CLIMATE ADAPTATION CORRIDORS IN KWAZULU-NATAL AND THE EASTERN CAPE, SOUTH AFRICA

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Citation:

Climate Action Partnership (2011). *Climate Adaptation Corridors in Kwazulu-Natal and the Eastern Cape, South Africa*. Unpublished report.

INTRODUCTION

This document provides a brief description of the process run by the Climate Action Partnership (CAP) that resulted in the delineation of climate adaptation corridors in the Eastern Cape and KwaZulu-Natal. This is not meant to be a comprehensive technical report but rather an overview of the process and results. This is a supporting document to other reports produced in the CAP programme:

- Climate adaptation assessments for KwaZulu-Natal and Eastern Cape sites.
- Monitoring protocols for climate adaptation corridors and sites.

CLIMATE ADAPTATION CORRIDORS

The maintenance and improvement of ecosystem services are critical elements for biodiversity conservation, and sustaining livelihoods. Long-term maintenance of these ecosystem services must take into consideration likely climate change impacts, some of which are already being experienced, and it is necessary planning for the impacts of climate change is done in an attempt to mitigate some of these impacts.

Protecting and restoring the important biodiversity in South Africa increasingly means allowing space for species and ecosystems to adapt to changing conditions, i.e. the higher temperatures, drier or wetter conditions and more variable weather events that are predicted for our country. As it is difficult to predict with any accuracy the exact climate change scenario and the most effective response, the best we can do now is to enhance the ability of ecosystems and species to adapt to change in the long-term; using a network of corridors.

A network of viable corridors through the landscape that link existing protected areas should improve the ability of species and systems to persist in the face of climate change. Such connectivity can be achieved through guiding land use and management to increase the likelihood of species survival. Successful implementation of landscape corridors will require private and communal landowners to be involved and a key mechanism to be used in securing these corridors is formalised stewardship.

As part of its programme, CAP initiated a process with relevant technical experts in the Eastern Cape and KwaZulu-Natal to start a delineation of corridors that span the province. In theory, if these corridors were secured in some form, the potential impacts of climate change on species extinctions and ecosystem degradation would be reduced. The delineation of the corridors will allow a focus for conservation efforts outside the existing reserve network, e.g. to the stewardship programme. The process of delineating a corridor's location required that criteria be defined as to what makes a good corridor and translating such criteria into a spatial location.

CRITERIA FOR A 'GOOD' CORRIDOR

Although a strict definition of a corridor was not used in this delineation, whole river valley corridors (source-to-sink) that had:

- Low levels of fragmentation as a result of transformation associated with agriculture, urban development, plantations, alien plant infestations and so on.
- Low levels of obvious degradation due to poor management, including poor fire regimes and overgrazing.

- High conservation significance in terms of the priority and status of the ecosystems as determined by the provincial conservation plans.
- Low vulnerability to, and likelihood of climate change.
- High potential for restoration.
- Low levels of current and predicted competing land uses such as commercial or subsistence agriculture or plantation forestry.
- High levels of willingness and ability of the land owners to be stewards to assist in developing, maintaining and monitoring the corridors.

By using whole valley systems it is likely that the corridors would include the specific features that maximise the opportunity for species movement, including:

- Avoiding climatic anomalies such as rain-shadows.
- Macro-climatic gradients associated with topographic (upland-lowland) and coastal – inland gradients.
- Sufficiently large area to allow ecological processes to function.
- Both North and South facing slopes.

DELINEATING THE CORRIDORS

In both the EC and KZN, workshops were held with technical experts from various NGOs and government departments. After a brief introduction as to what makes a good corridor, these experts were asked to identify large corridors in areas that they knew well that met the criteria described above. This was done by projecting GIS maps of the province and with overlays of the various biodiversity, hydrological, topographic, landcover and other relevant data. It is important to note that this process was not driven by detailed data but rather the on-the-ground knowledge of the experts in the workshop. More detailed workshop reports have been drafted by Sarshen Marais, the CAP Coordinator.

