
Supplementary information

**Effectiveness of protected areas influenced
by socio-economic context**

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Supplementary Information for

Effectiveness of protected areas influenced by socio-economic context

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Supplementary Table 1. List of studied PAs and their IUCN management category

ID	WDPA ID	NP	Country	Continent	IUCN management
1	169110	Donau-Auen National Park	Austria	Europe	II
2	174775	Gesäuse National Park	Austria	Europe	II
3	169111	Thayatal National Park	Austria	Europe	V
4	555547993	Mbam et Djerem National Park	Cameroon	Africa	II
5	3011	Bénoué National Park	Cameroon	Africa	II
6	308624	Boumba Bek National Park	Cameroon	Africa	II
7	1245	Lobéké National Park	Cameroon	Africa	II
8	3012	Dja Biosphere Reserve	Cameroon	Africa	UNESCO Biosphere Reserve
9	1242	Campo Ma'an National Park	Cameroon	Africa	II
10	606	Bouba Ndjida National Park	Cameroon	Africa	II
11	555547994	Mt Cameroon National Park	Cameroon	Africa	II
12	555547998	Bakossi National Park	Cameroon	Africa	II
13	31459	Dzanga-Sangha Complex of Protected Areas	Central African Republic	Africa	not reported
14	28745	Mbaéré-Bodingué National Park	Central African Republic	Africa	VI
15	641	Zakouma National Park	Chad	Africa	II
16	555558302	Sena Oura National Park	Chad	Africa	II
17	642	Manda National Park	Chad	Africa	II
18	5168	Binder-Léré Faunal Reserve	Chad	Africa	IV
19	643	Odzala-Kokoua National Park	Congo Republic	Africa	II
20	13694	Dimonika Biosphere Reserve	Congo Republic	Africa	UNESCO Biosphere Reserve
21	2266	Lefini faunal reserve	Congo Republic	Africa	IV
22	344525	Bohemian Switzerland National Park	Czech Republic	Europe	II
23	344526	Podyjí National Park	Czech Republic	Europe	II

24	344527	Šumava National Park	Czech Republic	Europe	II
25	344524	Krkonoše National Park	Czech Republic	Europe	V
26	2277	Mago National Park	Ethiopia	Africa	II
27	2281	Bale Mountains National Park	Ethiopia	Africa	II
28	2278	Nechsar National Park	Ethiopia	Africa	II
29	13704	Gambella National Park	Ethiopia	Africa	II
30	83231	Écrins National Park	France	Europe	V
31	103150	Vanoise National Park	France	Europe	V
32	103151	Pyrénées National Park	France	Europe	V
33	660	Cévennes National Park	France	Europe	V
34	303880	Waka National Park	Gabon	Africa	II
35	303877	Moukalaba-Doudou National Park	Gabon	Africa	II
36	301850	Mayumba National Park	Gabon	Africa	II
37	303873	Ivindo National Park	Gabon	Africa	II
38	102224	Nationalpark Unteres Odertal	Germany	Europe	II
39	667	Bavarian Forest National Park	Germany	Europe	II
40	148534	Hainich National Park	Germany	Europe	II
41	32666	Saxon Switzerland National Park	Germany	Europe	II
42	670	Digya National Park	Ghana	Africa	II
43	5173	Ankasa National Park	Ghana	Africa	II
44	672	Bia National Park	Ghana	Africa	II
45	26460	Kakum National Park	Ghana	Africa	II
46	671	Bui National Park	Ghana	Africa	II
47	29421	National Park of the Upper Niger	Guinea	Africa	II
48	2574	Mount Nimba Strict Nature Reserve	Guinea	Africa	UNESCO Biosphere Reserve
49	29376	Pinselli and Soyah Classified Forests	Guinea	Africa	Not assigned
50	29069	Badiar National Park	Guinea	Africa	II

51	679	Hortobágy National Park	Hungary	Europe	UNESCO Biosphere Reserve
52	680	Bükk National Park	Hungary	Europe	II
53	555539806	Balaton Uplands National Park	Hungary	Europe	V
54	178325	Duna-Ipoly National Park	Hungary	Europe	V
55	13652	Aggtelek National Park	Hungary	Europe	II
56	757	Mount Kenya National Park	Kenya	Africa	II
57	752	Tsavo East National Park	Kenya	Africa	II
58	761	Nairobi National Park	Kenya	Africa	II
59	1297	Maasai Mara National Reserve	Kenya	Africa	II
60	7409	Sapo National Park	Liberia	Africa	II
61	9170	Grebo-Krahn National Park	Liberia	Africa	Forest reserve
62	9176	East Nimba Nature Reserve	Liberia	Africa	Forest reserve
63	9171	Gola Rainforest National Park	Liberia	Africa	Forest reserve
64	303691	Tsau //Khaeb National Park	Namibia	Africa	II
65	555543018	Dorob National Park	Namibia	Africa	II
66	851	Bieszczady National Park	Poland	Europe	II
67	11144	Magura National Park	Poland	Europe	II
68	11147	Polesie National Park	Poland	Europe	II
69	850	Świętokrzyski National Park	Poland	Europe	II
70	848	Tatrzański National Park	Poland	Europe	II
71	854	Białowieża National Park	Poland	Europe	II
72	11151	Domogled-Valea Cernei National Park	Romania	Europe	II
73	555531207	Cozia National Park	Romania	Europe	II
74	555531386	Semenic-Caraș Gorge National Park	Romania	Europe	II
75	67728	Danube Delta Biosphere Reserve	Romania	Europe	UNESCO Biosphere Reserve
76	555540945	Nera Gorge-Beușnița National Park	Romania	Europe	II

77	555531377	Retezat National Park	Romania	Europe	II
78	7417	Outamba-Kilimi National Park	Sierra Leone	Africa	II
79	555542335	Gola Rainforest National Park	Sierra Leone	Africa	II
80	148026	Poloniny National Park	Slovakia	Europe	V
81	12152	Low Tatras National Park	Slovakia	Europe	II
82	4377	Slovak Paradise National Park	Slovakia	Europe	II
83	1975	Tatra National Park	Slovakia	Europe	II
84	4375	Malá Fatra National Park	Slovakia	Europe	V
85	9999999	Addo Elephant National Park	South Africa	Africa	not reported
86	881	Garden Route National Park	South Africa	Africa	not reported
87	876	Karoo National Park	South Africa	Africa	not reported
88	300408	Table Mountain National Park	South Africa	Africa	not reported
89	877	Mountain Zebra National Park	South Africa	Africa	not reported
90	17368	West Coast National Park	South Africa	Africa	not reported
91	389012	Doñana National Park	Spain	Europe	II
92	71213	Picos de Europa National Park	Spain	Europe	II
93	389011	Sierra Nevada National Park	Spain	Europe	II
94	196014	Aigüestortes i Estany de Sant Maurici National Park	Spain	Europe	II
95	349125	Cabañeros National Park	Spain	Europe	II
96	909	Abisko National Park	Sweden	Europe	II
97	905	Padjelanta nationalpark	Sweden	Europe	II
98	906	Sarek National Park	Sweden	Europe	II
99	907	Muddus/Muttos National Park	Sweden	Europe	II
100	3998	Stora Sjöfallet National Park	Sweden	Europe	II
101	908	Pieljekaise National Park	Sweden	Europe	II
102	17744	El Feidja National Park	Tunisia	Africa	Not assigned
103	941	Ichkeul National Park	Tunisia	Africa	UNESCO Biosphere Reserve

