerships differ, particularly in how they allocate governance and management
41 responsibility. We identified three main CMP organisational structures: 1) delegated
42 management, where a non-profit shares governance responsibility with the state and is
43 delegated full management authority; 2) co-management, where a non-profit shares
44 governance and management responsibility with the state; and 3) financial and technical
45 support (advisory or implementary), where a non-profit assists the state with aspects of
46 management without formal decision-making authority. Delegated models were associated
47 with higher funding than co-management and financial-technical support partnerships, but
48 models did not differ in PA land area size. Our study identifies the strengths and weaknesses
49 of each model and offers recommendations for implementing successful CMPs, many of
50 which are already playing a significant, positive role in conservation.

51

52 **Key words:** co-management; delegated management; financial-technical support;
53 government; non-profit organization; public-private partnership

1. Introduction

Terrestrial and marine protected areas (PAs) represent the "cornerstone" of global conservation efforts (Geldmann et al., 2013; Mascia et al., 2014), and are the basis for some of the most successful global conservation achievements. PAs currently cover 15.4% of the world's land—an area larger than the African continent—and 3.4% of oceans (Juffe-Bignoli et al., 2014). Through the Convention on Biological Diversity, governments worldwide have committed to increasing PA coverage to 17% of terrestrial areas and 10% of marine areas by 2020 (Convention on Biological Diversity, 2010). Achieving that target will require strong multi-stakeholder partnerships to leverage and maintain the necessary political will and financial resources.

Africa's PA networks support the world's highest diversity and abundance of megafauna and as such, host biodiversity of substantial global value (Ripple et al., 2016). Several African nations have been highly rated on a global index of contributions towards the conservation of megafauna, due in part to the presence of large PA networks within and across countries (Lindsey et al., 2017a). However, Africa's PA network is severely threatened by ineffective management resulting from under-funding and lack of capacity (Lindsey et al., 2017b; Mansourian and Dudley, 2008; Watson et al., 2014). Acute and growing human threats, combined with inadequate financial and human resources, have contributed to widespread, steep declines in wildlife populations (Bouché et al., 2012; Craigie et al., 2010; Lindsey et al., 2014; Struhsaker et al., 2005). Elephant populations have declined significantly in several countries due to intense poaching and inadequate law enforcement, and populations of many other species are being lost due to illegal hunting for bushmeat and other wildlife products (Thouless et al., 2016). In some PAs where substantial funding exists, donor funding is nevertheless not spent effectively due to inefficiency, poor choice of focal projects and corruption (Alcorn et al., 2005; Lindsey et al., 2016; McBride et al., 2007).

79 Donor funding that is allocated in large, non-recurrent, or inconsistent and unpredictable
80 amounts can also fail to deliver lasting improvements in PA management (Lindsey et al.,
81 2016). State (here used interchangeably with 'government') wildlife authorities frequently do
82 not have the capacity to absorb such large, one-off quantities of donor funding effectively,
83 nor the human resources necessary to deliver effective wildlife management (Bewsher et al.,
84 2016; O'Connell et al., 2017).

85 The establishment of collaborative management partnerships (CMPs) between state
86 wildlife authorities and non-profit organisations (hereafter 'non-profits') have potential to
87 address several of these challenges. Though CMPs have existed for many decades, in recent
88 years their number has increased in parts of Africa (Hatchwell, 2014; Nyirenda and Nkhata,
89 2013). This proliferation mirrors a global trend towards reduced reliance on state funding and
90 management for PAs, increased participation by stakeholders in PA management and
91 associated changes in legislation (Alcorn et al., 2005; Dearden et al., 2005). Given the wide
92 array of CMPs in existence, a framework would aid in understanding the differences between
93 various partnership models, understanding the tradeoffs between them and ultimately
94 identifying the situations in which each model is most appropriate and likely to succeed. Such
95 a framework, by clarifying the types of CMPs and the language used to describe them, also
96 has potential to address concerns about CMPs that persist among some states, non-profits and
97 sectors of civil society, and that may thereby inhibit CMP establishment and effectiveness
98 (Kunambura, 2017).

99 Although not all CMPs are with non-profit organisations, for the purposes of this study
100 we focused solely on partnerships between states and non-profits. While there is already a
101 wealth of literature on CMPs between local communities and state authorities (e.g. Borrini-
102 Feyerabend et al., 2013; Carlsson and Berkes, 2005; Koontz, 2016; Lockwood et al., 2012),
103 relatively little attention has been paid to the structure of relationships between states and

104 non-profit partners for PA management (Dearden et al., 2005; Hatchwell, 2014). In order to
105 understand and categorize these CMPs, we focused on two distinct and fundamentally
106 important dimensions of PA decision-making authority: governance and management
107 (Borrini-Feyerabend et al., 2013). Governance arrangements describe who has the power to
108 set overall priorities and strategies, and how such decisions are made. Management, by
109 contrast, involves the practical, day-to-day implementation of governance decisions. Most
110 discussions about CMPs have not clearly distinguished between governance and management
111 authority (Borrini-Feyerabend et al., 2013; Carlsson and Berkes, 2005; Dearden et al., 2005;
112 Sen and Raakjaer Nielsen, 1996). However, whether decision-making is shared at a
113 governance or a management level (or both) yields markedly different arrangements with
114 varying implications. As a result, although 'co-management' is now a buzzword in
115 conservation, it can also be a source of confusion since it encompasses a wide variety of
116 governance and management arrangements (Lockwood et al., 2012; Zurba et al., 2012).
117 Similarly, the terms 'public-private-partnership' and 'public-private-community-partnership'
118 are commonly and inconsistently used to describe a broad range of relationships. Establishing
119 a clear typology is essential for understanding the range and implications of different
120 partnership models.

121 We examined CMPs as they currently exist in Africa with the goal of answering four
122 questions: 1) Do distinct partnership models exist and if so, 2) what are their characteristics?
123 3) If distinct models do exist, what are the strengths and weaknesses of each, and 4) what are
124 the conditions under which each model might be most successful? We focus our investigation
125 on partnerships between states and non-profits across Africa and discuss the implications of
126 our findings for PA management globally.