In this way, 14 corridors were identified in the EC and 45 in KZN. Once the corridors had been delineated, there was a later GIS analysis to describe the characteristics and calculate the priority of each corridor. In the EC, the delineation was based on selecting all the sub-quaternary catchments (Schulze 2011) that fell within the broad boundaries identified by the technical experts at the workshop. In KZN, whole river corridors were identified by the experts. These were later overlayed with the planning units used in the EKZNW Conservation plan (2010) and all planning units that intersected the river were used as the corridor. In this way, both sides of the river valley were selected. Considering the planning units were based on a fine-scale hydrological basin, these units are similar in nature to the EC units.

PRIORITISING THE CORRIDORS

The prioritisation was slightly different for KZN and the EC due to differences in the conservation data. The results are shown in Tables 1 & 2. The maps of the corridors, colour-coded to show their priority (blue = low, red = high) are shown in Figures 1 & 2.

Eastern Cape

In the EC, the percentage of each corridor that comprised the three terrestrial and two aquatic Critical Biodiversity Areas (CBAs), and the percentage of natural land (i.e. not transformed by agriculture, urban, degradation or forestry - based on the 2005 Landcover from the EC Biodiversity Plan) was calculated. These percentages were then added for each corridor, calculating a basic priority score. In this way, corridors that have low levels of transformation and degradation, and high levels of biodiversity significance were elevated.

According to the EC Biodiversity Plan the descriptions of the critical biodiversity areas (CBAs) are:

Terrestrial CBA 1

- National critically endangered vegetation types (ecosystems): The amount of remaining intact SA vegetation type is less than representation target.
- STEP critically endangered vegetations types.
- National Forest Assessment critically endangered forest patches.
- 80-100% irreplaceable planning units: Areas definitely required to meet representation targets for biodiversity features (SA vegetation types, expert mapped areas).
- KZN C-Plan minset R1 & R2 minset display categories.
- Important forest clusters as identified in the forestry planning process as critical.

Terrestrial CBA 2

- Endangered SA vegetation types. The area of intact vegetation remaining of a vegetation type is within 15% of the set representation target.
- Endangered STEP vegetations types.
- Endangered forest patches.
- All expert mapped areas less than 25 000ha in size. Includes expert data from this project, STEP birds, SKEP, Wild Coast, Pondoland and marine studies.
- All other Forest Clusters (with 500m buffers).
- 1km coastal buffer (forests are not added to this as these are captured elsewhere).
- Ecological corridors and/or named macro-ecological corridors from existing studies (i.e. from STEP, Wild Coast/Pondoland, SEA, etc.) and expert mapped.
- Ecological corridors identified in this project using an integrated corridor design for the whole province.

Terrestrial CBA 3:

- Vulnerable SA vegetation types.
- Vulnerable STEP vegetation types.

Aquatic CBA 1

- Irreplaceability river sub-catchments for Eco-region level 2 representation, endemic fish, terrestrial priorities and estuaries.
- Critical estuaries. Highest importance estuaries (conservation rank of 10) as identified by Turpie 2007.

Aquatic CBA 2

- Important sub-catchments – supporting zone required for preventing degradation of A1 rivers. Require moderate or high protection. Defined as all remaining areas within the designed river catchment network not in A-CBA1.
- Free flowing rivers/ fish migratory systems. Mapped at the Quaternary catchment level based on data from CSIR/DWAF assessment.
- All important estuaries not in E1 (Turpie 2007 ranks 4-9).

KwaZulu-Natal

In KZN a similar process was done, but using the KZN biodiversity data calculated as a percentage of the corridor area. Because KZN underwent a different process to calculate biodiversity importance, there are different data fields (see below). The percentages were summed for each corridor and the priority determined by the total score.