104	4487	Bou-Hedma National Park	Tunisia	Africa	II
105	555624270	Jebil National Park	Tunisia	Africa	Not assigned
106	18776	Sidi Toui National Park	Tunisia	Africa	Not assigned
107	555624249	Dghoumes National Park	Tunisia	Africa	Not assigned
108	555624261	Orbata National Park	Tunisia	Africa	Not assigned
109	40042	Toro Semliki Wildlife Reserve	Uganda	Africa	II
110	1441	Lake Mburo National Park	Uganda	Africa	II
111	18437	Bwindi Impenetrable National Park	Uganda	Africa	II
112	40002	Kibale National Park	Uganda	Africa	II
113	18438	Rwenzori Mountains National Park	Uganda	Africa	II
114	957	Queen Elizabeth National Park	Uganda	Africa	II

Supplementary Table 2: Definition of variables

Variables	Type	Definition	Sources of data
Ecological variables			
Change in the abundance of mammals and birds	Response	A binary variable assuming 1 if the change is stable/improving or 0 otherwise in the past 10 years.	Our questionnaire
Threat intensity	Response / Test Predictor	A composite index for the intensity of threats to biodiversity. In our data, threats are broadly divided into three parts: 1.habitat loss, 2. resource use, 3. general human pressure	Our questionnaire Part: IV. Biodiversity related questions 1. Question 24. Forest cover, 25. Forest degradation, 26. Forest fragmentation, 27. Shrub land cover, 28. Meadow and grassland cover, 29. Cropland cover, 30. Wetland cover, 31. Aquatic vegetation cover 2. Question: 35 Current severity situation regarding: Agriculture, water management, Pollution, Human intrusion, Transport corridors, Residential development, Mining, Hunting, Logging, Gathering plants, Fishing, Killing animals, Invasive species, Climate change, Fire, Geological events Part: VI. Social impact,

			3. Question: 3. Behavioral impact by local communities, Items: 3 Illegal logging, 4. Illegal mining, 6. Agricultural expansion, 7. Livestock grazing, 8. setting fire
HDI	Test predictor	HDI is a measure of the level of socioeconomic development of a nation. It is an index obtained from three measures of socioeconomic indicators: health, wealth (GDP) and education. We used the HDI value for 2017.	United Nations Development Programme http://hdr.undp.org/en/composite/HDI (Accessed 15/12/18)
Protection-based conservation efforts	Test predictor	A composite index obtained from three specific protection-based interventions.	Our questionnaire: Part: III. Conservation interventions, Question • a) Regular patrol • b) Buffer zone • f) Presence of permanent research institution
Community-based conservation interventions	Test predictor	A composite index for the local interventions regarding conservation derived from 4 main parts: 1. Education and Awareness, 2. Local economic benefits, 3. Governmental support, 4. Management support	Our questionnaire: Part: General: Item: Budget, sufficiency of it Part: III. Conservation interventions, Question: • m. Provision of community projects • r. Community based conservation (CBC) • p. Alternative livelihood projects • q. Environmental/conservation education and awareness creation Part: V. Economic benefits to local communities, Item: 2. Social related benefits, 3. Economic benefits, 10. Benefits through tourism, 12. Legal right to access resources from the PA Part: VI. Social impact Question: • 2. Involvement, Item: 1. In the decision making, 4. Local culture taken into account in management decisions, 5. participation in the protection, 6. Village chiefs/leaders participate in the decision making Part: VII. Characteristics of the local communities Item: 2. Local institutions

			Part: VIII. Management capacity and political support Item: 1 Sufficient job training, 2. Sufficient resources, 3. Government is willing support, 4. Sufficient support from the government, 5. Power to make management decisions, &. Ability to give rewards, 7. Ability to penalize, 8. Government gives priority to biodiversity conservation, 9. Independent and strong government office
PA size	Control	Size of PA in km ²	World Protected Areas Database
PA age	Control	Number of years since the establishment of the PA	World Protected Areas Database
Country	Random effect	The country the NP is located	World Protected Areas Database
Species	Random effect	The species of mammal or bird	Our questionnaire
Species group	Random effect	Functional guild/group of the species	Our questionnaire

Supplementary Table 3. Results of Bayesian Regression Models (BRMs) for the predictors versus threat intensity across the PA network. The model included the combined conservation efforts (community-based interventions and protection-based interventions). Given are the estimates of the mean marginal posterior distribution, standard deviation of the estimate (SD), the 2.5% and 97.5% credibility interval (CI). When two values are given, the first one refers to the model without interaction and the second value is for the model with interaction, i.e. HDI:community based interventions & protection based interventions

Variable	Estimate	SD	CI 2.5%	CI 97.5%
Intercept	0.535/0.531	0.023/0.022	0.491/0.487	0.581/0.575
HDI	-0.078/-0.084	0.023/0.023	-0.124 /-0.132	-0.032 /-0.038
Community based interventions & protection based interventions	-0.039 /-0.041	0.024 /0.022	-0.088 /-0.084	0.008 /0.004
PA age	0.021 /0.022	0.024 /0.023	-0.023 /-0.022	0.072 /0.068
PA size	0.010 /0.012	0.022 /0.023	-0.035 /-0.034	0.054 /0.057
IA - HDI:community based interventions & protection based interventions	0.046	0.023	-0.001	0.092

Supplementary Table 4. Results of Bayesian Regression Models (BRMs) for the predictors versus abundance of mammals and birds across the PA network. The model included the separated conservation efforts (community-based interventions and protection-based interventions). Given are the estimates of the mean marginal posterior distribution, standard deviation of the estimate (SD), the 2.5% and 97.5% credibility interval (CI).

Variable	Estimate	SD	CI 2.5%	CI 97.5%
Intercept	2.416	0.409	1.643	3.280
Threat intensity index	-0.538	0.431	-1.395	0.282
HDI	0.247	0.427	-0.599	1.058
Community based interventions	0.504	0.417	-0.277	1.365
Protection based interventions	-0.251	0.387	-1.052	0.494
PA age	-0.150	0.320	-0.784	0.476
PA size	-0.124	0.331	-0.756	0.539
IA -Threat intensity index:HDI	-0.020	0.418	-0.857	0.818
IA -Threat intensity index:community based interventions	-0.229	0.485	-1.240	0.685
IA -Threat intensity index:protection based interventions	-0.147	0.508	-1.192	0.829

Supplementary Table 5. Results of Bayesian Regression Models (BRMs) for the predictors versus abundance of mammals and birds across the PA network. The model included the combined conservation efforts (community-based interventions and protection-based interventions). Given are the estimates of the mean marginal posterior distribution, standard deviation of the estimate (SD), the 2.5% and 97.5% credibility interval (CI).

