Analysis of human-wildlife conflict in the MCA-supported conservancies for the five-year period of 2006-2010

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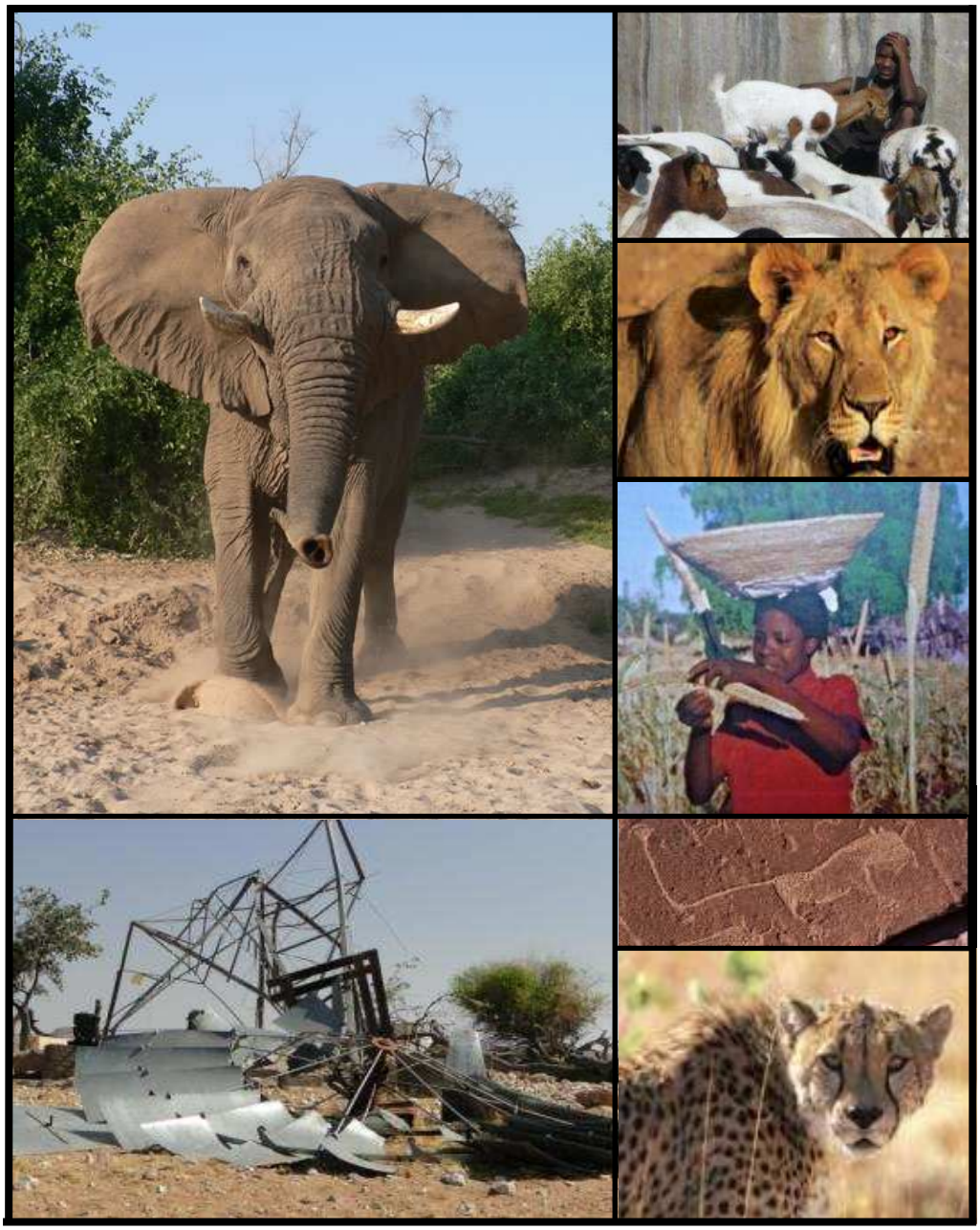


Introduction

- As wildlife numbers have increased in Namibia's conservancies because of improved local level management, so have the incidents of human-wildlife conflict (HWC).
- HWC causes significant financial loss to conservancy members. These losses vary between conservancies, both in the types of loss, i.e. livestock, crop, infrastructure, and in the level of the loss in financial terms.
- Also, within a conservancy, the losses are not shared equally between all members. Some members carry a disproportionately large financial burden.
- Significant losses can have a markedly detrimental impact on people's attitudes to wildlife and to the conservancy programme.
- HWC is thus a significant issue that requires focused and pro-active attention from support organisations - both government and NGO, from the conservancies themselves and from development partners.
- Before focused and pro-active attention can be provided, good information is needed on the extent and geographic occurrence of HWC so that interventions are strategic, focus on the main problem areas and are cost effective.

Objectives

- The purpose of this analysis is to identify those conservancies supported by MCA-Namibia which have the greatest HWC problems. Once the priority conservancies have been identified, then more detailed work will be done to analyse HWC within each conservancy at a far greater level of detail (see analysis for ≠Khoadi //Hoas as an example) so that project interventions can be designed to address specific problems, species and sites that are relevant per priority attention.

Methods and analyses

- This analysis draws on the data contained within the NACSO ConInfo databases with primary data from the conservancies' Event Books. It also draws on the NACSO State of Conservancy database on economic benefits earned by conservancies.
- The analysis covers the period 2006 to 2010. Data are available for most conservancies for this full period. Where this is not the case the length of coverage is stated.
- All HWC falls into four different types or categories:
  (i) garden & crop damage,
  (ii) livestock losses,
  (iii) infrastructure damage and
  (iv) human attacks.
- There is some variation across the country within the HWC categories, which has been taken into account in the analysis. For example, gardens in the Kunene region are generally small hand-watered kitchen gardens while those in the north and north-east of the country are rain-fed crop fields. In southern and parts of central Kunene livestock is made up largely of small-stock, mainly goats, while in the north of Kunene, north-central and north-east regions cattle are far more prominent.
- There are also different consequences to HWC in different regions. In the north-west and north-central regions for example, destruction of water installations by elephants can have severe impacts on people and their livestock because of the absence of alternatives. In the north-east, because of the large river

systems, such damage is generally far less severe. These issues are taken into account within the more detailed analysis of each priority conservancy.

- A consolidate set of data (Table 1) were prepared in an excel spreadsheet from which the follow aspects were analysed per type of HWC:
  - ✓ the average, maximum and minimum numbers of incidents per conservancy (where the maximum and minimum numbers reflect the highest and lowest number of incidents in any one of the five years)
  - ✓ the average and maximum number of incidents per 1,000 sq km per conservancy
  - ✓ the average and maximum number of incidents per 1,000 people per conservancy
  - ✓ the average number of incidents of HWC per category per region
- Monetary values for the different types of HWC were calculated and applied to the different types of HWC incidents. These monetary values are based on actual costs of replacing equipment, market values of livestock and crops as well as labour costs for repairs. Some regional variation is applied where necessary, but in most cases general standardized costs are applied. The reason is that, at this level of analysis, we are looking at comparative HWC impacts across and between conservancies. More detail is appropriate at the conservancy level analysis. The rationale for ascribing costs to various categories and types of HWC is set out in Table 2.
- No monetary values are ascribed to the loss of human life. It is not possible nor is it appropriate to place a monetary value on the life of a person. Where a cost has to be assigned, just the cost of funeral provisions as covered by MET are used.
- The following cost analyses per type of HWC (but excluding human attack) were done:
  - ✓ the average and maximum cost (financial value of the damage in N$) per conservancy
  - ✓ the average and maximum cost per 1,000 sq km per conservancy
  - ✓ the average and maximum cost per 1,000 people per conservancy
- The total combined average and maximum costs of all HWC were calculated:
  - ✓ per conservancy
  - ✓ per 1,000 sq km per conservancy
  - ✓ per 1,000 people per conservancy
- The total value of benefits earned by each conservancy was compared to the average and maximum HWC costs.

Results

- The results for each of the above analyses are shown in the attached Figures as follows:

  Incidents of HWC per conservancy - Figures A1 to A16 show
  Incidents of HWC per region - Figure B1 shows
  Costs of HWC per conservancy - Figure C1 to C12 show, and
  Benefit to HWC cost ratio per conservancy - Figures D1 – D2 shows the
- The worst 10 impacted conservancies for each category of HWC, per number of incidents, per 1,000 sq km and per 1,000 people, are listed in Table 3.
- The worst 10 impacted conservancies for all categories of HWC combined per incident, per 1,000 sq km and per 1,000 people, are listed in Table 4.
- A summary of the findings is presented in the following six maps and tables.
  - ✓ Gardens and crops: The greatest costs by far are experienced in the Caprivi; the seven worst impacted conservancies are all in the Caprivi. In the most impacted conservancy, Kwandu, the

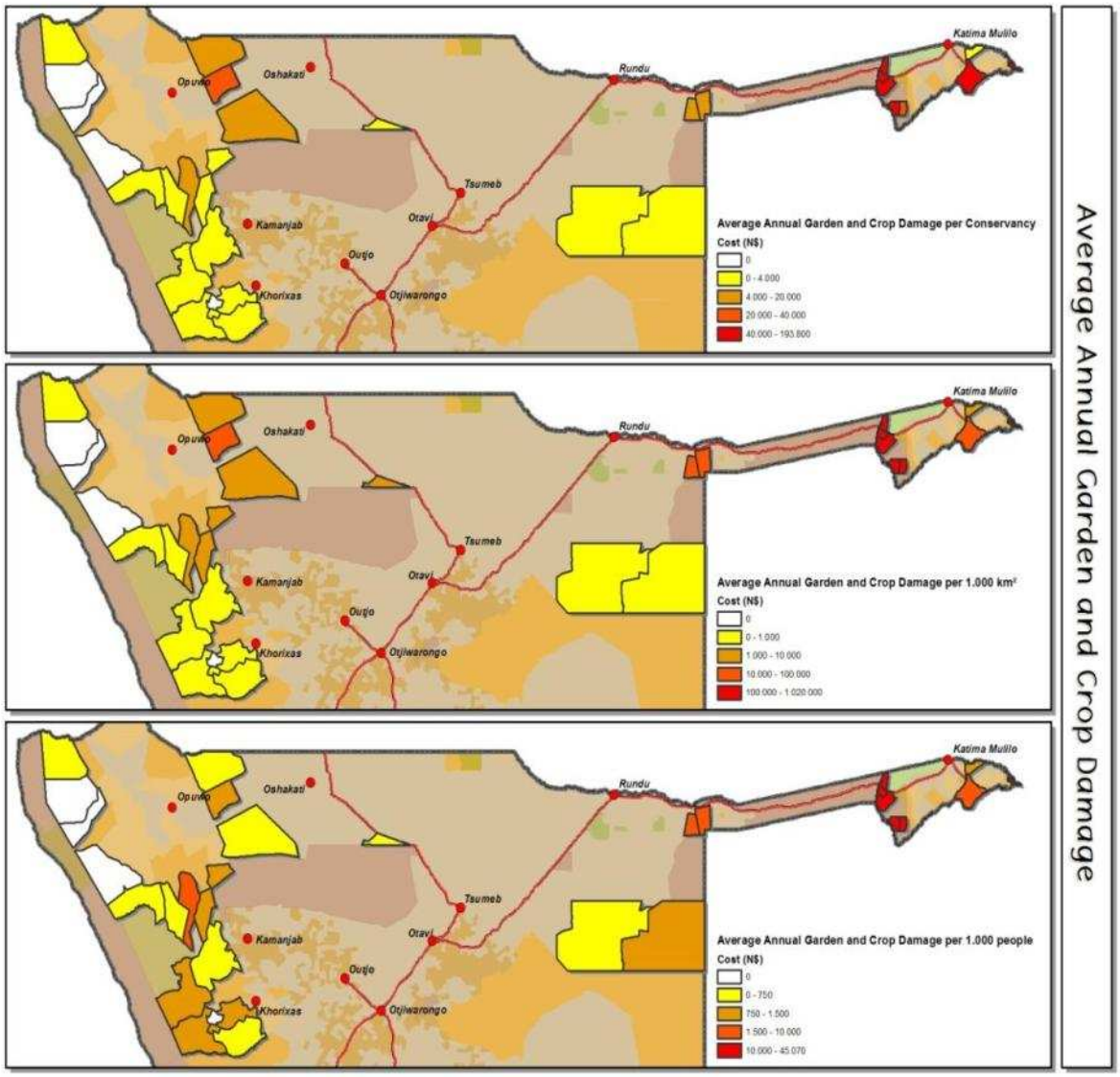
average annual crop loss amounts to about N$45 per person per year and just over N$10 per hectare of all land (i.e. not just land under crops) in the conservancy per year. The maximum loss in any one year was about N$68 per person and about N$15 per ha. The region with the next greatest losses is the Kavango at much reduced levels of about N$4 per person and about N$0.13 to N$0.18c per ha. Over 95% of the damage is caused by elephants. The colour code in the table below reflects the levels of HWC impact, and these colours are also used in the accompanying maps.

HWC Costs (N$) per conservancy, per 1,000 sq km and per 1,000 people for garden and crop damage

Average annual garden and crop damage per conservancy		Average annual garden and crop damage per 1,000 sq km per conservancy		Average annual garden and crop damage per 1,000 people per conservancy	
Conservancy	**Cost (N$)**	**Conservancy**	**Cost (N$)**	**Conservancy**	**Cost (N$)**
Orupembe	-	Orupembe	-	Orupembe	-
Sanitatas	-	Sanitatas	-	Sanitatas	-
Puros	-	Puros	-	Puros	-
Uibasen Twyfelfontein	-	Uibasen Twyfelfontein	-	Uibasen Twyfelfontein	-
Marienfluss	50	Marienfluss	16	Sesfontein	40
Sesfontein	100	Sesfontein	41	King Nehale	72
Sorris Sorris	750	N=/a Jaqna	233	Marienfluss	167
Anabeb	900	Nyae Nyae	237	Uukolonkadhi/Ruacana	240
Torra	1,200	Doro !Nawas	302	Sheya Uushona	271
Doro !Nawas	1,200	Sorris Sorris	328	N=/a Jaqna	304
#Khoadi//hoas	1,300	Torra	344	#Khoadi//hoas	406
King Nehale	1,444	#Khoadi//hoas	386	Anabeb	450
Nyae Nyae	2,128	Anabeb	573	Sorris Sorris	577
N=/a Jaqna	2,128	Ehirovipuka	1,313	Doro !Nawas	800
Sikunga	2,470	Sheya Uushona	1,890	Uukwaluudhi	876
Ehirovipuka	2,600	Uukolonkadhi/Ruacana	2,006	Nyae Nyae	925
Omatendeka	4,375	Omatendeka	2,702	Torra	1,000
Uukolonkadhi/Ruacana	6,004	King Nehale	2,843	Ehirovipuka	1,040
Muduva Nyangana	8,018	Sikunga	8,606	Sikunga	1,235
George Mukoya	8,588	Muduva Nyangana	13,037	Omatendeka	1,750
Sheya Uushona	9,576	Uukwaluudhi	15,232	Muduva Nyangana	4,009
Uukwaluudhi	21,888	George Mukoya	17,671	George Mukoya	4,294
Wuparo	24,396	Salambala	65,376	Salambala	7,896
Impalila	41,040	Wuparo	164,838	Wuparo	11,617
Mayuni	59,660	Balyerwa	276,054	Mayuni	24,858
Salambala	60,800	Mayuni	395,099	Impalila	27,360
Balyerwa	61,560	Mashi	397,912	Mashi	30,303
Mashi	118,180	Impalila	562,192	Balyerwa	41,040
Kwandu	193,800	Kwandu	1,020,000	Kwandu	45,070

- ✓ Livestock losses: In terms of costs per conservancy, the north-central regions and Kunene experience the largest numbers of livestock losses from predators. When alanysed per area some of the Caprivi conservancies enter the list of worst impacted conservancies. When analysed per capita the Kunene conservancies occupy the top 13 places, i.e. all conservancies in the Kunene are ahead of all other conservancies. The worst impacted conservancy in terms of cost per capita, Sanitatas, experiences twice the loss of the next worst conservancy,

Marienfluss, which in turn experiences twice the loss of the third-worst impacted conservancy, Orupembe. Each member of the Sanitatas conservancy experiences an average annual loss of about N$1,000. The maximum loss in any one year was N$1,400 per person. Livestock losses are clearly associated with proximity to national parks and dedicated wildlife areas, particularly Etosha and Skeleton Coast National Parks, Hobatere and Palmwag tourism concession areas, and Mudumu and Mamili National Parks.