127

128 **2. Methods**

129 We focused on CMPs for the management of state-owned, terrestrial PAs in Africa. We
130 excluded partnership arrangements for community conservation areas and between private
131 companies and wildlife authorities where the primary objective is delivering financial profit
132 (e.g. trophy hunting or photographic tourism). We identified as many PAs as possible in
133 which management decision-making authority for a state PA is formally shared with or
134 delegated to a non-profit partner. We also identified numerous partnerships in which non-
135 profits provide financial and technical support without formally sharing in governance or
136 management decision-making. Because of the abundance of this latter type of PA support, we
137 sampled only a subset of these arrangements. The sample included different types of support
138 spread across different parts of the continent; interviews on this model were ceased when
139 they became repetitive and no longer generated significant new insights. We identified CMPs
140 through networking with professional colleagues in African governments, PA authorities,
141 non-profits and donor sectors, and through reading peer-reviewed literature. We used
142 snowball sampling to exhaustively pursue leads.
143
144 *2.1 Semi-structured interviews*
145 We conducted semi-structured interviews orally over the phone and, where this was not
146 possible, through written surveys. We interviewed several respondent groups: a) senior
147 officials from state wildlife authorities; b) senior management representatives from non-
148 profits involved in CMPs; c) park level representatives from state wildlife authorities; d) park
149 level representatives from non-profits; and e) independent consultants working in multiple
150 PAs. Between May 1 and October 31, 2016, we interviewed 69 respondents (Appendix S1):
151 22 participants from state wildlife authorities in 16 countries, 45 participants from 21 non-
152 profits and two independent consultants. Of our non-profit respondents, 17 were from the
153 national and international level and 35 from the PA level (levels were not mutually exclusive

since some respondents had experience at both levels). Of the state respondents, 15 were from the national level and seven from the PA level. The two independent consultant respondents worked at an international level. Respondents provided information on CMPs in 43 PAs, encompassing 473,861 km^2 primarily across southern, central and eastern Africa (Fig 1, Appendix S2). Most PAs (93%) fell in IUCN Protected Area Categories I through IV.

Respondents were asked open-ended questions about the characteristics, strengths, and weaknesses of CMPs. Questions addressed the following main themes: constraints to effective management of the PA; funding needs of PA; motivation for engaging in CMPs; how the CMP originated; description of CMP structure; legal agreement; likeliness to pursue future CMPs; and lessons learned. We asked respondents to provide answers for specific CMPs with which they had direct experience. Interviews were transcribed and answers coded into categories for analysis. Interview methods were approved in advance by Oxford University's Research Ethics Committee.

2.2 Workshop

To identify key elements of success in CMPs, a three-day symposium was organised to bring together a wide array of stakeholders on the topic of conservation, collaboration and management support. The symposium was organised through the Southern African Development Community (SADC) Transfrontier Conservation Area Network and attended by more than 100 experts involved in CMPs in Africa, representing wildlife authorities from 10 countries (Botswana, Kenya, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe), 20 non-profits as well as the private sector, communities and bi- and multi-lateral donors (Bewsher et al., 2016). The symposium included a workshop in which delegates were divided into working groups and asked to discuss the key elements and lessons learned of three baseline CMP models: co-management, delegated management

179 and financial-technical support partnerships (see Results for definitions). Participants also
180 scored the aspects of each CMP model that were most important to success. We report the
181 outcomes of these discussions qualitatively to contextualise practitioners' recommendations.
182
183 *2.3 Protected area size and funding*
184 To understand the geographic and financial scope in which partnership models are
185 implemented, we examined the PA size and non-profit funding levels associated with each
186 CMP model. We obtained PA size data from the World Database on Protected Areas
187 (https://www.protectedplanet.net, accessed March 2017). Funding data were directly
188 requested and obtained from the non-profit partners associated with the majority of the study
189 PAs (n = 28; 64%). These data represent the 'average' annual investment in management
190 activities (converted to 2015 US$ using a Consumer Price Index calculator,
191 https://www.bls.gov/data/inflation_calculator, accessed July 2017) by the non-profit partner
192 in the PA. We examined differences between CMP models by funding and size using
193 ANOVA followed by Tukey post-hoc tests to examine pairwise differences.
194
195 *2.4 Model analysis*
196 We used principal component analysis (PCA) to explore correlations between CMP
197 characteristics and identify distinct models. In preparation for analysis, interview data were
198 compiled and synthesised by PA to identify the authority responsible for various components
199 of governance and management. For governance, we examined the authority responsible for:
200 1) overall strategy, 2) oversight, and 3) hiring and firing of senior management staff. For
201 management, we examined who had authority for: 1) lead overall management, 2) hiring and
202 firing of general staff, 3) implementation of management actions, 4) law enforcement
203 operations and 5) hiring and firing of law enforcement staff. We created distinct categories

for law enforcement because this division was sometimes managed separately from other elements of management. We assigned the authority responsible for each of these eight categories based on a gradient of partnership relationships: 'state' (wildlife authority leads decision-making), 'independent' (state and non-profit make decisions independently, e.g. regarding their own separate staff or funds), 'shared' (state and non-profit share authority), 'special purpose entity' (an entity created jointly by the state and non-profit leads decision-making) and 'non-profit' (non-profit partner leads decision-making). Critically, categories were assigned based on formal decision-making power, rather than informal practice, which sometimes differed. Data were coded, normalised and scaled prior to analysis. We ran PCA analyses in the R package 'vegan' (Oksanen et al., 2017) and used the broken-stick method to identify non-trivial components (Jackson, 1993).

We assessed whether CMP characteristics formed distinct models by performing a hierarchical agglomerative cluster analysis. We ran analyses in the R packages 'vegan' using Euclidean distance and Ward linkages and found similar cluster outcomes between 'single', 'complete' and 'average' method settings (Oksanen et al., 2017). We then identified the optimal number of distinct clusters (using the 'average' cluster output for simplicity) to calculate the mean silhouette width using the R package 'cluster' (Maechler et al., 2015). All statistical analyses were run using R version 3.3.3 (R Core Team, 2015).