Variable	Estimate	SD	CI 2.5%	CI 97.5%
Intercept	2.211	0.362	1.513	2.941
Threat intensity index	-0.643	0.384	-1.468	0.054
HDI	0.192	0.385	-0.576	0.944
Community based interventions & protection based interventions	0.180	0.369	-0.546	0.900
PA age	-0.135	0.275	-0.663	0.414
PA size	-0.258	0.303	-0.864	0.343
IA -Threat intensity index:HDI	-0.111	0.383	-0.839	0.645
IA -Threat intensity index:community based interventions & protection based interventions	-0.193	0.395	-1.028	0.590

Supplementary Table 6: Results of Bayesian Regression Models (BRMs) for the predictors versus mean abundance of all mammals and birds for a given PA. The model included the separated conservation efforts (community based interventions and protection based interventions). The table shows the estimates of the mean marginal posterior distribution, standard deviation of the estimate (sd), the 2.5% and 97.5% credibility interval (CI).

Vars	Estimate	Est.Error	CI 2.5%	CI 97.5%
Intercept	1.863	0.291	1.299	2.466
Threat intensity index	-0.428	0.290	-1.029	0.123
HDI	0.180	0.282	-0.385	0.741
Community based interventions	0.298	0.271	-0.223	0.839
Protection based interventions	-0.150	0.246	-0.651	0.330
PA age	-0.079	0.202	-0.474	0.322
PA size	-0.171	0.228	-0.621	0.287
IA -Threat intensity index:HDI	-0.048	0.300	-0.616	0.585
IA -Threat intensity index:community based interventions	-0.071	0.321	-0.740	0.533
IA -Threat intensity index:protection based interventions	-0.122	0.348	-0.859	0.531

Supplementary Table 7: Results of Bayesian Regression Models (BRMs) for the predictors versus mean abundance over all mammals and birds per PA. The model included the combined conservation efforts (community based interventions and protection based interventions). The table shows the estimates of the mean marginal posterior distribution, standard deviation of the estimate (sd), the 2.5% and 97.5% credibility interval (CI).

Vars	Estimate	Est.Error	CI 2.5%	CI 97.5%
Intercept	1.835	0.278	1.290	2.400
Threat intensity index	-0.493	0.274	-1.050	0.036
HDI	0.205	0.282	-0.341	0.779
Community-based interventions & protection-based interventions	0.115	0.248	-0.379	0.601
PA age	-0.082	0.193	-0.457	0.292
PA size	-0.244	0.233	-0.704	0.234
IA -Threat intensity index: HDI	-0.098	0.281	-0.641	0.445
IA -Threat intensity index: community-based interventions & protection-based interventions	-0.103	0.277	-0.661	0.439

Supplementary Table 8: The overlap between data from this study and data from LPD, IUCN SSC A.P.E.S, and other sources

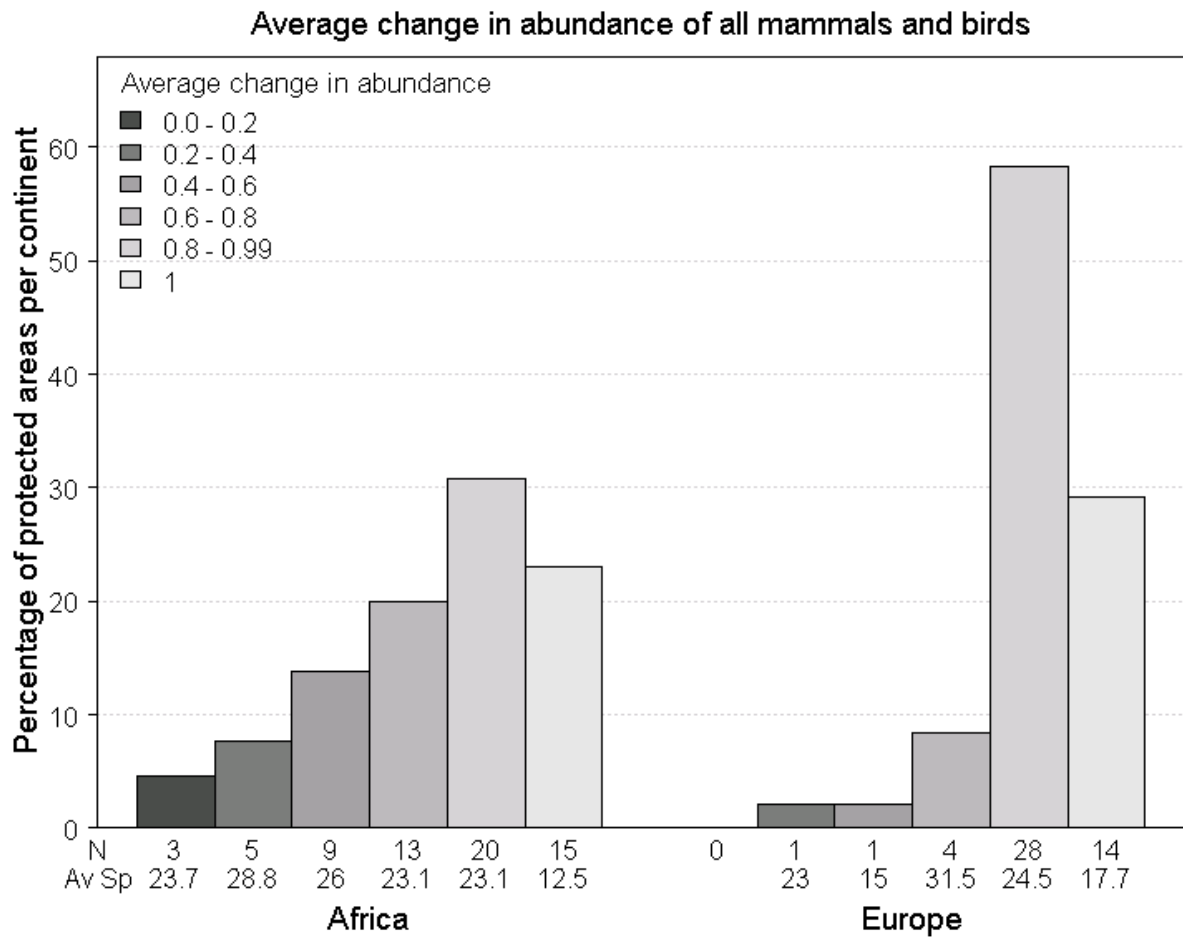
ID	Common Name	PA	Country list	Change abundance from this study	Change in abundance from other sources	Overlap	Source
1	Ethiopian wolf	Bale Mountain National Park	Ethiopia	0	0	Yes	LPD
2	Mountain gorilla / Eastern lowland gorilla	Bwindi Impenetrable NP	Uganda	1	1	Yes	LPD
3	Olive baboon	Kibale National Park	Uganda	1	1	Yes	LPD
4	Red-tailed monkey	Kibale National Park	Uganda	1	0	No	LPD
5	Chimpanzee	Kibale National Park	Uganda	1	0	No	LPD
6	African elephant	Kibale National Park	Uganda	1	1	Yes	LPD
7	Bushpig	Kibale National Park	Uganda	0	1	No	LPD
8	Topi / Tsessebe antelope	QENP	Uganda	1	1	Yes	LPD
9	Hippopotamus	QENP	Uganda	1	1	Yes	LPD
10	African buffalo / Cape buffalo	QENP	Uganda	1	1	Yes	LPD
11	African elephant	QENP	Uganda	1	1	Yes	LPD
12	Waterbuck	QENP	Uganda	1	0	No	LPD
13	Common warthog / Desert warthog	QENP	Uganda	1	0	No	LPD
14	African buffalo / Cape buffalo	Toro Semliki Wildlife Reserve	Uganda	1	1	Yes	LPD
15	African elephant	Toro Semliki Wildlife Reserve	Uganda	1	0	No	LPD
16	Waterbuck	Toro Semliki Wildlife Reserve	Uganda	1	1	Yes	LPD
17	Common warthog / Desert warthog	Toro Semliki Wildlife Reserve	Uganda	0	1	No	LPD
18	Bushbuck	Toro Semliki Wildlife Reserve	Uganda	1	1	Yes	LPD
19	Hippopotamus	Lake Mburo National Park	Uganda	1	1	Yes	LPD