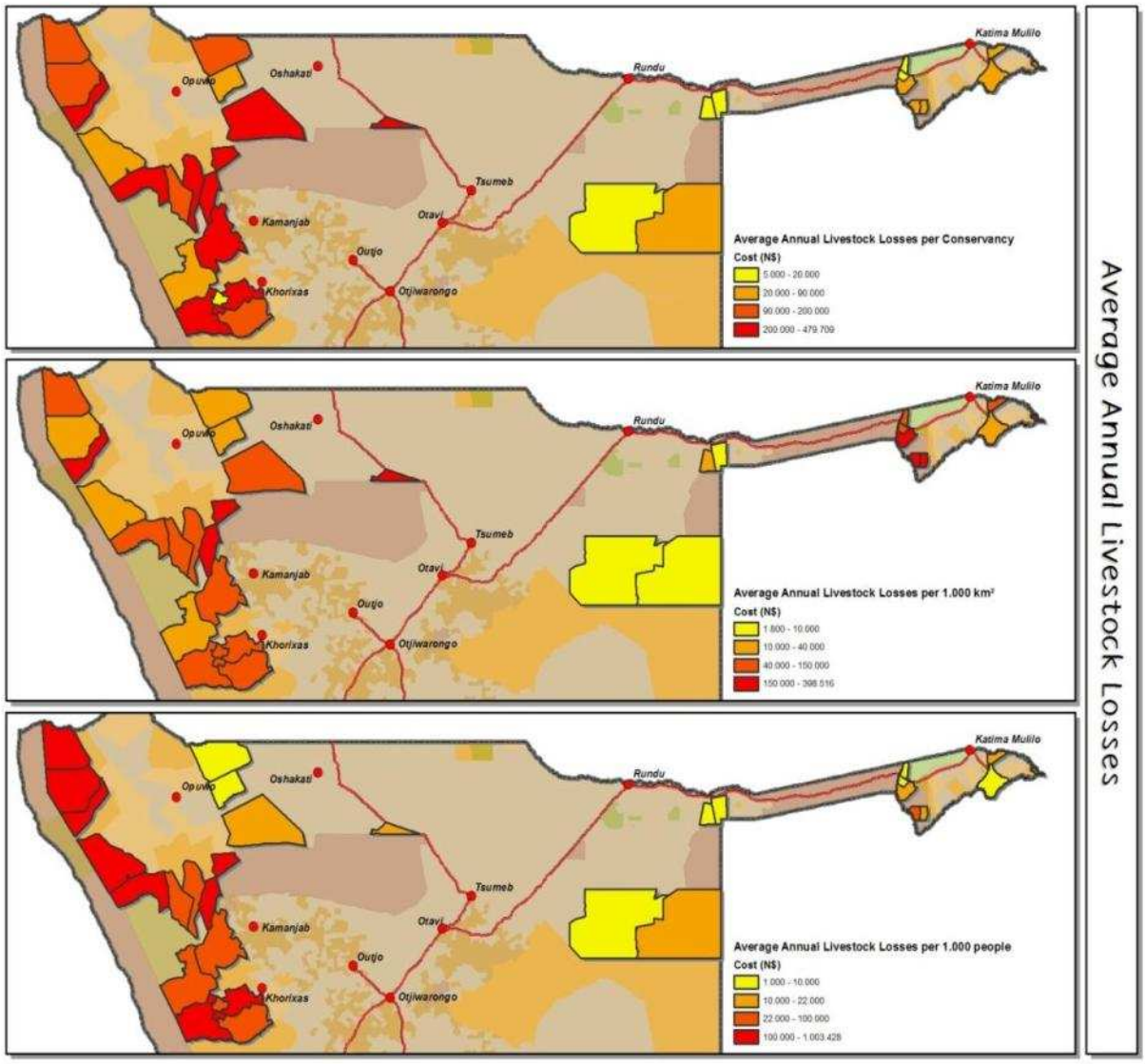


✓ Infrastructure damage: In terms of cost per capita, the southern Kunene conservancies are the worst affected, followed by conservancies in the Caprivi. Elephants cause over 99% of the damage. The average annual cost per person in the worst three impacted conservancies is about N$20 and the maximum in the five years was just over N$60. However, these costs are not distributed evenly across the conservancy. Particularly in the Kunene, elephants follow particular routes down river courses and between river systems, and have favoured feeding areas in different seasons. This makes individuals farmers more prone to experiencing infrastructure damage, particularly in drier seasons and years. An individual farmers can experience damage of well over N$100,000 when elephants pull down and destroy a windmill, pull up pipes and damage the water tank.

HWC Costs (N$) per conservancy, per 1,000 sq km and per 1,000 people for livestock losses							
Average annual livestock losses per conservancy			Average annual livestock losses per 1,000 sq km per conservancy			Average annual livestock losses per 1,000 people per conservancy	
Conservancy	Cost (N$)		Conservancy	Cost (N$)		Conservancy	Cost (N$)
Muduva Nyangana	5,868		N=/a Jaqna	1,898		Uukwaluudhi	1,185
Mayuni	9,976		Nyae Nyae	5,449		N=/a Jaqna	2,473
Uibasen Twyfelfontein	16,063		Muduva Nyangana	9,541		Muduva Nyangana	2,934
N=/a Jaqna	17,311		Puros	14,180		Uukolonkadhi/Ruacana	3,603
George Mukoya	18,044		Uukwaluudhi	20,622		Mayuni	4,157
Kwandu	18,484		Torra	25,364		Kwandu	4,299
Sikunga	22,445		Orupembe	28,229		Salambala	4,801
Impalila	27,873		Uukolonkadhi/Ruacana	30,095		George Mukoya	9,022
Uukwaluudhi	29,633		George Mukoya	37,128		King Nehale	10,122
Salambala	36,968		Salambala	39,751		Sikunga	11,223
Balyerwa	37,849		Doro !Nawas	52,036		Sheya Uushona	13,566
Wuparo	40,196		Sorris Sorris	53,874		Impalila	18,582
Nyae Nyae	48,998		Marienfluss	54,638		Wuparo	19,141
Puros	50,508		Uibasen Twyfelfontein	56,165		Mashi	20,500
Mashi	79,952		Anabeb	57,485		Nyae Nyae	21,303
Torra	88,596		Mayuni	66,064		Balyerwa	25,232
Uukolonkadhi/Ruacana	90,074		#Khoadi//hoas	70,641		Anabeb	45,126
Anabeb	90,252		Sikunga	78,206		Uibasen Twyfelfontein	69,840
Orupembe	100,636		Sheya Uushona	94,692		Torra	73,830
Sorris Sorris	123,372		Kwandu	97,285		#Khoadi//hoas	74,261
Marienfluss	165,771		Sesfontein	107,719		Omatendeka	85,673
King Nehale	202,446		Omatendeka	132,293		Sorris Sorris	94,902
Doro !Nawas	207,000		Ehirovipuka	165,964		Sesfontein	106,211
Omatendeka	214,182		Balyerwa	169,725		Ehirovipuka	131,443
#Khoadi//hoas	237,636		Sanitatas	173,483		Doro !Nawas	138,000
Sanitatas	250,857		Mashi	269,197		Puros	194,262
Sesfontein	265,527		Wuparo	271,593		Orupembe	251,591
Ehirovipuka	328,608		Impalila	381,822		Marienfluss	552,570
Sheya Uushona	479,709		King Nehale	398,516		Sanitatas	1,003,428

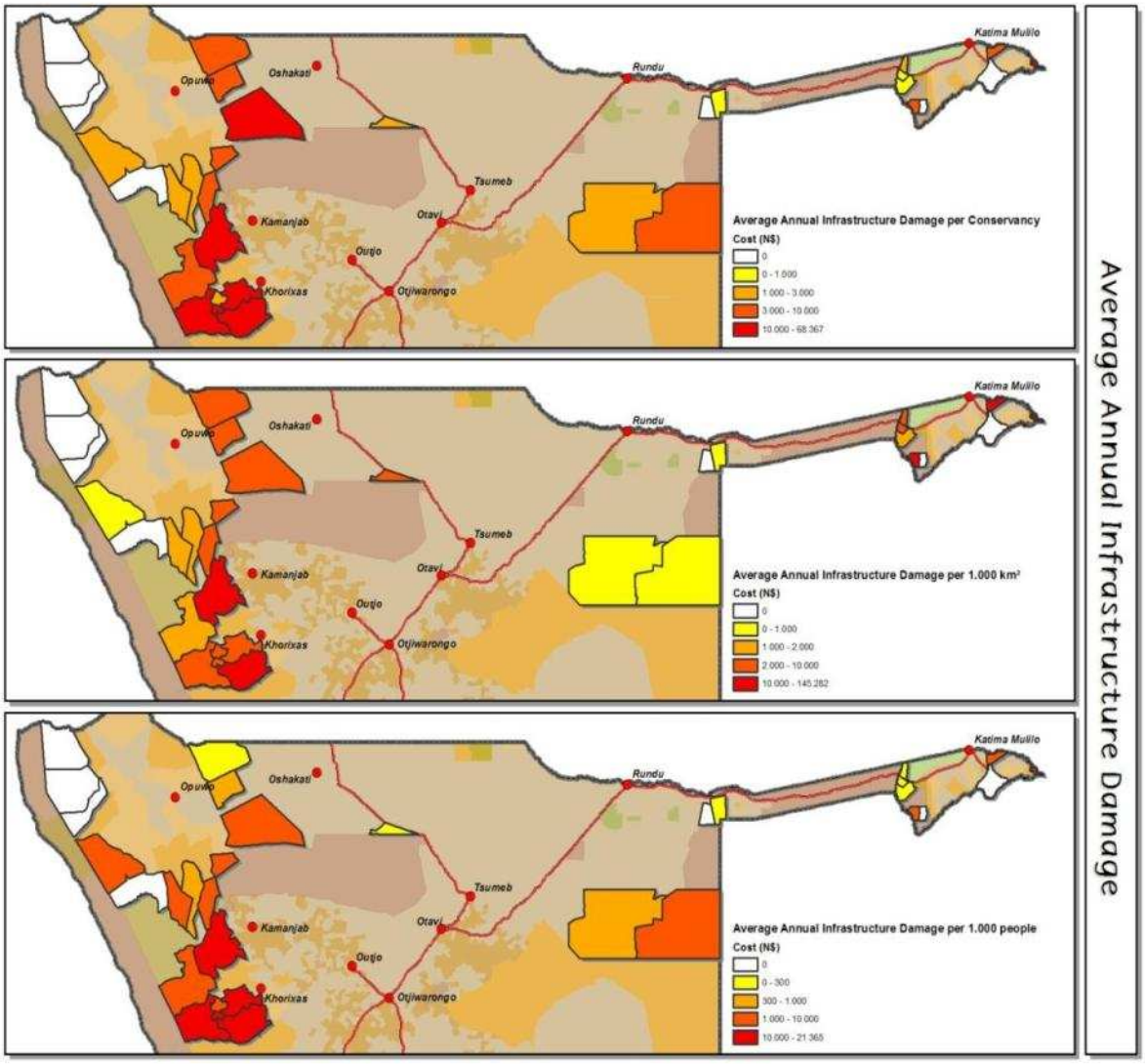
- ✓ Human attack: This refers to serious injury and death. The information is presented as number of incidents, not as costs, because it is not appropriate to try and place a financial value on a human life. In terms of numbers of incidents per conservancy, and incidents per 1,000 sq km, the Caprivi conservancies suffer most attacks, particularly Impalila, Kwandu, Wuparo, Sikunga and Salambala. In terms of conflict per capita, Uibasen Twyfelfontein heads the list at just under 3 human attacks per 1,000 people per year, followed by Impalila (just under 2 attacks/year), Marienfluss, Sikunga and Kwandu. The wildlife species differ from area to area. In the Caprivi crocodiles and hippos play a significant role, while in the Kunene elephants are the main culprits. With the recent rapidly expanding numbers of tourists to the Uibasen conservancy as a result of the registration of Twyfelfontein by UNESCO as a World Heritage Site (about 70,000 visitors reported for 2010) this conservancy needs to receive urgent attention. Also, pro-active attention needs to be provided to other conservancies or to

specific potential problem spots in conservancies when it is evident that human attacks could take place, rather than waiting for such potential attacks to become statistics.



HWC Costs (N$) per conservancy, per 1,000 sq km and per 1,000 people for infrastructure damage							
Average annual infrastructure damage per conservancy			Average annual infrastructure damage per 1,000 sq km per conservancy			Average annual infrastructure damage per 1,000 people per conservancy	
Conservancy	Cost (N$)		Conservancy	Cost (N$)		Conservancy	Cost (N$)
Orupembe	-		Orupembe	-		Orupembe	-
Sanitatas	-		Sanitatas	-		Sanitatas	-
Sesfontein	-		Sesfontein	-		Sesfontein	-
Marienfluss	-		Marienfluss	-		Marienfluss	-
George Mukoya	-		George Mukoya	-		George Mukoya	-
Wuparo	-		Wuparo	-		Wuparo	-
Salambala	-		Salambala	-		Salambala	-
Mashi	368		N=/a Jaqna	231		Mashi	94
Muduva Nyangana	442		Puros	295		King Nehale	105
Mayuni	589		Nyae Nyae	390		Muduva Nyangana	221

Puros	1,052		Muduva Nyangana	719		Mayuni	246
Kwandu	1,178		Mashi	1,240		Uukolonkadhi/Ruacana	266
Uibasen Twyfelfontein	1,402		Omatendeka	1,408		Kwandu	274
King Nehale	2,104		Anabeb	1,563		N=/a Jaqna	301
N=/a Jaqna	2,104		Torra	1,606		Uukwaluudhi	351
Omatendeka	2,279		Uukolonkadhi/Ruacana	2,226		Omatendeka	912
Anabeb	2,454		Mayuni	3,902		Sheya Uushona	1,101
Nyae Nyae	3,506		King Nehale	4,141		Anabeb	1,227
Balyerwa	4,419		Ehirovipuka	4,250		Nyae Nyae	1,524
Torra	5,610		Uibasen Twyfelfontein	4,903		Balyerwa	2,946
Uukolonkadhi/Ruacana	6,661		Uukwaluudhi	6,100		Ehirovipuka	3,366
Ehirovipuka	8,414		Kwandu	6,202		Puros	4,045
Uukwaluudhi	8,765		Doro !Nawas	6,522		Torra	4,675
Sikunga	9,943		Sheya Uushona	7,682		Sikunga	4,971
Impalila	10,606		Sorris Sorris	11,712		Uibasen Twyfelfontein	6,097
Doro !Nawas	25,944		Balyerwa	19,816		Impalila	7,070
Sorris Sorris	26,821		#Khoadi//hoas	20,323		Doro !Nawas	17,296
Sheya Uushona	38,917		Sikunga	34,644		Sorris Sorris	20,631
#Khoadi//hoas	68,367		Impalila	145,282		#Khoadi//hoas	21,365