Table Header	Description
NFEPA A,AB	The percentage of the NFEPA river length where the conservation category is A or AB (pristine or close to pristine). River Condition A or B is considered intact and able to contribute towards river ecosystem targets. A = Unmodified, natural. B = Largely natural with few modifications.
Hab. Corr.	The percentage of corridor that comprises land identified in the EKZNW habitat corridors 2009.
PA Exp'n	The percentage of corridor that comprises land identified in the EKZNW Protected Area expansion strategy 2010.
BPA 1	The percentage of corridor that comprises land identified as **Biodiversity Priority Area 1** in the EKZNW Conservation Plan 2010. BPA1 designated planning units contain one or more features* within an irreplaceability = 1. This means that there are no other localities which we have been able to identify as alternates to try an meet the conservation target for this feature(s).
BPA 2	The percentage of corridor that comprises land identified as **Biodiversity Priority Area 2** in the EKZNW Conservation Plan 2010. BPA2 indicate the presence of one (or more) features* with a very high irreplaceability score. In practical terms, this means that there are alternate sites within which the targets can be met, but there aren't many. This site was chosen because it represents the most optimal area for choice in the systematic planning process, meeting both the target goals for the features concerned, as well as a number of other guiding criteria such as high agricultural potential area avoidance, falls within a macro-ecological corridor etc. Whilst the targets could be met elsewhere, the revised reserve design (derived through MINSET) would more often than not be slightly more 'land-hungry' in an effort to meet its conservation objectives. The scarcity of the Biodiversity features contained within is, however, still the primary driver for this PU's selection in MINSET.
BPA 3	The percentage of corridor that comprises land identified as **Biodiversity Priority Area 3** in the EKZNW Conservation Plan 2010. BPA3 indicate the presence of one (or more) features* with a low irreplaceability score. Derived in the same way as outlined for BPA2 described above, the determination vision of these PU's is driven primarily by the guiding layers.
Large Undegraded	The percentage of corridor that comprises land identified by EKZNW in the 'Large and Undegraded' data layer 2010, based on the 2008 landcover. Large undegraded land was calculated as an index that combined minimum patch size and degradation in a 1.5 : 1 ratio. Minimum patch size was calculated from a grassland / savanna biome perspective for each vegetation type specifically and degradation was associated buffers applied around rural settlements (600m in sour veld; 200m in sweet veld); as extracted from the KZN 2005 land cover. The higher the index value within a planning unit, the greater the chance the planning unit in question is a member of a group of planning units

	encompassing a large patch of relatively continuous vegetation that displays low degradation.
Aqu. Score > 75	The percentage of corridor that comprises land with an conservation score of > 75 in the EKZNW Aquatic C-Plan 2007.
Nat	The percentage of corridor that comprises land that is not transformed or degraded, based on the 2008 landcover.

* The distribution of the features in the BPAs are not always applicable to the entire extent of the PU however (except in the case of certain grassland vegetation types), but is more often than not confined to a specific niche habitat e.g. a forest or wetland. Should this be the case, and special mitigation measures would have to be considered to safeguard this feature are put in place, then the potential for development (dependant on its nature of course) could be permitted in the area. Obviously this is dependent on a site by site, case by case basis. This distribution dynamics outlined above are the same for all 3 BPA's indicated in the MINSET.

WAY FORWARD

These corridors represent a rapid expert assessment of where conservation initiatives, such as the biodiversity stewardship programmes, can be focused. In doing so, they will contribute significantly towards securing land that will allow for adaptation of ecosystems and people to climate change. Where a provincial stewardship (or other conservation) programme requires a more detailed focus, the higher priority corridors can be subjected to a detailed analysis that will identify specific land portions that require interventions to be secured.

ACKNOWLEDGEMENTS

Many technical experts from governmental departments and NGOs contributed to the derivation of the corridors in the two provincial workshops. Richard Lechmere-Oertel conducted the GIS analysis and drafted the report.