3. Results

PCA identified one non-trivial principal component that explained 86% of the variance (standard deviation of 2.6). Cluster analysis identified an optimal arrangement of ten models representing different types of partnerships (Fig. S1), however we combined several models with similar characteristics and closely related clustering (Fig S2). This produced five models representing three overarching CMP structures (Fig 1, Fig 2): delegated management, co-

229 management (and project co-management) and financial-technical support (comprised of
230 advisory and implementary) (model definitions in Table 1 and following sections).
231 Data on non-profit partner funding were available for 50% (n = 6) of delegated
232 management, 58% (n = 7) of co-management, 100% (n = 1) of project co-management, 67%
233 (n = 8) of financial-technical advisory and 83% (n = 5) of financial-technical implementary
234 PAs. The three general model types differed in non-profit funding ($F(2) = 5.128$, $p = 0.015$)
235 but not PA size ($F(2) = 0.613$, $p = 0.547$), and the five detailed models did not differ by
236 funding ($F(4) = 2.531$, $p = 0.071$) or size ($F(4) = 0.743$, $p = 0.569$; however, we report
237 funding and size below to show minor trends). Below we outline quantitative PCA results
238 used to identify models, as well as qualitative information synthesised from interviews and
239 the workshop. We used these results to compile a general framework of models (Table 1).
240
241 *3.1 Delegated management models*
242 PCA identified 12 (28% of PAs) 'delegated management' partnerships covering 61,269 km^2
243 (18% of the PA land area in our survey) in eight countries (Central African Republic (CAR),
244 Democratic Republic of Congo (DRC), Chad, Madagascar, Malawi, Republic of the Congo,
245 Rwanda and Zambia). In these models, a special purpose entity is typically (but not always)
246 created to oversee governance and management of the PA. The governance body typically
247 operates by consensus, though the non-profit frequently nominates a majority of its members.
248 Governance-level decisions regarding strategy and oversight are shared between the state and
249 non-profit partner. By contrast, the non-profit partner appoints high-level management staff
250 and has full management responsibility on the ground, which assists it in both securing and
251 being accountable for donor funding and for conservation outcomes.
252 Protected areas with delegated management models were smaller than PAs in other
253 models (mean 5,106 km^2, range 538-17,600 km^2) and had higher levels of non-profit

254 investment (mean \$1,239/km^2, range \$147-2,768/km^2) than PAs in co-management and
255 financial-technical support partnerships (Tukey post-hoc tests: $p = 0.039$ and $p = 0.014$,
256 respectively). Delegated management models typically inject significant finances, which are
257 needed to turn prospects around in PAs facing serious challenges, and non-profits generally
258 require revenue retention at a park level. These models typically established the most
259 comprehensive, legally-binding and long-term agreements compared to other models. They
260 are most frequently 20-25 years with an option to renew, although one partnership agreement
261 was for only 5 years (with automatic renewal) and another was for 50 years.
262 Both state and non-profit respondents recognised the major strength of delegated
263 management as relieving states of a financial burden while delivering effective management.
264 Non-profit partners identified the key advantage as having the ability to efficiently execute a
265 vision for the improvement of a PA, including the ability to select high quality staff and
266 remove non-performing or corrupt personnel. With full and direct management responsibility
267 on the ground, non-profits are clearly accountable for delivering conservation outcomes and
268 cannot easily shift responsibility for unachieved results to the state partner (as may occur in
269 other models). Non-profit respondents also highlighted that delegated management models
270 attract donor funding that may otherwise not be available, and suggested that they do so by
271 offering confidence to donors that money will be well spent in countries that otherwise
272 experience capacity, governance or corruption issues. The delegated management model thus
273 has the potential to mobilise increased investment in PAs and associated tourism industries,
274 which in turn can yield a "development dividend" (non-profit respondent) for remote rural
275 areas with few alternative economic avenues. Several respondents noted that the explicit goal
276 was to harness this large influx of investment to transform a PA and increase its financial
277 sustainability over time. Finally, some respondents suggested that the long-term nature of
278 delegated management arrangements can develop capacity more effectively than other

279 models "where NGOs engage for 2-5 years and spend significant amounts of money
280 supporting states, before exiting and letting the status quo return" (non-profit respondent).
281 The primary disadvantage of the delegated model is political, where some state
282 representatives expressed resistance to delegated management due to feelings of
283 disempowerment and loss of sovereignty, a concern of PAs appearing "sold" to foreigners or
284 embarrassment at state management having "failed." Relatedly, there are complex issues of
285 legitimacy when states delegate authority for law enforcement in a PA to a non-state partner.
286 As a result, states that are willing to fully delegate management have generally only been
287 willing to do so in the most depleted and underperforming PAs, under conditions of extreme
288 resource limitations or in PAs with the least tourism potential.
289
290 *3.2 Co-management models*
291 We identified 12 PAs (33%) in the 'co-management' model covering 113,089 km^2 (24%) in
292 seven countries (CAR, DRC, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe).
293 Structurally, co-management models may take an 'integrated' approach, in which the partners
294 jointly create a special purpose entity, or a 'bilateral' approach, in which the government and
295 non-profit work side by side in their existing organizational forms. Substantively, co-
296 management arrangements involve more equal sharing of authority than delegated
297 management, with the state and non-profit typically sharing governance responsibilities as
298 well as some or all aspects of management. In many cases, however, law enforcement
299 operations are formally led by the state wildlife authority, and hiring and firing of law
300 enforcement and other staff is under the sole purview of the state wildlife authority or
301 undertaken independently by the partners (who each employ their own personnel). PAs under
302 co-management were larger on average than those under delegated management (mean 9,424
303 km^2, range 390-42,000 km^2) and involved moderate levels of non-profit funding (mean