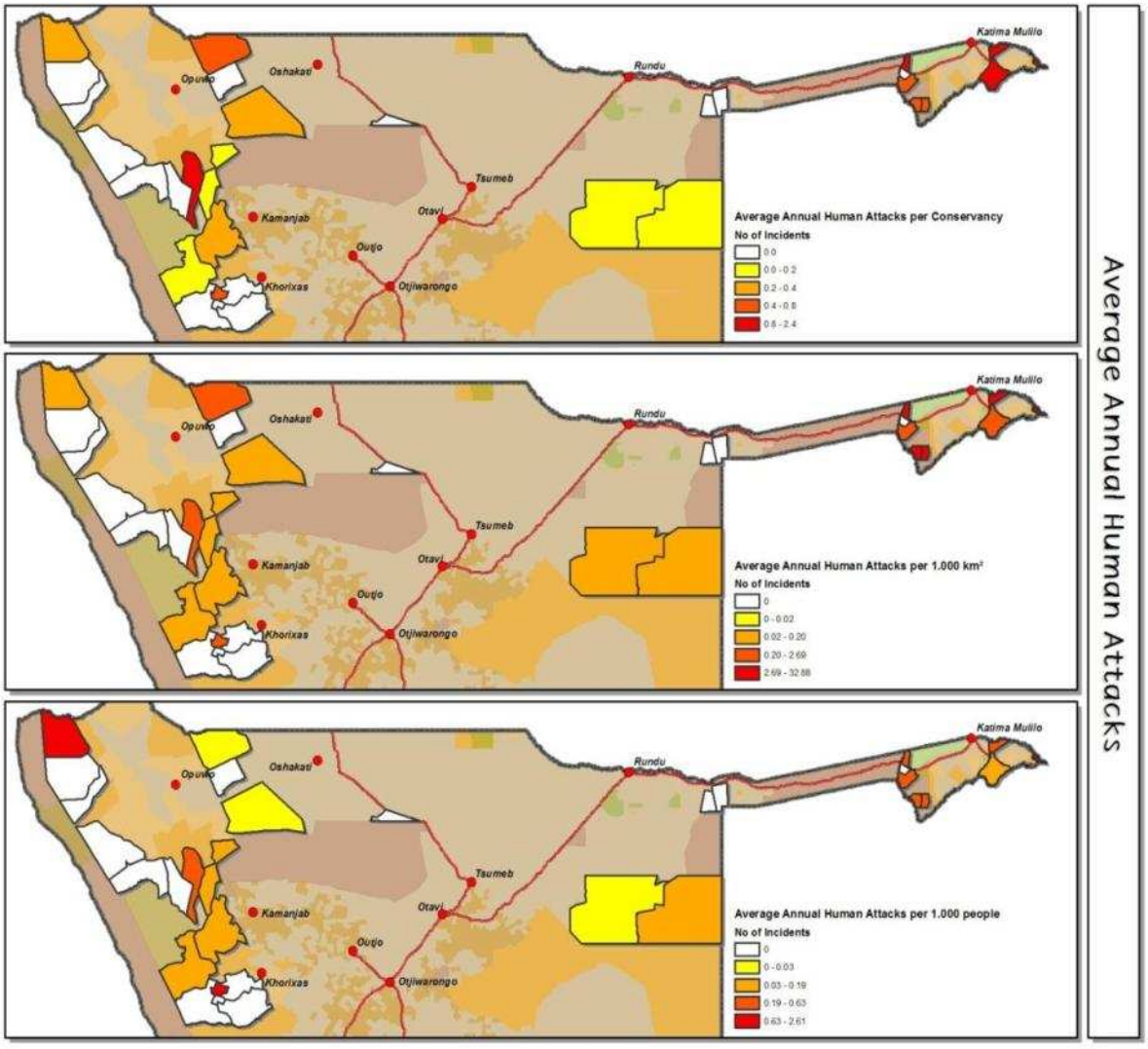


HWC number of incidents per conservancy, per 1,000 sq km and per 1,000 people for human attacks

Average annual human attacks per conservancy		Average annual human attacks per 1,000 sq km per conservancy		Average annual human attacks per 1,000 people per conservancy	
Conservancy	**No. incidents**	**Conservancy**	**No. incidents**	**Conservancy**	**No. incidents**
Muduva Nyangana	0	Orupembe	0	Orupembe	0
George Mukoya	0	George Mukoya	0	Sanitatas	0
Orupembe	0	Sesfontein	0	Sesfontein	0
Sanitatas	0	Sanitatas	0	George Mukoya	0
Sesfontein	0	Puros	0	King Nehale	0
Puros	0	Muduva Nyangana	0	Muduva Nyangana	0
Anabeb	0	Anabeb	0	Mayuni	0
Uukwaluudhi	0	King Nehale	0	Uukwaluudhi	0
King Nehale	0	Mayuni	0	Anabeb	0
Doro !Nawas	0	Uukwaluudhi	0	Puros	0
Sorris Sorris	0	Doro !Nawas	0	Doro !Nawas	0
Mayuni	0	Sorris Sorris	0	Sorris Sorris	0
Ehirovipuka	0.2	N=/a Jaqna	0.02	Sheya Uushona	0.01
Torra	0.2	Nyae Nyae	0.02	Uukolonkadhi/Ruacana	0.02
Nyae Nyae	0.2	Torra	0.06	N=/a Jaqna	0.03
N=/a Jaqna	0.2	Sheya Uushona	0.08	Ehirovipuka	0.08
Marienfluss	0.4	Ehirovipuka	0.10	Nyae Nyae	0.09
Sheya Uushona	0.4	#Khoadi//hoas	0.12	#Khoadi//hoas	0.13
#Khoadi//hoas	0.4	Marienfluss	0.13	Salambala	0.16
Uukolonkadhi/Ruacana	0.6	Uukolonkadhi/Ruacana	0.20	Torra	0.17
Uibasen Twyfelfontein	0.6	Omatendeka	0.62	Mashi	0.19
Balyerwa	0.6	Salambala	1.29	Wuparo	0.38
Mashi	0.75	Uibasen Twyfelfontein	2.10	Balyerwa	0.40
Wuparo	0.8	Mashi	2.53	Omatendeka	0.40
Omatendeka	1	Balyerwa	2.69	Kwandu	0.56
Salambala	1.2	Sikunga	4.36	Sikunga	0.63
Sikunga	1.25	Wuparo	5.41	Marienfluss	1.33
Kwandu	2.4	Kwandu	12.63	Impalila	1.60
Impalila	2.4	Impalila	32.88	Uibasen Twyfelfontein	2.61

- ✓ Overall HWC costs: Because of the relatively high value of livestock, particularly cattle, to other forms of HWC loss (but excluding human attack for reasons already stated), the predominantly cattle-farming conservancy areas come out as those suffering greatest overall HWC losses and those bearing the greatest costs. These are the north-central and Kunene regions, with Sheya Uushona, Ehirovipuka and ≠Khoadi //Hoas carrying the greatest costs – all conservancies bordering onto Etosha National Park. In terms of the cost of HWC per area, the small Caprivi conservancies head the list – Impalila, Kwandu, Mashi, Balyerwa, Mayuni and Wuparo, before a conservancy in another region – King Nehale, enters the list. However, in terms of overall HWC costs per capita, the Kunene region occupies the 12 top positions, with Sanitatas, Marienfluss, Orupembe and Puros at the top, followed by Doro !Nawas, Ehirovipuka, Sorris Sorris, Sesfontein and ≠Khoadi //Hoas. The HWC costs range from an average of about N$2.4 per person per year (Uukwaluudhi) to about N$1,010 per person per year (Sanitatas), with the highest in any one year over the five year period being about N$1,410 per person per year (Sanitatas). The table below summarises the costs of HWC per capita for the different conservancies.

Average annual costs (N$) being carried by conservancy members based on cost of all HWC per person	
Average HWC cost (N$) per member per year	**Conservancy**
> 1,000	Sanitatas
500 - 1,000	Marienfluss
250 - 500	Orupembe
100 - 250	Puros, Doro !Nawas, Ehirovipuka, Sorris Sorris, Sesfontein
50- 100	#Khoadi//hoas, Omatendeka, Uibasen Twyfelfontein, Torra, Balyerwa, Impalila, Kwandu, Mashi
25 - 50	Anabeb, Wuparo, Mayuni
10 - 25	Nyae Nyae, Sikunga, Sheya Uushona, Salambala, George Mukoya, King Nehale
< 10	Muduva Nyangana, Uukolonkadhi/Ruacana, N=/a Jaqna, Uukwaluudhi

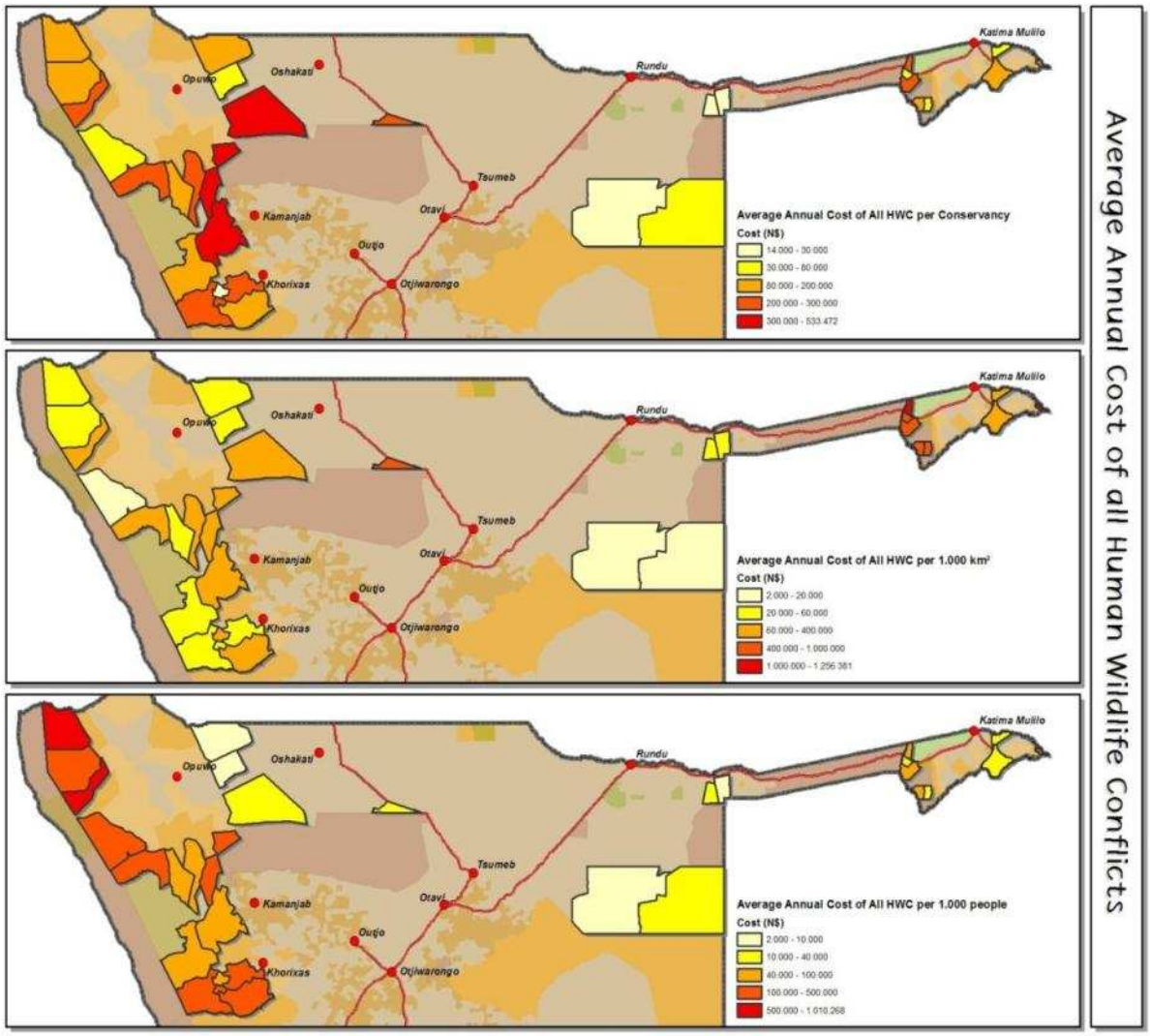


Cost (N$) of HWC incidents per conservancy, per 1,000 sq km and per 1,000 people for all HWC combined					
Average annual cost (N$) of all HWC per conservancy		Average annual cost (N$) of all HWC per 1,000 sq km per conservancy		Average annual cost (N$) of all HWC per 1,000 people per conservancy	
Conservancy	Cost (N$)	Conservancy	Cost (N$)	Conservancy	Cost (N$)
Muduva Nyangana	14,368	N=/a Jaqna	2,485	Uukwaluudhi	2,420
Uibasen Twyfelfontein	20,466	Nyae Nyae	6,224	N=/a Jaqna	3,237
N=/a Jaqna	22,660	Puros	14,475	Uukolonkadhi/Ruacana	4,254
George Mukoya	26,755	Muduva Nyangana	23,362	Muduva Nyangana	7,184
Sikunga	41,268	Torra	27,600	King Nehale	10,369
Puros	51,560	Orupembe	28,421	George Mukoya	13,378
Nyae Nyae	55,966	Uukolonkadhi/Ruacana	35,534	Salambala	13,509
Uukwaluudhi	60,488	Uukwaluudhi	42,094	Sheya Uushona	15,087
Wuparo	68,866	George Mukoya	55,052	Sikunga	20,634
Mayuni	70,293	Marienfluss	55,686	Nyae Nyae	24,333
Impalila	91,716	Doro !Nawas	58,860	Mayuni	29,289
Anabeb	93,606	Anabeb	59,622	Wuparo	32,793
Torra	96,406	Sorris Sorris	65,914	Anabeb	46,803
Orupembe	101,322	Uibasen Twyfelfontein	71,558	Mashi	51,999
Salambala	104,020	#Khoadi//hoas	91,945	Kwandu	52,463
Uukolonkadhi/Ruacana	106,353	Sheya Uushona	105,304	Impalila	61,144
Balyerwa	107,089	Sesfontein	108,494	Balyerwa	71,392
Sorris Sorris	150,943	Salambala	111,850	Torra	80,338
Marienfluss	168,951	Omatendeka	140,393	Uibasen Twyfelfontein	88,981
Mashi	202,795	Sikunga	143,790	Omatendeka	90,918
King Nehale	207,374	Ehirovipuka	173,163	#Khoadi//hoas	96,657
Kwandu	225,589	Sanitatas	174,666	Sesfontein	106,975
Omatendeka	227,296	King Nehale	408,216	Sorris Sorris	116,110
Doro !Nawas	234,144	Wuparo	465,309	Ehirovipuka	137,145
Sanitatas	252,567	Mayuni	465,518	Doro !Nawas	156,096
Sesfontein	267,437	Balyerwa	480,218	Puros	198,307
#Khoadi//hoas	309,303	Mashi	682,811	Orupembe	253,306
Ehirovipuka	342,862	Kwandu	1,187,313	Marienfluss	563,170
Sheya Uushona	533,472	Impalila	1,256,381	Sanitatas	1,010,268

- ✓ HWC cost : Benefit ratios: The cost to benefit ratio is an important consideration in any enterprise, and particularly where the costs have an emotive component such as in HWC. Psychological assessments indicate that people generally give about twice the weighting to costs as they do to benefits. The benefit data used here is that of total benefits earned by each conservancy, including cash and in-kind such as meat from the own-use quota.

  The top performing conservancies in this category are those that have both relatively high benefits levels and low costs – figures shown in green in the table below. The worst performing conservancies have both low benefits and high costs – shown in red and orange. Only six conservancies have benefits exceeding costs by 20 times or more. Six conservancies have costs exceeding benefits!