20	African buffalo / Cape buffalo	Lake Mburo National Park	Uganda	1	1	Yes	LPD
21	Waterbuck	Lake Mburo National Park	Uganda	1	1	Yes	LPD
22	Common warthog / Desert warthog	Lake Mburo National Park	Uganda	0	1	No	LPD
23	Common crane	Hortobágy National Park	Hungary	1	1	Yes	LPD
24	Great bustard	Hortobágy National Park	Hungary	1	1	Yes	LPD
25	Black rhinoceros	Nairobi National Park	Kenya	1	1	Yes	LPD
26	African elephant	Masai Mara National Reserve	Kenya	1	0	No	LPD
27	spotted hyena	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
28	Lion	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
29	Leopard	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
30	Jacal	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
31	wild cat	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
32	Zibra	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
33	Greater kudu	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
34	Lesser kudu	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
35	Waterbuck	Nech sar	Ethiopia	0	1	No	Unpublished PA report
36	Bushbuck	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
37	Common duiker	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
38	Common warthog / Desert warthog	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
39	Baboon	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
40	Colombus monkey	Nech sar	Ethiopia	1	1	Yes	Unpublished PA report
41	Vervent monkey	Nech sar	Ethiopia	0	0	Yes	Unpublished PA report
42	Chimpanzee	Sapo	Liberia	1	1	Yes	LPD
43	Chimpanzee	Dja Biosphere Reserve	Cameroon	1	1	Yes	IUCN SSC A.P.E.S
44	Elephant	Dja Biosphere Reserve	Cameroon	0	1	No	IUCN SSC A.P.E.S
45	Elephant	Campo Ma'an NP	Cameroon	0	1	No	IUCN SSC A.P.E.S
46	Chimpanzee	Mount Cameroon NP	Cameroon	1	1	Yes	IUCN SSC A.P.E.S

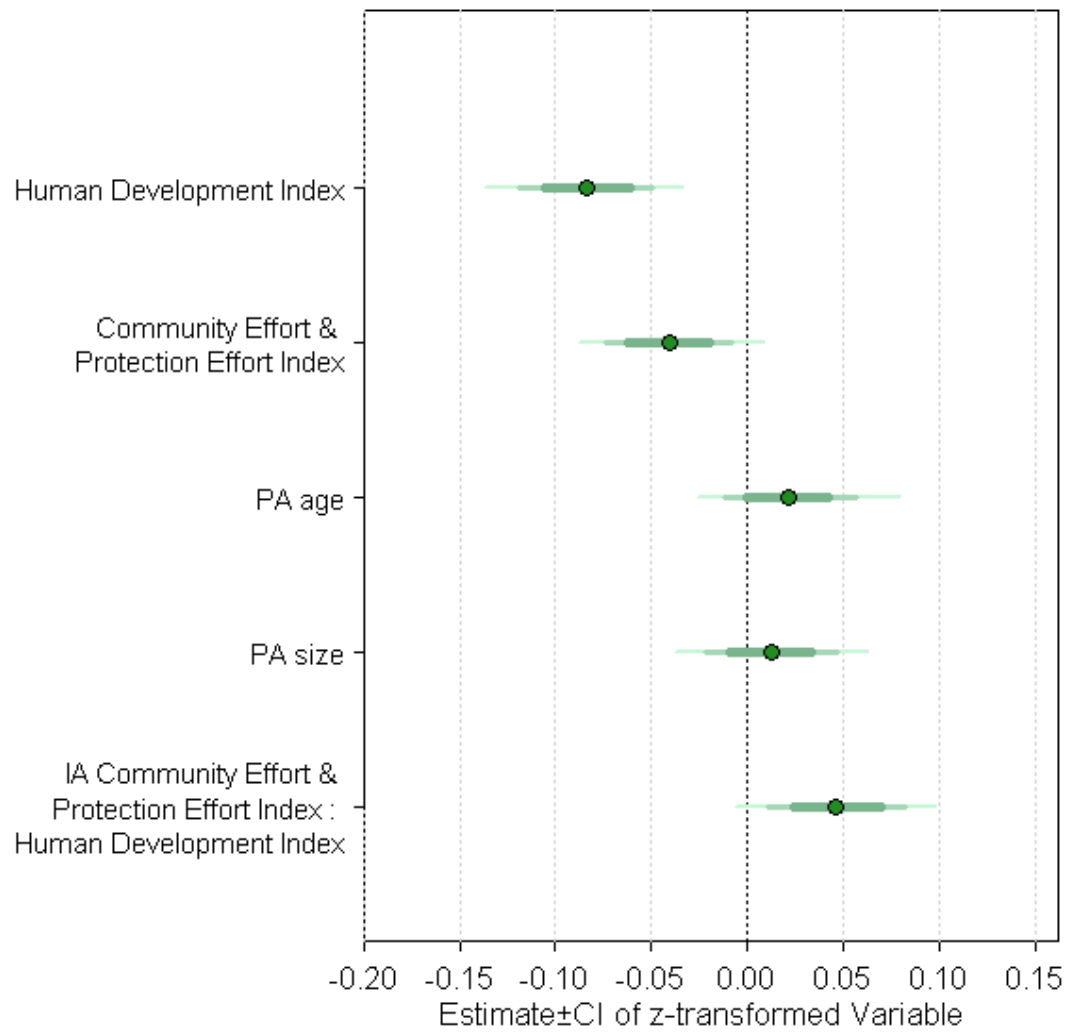
47	Elephant	Lobéké NP	Cameroon	0	1	No	IUCN SSC A.P.E.S
48	Elephant	Mount Cameroon NP	Cameroon	1	1	Yes	IUCN SSC A.P.E.S
49	Chimpanzee	Odzala	Congo	0	1	No	IUCN SSC A.P.E.S
50	Elephant	Odzala	Congo	0	1	No	IUCN SSC A.P.E.S
51	Elephant	Sena Oura Np	CAR	0	1	No	IUCN SSC A.P.E.S
52	Grizzly bear / Brown bear	Pyrénées National Park	France	1	1	Yes	LPD
53	Purple heron	Doñana National Park	Spain	0	1	No	LPD
54	Glossy ibis	Doñana National Park	Spain	1	1	Yes	LPD
55	Red fox	Vanoise	France	0	0	Yes	http://biodiversite .vanoise- parcnational.fr/
56	Griffon vulture	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
57	Red-billed chough	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
58	Alpine ibex	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
59	Chamois	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
60	Mistle thrush	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
61	European badger	Vanoise	France	0	0	Yes	http://biodiversite .vanoise- parcnational.fr/
62	Wolf	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
63	Cinereous vulture	Vanoise	France	1	1	Yes	http://biodiversite .vanoise- parcnational.fr/
64	Sparrowhawk	Vanoise	France	1	0	No	http://biodiversite .vanoise- parcnational.fr/
65	Red fox	Ecrins	France	1	1	Yes	https://biodiversit e.eocrins- parcnational.fr/
66	Griffon vulture	Ecrins	France	1	1	Yes	https://biodiversit e.eocrins- parcnational.fr/
67	red-billed chough	Ecrins	France	1	1	Yes	https://biodiversit e.eocrins- parcnational.fr/
68	Alpine ibex	Ecrins	France	1	1	Yes	https://biodiversit e.eocrins- parcnational.fr/