304 $295/km^2, range $43-593/km^2) compared to other models. One additional PA – Limpopo
305 National Park in Mozambique – presented a related but separate additional model that we
306 termed 'project co-management.' In this model, the state and non-profit shared governance
307 and management authority regarding a large 'project', which supplied the vast majority of PA
308 funding, and established special decision-making structures to do so. Responsibility for
309 anything outside the scope of project funding remained with the state. Limpopo is moderate
310 in size (10,000 km^2) with a lower level of non-profit funding ($116/km^2). The basis for co-
311 management agreements was usually legally-binding written agreements, which were
312 typically of 10-20 years in duration, with the possibility of renewal.
313 Several respondents noted that a major benefit of co-management is that the state and
314 non-profit can capitalise on the unique strengths of each party. In the words of one non-profit
315 representative, it "marries a local, contextual, political understanding with international,
316 technical and financial capacity and best practice." State respondents appreciated the sharing
317 of knowledge and expertise, along with the sharing of risk and responsibility. Additionally,
318 some state respondents acknowledged the value of an external partner injecting fresh ideas
319 and management styles. As with delegated management, non-profit respondents commonly
320 stressed that co-management agreements unlock funding that would not otherwise be
321 available. Some respondents felt that the collaborative nature of co-management projects
322 means that they have potential to build more capacity within the state authority than other
323 models, and are thus less vulnerable to collapse if a non-profit partner disengages. The non-
324 profit's formal contribution to decision-making and long-term commitment in a co-
325 management arrangement means that the non-profit potentially has a more transformative
326 impact compared to financial-technical support partnerships employed in similar contexts.
327 Co-management shares some of the disadvantages of the other models. For example, the
328 model is subject to some of the political sensitivities associated with delegated management.

Like financial-technical support models, co-management is highly impacted in the event of a breakdown in relationships and is more exposed to political interference. The co-management model also has disadvantages that are unique to its structure. The need to align two distinct entities can lead to: confusion over roles and responsibilities; elevated risk of conflict and misunderstandings; and slower and more bureaucratic decision-making due to the need for consensus over management decisions.

3.3 Financial-technical support models

'Financial-technical support' partnerships comprised two models, depending on whether the non-profit played an 'implementary' (12 PAs or 27%) or solely 'advisory' (6 PAs or 14%) role. Implementary models covered 25,870 km^2 (8%) in the Republic of the Congo, Ethiopia, Kenya and Zambia, while advisory models spanned 133,713 km^2 (39%) in Benin, DRC, Ethiopia, Kenya, Tanzania, Uganda and Zambia (however, note that our sample of PAs using financial-technical models was not exhaustive). In this model, the state was the main authority, and in the case of advisory financial-technical partnerships, the dominant player across all categories of governance and management. In implementary financial-technical models, non-profits played a role in the hiring and firing of some general and/or law enforcement staff, and shared implementation of some management decisions. Implementary models were used in small to moderately-sized PAs (mean 4,312 km^2, range 734-8,316 km^2) but advisory models were implemented in PAs across a vast size range (mean 11,142 km^2, range 179-32,748 km^2) that included some of the largest parks. Both implementary and advisory models were used in PAs with moderate levels of non-profit funding relative to other models (implementary mean of \$253/km^2 with range \$64-575/km^2 and advisory mean of \$242/km^2 with range \$4-1365/km^2). Written agreements for financial-technical support arrangements were typically short (often 3-5 years), though frequently renewed, enabling

such projects to continue for many years. Agreements frequently took the form of a simple project document or Memorandum of Understanding (MOU), allowing either partner to end the relationship with relative ease.

Both government and non-profit respondents view the financial-technical support model as creating a flexible and potentially cost-effective arrangement that has the potential to make a significant conservation impact. These models allow for the engagement of a wide array of non-profits, including those that lack the resources or capacity to engage in co- or delegated management. Financial-technical support models were popular among state wildlife authorities, which considered them to bridge gaps in funding and human resources, and to provide an opportunity for capacity building. Both state and some non-profit respondents viewed financial-technical support models as empowering (as opposed to replacing) the state authority, and therefore recognised the state's role as "the appropriate authority in the long term" (non-profit respondent). Some non-profit respondents stressed that by engraining capacity in the local wildlife authority, these models permitted a realistic exit strategy. These models also allowed non-profits to work in areas where states were not willing to consider co-management or delegated management models – because a country already had significant capacity and resourcing of its wildlife authority, because it did not want to share power over its 'flagship' PAs (best known or highest potential tourism-value) or because it was reticent to share management over natural assets for ideological or political reasons.

A key weakness of financial and technical support models is that their loose, largely informal framework means that their success often hinges on strong personal relationships, and therefore are vulnerable if those relationships break down or if there are significant personnel changes. State respondents identified two additional weaknesses associated with the model: the vulnerability of projects to collapse if the non-profit partner leaves before local capacity has been sufficiently built, and reduced autonomy in goal-setting and resource

allocation. Non-profit respondents identified lack of adequate accountability from the state partner and vulnerability to political interference as shortcomings of the model in some cases. They further indicated that financial-technical support could lead states to shift resources to less-resourced PAs, thereby undermining and weakening the baseline capacity of the partnership. Non-profits also lamented their lack of formal decision-making authority, especially regarding the power to select qualified personnel and fire non-performing or corrupt staff. This lack of decision-making authority made it more difficult to source major funding and constrained their ability to deliver conservation outcomes.

3.4 Recommendations for success

Workshop participants identified a series of recommendations for successful partnerships related to legal agreements, financial arrangements, governance, management, community involvement, leadership, staffing and interpersonal relationships (Appendix S3).

4. Discussion

Our analysis identified three overarching models of CMPs with distinct clusters of characteristics based on the degree of formal devolution of governance and management authority. These models represent a continuum of management authority allocation, with the state transferring formal management authority to a non-profit in the delegated model, sharing formal authority (to varying degrees) in the co-management model and retaining formal management authority in the financial-technical support model. Unlike management, however, governance is rarely, if ever, fully delegated. Even in delegated models, key elements of governance—namely strategy and oversight—are shared between the non-profit and state partners and all decisions are subject to the laws, regulations and policies established by the state. Because of this shared governance, and the unique legitimacy,

influence and powers of the government partner, a clear, strong working relationship between the non-profit and state is critical to the success of all partnership models, including the delegated model. Our study also revealed that the non-profits and states that engage in delegated and co-management partnerships are often motivated by a desire for greater accountability and the potential for long-term transformation and increased financial sustainability of a PA, while those that prefer the financial-technical support model tend to have a strong philosophical belief that management and governance authority should remain vested with the state and that such a model will better enhance PA authority capacity and provide a realistic exit strategy. These results help clarify the distinctions between CMPs and identify strategies for ensuring success in future partnerships.