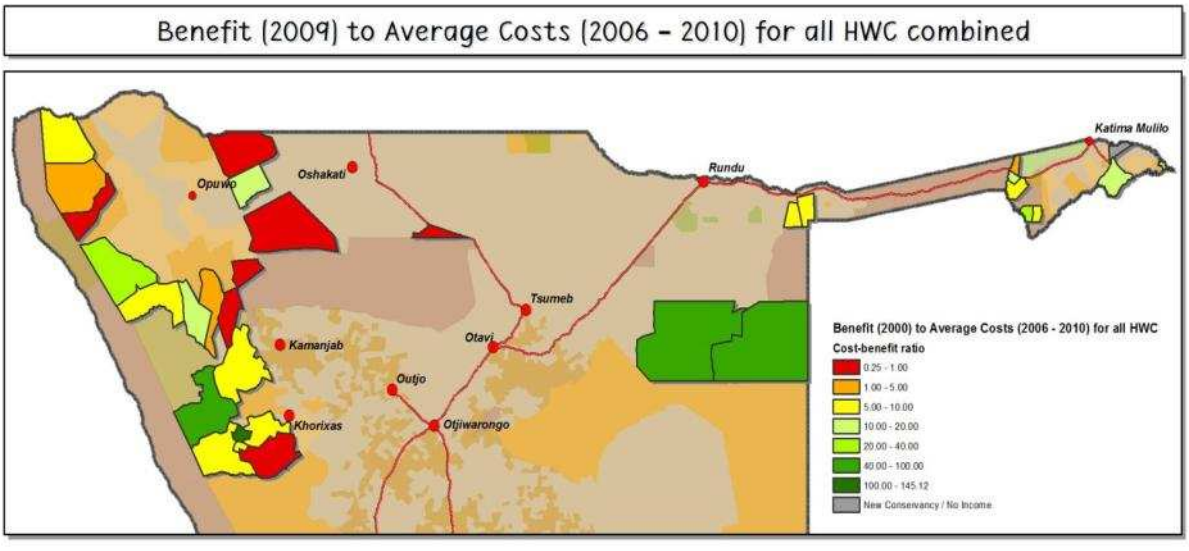
  A number of conservancies have relatively low costs, but also low benefits. The two Kavango conservancies of George Mukoya and Muduva Nyangana fall into this category. Additional income-



earning enterprises will quickly lift them into more favourable cost-benefit ratios. A number of conservancies are in the opposite situation where they are earning relatively high benefits, but also carry high HWC costs. By bringing down the costs of HWC in this second group, the cost-benefit ratio would be dramatically improved. This would make a significant livelihoods impact on the people that are being directly affected by HWC. The following conservancies fall into this category: Mashi, ≠Khoadi //Hoas, Sesfontein and Doro !Nawas. By halving their HWC costs they effectively double their benefit to cost ratios, moving them from the 5-10 : 1 category to the 10 – 20 : 1 category. Bringing down these costs by means of focused project interventions is very feasible, and this should be given priority.

- Based on these assessments, the five (5) worst impacted conservancies for each of the HWC categories in terms of costs per capita, for all HWC combined and those with the worst benefit to HWC cost ratios are listed in the final table below. From this the priority conservancies for HWC attention and for grant eligibility can be deduced. If each conservancy in each category in the table is scored from 1 to 5 based on least to more cost, and these scores are added up for each conservancy, then the following order of priority results: Marienfluss & Sanitatas (12 points); #Khoadi //Hoas (9 pts); Mashi, Impalila & Sorris Sorris (8 pts); Doro !Nawas (7 pts); Kwandu, Uibasen Twyfenfontein & Orupembe (6 pts); Sheya Uushona (5 pts); Balyerwa & Puros (4 pts); King Nehale & Sesfontein (3 pts); Sikunga (2 pts); and Mayuni & Ehirovipuka (1 pt).

Categories of total benefits per conservancy (2009 data) versus average HWC costs (2006–2010 data)				
Benefit to Cost Category	**Benefit : HWC Cost Ratio**	**Conservancy**	**Cost (N$)**	**Benefit (N$)**
Total benefits (2009) exceed average HWC costs (2006-2010)	>50 : 1	Uibasen - Twyfenfontein	20,500	2,970,000
	35-50: 1	Nyae-Nyae	56,000	2,750,000
		N=/a Jaqna	23,000	1,044,000
		Torra	96,500	3,969,000
	20-35 : 1	Puros	51,500	1,372,000
		Balyerwa	107,100	2,272,000
	10-20 : 1	Mayuni	70,000	1,133,000
		Impalila	92,000	1,205,000
		Anabeb	94,000	1,099,000
		Salambala	104,000	1,221,000
		Uukwaluudhi	60,500	687,000
	5-10 : 1	Mashi	203,000	1,959,000
		George Mukoya	27,000	251,000
		Marienfluss	169,000	1,321,000
		Wuparo	69,000	503,000
		Muduva Nyangana	14,000	94,000
		#Khoadi //Hoas	309,000	1,963,000
		Sesfontein	267,437	1,475,000
		Doro !Nawas	234,000	1,207,000
	1-5 : 1	Orupembe	101,000	178,000
		Kwandu	226,000	381,000
		Omatendeka	227,000	251,000
Average HWC costs (2006-2010) exceed total benefits (2009)	<1 : 1	Uukolonkadhi/Ruacana	106,000	78,000
		Ehirovipuka	343,000	148,000
		Sanitatas	253,000	94,000
		King Nehale	207,000	69,000
		Sorris Sorris	151,000	44,000
		Sheya Uushona	533,500	138,000



The five most seriously impacted conservancies for each of the four HWC categories as well as total HWC, based on per capita costs; the worst benefit to cost ration and the conservancies with the best potential to improve the cost-benefit ratio by means of project intervention. The conservancies that appear in more than one column are colour coded.

Position (score)	Garden & crop damage	Livestock loss	Infrastructure damage	Human attack	Total HWC damage	Worst benefit to cost ratio	Best intervention for C:B ratio
1 (5)	Kwandu	Sanitatas	≠Khoadi //Hoas	Uibasen Twyfelfontein	Sanitatas	Sheya Uushona	Mashi
2 (4)	Balyerwa	Marienfluss	Sorris Sorris	Impalila	Marienfluss	Sorris Sorris	≠Khoadi //Hoas
3 (3)	Mashi	Orupembe	Doro !Nawas	Marienfluss	Orupembe	King Nehale	Sesfontein
4 (2)	Impalila	Puros	Impalila	Sikunga	Puros	Sanitatas	Doro !Nawas
5 (1)	Mayuni	Doro !Nawas	Uibasen Twyfelfontein	Kwandu	Doro !Nawas	Ehirovipuka	Marienfluss

Recommendations for CDSS

- This analysis and the power point presentation prepared to accompany it should be shared with all CDSS consortium members (and ensuring that it reaches their field staff), with the MCA-supported conservancies, regional MET staff in the target regions as well as key Windhoek-based senior MET officials, NACSO Secretariat and NACSO's Natural Resources Working Group.
- The analysis should be shared with MCA-Namibia and particularly with the grants team to discuss and agree on the priority conservancies that should be submitted for HWC grants.
- These priority conservancies would then undergo further conservancy-level analyses of HWC using more detailed information contained in their respective event books.
- Based on the outcomes of the detailed conservancy analyses and within the contexts of their HWC management plans, HWC grant applications should be prepared and submitted to MCA-Namibia.
- Using the same approach, important MCA-supported conservancies from a HWC perspective not prioritized by the MCA-Namibia grants team as eligible for HWC grants should nevertheless be supported to complete grant applications which should be submitted to the Game Products Trust Fund.

Recommendations for NACSO

- This analysis should be expanded to all conservancies that have sufficient HWC data to show meaningful results.
- The expanded analysis should be prepared as a power point presentation and shared with all NACSO members, the Natural Resources Working Group and conservancies.
- The power point presentation should be given to and discussed with key partners, including MET head office and regional offices, relevant existing and potential donors (including the Game Products Trust Fund), potential support organisations such as the Large Carnivore Management Association of Namibia (LCMAN), etc.

- Conservancies experiencing high costs from HWC (and specifically those not receiving support from MCA-Namibia) should be prioritized and assisted to develop grant applications to the Game Products Trust Fund (and other sources of funding).
- The HWC approaches being developed and tested under CDSS with MCA-Namibia/MCC HWC grant funds should be widely shared across Namibia's CBNRM/Conservancy programme.

Acknowledgements

The conservancy game guards collect and document all the HWC incidents in their Event Books. These are in turn checked by conservancy managers and audited annually by NACSO's Natural Resources Working Group. Without the team of people who developed and fine-tuned the Event Book system, provided the training and back-stopping, provide ongoing support to conservancies in the regions, collect, check, analyse and curate the data, this report would not have been possible. I would take this opportunity to acknowledge the fine ground-breaking work done by the whole team, from community game guards to support organisations to technical support staff. I thank Tony Robertson for extracting the data from NACSO's ConInfo database system, Anna Davis for providing data from NACSO's income and benefits database, and Jo Tagg for discussions on the strategic approach to HWC analysis and management.

Table 1: Summary of HWC incidents per category for the MCA-supported Conservancies																		
Region	Conservancy	Area (sq km)	No. members	Number of incidents per year per category of HWC over past 5 years (2006-2010) unless otherwise indicated														
				Garden damage			Crop field damage			Livestock losses			Infrastructure damage			Human attacks		
				Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min
Northern and Central Kunene (average 4.89 yrs)	Orupembe	3,565	400	0	0	0	0	0	0	68.6	92	50	0	0	0	0	0	0
	Sanitatas	1,446	250	0	0	0	0	0	0	171	240	87	0	0	0	0	0	0
	Ehirovipuka	1,980	2,500	10.4	3.5	0	0	0	0	224	352	158	4.8	8	0	0.2	1	0
	Omatendeka (4 yrs)	1,619	2,500	17.5	33	0	0	0	0	146	188	122	1.3	3	0	1	4	0
	Sesfontein	2,465	2,500	0.4	2	0	0	0	0	181	318	88	0	0	0	0	0	0
	Torra	3,493	1,200	4.8	9	1	0	0	0	107	137	76	3.2	5	1	0.2	1	0
	Puros	3,562	260	0	0	0	0	0	0	61	79	43	0.6	2	0	0	0	0
	Anabeb	1,570	2,000	3.6	11	0	0	0	0	109	222	35	1.4	7	0	0	0	0
	Marienfluss	3,034	300	0.2	1	0	0	0	0	113	159	63	0	0	0	0.4	1	0
	Subtotal/average	**22,734**	**11,910**	**3.8**	**33**	**0**	**0**	**0**	**0**	**130.7**	**352**	**35**	**1.2**	**8**	**0**	**0.2**	**4**	**0**
Southern Kunene (average 4.5 yrs)	Doro !Nawas	3,978	1,500	4.8	17	1	0	0	0	250	338	194	14.8	52	4	0	0	0
	Uibasen Twyfelfontein	286	230	0	0	0	0	0	0	19.4	37	5	0.8	3	0	0.6	3	0
	#Khoadi//hoas	3,364	3,200	5.2	11	0	0	0	0	287	369	161	39	68	20	0.4	2	0
	Sorris Sorris (3 yrs)	2,290	1,300	3	6	0	0	0	0	149	175	134	15.3	26	1	0	0	0
	Subtotal/average	**9,918**	**6,230**	**3.3**	**17**	**0**	**0**	**0**	**0**	**179.3**	**369**	**5**	**17.7**	**68**	**0**	**0.3**	**3**	**0**
North-Central (average 5 yrs)	Uukolonkadhi/Ruacana	2,993	25,000	0	0	0	15.8	38	3	61.4	105	28	3.8	6	1	0.6	3	1
	Uukwaluudhi	1,437	25,000	0	0	0	57.6	89	19	20.2	29	3	5	19	0	0	0	0
	Sheya Uushona	5,066	35,360	0	0	0	25.2	48	0	327	625	37	22.2	58	0	0.4	2	0
	King Nehale	508	20,000	0	0	0	3.8	19	0	138	337	7	1.2	3	0	0	0	0
	Subtotal/average	**10,004**	**105,360**	**0**	**0**	**0**	**25.6**	**89**	**0**	**136.5**	**625**	**3**	**8.1**	**58**	**0**	**0.25**	**3**	**0**
Kavango (average 3.5 yrs)	Muduva Nyangana (3 yrs)	615	2,000	0	0	0	21.1	35	18	4	6	0	0.3	1	0	0	0	0
	George Mukoya (3 / 4 yrs)	486	2,000	0	0	0	22.6	35	11	12.3	17	10	0	0	0	0	0	0
	Subtotal/average	**1,101**	**4,000**	**0**	**0**	**0**	**21.9**	**35**	**11**	**8.1**	**17**	**0**	**0.1**	**1**	**0**	**0**	**0**	**0**
Eastern Otjozondjupa (average 5 yrs)	Nyae Nyae	8,992	2,300	0	0	0	5.6	13	0	33.4	77	2	2	4	0	0.2	1	0
	N=/a Jaqna	9,120	7,000	0	0	0	5.6	13	1	11.8	32	2	1.2	3	0	0.2	1	0
	Subtotal/average	**18,112**	**9,300**	**0**	**0**	**0**	**5.6**	**13**	**0**	**22.6**	**77**	**2**	**1.5**	**4**	**0**	**0.2**	**1**	**0**
Caprivi (average 4.75 yrs)	Kwandu	190	4,300	0	0	0	510	750	399	12.6	25	3	0.8	3	0	2.4	6	0
	Mayuni	151	2,400	0	0	0	157	199	97	6.8	14	1	0.4	1	0	0	0	0
	Mashi (4 yrs)	297	3,900	0	0	0	311	355	280	54.5	68	33	0.25	1	0	0.75	1	0
	Wuparo	148	2,100	0	0	0	64.2	85	43	27.4	37	17	0	0	0	0.8	3	0
	Balyerwa	223	1,500	0	0	0	162	206	107	25.8	56	10	3	4	2	0.6	2	0
	Sikunga (4 yrs)	287	2,000	0	0	0	6.5	12	2	15.3	22	7	6.75	25	0	1.25	3	1
	Impalila	73	1,500	0	0	0	108	138	90	19	48	9	7.2	15	1	2.4	3	1
	Salambala	930	7,700	0	0	0	160	222	84	25.2	37	18	0	0	0	1.2	3	0
	Subtotal/average	**2,299**	**25,400**	**0**	**0**	**0**	**186.3**	**750**	**2**	**22.7**	**68**	**1**	**2.2**	**25**	**0**	**1.2**	**6**	**0**

Figure A1: Number of incidents of garden and crop damage from HWC in the MCA-supported conservancies per region for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents per region, and the regions are sorted on the average number of incidents per region. Data are from the NACSO InfoCom system with primary data from the Conservancies' Event Books.