69	Chamois	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
70	Mistle thrush	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
71	Bearded vulture	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
72	Short-toed snake eagle	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
73	European badger	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
74	Wolf	Ecrins	France	1	1	Yes	https://biodiversite.ecrins-parcnational.fr/
75	European bison	Białowieża National Park	Poland	1	1	Yes	LPD
76	Forest elephant	Bia	Ghana	1	1	Yes	LPD
77	Otter (<i>Lutra lutra</i>)	Unteres Odertal	Germany	1	1	Yes	PA report
78	Wild boar	Unteres Odertal	Germany	1	1	Yes	PA report
79	Lesser spotted eagle	Unteres Odertal	Germany	1	1	Yes	PA report
80	Eagle owl (<i>Bubo bubo</i>)	Unteres Odertal	Germany	1	1	Yes	PA report
81	Osprey (<i>Pandion haliaetus</i>) or Hawk	Unteres Odertal	Germany	1	1	Yes	PA report
82	See adler	Unteres Odertal	Germany	1	1	Yes	PA report
83	Honey Buzzard (<i>Pernis apivorus</i>)	Unteres Odertal	Germany	1	1	Yes	PA report
84	Red Kite (<i>Milvus milvus</i>)	Unteres Odertal	Germany	0	0	Yes	PA report
85	Marsh harrier (<i>Circus aeruginosus</i>)	Unteres Odertal	Germany	1	1	Yes	PA report
86	Hen harrier (<i>Circus cyaneus</i>)	Unteres Odertal	Germany	1	1	Yes	PA report
87	European nightjar	Unteres Odertal	Germany	1	1	Yes	PA report
88	black tern	Unteres Odertal	Germany	1	1	Yes	PA report
89	Bluethroat	Unteres Odertal	Germany	1	1	Yes	PA report
90	corn crake	Unteres Odertal	Germany	1	1	Yes	PA report
91	Ravens	Unteres Odertal	Germany	1	1	Yes	PA report

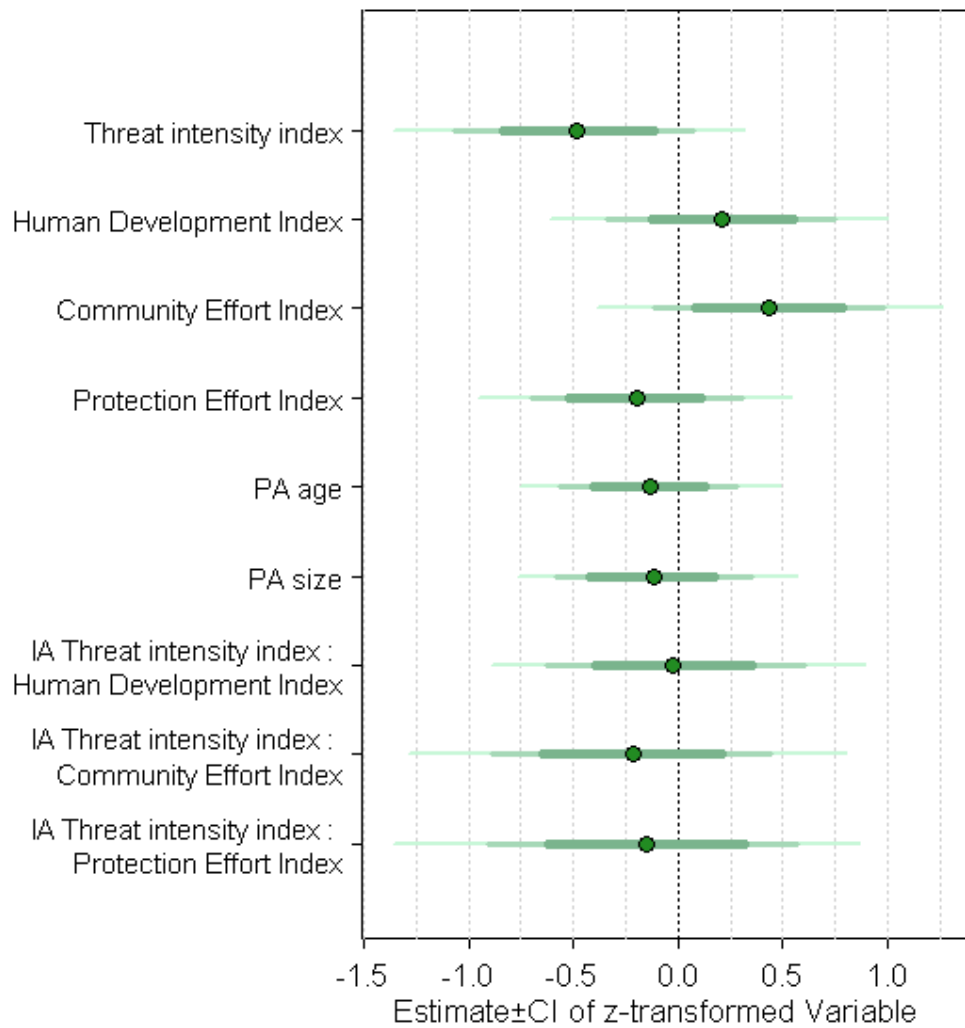
92	Middle spotted woodpecker	Unteres Odertal	Germany	1	1	Yes	PA report
93	red-breasted flycatcher	Unteres Odertal	Germany	1	1	Yes	PA report
94	African elephants	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
95	blue duiker	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
96	yellow-backed duiker	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
97	Chimpanzee	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
98	Gorillas	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
99	Crowned Guenon	<i>Ivindo</i>	Gabon	1	1	Yes	Koerner et al., 2016
100	Moustached guenon	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
101	Grey-cheeked mangabey	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016
102	Red-tailed monkey	<i>Ivindo</i>	Gabon	0	0	Yes	Koerner et al., 2016