Table 1. Prioritisation of climate adaptation corridors in KZN

(See text for detail on descriptions of table headings)

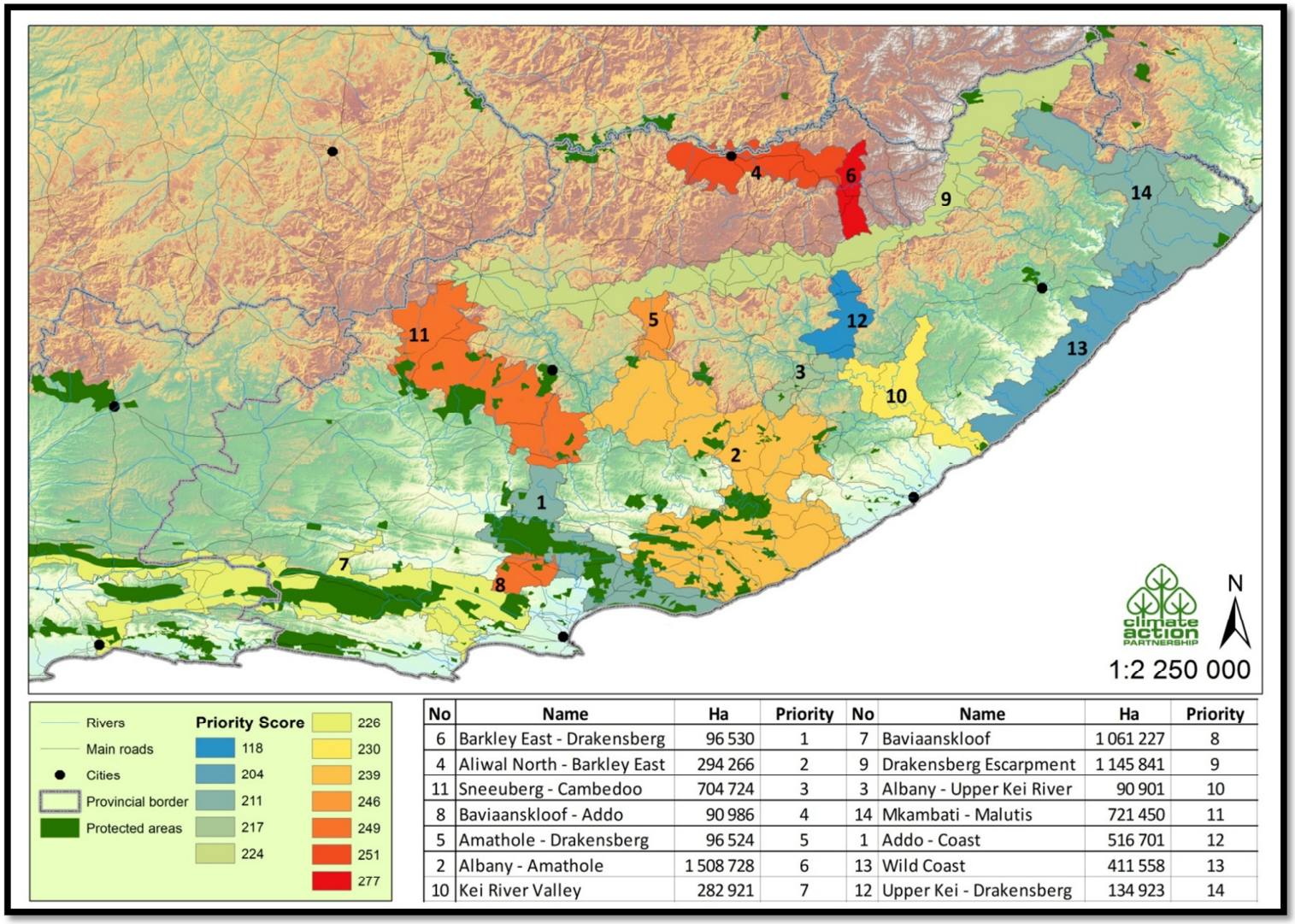
No	Corridor Name	Ha	NFEPA A,AB	KZN Hab. Corr	PA Exp'n	BPA 1	BPA 2	BPA 3	Large & undegraded	Aquatic Score > 75	Nat	Total	Priority
7	Lower Mhlatuze River Valley	57858	10	8	8	6	0	11	18	0	96	157	45
45	UpperThukela - Escarpment Link	8327	0	0	0	4	0	14	54	0	92	164	44
40	Upper Mkhuze River Valley	26010	14	0	0	0	0	22	51	0	80	167	43
39	Upper Mhlatuze River Valley	31260	0	0	0	3	0	35	27	6	97	168	42
35	Umgeni -Mdloti Link	19883	0	0	6	54	0	1	0	22	97	180	41
42	Upper Phongola River	81973	41	0	3	3	0	18	27	1	98	191	40
9	Lower Phongola River	61286	14	1	8	2	0	4	29	51	94	203	39
3	Buffels River Valley	133126	21	1	1	5	0	18	39	43	78	206	38
16	Mid Thukela River Valley	43410	10	0	0	1	0	18	62	38	81	210	37
4	Bushman's River Valley	38007	16	21	7	9	0	13	53	8	94	221	36
21	Mtamvuna-Oribi Gorge-Mzimkhulu Link	14118	73	18	10	26	0	1	7	1	87	223	35
23	Mvoti - Karkloof - uMngeni Link	22703	25	21	15	52	0	4	8	17	85	227	34
44	Upper Thukela River Valley	64917	2	9	1	3	0	11	51	65	91	233	33
22	Mtamvuna River Valley	51712	14	53	12	14	0	7	14	23	98	235	32
31	Slang River Valley	26700	6	7	8	45	0	0	64	20	86	236	31
37	Umgeni River Valley	85032	25	0	9	34	0	7	8	64	94	241	30
27	Mzimkhulu River Valley	132972	65	9	5	11	0	13	34	20	89	246	29
29	Phongola Dam-Ndumo-Usuthu River Link	52834	61	23	9	7	0	6	35	10	96	247	28
24	Mvoti River Valley	65697	25	10	9	32	0	4	16	57	95	248	27
10	Lower Thukela - Nadi Ridge Link	14323	31	22	8	8	0	24	37	35	85	250	26
12	Mhlatuze - Ridge Link	11950	51	18	7	0	0	35	56	0	87	254	25
19	Mlalazi - Mhlatuze Link	10849	0	53	15	65	0	0	30	0	93	256	24