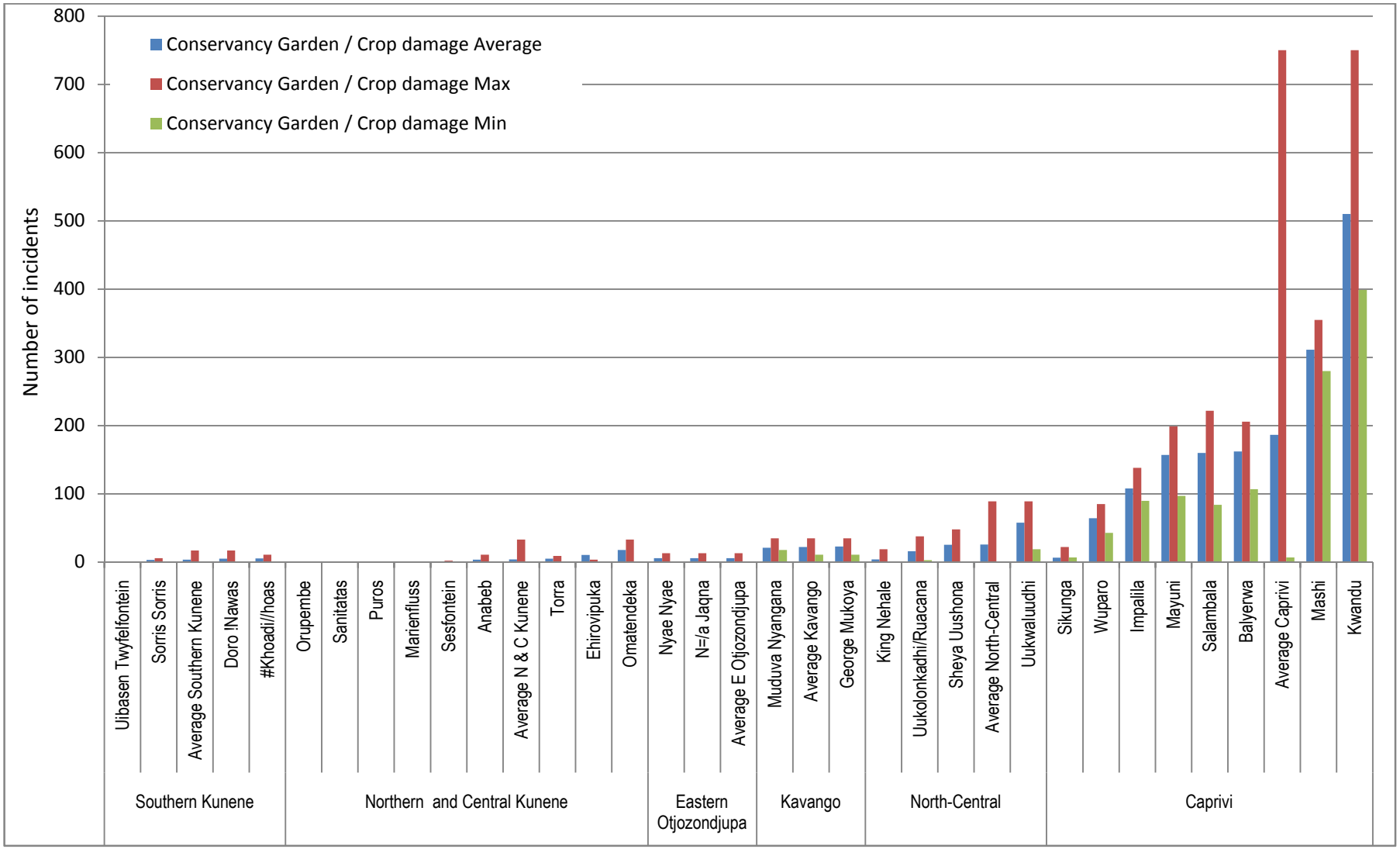


Figure A2: Number of incidents of garden and crop damage from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

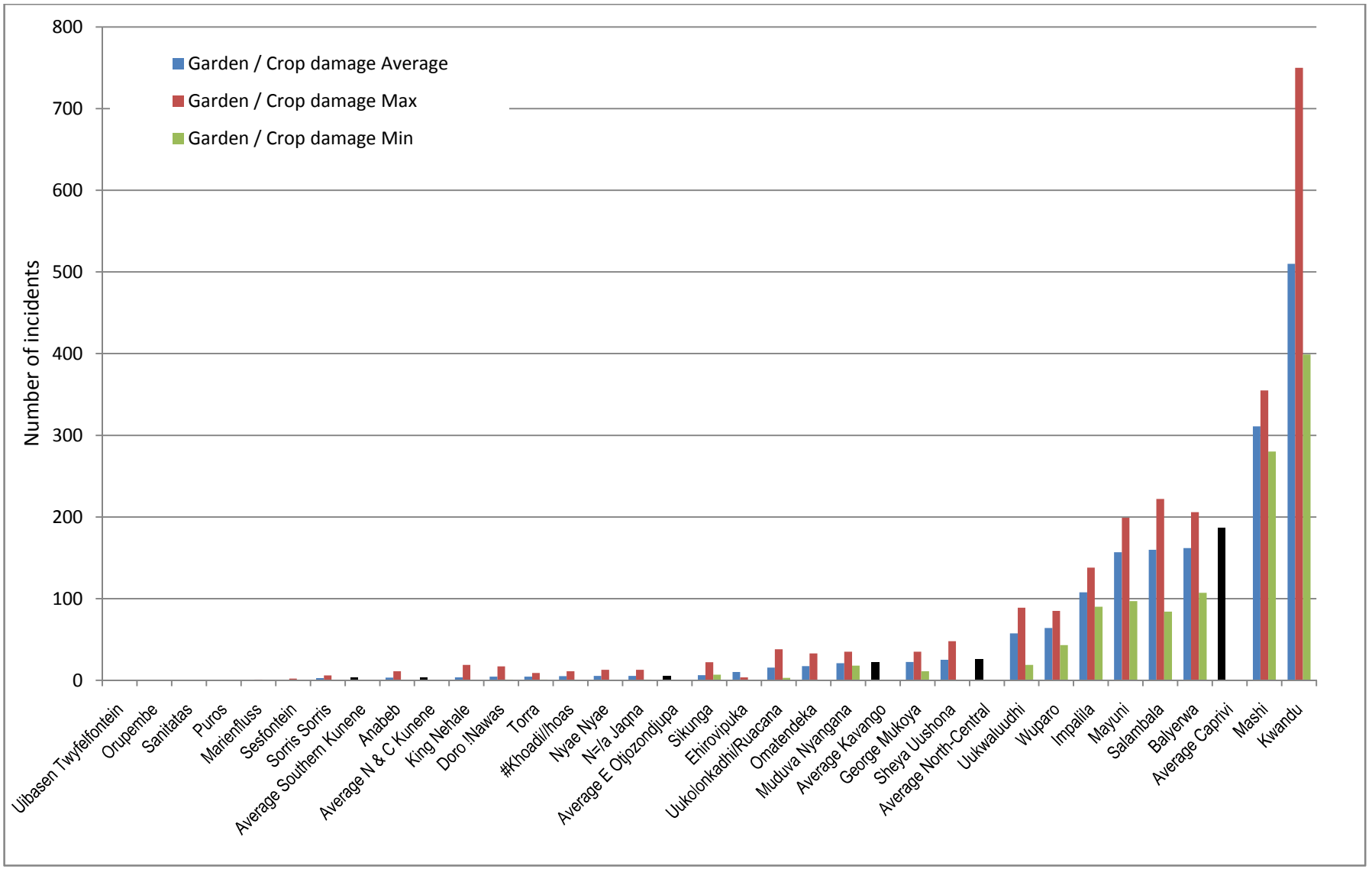


Figure A3: Average and maximum number of incidents of garden and crop damage from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

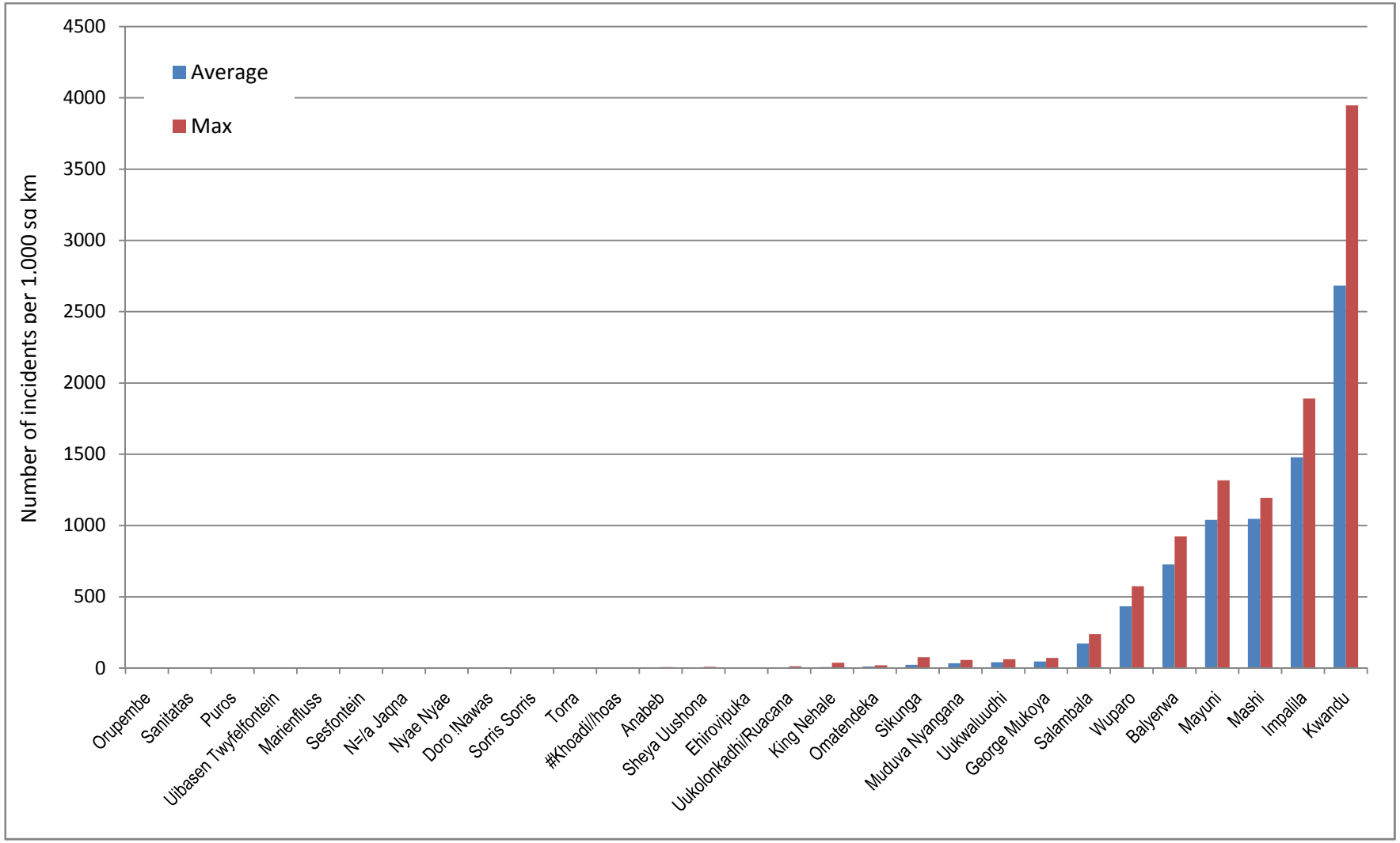


Figure A4: Average and maximum number of incidents of garden and crop damage from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

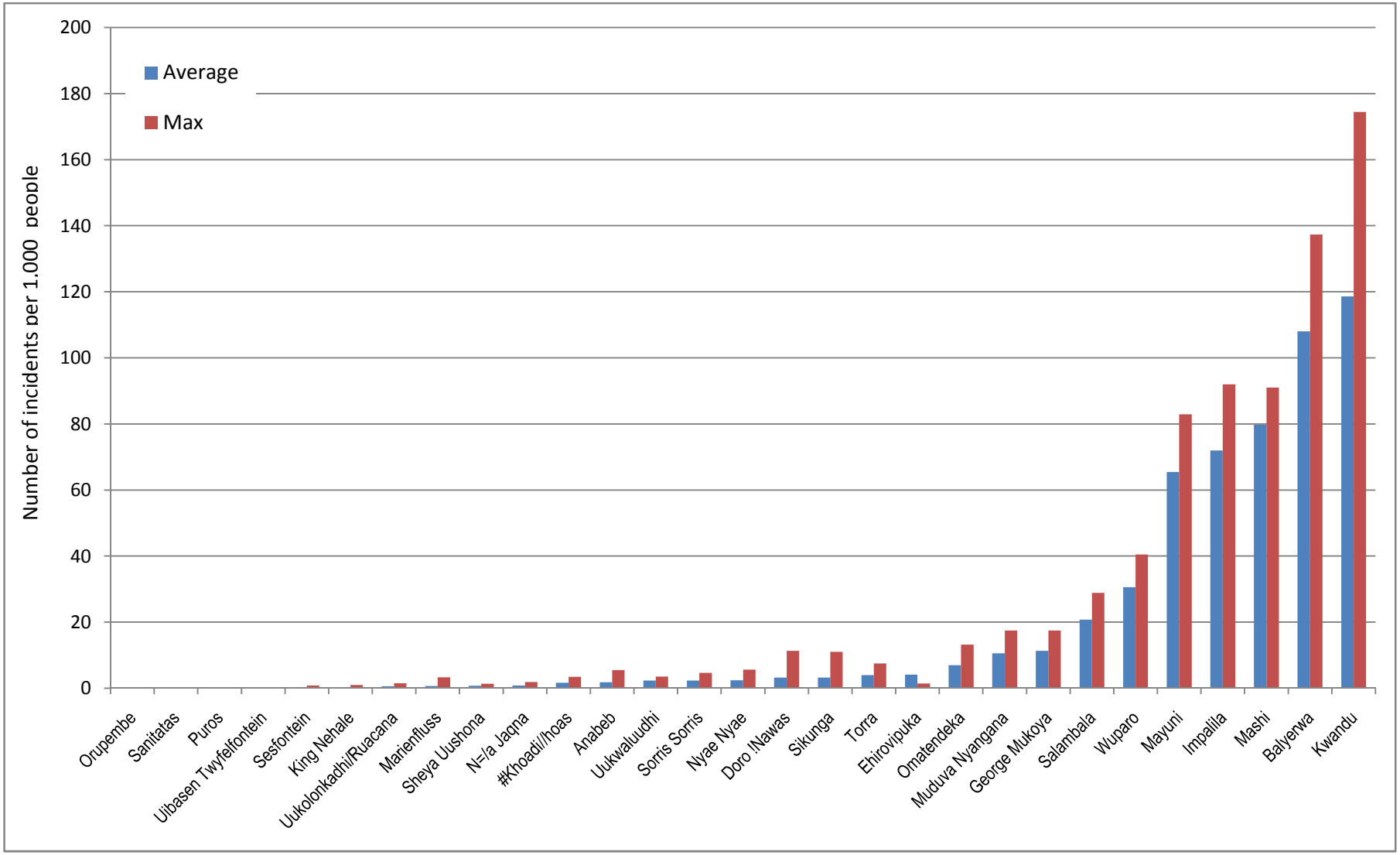


Figure A5: Number of incidents of livestock loss from HWC in the MCA-supported conservancies per region for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents per region, and the regions are sorted on the average number of incidents per region.