4.1 Contexts in which the models occur

Delegated management models tend to be found in the most severely under-resourced PAs, in challenging situations (such as extreme remoteness or the presence of political instability) where the capacity and resourcing of state wildlife authorities is extremely low, where there is little or no income from tourism and where wildlife populations are severely depleted or in danger of becoming so. Such extreme circumstances require significant input of resources and technical expertise, and therefore are more apt candidates for delegated management. However, more recently, African Parks has been delegated authority to manage higher profile PAs, such as Liwonde National Park in Malawi and Akagera National Park in Rwanda, which suggests a possibility that some states may be increasingly willing to engage this model more broadly. Delegated management models have not yet been attempted in exceptionally large PAs.

Co-management models offer a more equal sharing of management responsibility than delegated management arrangements. They may enable the partners to capitalise on their

unique strengths, combining the political legitimacy and local knowledge of the state with the innovation, efficiencies and expertise of the non-profit sector. Such a partnership presents less risk of the state wildlife authority feeling sidelined or dominated. However, the sharing of management authority between two entities with differing organisational structures, cultures, management and leadership styles may be prone to confusion, conflict and high transaction costs. Co-management agreements have in some cases evolved from financial-technical support partnerships that proved insufficient to achieve the partners' goals. Like the delegated model, the additional investment that comes with co-management models often leads the non-profit partner to seek greater decision-making authority, and the sharing of this authority makes the two partners accountable to each other.

Financial-technical support partnerships are found in the widest range of countries and contexts. This model has been by far the most prominent model across Africa for many decades, and several respondents indicated that the move to more devolved models like co- and delegated management was as a result of long experience with the financial-technical support model and its inability in many circumstances to achieve desired outcomes. Nonetheless, it remains the most common and widespread model, and when implemented well in the appropriate contexts, it can be quite effective. The lack of authority of non-profits for governance and management decision-making that characterises these partnerships is a product of varied factors. First, in some countries (such as in South Africa, Botswana, Kenya, Namibia and Tanzania), there is significant state capacity, funding and commitment to managing PAs, and especially national parks. In such countries, financial-technical support "makes sense where there is solid government commitment for core management of the PA, but there are some specific threats—or challenges, or even opportunities—that the government is not able to tackle alone" (non-profit respondent) and that the non-profit can support. Second, as revealed by interviews, some countries may be reluctant to engage in

models that involve sharing or delegating authority because of political and post-colonial sensitivities. Third, some non-profits do not have adequate resources or expertise to take on significant management responsibility. Finally, some non-profits believe that their proper role is to support (not supplant) the state, which they see as the appropriate management authority for PAs, even where capacity is low.

4.2 Caveats to our model framework

The breakdown of current examples into these three models is not clear-cut and our framework, by necessity, oversimplifies the complexity of CMPs in several ways. First, the variation among CMPs is more akin to a continuum of possibilities rather than discreet categories, and some examples fall on the borderlines of these constructed types. For example, Virunga National Park in DRC, categorised as a co-management model, could alternatively be considered delegated management because the Chief Warden of the park comes from the non-profit partner and oversees general and law enforcement management decisions (though he shares other decisions with the wildlife authority). Second, in some cases models differ on paper and in practice. For example, in practice some financial-technical support models approximate co-management, due to the non-profit providing the majority of funding to a PA and having authority on how money is spent, and in others due to the state authority developing trust in the partner over time. Third, models may evolve over time. Across Africa, many partnerships are gradually shifting from financial-technical support towards co-management and delegated management due to recognition of the severe capacity constraints experienced by some state partners. It is further envisioned that, if successful, these more devolved models will in the future 'hand back' authority to the state. Finally, the purpose of partnerships may vary, further complicating the categorisation of models. For example, in the case of Marakele National Park in South Africa, co-management

is used as a tool to extend the area of land under protection, rather than as a means to improve the management of an existing PA.

Our study represents a first attempt to qualitatively and quantitatively identify the models of CMPs that are operational for the management of state-owned PAs in Africa and to understand the strengths and weaknesses of these different models. Additional research is needed to examine the effectiveness of different approaches on *inter alia* the conservation status of PAs, national capacity for PA management and revenue generation.

4.3 The case for non-profits to engage in CMPs

Human pressures on Africa's wildlife are growing and a rising proportion of PAs are becoming depleted (Craigie et al., 2010; Lindsey et al., 2017). In Africa, PAs are likely to become increasingly important for conservation as human populations expand and occupy unprotected lands. Countries are at risk of losing valuable wildlife, ecosystem services and natural resources, even within PAs, before significant benefits can be derived from those resources via tourism and other mechanisms (Lindsey et al., 2017). If PAs are not able to fulfil basic ecological functions and do not contribute significantly to local or national economies, there is likely to be increasing political pressure for converting such land to alternative uses. Worryingly, a substantial number of African PAs have already been downsized or degazetted (Mascia et al., 2014); more are likely to follow unless their economic contributions significantly increase to effectively outcompete alternative land use options.

Providing support to PA management arguably represents one of the most direct ways in which the donor community can improve the prospects for conservation in Africa. Numerous studies have highlighted the importance of strong management budgets for effective conservation of African PA (Henschel et al., 2016; Leader-Williams et al., 1990; Lindsey et

al., 2017b; Packer et al., 2013). Investing in PAs, particularly through the framework of CMPs, has the potential to yield direct conservation benefits and in some cases significant social and economic benefits by providing a platform from which to develop more sustainable wildlife-based economies. Tourism specifically has the potential to meaningfully support GDP growth, to create large numbers of jobs and promote development in remote areas where few other economic activities are available (Lindsey et al., 2012; Makochekanwa, 2013; Uddhammar, 2006; World Travel &Tourism Council, 2016). In addition, PAs protect critical ecosystem services upon which people and economies depend. Further, the long-term presence of a non-profit working in remote areas and strengthening law enforcement and natural resource governance through engagement with local government and communities often leads to improved governance and security.