No	Corridor Name	Ha	NFEPA A,AB	KZN Hab. Corr	PA Exp'n	BPA 1	BPA 2	BPA 3	Large & undegraded	Aquatic Score > 75	Nat	Total	Priority
15	Mid Phongola River	92512	15	29	15	20	0	3	41	40	93	256	23
8	Lower Mkhuze River Valley	32051	29	37	20	17	0	2	49	8	94	256	22
32	Sundays River Valley	55405	46	5	19	26	0	18	62	4	86	266	21
36	Umgeni -Umkomazi Link	23328	3	11	24	62	0	4	36	44	92	276	20
38	Upper Buffels- Phongola Escarpment	35631	68	10	19	22	0	6	54	3	95	277	19
43	Upper Sundays- Buffels Escarpment	57895	14	23	24	34	0	2	67	25	90	279	18
2	Black Mfolozi River Valley	122589	75	20	5	7	0	6	39	43	85	280	17
1	Bivane River Valley	43218	64	8	13	15	0	15	42	31	92	280	16
28	Phongola - Thembe - Kosi Link	56755	91	11	12	4	0	9	48	13	97	285	15
18	Mkomzai River Valley	99743	36	33	10	7	0	17	47	53	90	293	14
33	Thukela - Mhlatuze Link	23290	90	0	6	25	0	43	31	10	89	294	13
26	Mzimkhulu - Ntsikene Link	31904	73	26	10	6	0	14	57	19	89	294	12
6	Lower Mfolozi - Mkhuze Coastal Link	114607	87	75	1	0	0	0	28	13	94	298	11
17	Mkomzai - Bulwer - Mzimkhulu Link	32764	53	0	22	38	0	3	38	55	94	303	10
25	Mweni - Upper Sundays Escarpment	66339	57	20	18	30	0	3	49	33	96	306	9
20	Mtamvuna - Ngeli - Ntsikene Link	57994	81	15	25	24	0	11	44	28	87	315	8
13	Mhlatuze off shoot	8169	100	0	25	17	0	32	58	1	96	329	7
30	Phongolo - Bivane Link	18706	100	50	3	10	0	19	64	1	89	336	6
11	Lower Thukela River Valley	91564	56	8	9	19	0	17	49	86	94	338	5
41	Upper Mweni Link	39500	70	19	27	33	0	0	79	24	98	350	4
5	Kosi - Sibaya - Mkhuze Coastal Link	24395	100	68	9	0	0	5	57	19	98	356	3
14	Mid Mkhuze River Valley	69230	57	6	52	61	0	2	69	21	89	357	2
34	Umgeni - Drakensberg Link	12141	61	56	27	27	0	0	91	22	97	381	1