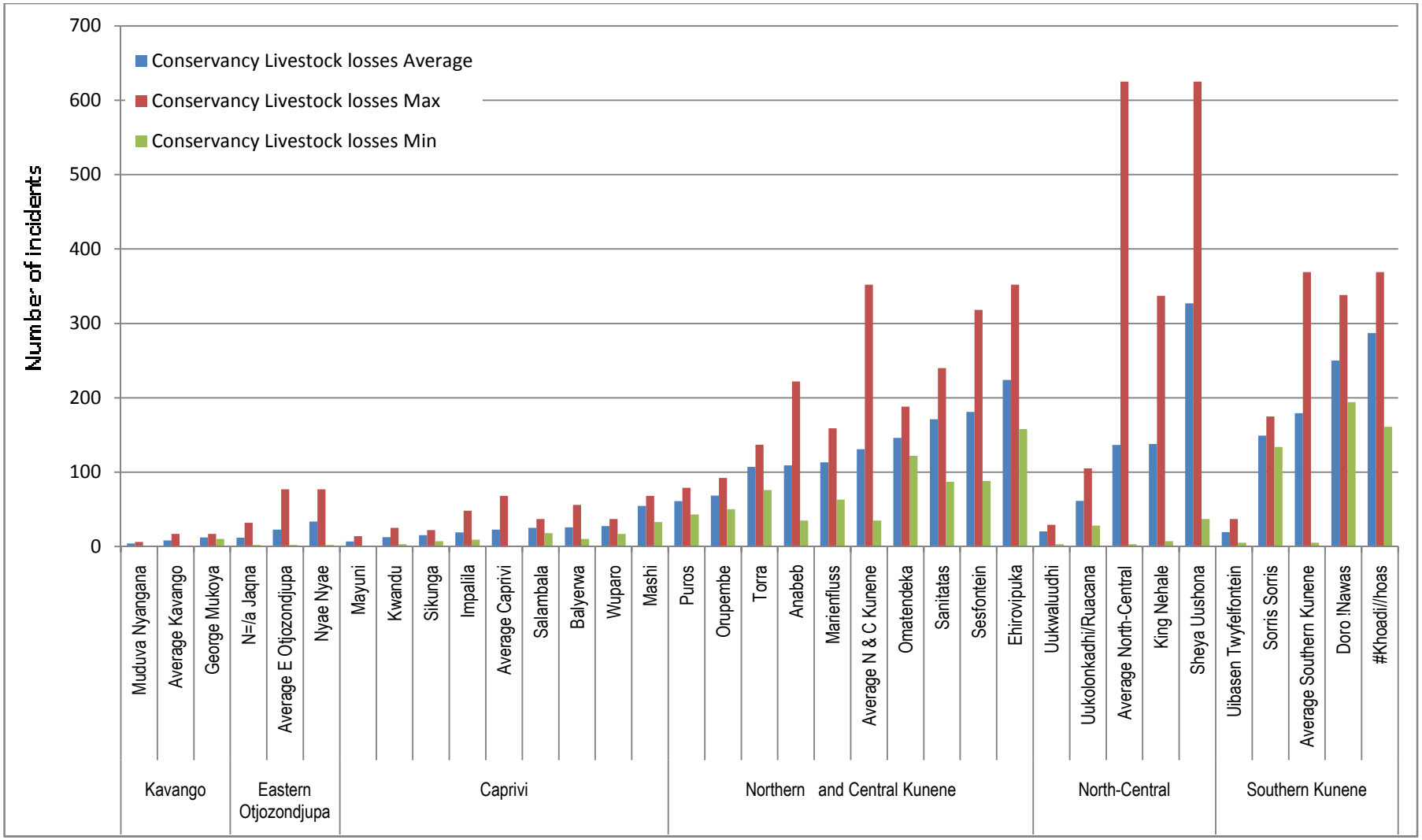


Figure A6: <u>Number of incidents of livestock loss</u> from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

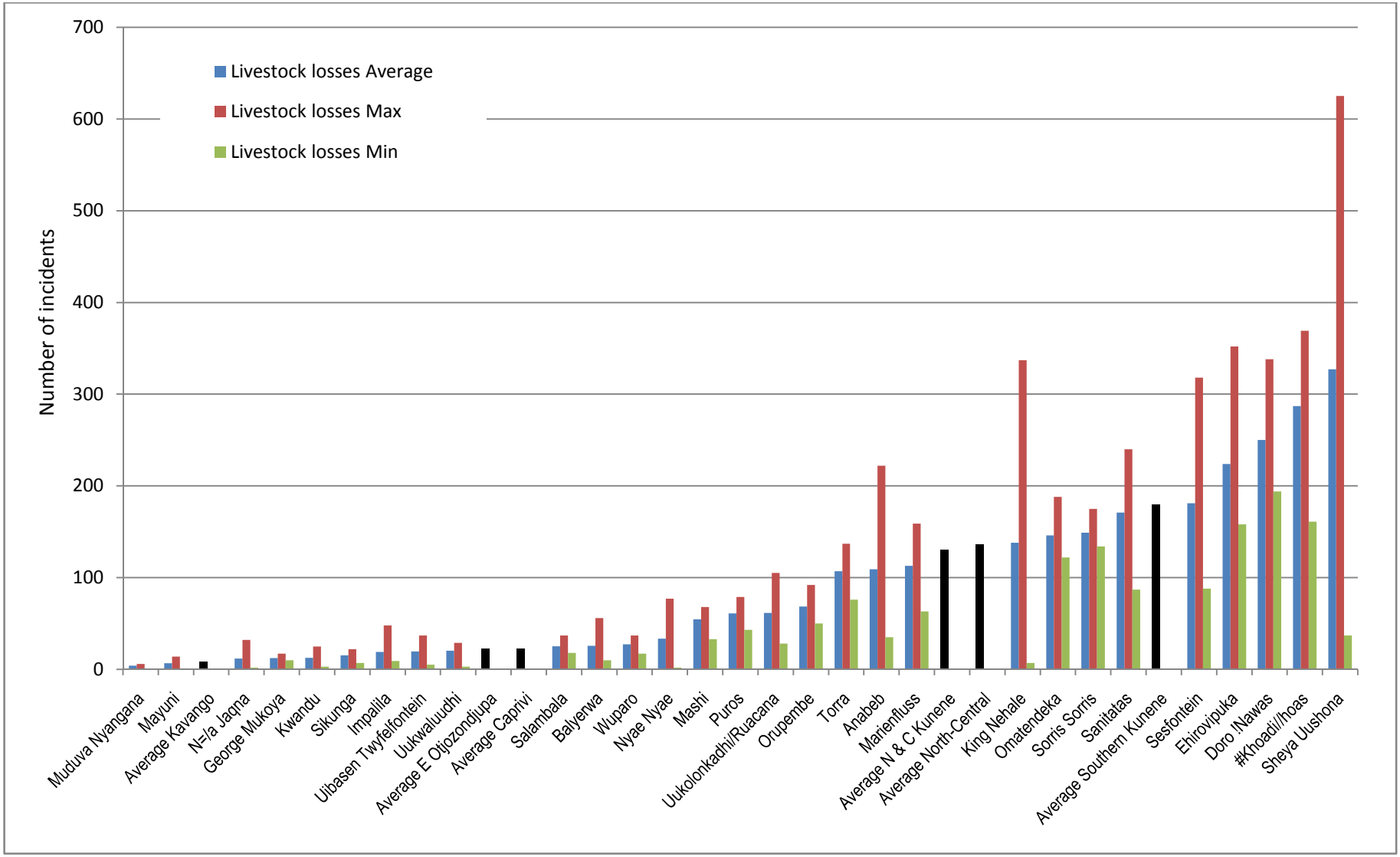


Figure A7: Average and maximum number of incidents of livestock loss from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

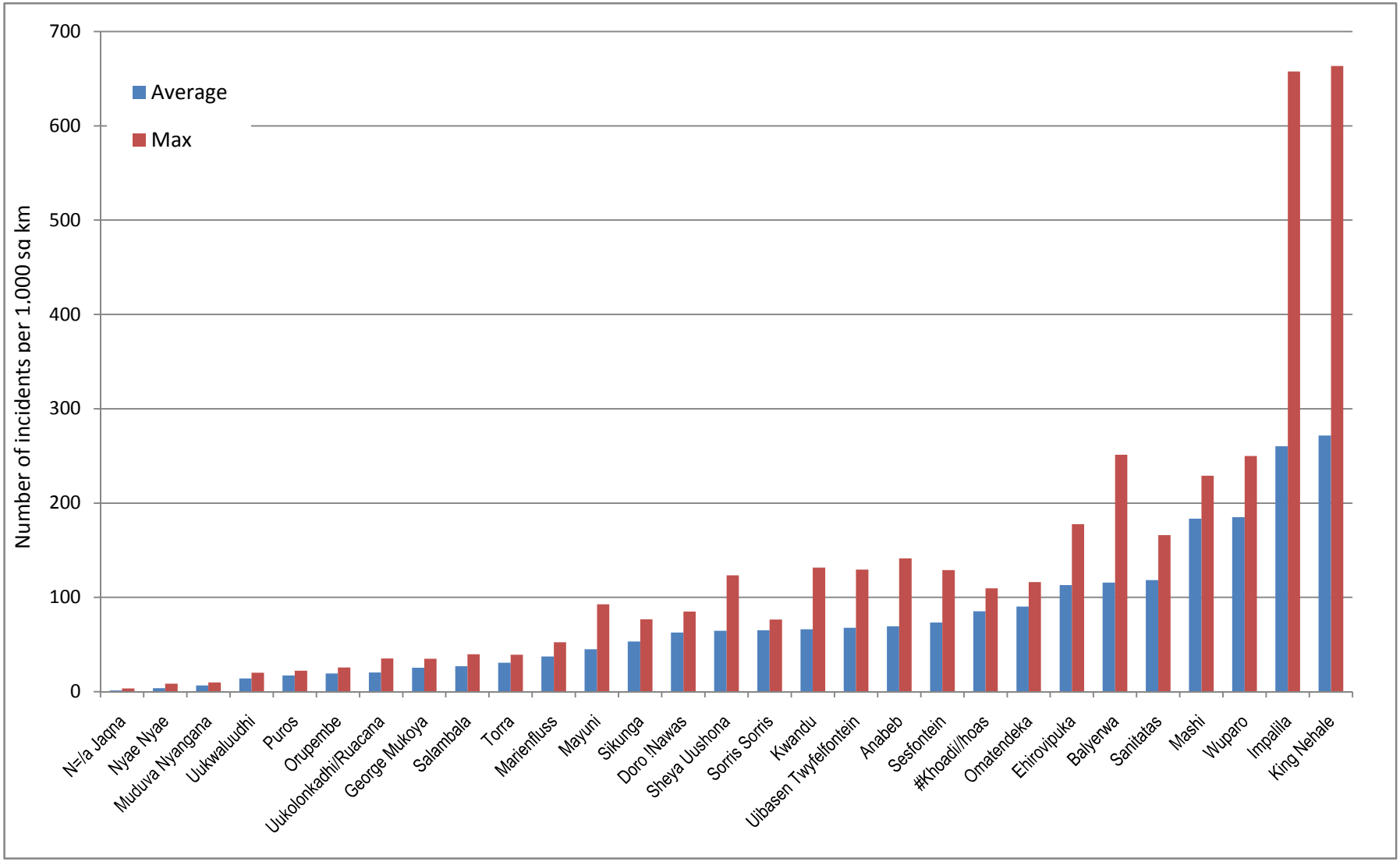


Figure A8: Average and maximum number of incidents of livestock losses from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

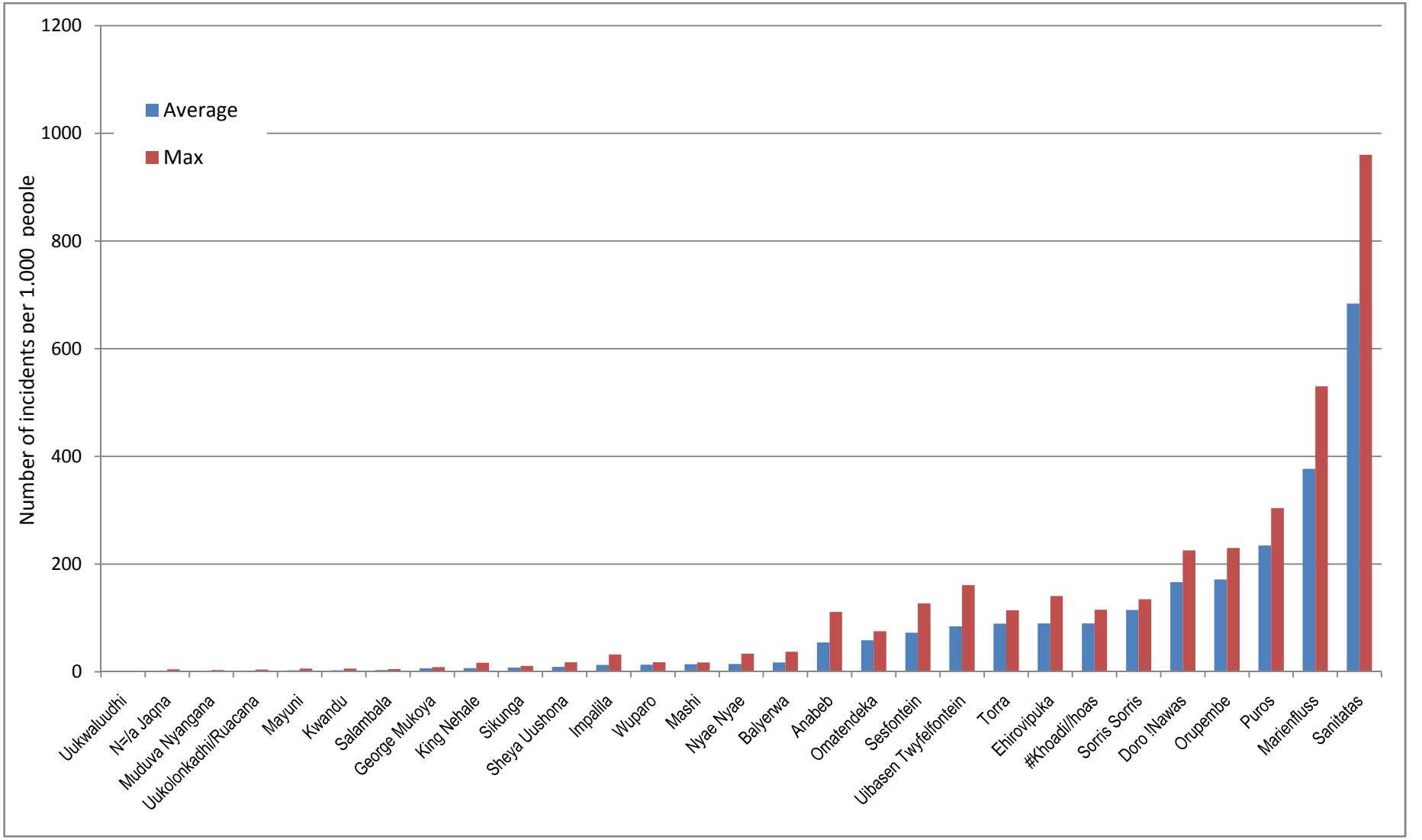


Figure A9: Number of incidents of infrastructure damage from HWC in the MCA-supported conservancies per region for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents per region, and the regions are sorted on the average number of incidents per region.