Interviews suggest that donor and non-profit interest in more devolved CMPs – co-management and delegated management partnerships – is on the rise. Numerous interviewees highlighted the fact that these models attract important additional sources of institutional and philanthropic funding. Indeed, donors were sometimes quite strong in their commitment to funding more devolved models and in some cases require co- or delegated management agreements prior to investing in PAs. Several international non-profits are increasing their engagement in co- and delegated management models (e.g. African Parks Network, African Wildlife Foundation, Frankfurt Zoological Society, Peace Parks Foundation, Wildlife Conservation Society), as are several smaller-scale non-profits focusing on single PAs. Of the international non-profits interviewed, 78% (seven out of nine) were looking to undertake a co- or delegated management arrangement either in PAs they already supported with another model or in entirely new PAs. However, a large number of PAs currently lack any support and much greater levels of support and engagement are required from the donor community. For these reasons, we urge the international development community (as well as the

conservation community) to consider investing in CMPs as a means of simultaneously promoting sustainable rural development and environmental conservation.

We would be remiss if we did not acknowledge that such partnerships provide nonprofits significant benefits, including increased funding and profile. However, it is equally important to note that by assuming management responsibility—particularly in co- and delegated management models—nonprofits also increase their reputational risk and become directly accountable for delivering positive conservation outcomes.

4.4 The case for African governments to engage in CMPs

As mentioned, wildlife and PA networks can represent crucially important assets for African countries. Some PAs provide vital ecological services such as watershed protection and carbon sequestration and can act as the basis for tourism industries that have potential to both grow and diversify economies (Lindsey et al., 2014; Watson et al., 2014). CMPs offer African states the opportunity to share the burden of managing their vast PA estates. External funding and assistance channeled through CMPs have the potential to improve the prospects of effective conservation of Africa's natural assets. The variety of models available allows CMPs to be applied across a wide range of contexts. In cases where the state wildlife authority is relatively well funded but lacks the resourcing to achieve optimal PA performance, or where staffing numbers or specific skill sets are lacking, financial-technical support models remain important. In PAs where a higher and more sustained injection of funding is required, but where the state wildlife authority has the desire and capacity to maintain an active role on the ground, co-management arrangements represent a potentially useful approach. In situations where PAs and the wildlife authority are extremely poorly resourced, or where the state believes 'outsourcing' PA management to a specialised organisation is the most effective way to secure or even transform its PA estate, the delegated

554 management model has demonstrated potential (Fearnhead, 2009). In summary, CMPs have
555 potential to provide African states with a number of opportunities and benefits.
556 Our study also addresses some government concerns about CMPs. For example, we found
557 no evidence that a country's sovereignty or ownership of PAs was diminished as a result of a
558 partnership. It should be underscored that CMPs relate to governance and management, not
559 ownership, of PAs. Moreover, all CMPs studied are subject to a state's laws and sovereign
560 authority. Even when management was fully delegated, the state usually shared governance
561 decision-making authority over the strategic direction of the PA, and effectively engaged an
562 outside entity to manage it on a day-to-day basis, under its oversight, and for a well-defined
563 and limited period of time. Moreover, without a willing, supportive and engaged state
564 partner, even a strong delegated model "is doomed to fail" (non-profit respondent) since
565 important activities, including securing permits and permissions, engaging local communities
566 and dealing with complex law enforcement issues and policy considerations require a
567 committed government partner. We urge African states to see CMPs as an opportunity and a
568 strategic approach to access international willingness to pay for African conservation, to
569 facilitate capacity-building, and ultimately to help fulfil their national and international
570 obligations. We further urge African states to strive for clarity on the types of models that
571 they are comfortable with for different sections of their PA estates, to establish a streamlined
572 process for engaging partners and to actively solicit partners to assist with the management of
573 PAs where support is most needed and has the most potential. Although different models may
574 be appropriate for different PAs, some degree of consistency between agreements will
575 decrease the monitoring and management burden on the PA authority.
576
577 *4.5 The need for best practice guidelines*

578 Given the vast area over which CMPs are practiced, and the potential they confer for
579 enhancing the conservation prospects of PAs in Africa and elsewhere if implemented well,
580 we recommend that the International Union for Conservation of Nature (IUCN) establish a
581 set of best-practice guidelines. Such guidelines would assist donors, prospective non-profit
582 partners and state wildlife authorities by allowing them to learn from the mistakes and
583 successes of others (Rutagarama and Martin, 2006). A dedicated group of experts could
584 further strengthen the implementation of these guidelines to encourage information sharing
585 and collaboration.

586 In summary, CMPs provide a direct and potentially effective means for the international
587 community, donors, and non-profits to contribute to conservation, economic development
588 and governance in Africa. For African states, CMPs offer potential to build local capacity,
589 share the financial burden associated with managing vast PA estates and increase the
590 ecological and economic benefits derived from PAs. We encourage both African states and
591 the non-profit community to engage in these models using best practice. We also urge the
592 research community to investigate the relative efficacy of the various models, to contribute to
593 improving the proposed framework and to help understand how the effectiveness of CMPs
594 might be enhanced.

595

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Supplementary Information

Appendix S1. Respondent information.

Appendix S2. Protected area names.

Appendix S3. Recommendations for successful collaborative management partnerships.

Figure S1. Results from silhouette width analysis.

Figure S2. Principle component analysis dendrogram.