Table 2. Prioritisation of climate adaptation corridors in the EC.

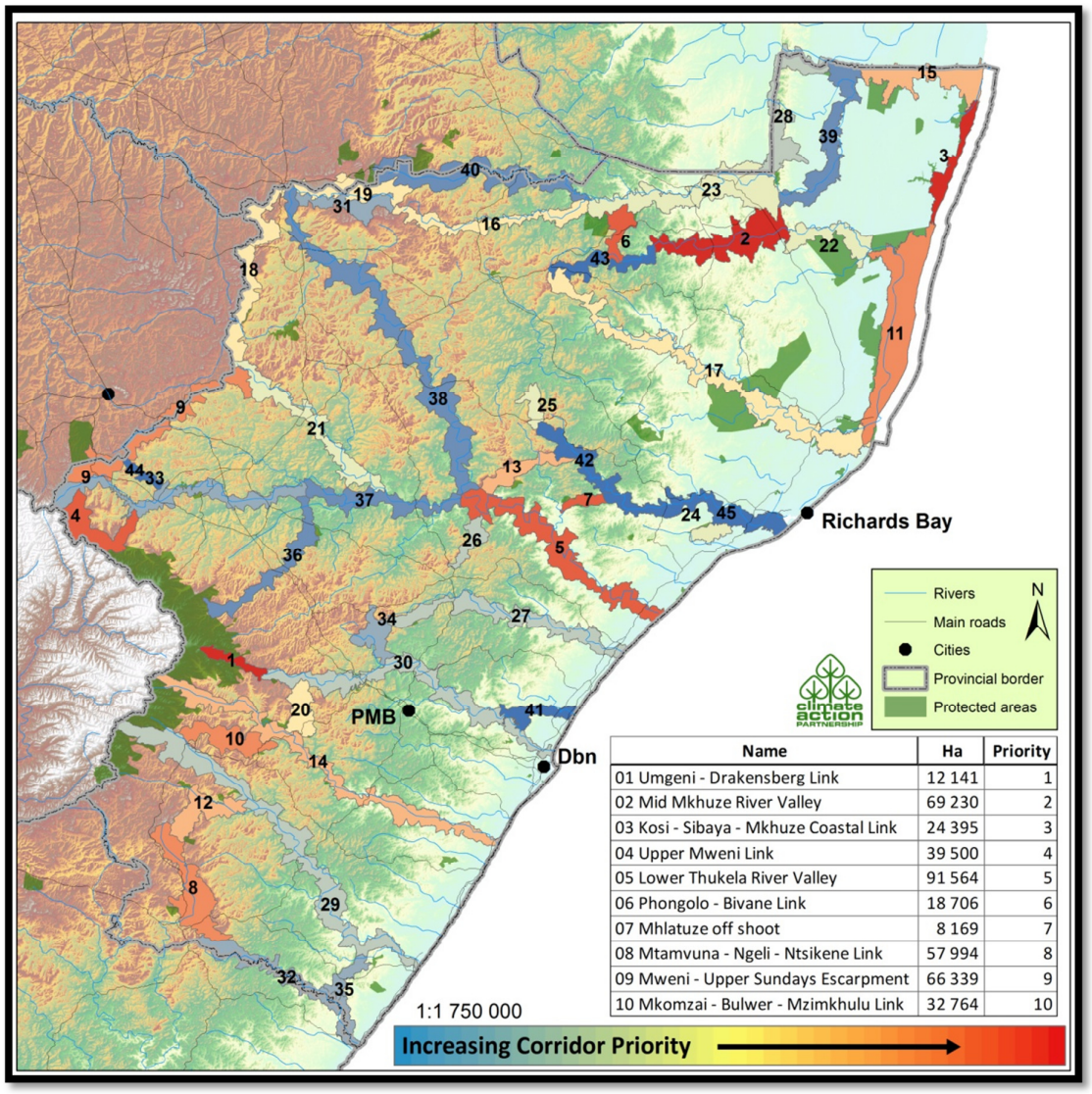
No.	Corridor Name	Ha	Terr. CBA 1 [1]	Terr. CBA 2 [1]	Terr. CBA 3 [1]	Aqu. CBA 1 [1]	Aqu. CBA 2 [1]	Natural [1]	Total	Priority
1	Addo - Coast	516 701	27	53	5	25	28	73	211	3
2	Albany - Amathole	1 508 728	16	64	5	40	36	78	239	9
3	Albany - Upper Kei River	90 901	8	51	25	22	28	83	217	5
4	Aliwal North - Barkley East	294 266	1	59	11	12	81	87	251	13
5	Amathole - Drakensberg	96 524	1	75	0	0	75	95	246	10
6	Barkley East - Drakensberg	96 530	36	53	3	53	40	92	277	14
7	Baviaanskloof	1 061 227	14	53	4	46	23	86	226	7
8	Baviaanskloof - Addo	90 986	24	57	16	16	84	52	249	11
9	Drakensberg Escarpment	1 145 841	30	42	3	30	38	81	224	6
10	Kei River Valley	282 921	13	68	10	62	14	63	230	8
11	Sneeuberg - Cambedoo	704 724	6	81	0	20	47	95	249	12
12	Upper Kei - Drakensberg	134 923	1	6	60	0	0	51	118	1
13	Wild Coast	411 558	37	55	0	49	5	58	204	2
14	Mkambati - Malutis	721 450	32	61	3	40	24	51	211	4