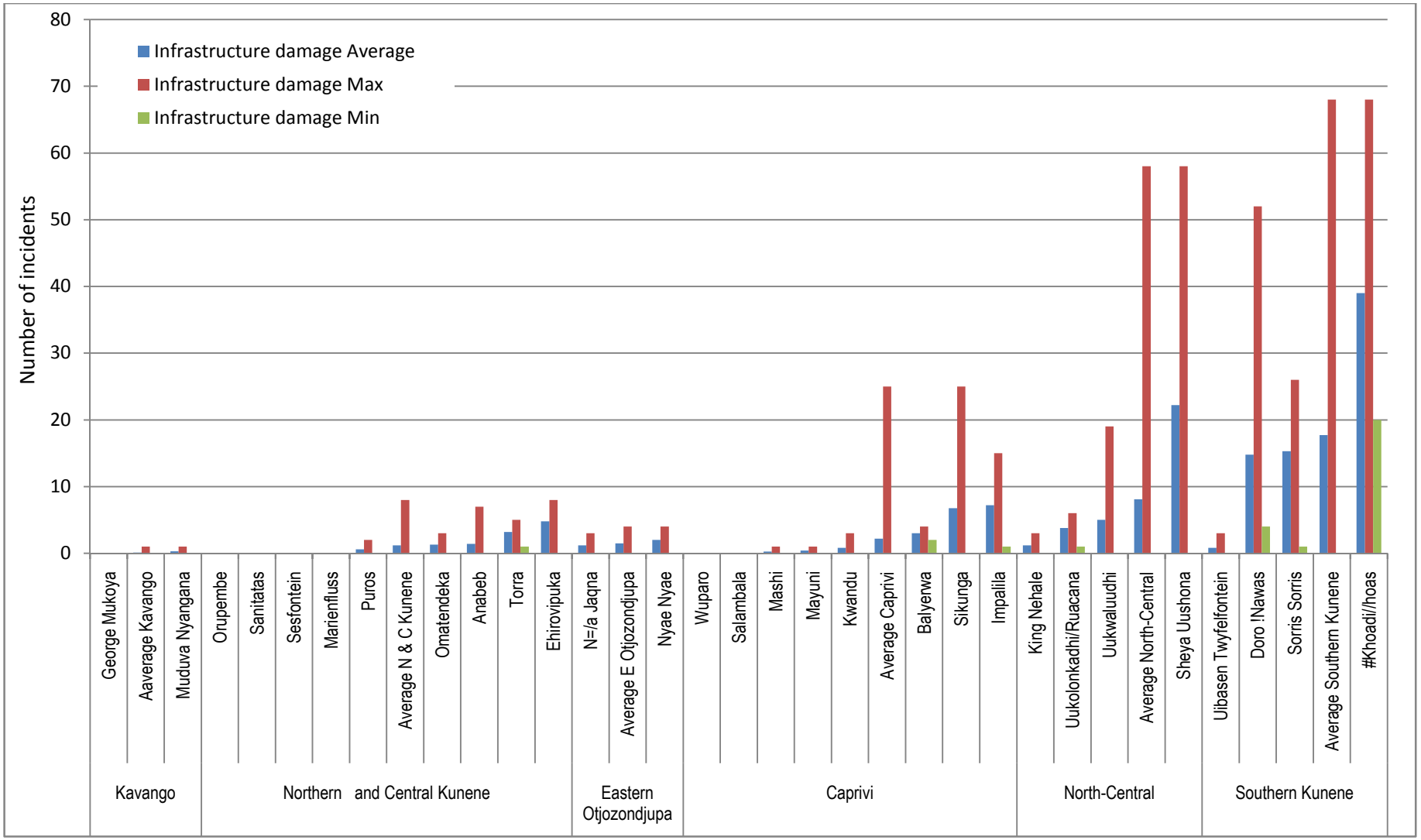


Figure A10: Number of incidents of infrastructure damage from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

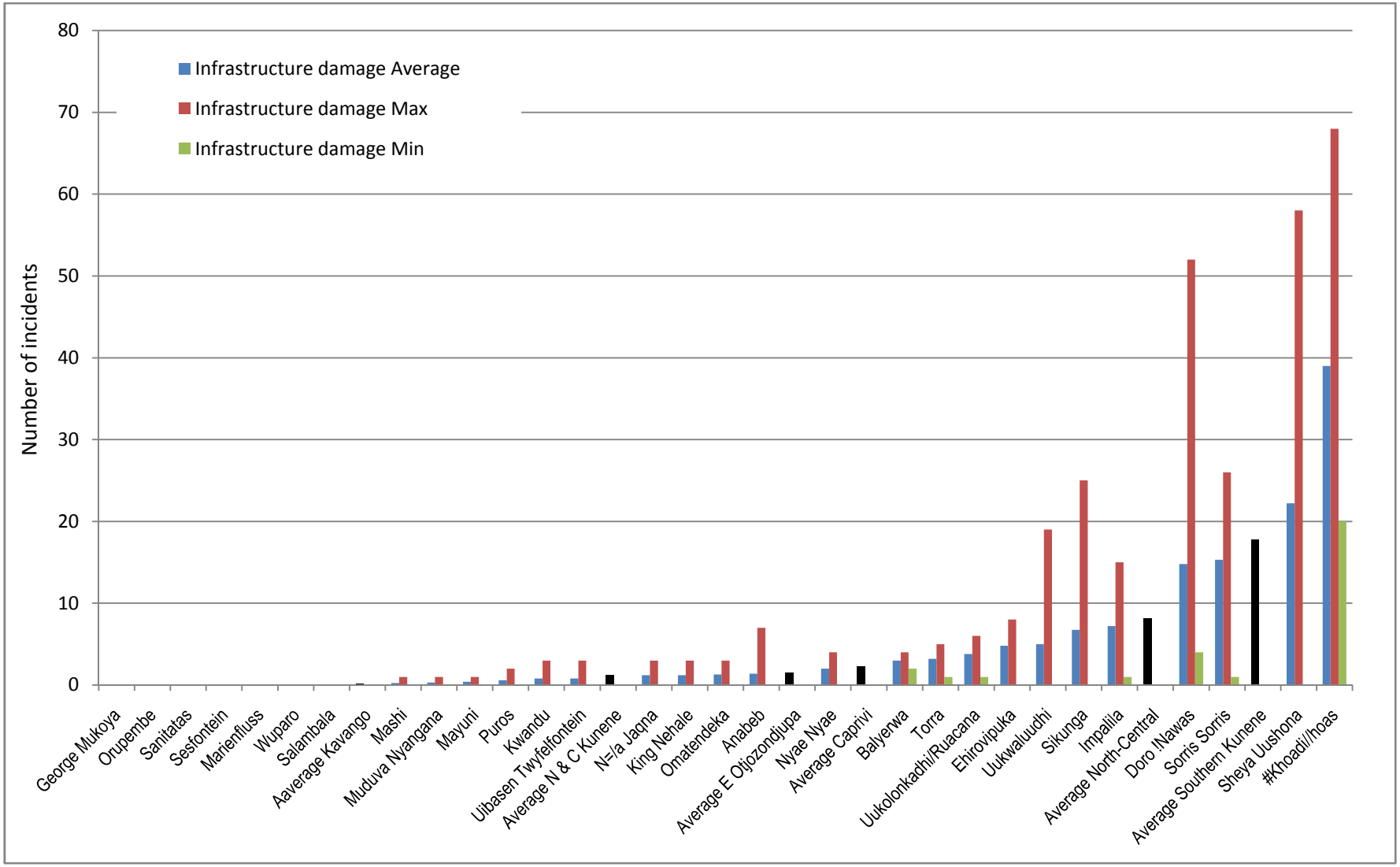


Figure A11: Average and maximum number of incidents of infrastructure damage from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

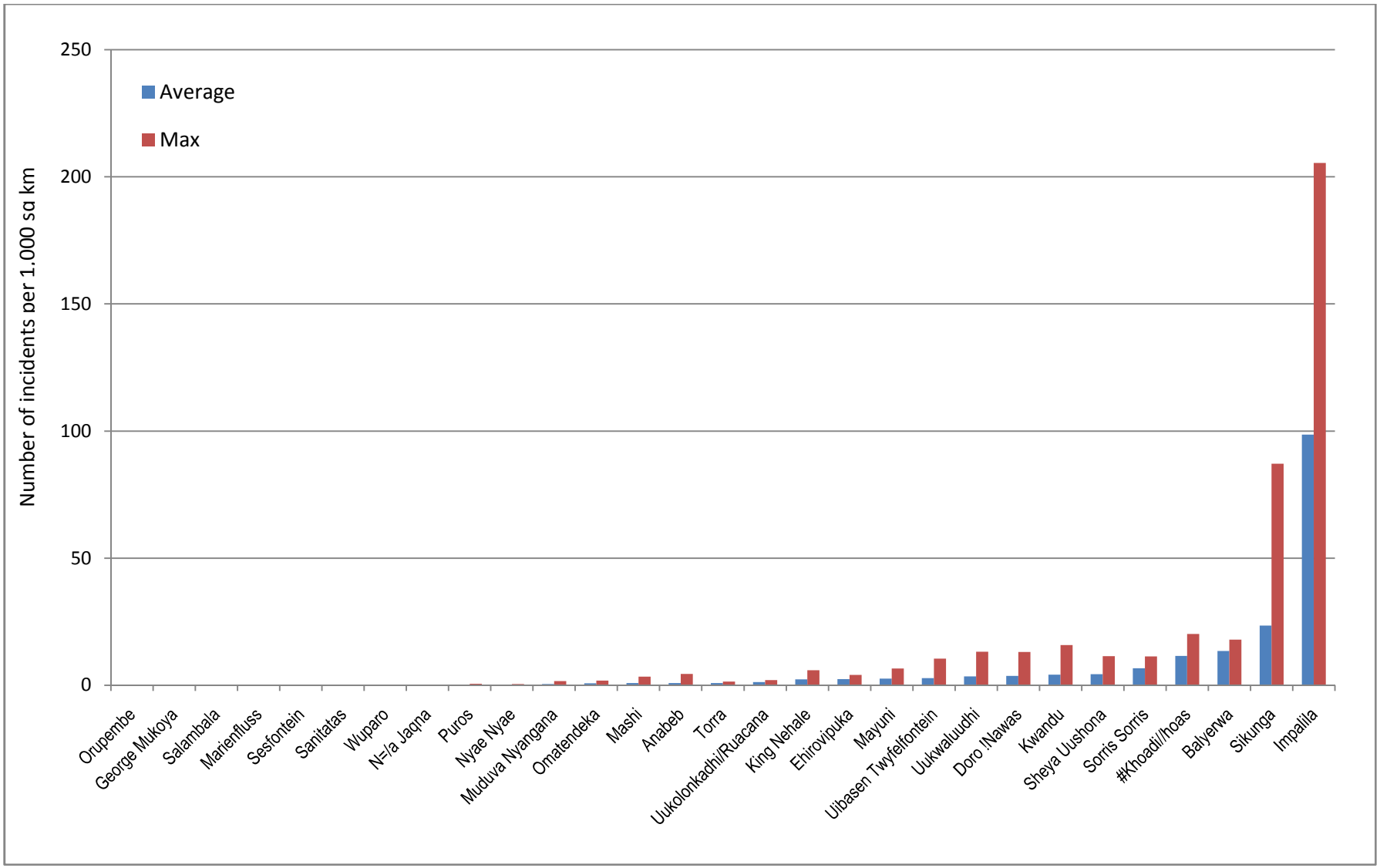


Figure A12: Average and maximum number of incidents of infrastructure damage from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

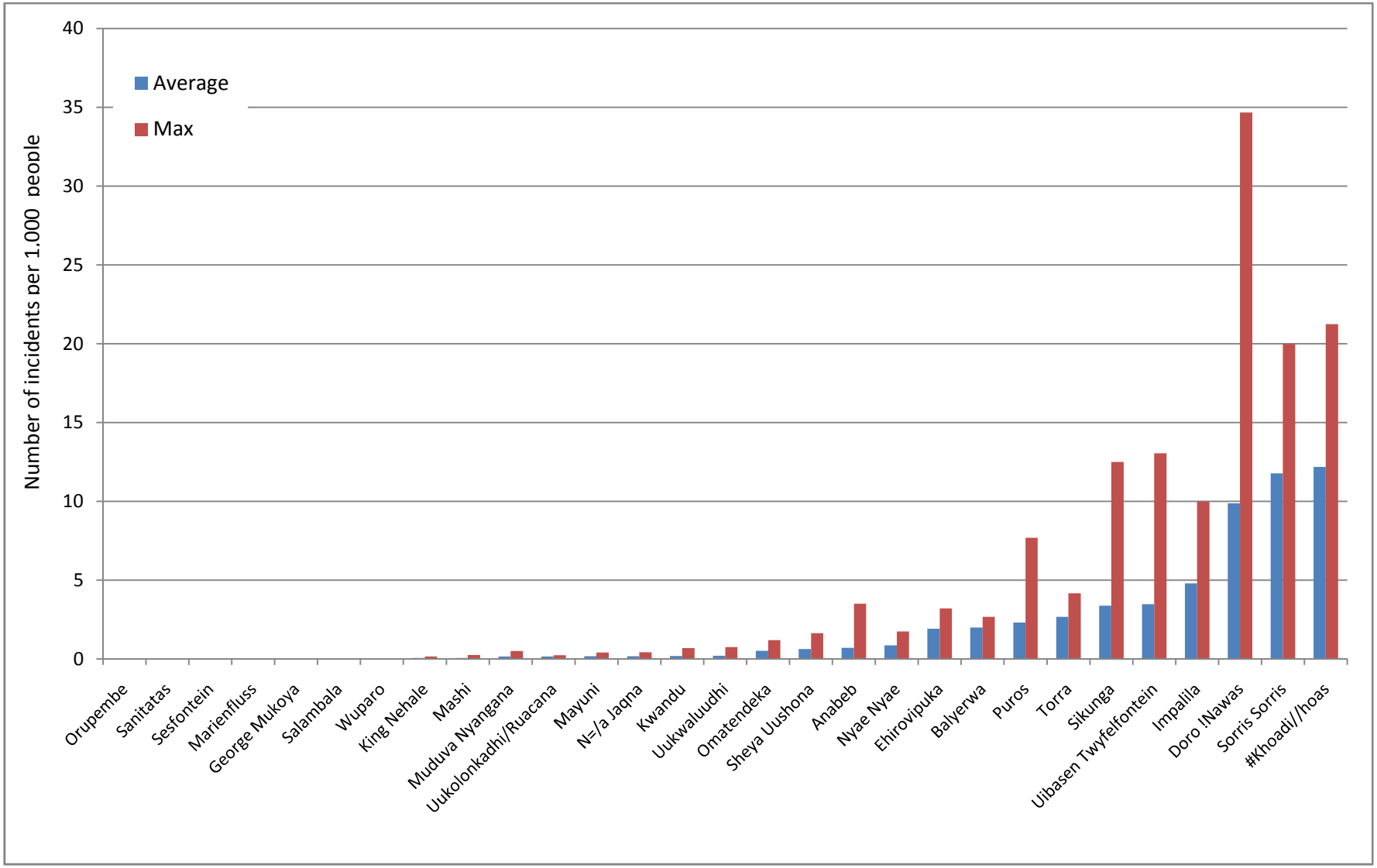


Figure A13: Number of incidents of human attack from HWC in the MCA-supported conservancies per region for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents per region, and the regions are sorted on the average number of incidents per region.