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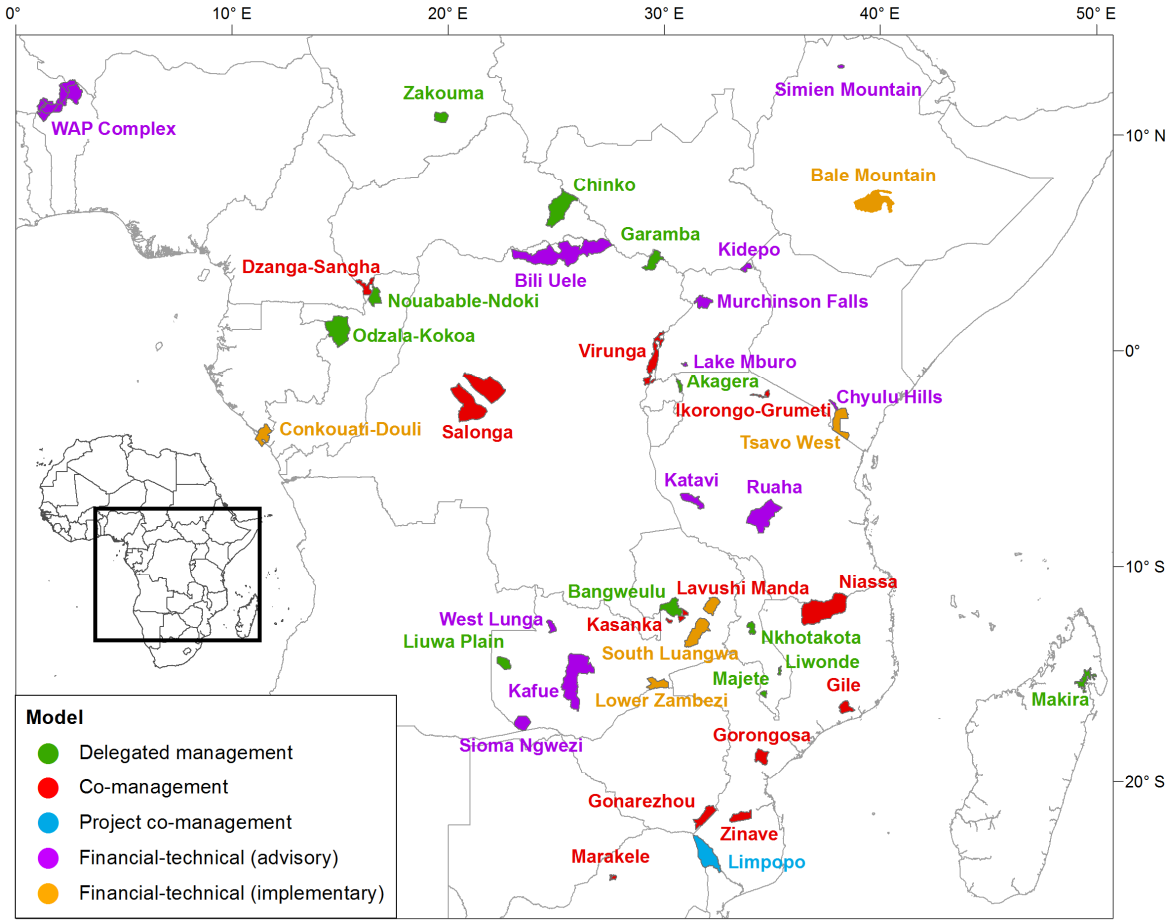
746 **Table 1.** Model framework for collaborative management partnerships.

Model	Division of authority between partners		Size relative to PA sample (range)	Relative non-profit funding (mean and range in sample)
	Governance	Management		
Delegated management	Strategy and oversight typically handled by a special purpose entity created by both partners; non-profit typically appoints park manager	Run by non-profit	Small to moderate (538-17,600 km^2)	High ($1200/$km^2$, $150-2800/$km^2$)
Co-management	Shared, to varying degrees, between state and non-profit (may or may not include the creation of a special purpose entity)	Shared, to varying degrees, between state and non-profit; except in some cases for management of law enforcement (run by state) and employing personnel (particularly law enforcement personnel), which may be run by the state or independently by the partners	Small to large (390-42,000 km^2)	Moderate ($300/$km^2$, $40-600/$km^2$)
Project co-management	State leads strategy and oversight, with involvement and consensus of non-profit on project-related areas; joint Steering Committee appoints project leadership	State oversees management of law enforcement and management of all staff; shares authority with non-profit for all project-related and project-funded decisions	Moderate (10,000 km^2)	Low ($116/$km^2$)
Financial-technical support (implementary)	State is main authority	State is main authority; non-profit plays varying roles to support shared goals, employing personnel and helping to implement management decisions	Small to moderate (734-8,316 km^2)	Moderate ($250/$km^2$, $60-600/$km^2$)
Financial-technical support (advisory)	State is main authority	State is main authority	Small to large (179-32,748 km^2)	Moderate ($250/$km^2$, $5-1400/$km^2$)



747

748 Figure 1. Map of the protected areas included in the study, with colour indicating the model

749 of collaborative partnership.