[1] Data are percentages of the corridor.



No	Name	Ha	Priority	No	Name	Ha	Priority
6	Barkley East - Drakensberg	96 530	1	7	Baviaanskloof	1 061 227	8
4	Aliwal North - Barkley East	294 266	2	9	Drakensberg Escarpment	1 145 841	9
11	Sneeuberg - Cambedoo	704 724	3	3	Albany - Upper Kei River	90 901	10
8	Baviaanskloof - Addo	90 986	4	14	Mkambati - Malutis	721 450	11
5	Amathole - Drakensberg	96 524	5	1	Addo - Coast	516 701	12
2	Albany - Amathole	1 508 728	6	13	Wild Coast	411 558	13
10	Kei River Valley	282 921	7	12	Upper Kei - Drakensberg	134 923	14

Figure 1. The Climate Adaptation Corridors for the Eastern Cape



Name	Ha	Priority
01 Umgeni - Drakensberg Link	12 141	1
02 Mid Mkhuze River Valley	69 230	2
03 Kosi - Sibaya - Mkhuze Coastal Link	24 395	3
04 Upper Mweni Link	39 500	4
05 Lower Thukela River Valley	91 564	5
06 Phongolo - Bivane Link	18 706	6
07 Mhlatuze off shoot	8 169	7
08 Mtamvuna - Ngeli - Ntsikene Link	57 994	8
09 Mweni - Upper Sundays Escarpment	66 339	9
10 Mkomzai - Bulwer - Mzimkhulu Link	32 764	10

Figure 2. The Climate Adaptation Corridors for KZN with a table showing the top 10 corridors.