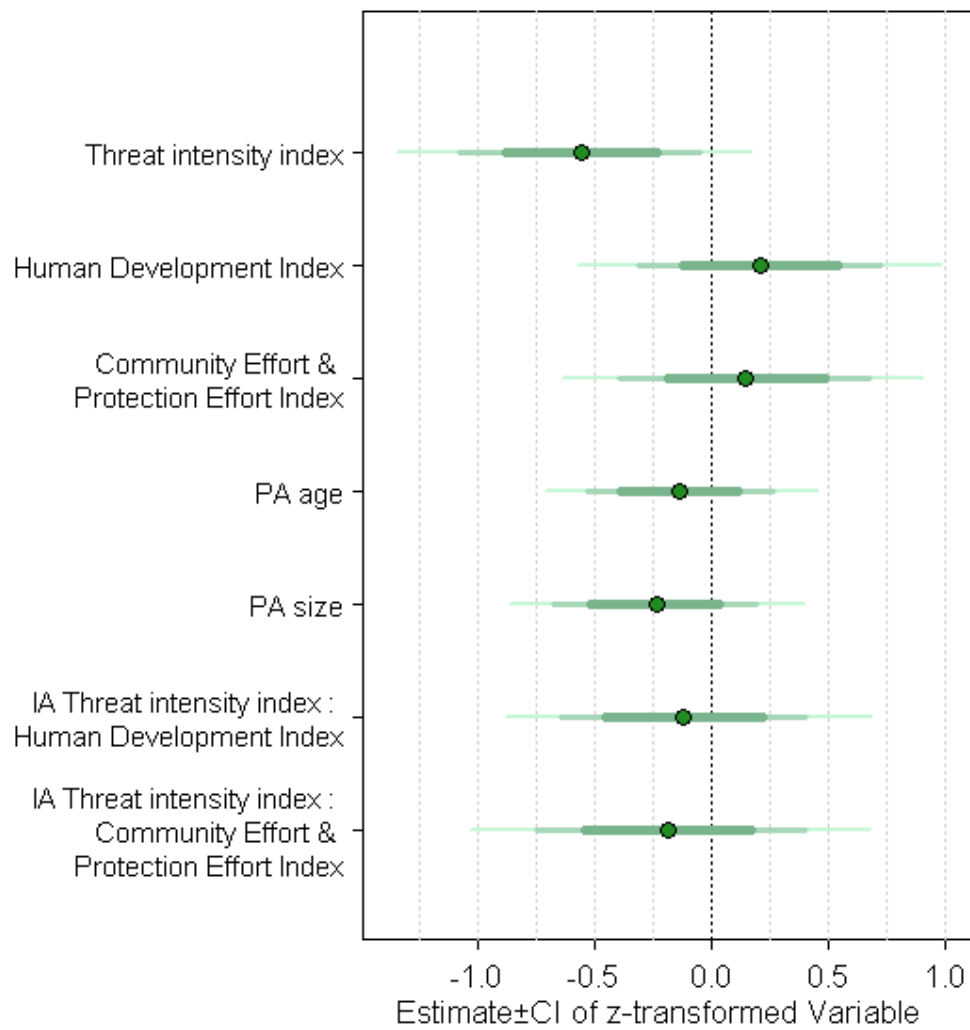
Supplementary Figure 1. Average change in the abundance of all mammals and birds combined per PA in the 10 years preceding the survey. A value of 1 indicates that none of the species in a PA were declining in the past 10 years, while a value of 0 indicates all species were declining. N on the horizontal axis represents the number of PAs and Av.Sp represents the average number of species investigated in a specific class across all PAs in this class.



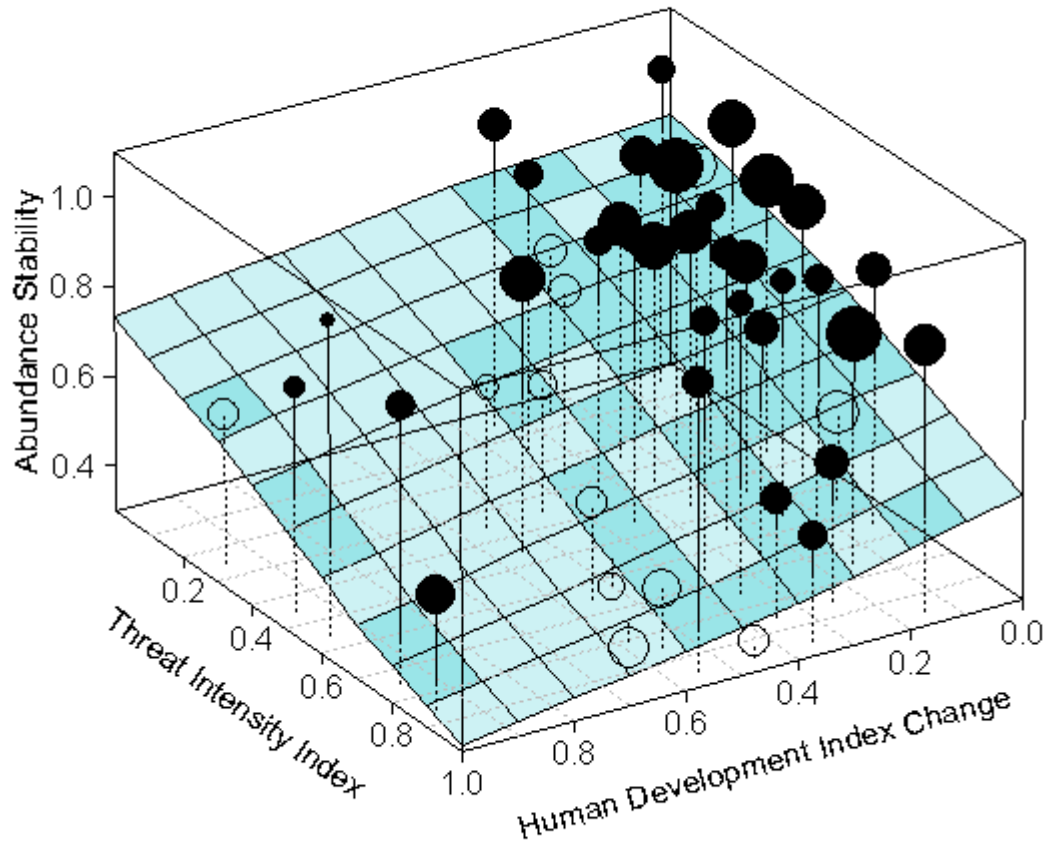
Supplementary Figure 2. Estimate plot of results for the depicted predictors versus threat intensity. The plot shows the estimates (mean of the posterior distribution; dots) and the 67%, 87%, 97% credibility intervals (green lines).