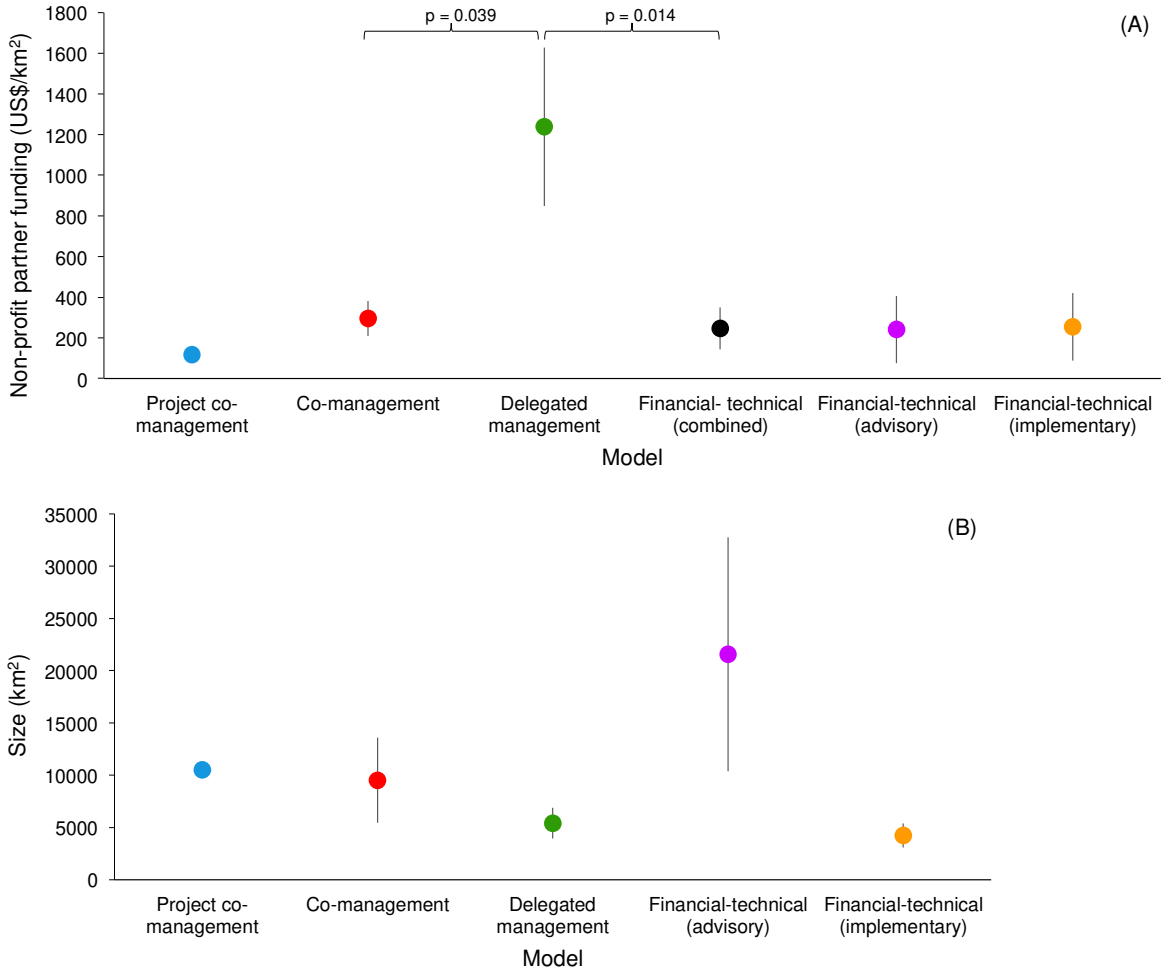


Figure 2. The financial and geographical scope of collaborative partnership models, showing (A) non-profit partner funding levels and (B) the average land area size of protected areas. Vertical lines represent standard error. P-values indicate statistical differences in funding between delegated management and co-management, and between delegated management and financial-technical (combined) (A); models did not differ in size (B). Values in B represent all protected areas in study; values in A are based on a subset of the protected areas for which funding data was available: project co-management ($n_A = 1$; $n_B = 1$); co-management ($n_A = 7$; $n_B = 12$); financial-technical (combined) ($n_A = 13$); financial-technical (advisory) ($n_A = 8$; $n_B = 12$); financial-technical (implementary) ($n_A = 5$; $n_B = 6$).

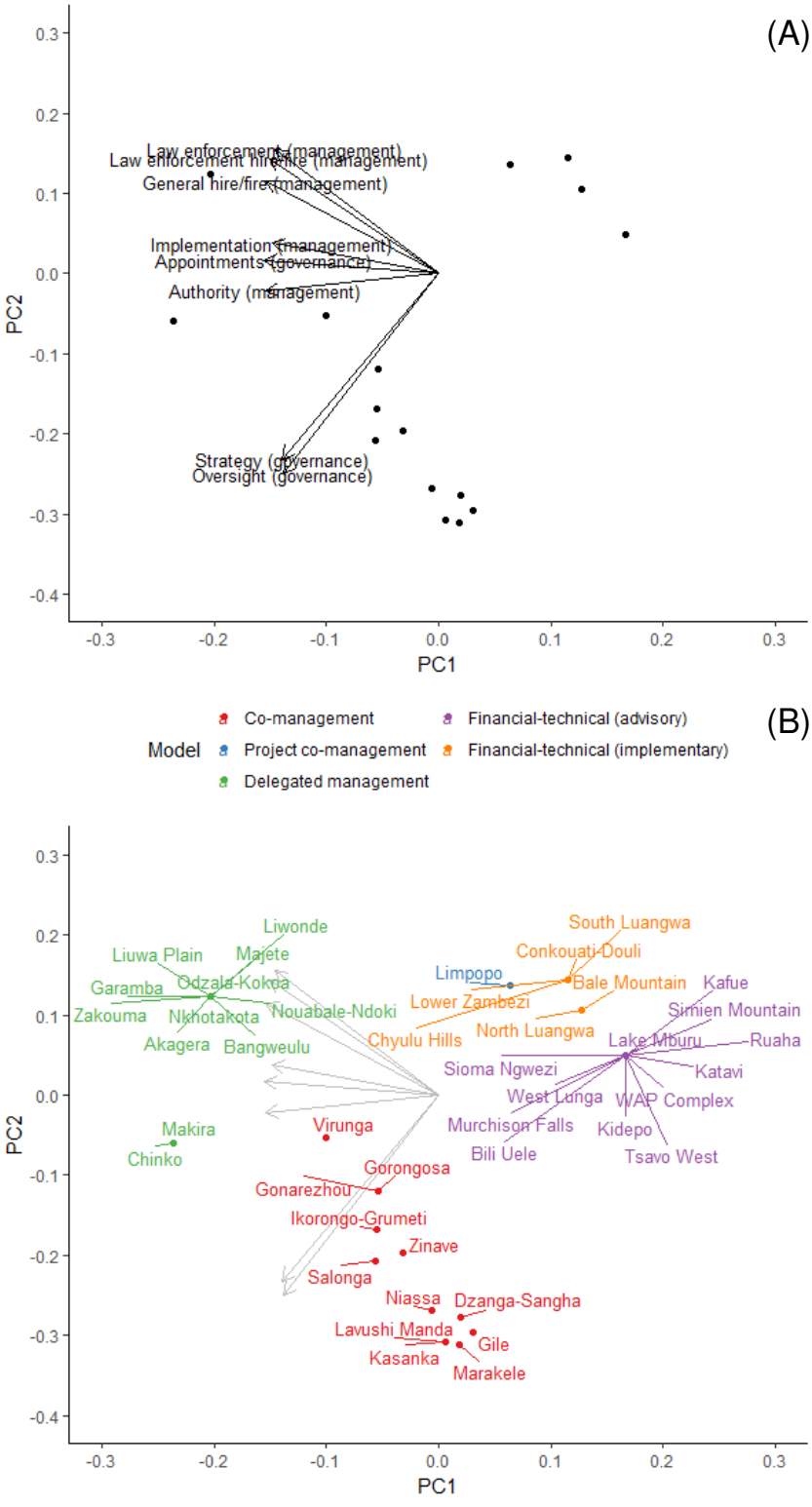


Figure 3. Principal components analysis (PCA) biplots. Panel A shows the relative scores and associated eigenvectors of eight collaborative management partnership characteristics on the

first two principal components. Panel B shows data points representing scores of 43 protected areas clustered and coloured by model type.