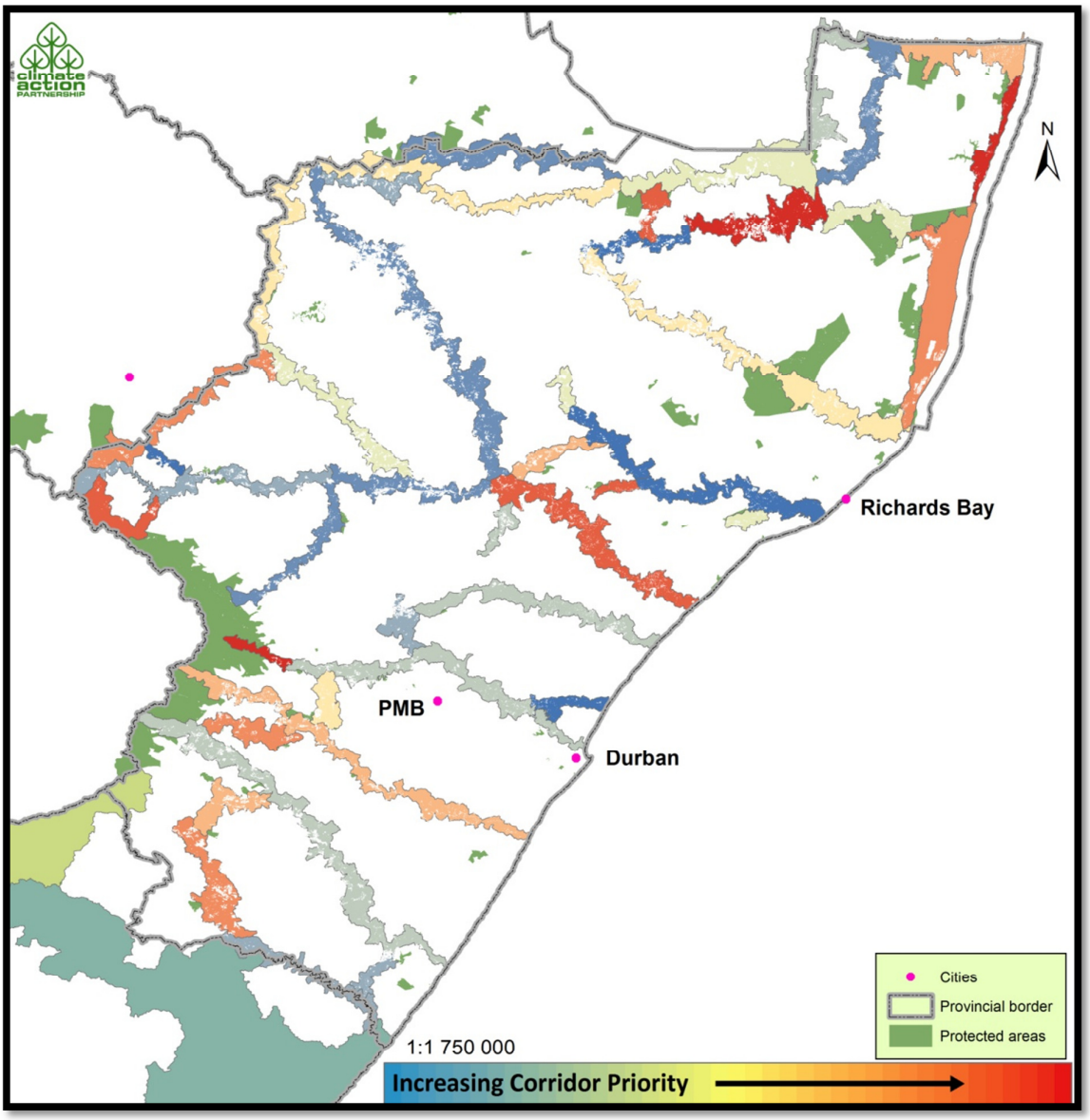


Figure 3. The KZN corridors with land that has already been transformed whited out.