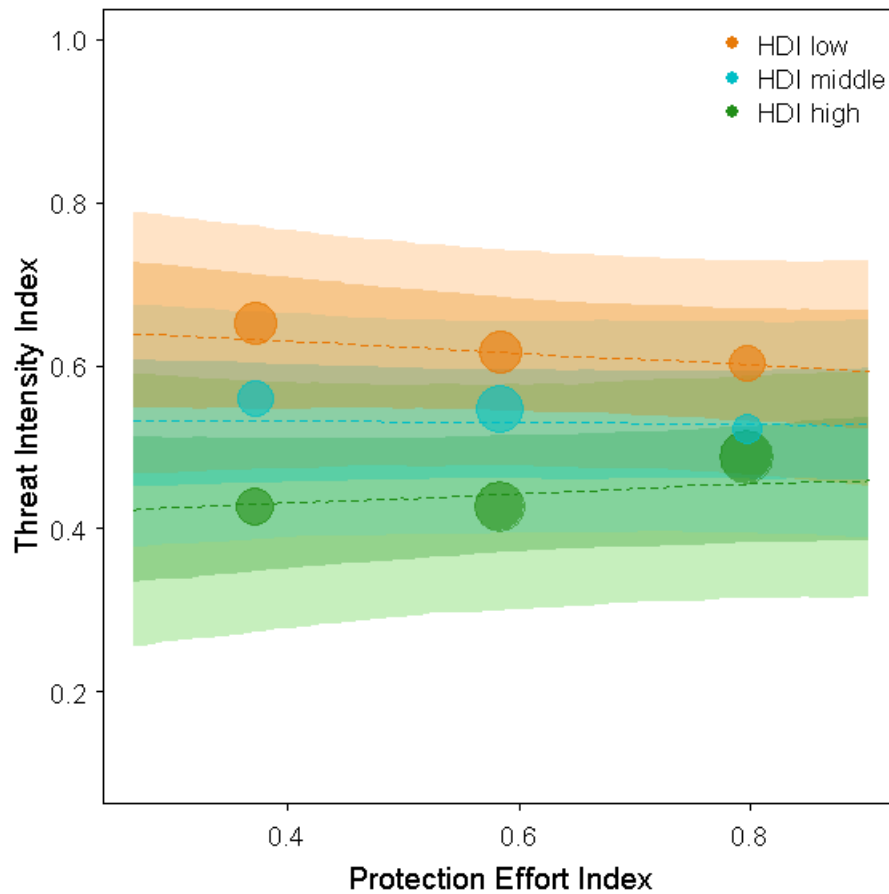
Supplementary Figure 3. Estimate plot of results for the depicted predictors versus abundance of mammals and birds across the PA network. The model included the separated conservation efforts (community-based interventions and protection-based interventions). The plot shows the estimates (mean of the posterior distribution; dots) and the 67%, 87%, 97% credibility intervals (green lines).



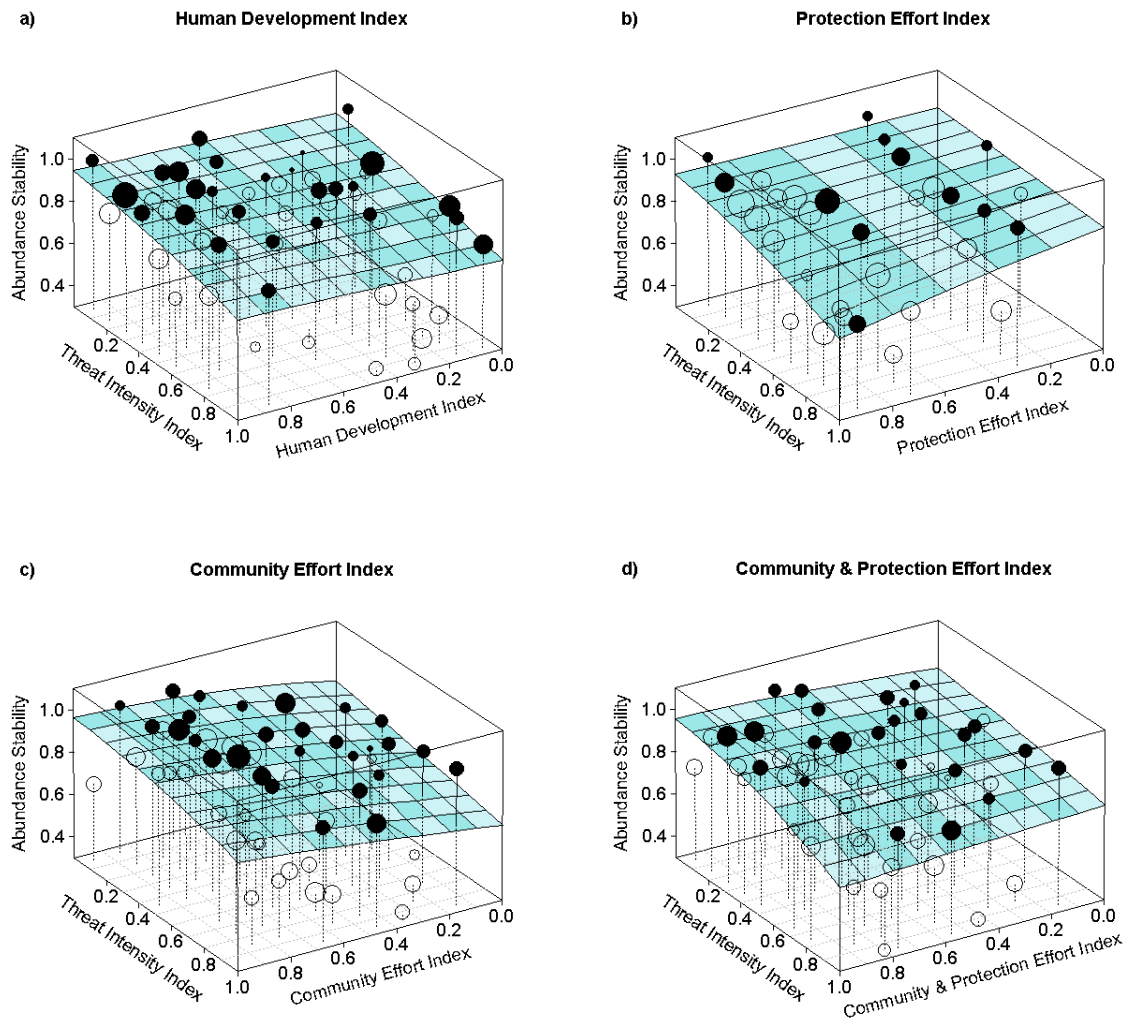
Supplementary Figure 4. Estimate plot of results for the depicted predictors versus abundance of mammals and birds across the PA network. The model included the combined conservation efforts (community-based interventions and protection-based interventions). The plots show the estimates (mean of the posterior distribution; dots) and the 67%, 87%, 97% credibility intervals (green lines).



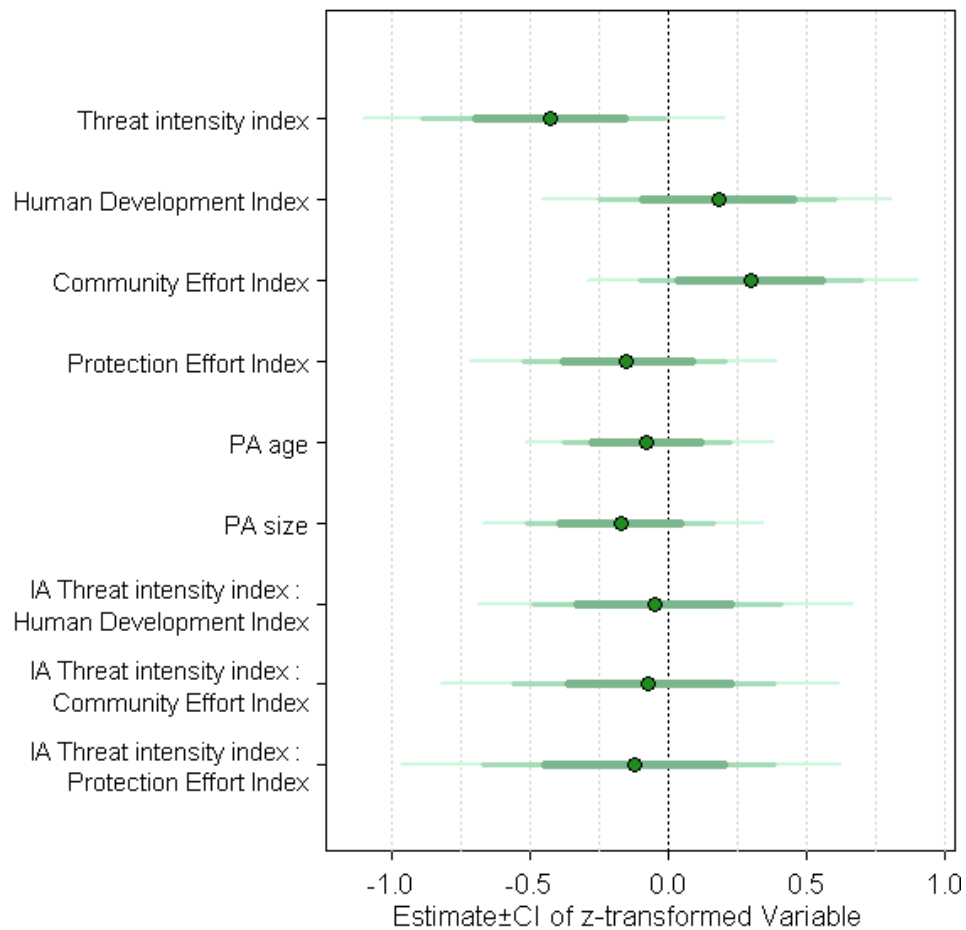
Supplementary Figure 5. The relationship between abundance stability, threat intensity and the average change in HDI for the period of 2010-2017. The figure depicts the fitted model surface. Darker coloured cells are representing cells where observational data exist. Values above the fitted model are depicted as filled points, and values below as open points. The volume of the points corresponds to number of PAs per cell. Abundance stability is defined as the average change in the abundance of mammals and birds, obtained by averaging binary values (1 when the change in the abundance is zero or positive and 0 when the change is negative).



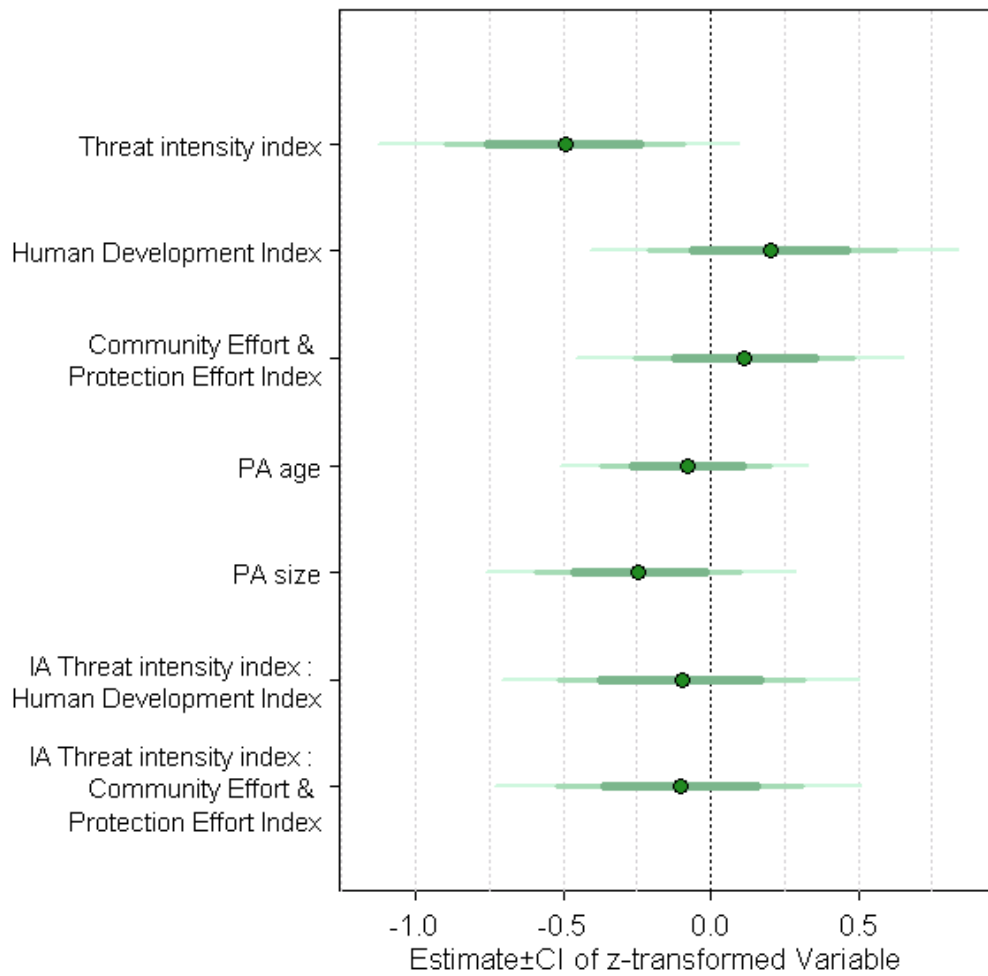
Supplementary Figure 6. The relationship between threat intensity, national socio-economic context (HDI) and protection effort. The dashed line is depicting the expected mean of the predicted posterior distribution, the colored areas are depicting the 50% and 77% credibility intervals, the size of the bubbles corresponds to the respective number of PAs. In contrast to the negative association between protection effort and abundance stability when threat level is high, threat intensity remains stable with protection effort and is more variable with different socio-economic context.



Supplementary Figure 7: Interaction effects of predictors of biodiversity change with PAs as the unit of analysis. The effect of the interaction between threat intensity and (a) HDI, (b) protection-based interventions, (c) community-based conservation interventions and (d) all interventions combined. The figure depicts the fitted model surface. Darker coloured cells are representing cells where observational data exist. Values above the fitted model are depicted as filled points, and values below as open points. The volume of the points corresponds to number of PAs per cell. Abundance stability is defined as the average change in the abundance of all mammals and birds for a given PA, obtained by averaging binary values (1 when the change in the abundance is zero or positive and 0 when the change is negative).



Supplementary Figure 8: Estimate plot of results for the depicted predictors versus mean abundance of all mammals and birds with PAs as the unit of analysis. The model included the separated conservation efforts (community-based interventions and protection-based interventions). The plots show the estimates (mean of the posterior distribution; dots) and the 67%, 87%, 97% credibility intervals (green lines).



Supplementary Figure 9: Estimate plot of results for the depicted predictors versus abundance of all mammals and birds with PAs as the unit of analysis. The model included the combined conservation efforts (community-based interventions and protection-based interventions). The plots show the estimates (mean of the posterior distribution; dots) and the 67%, 87%, 97% credibility intervals (green lines).