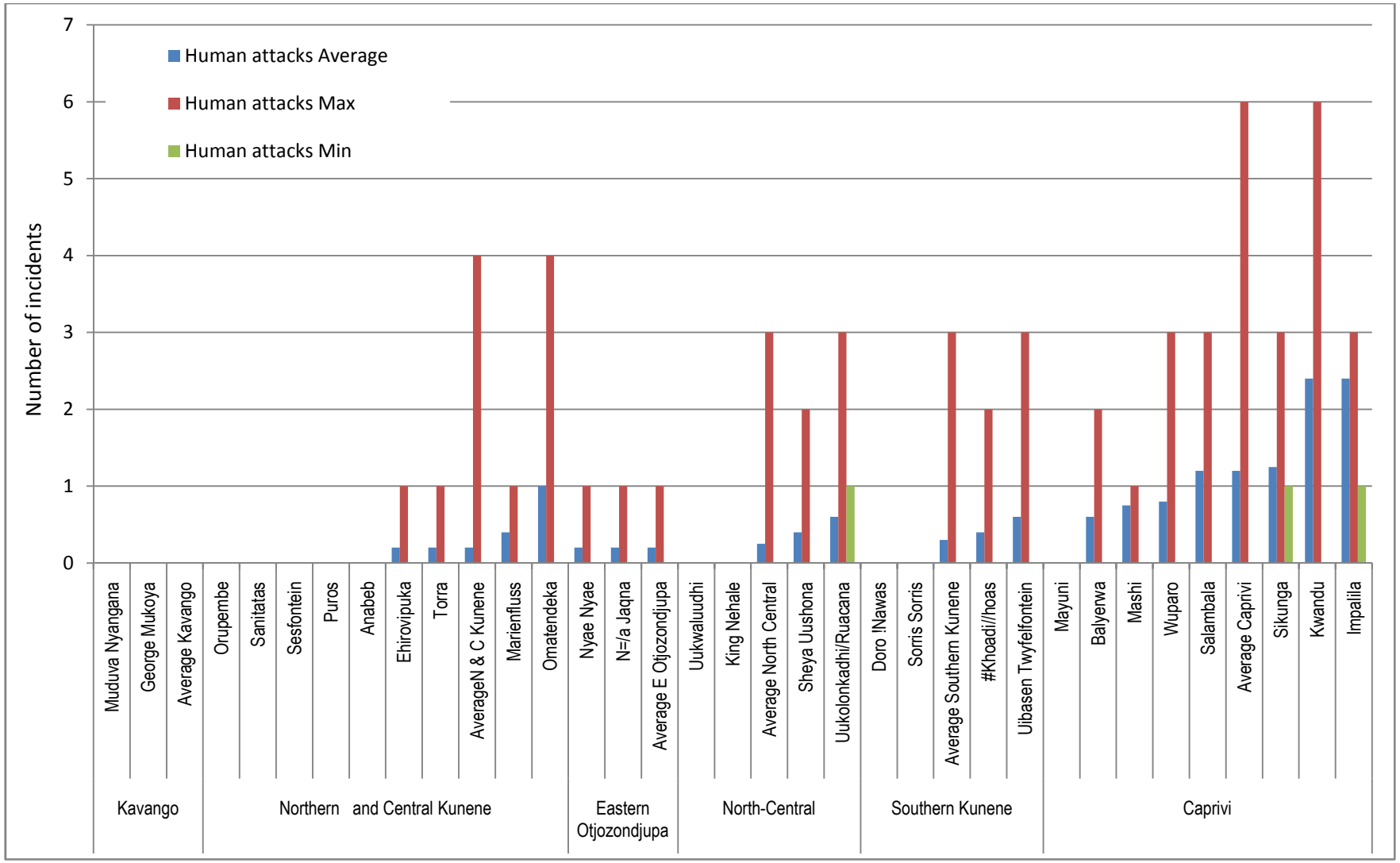


Figure A14: Number of incidents of human attack from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

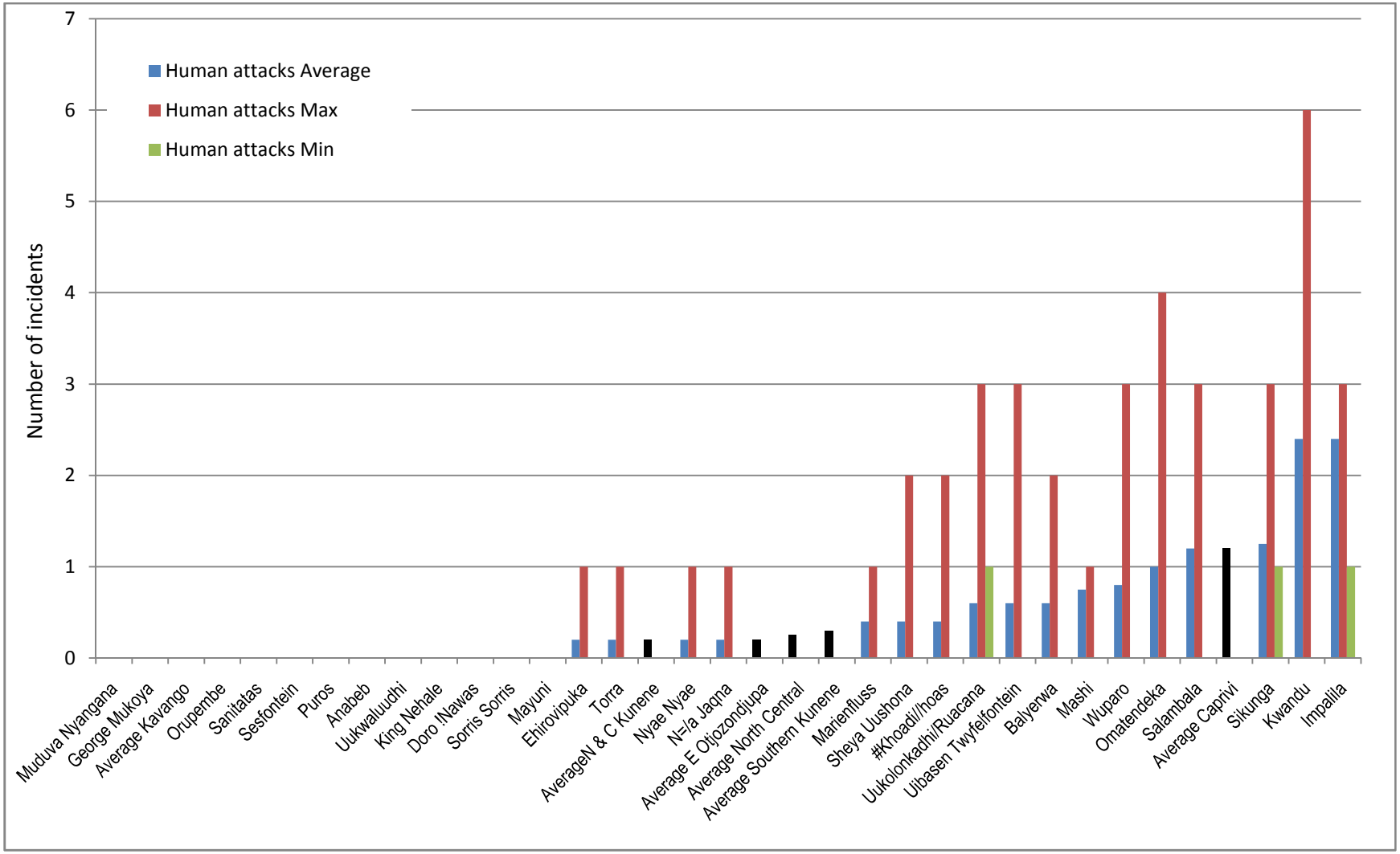


Figure A15: Average and maximum number of incidents of human attacks from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.

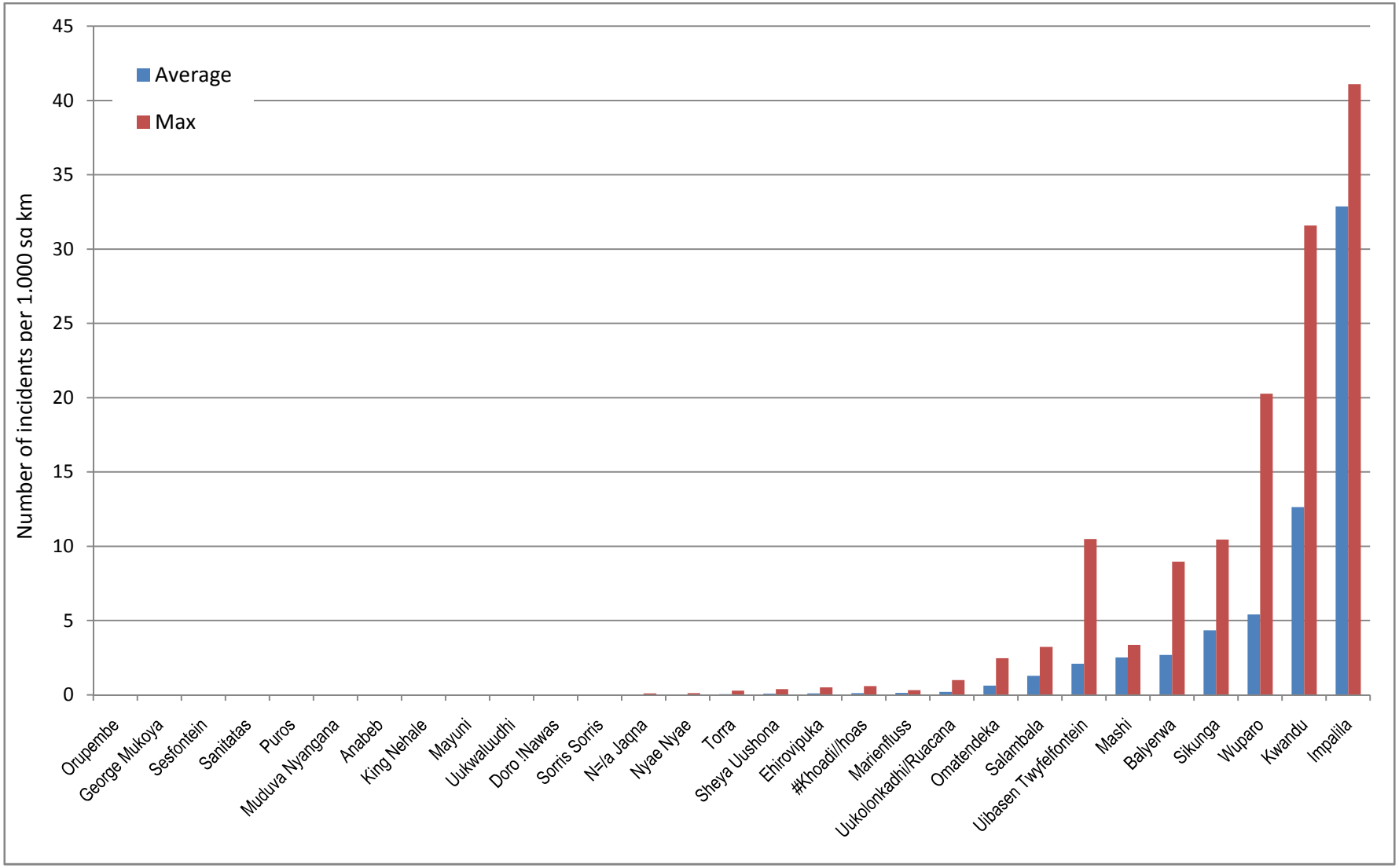
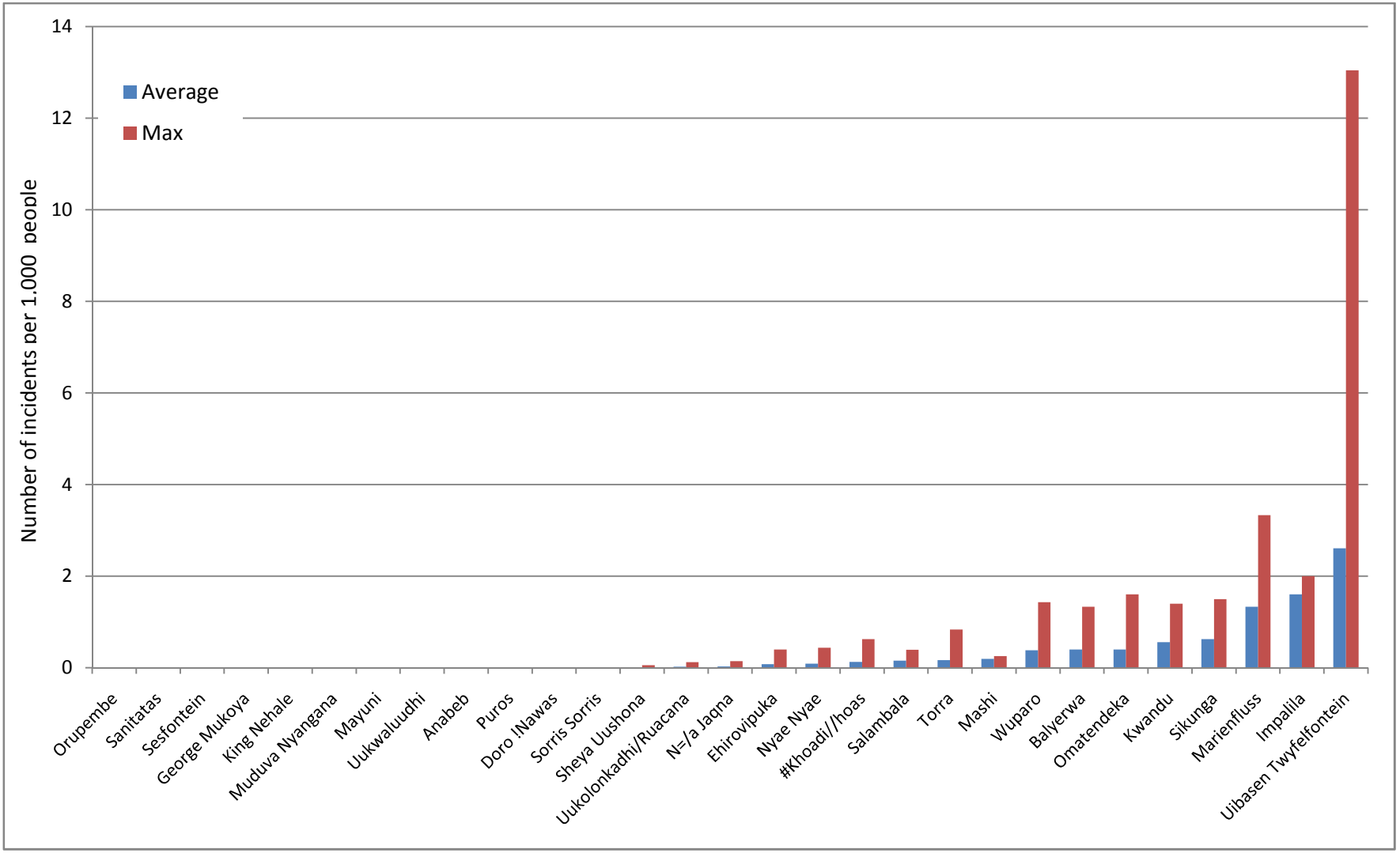
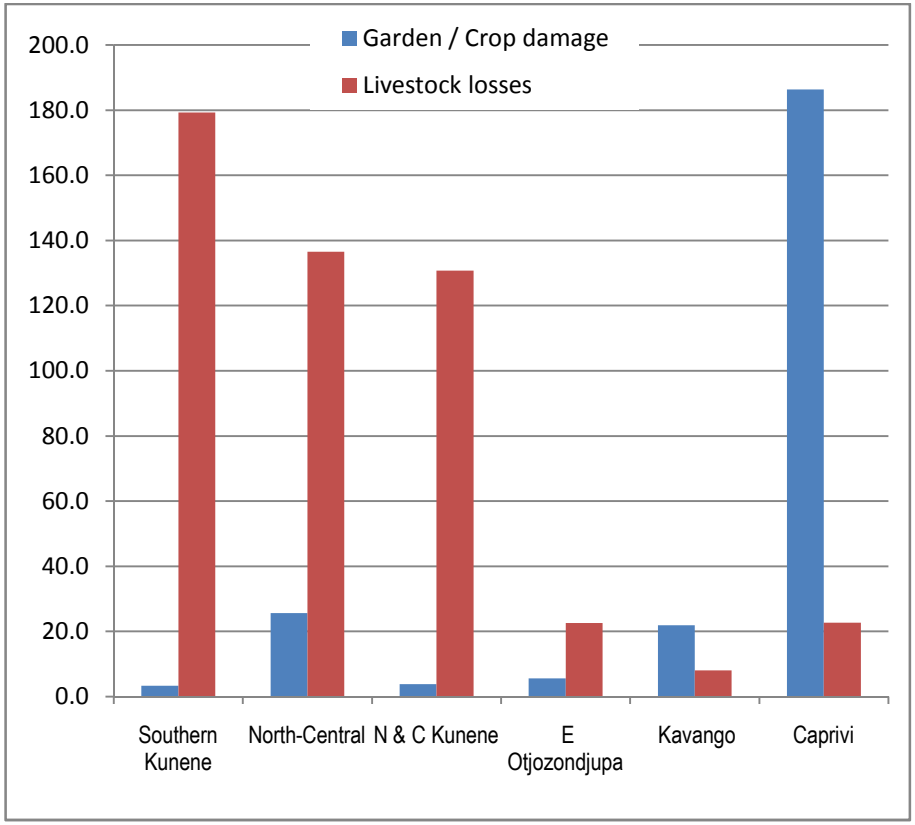
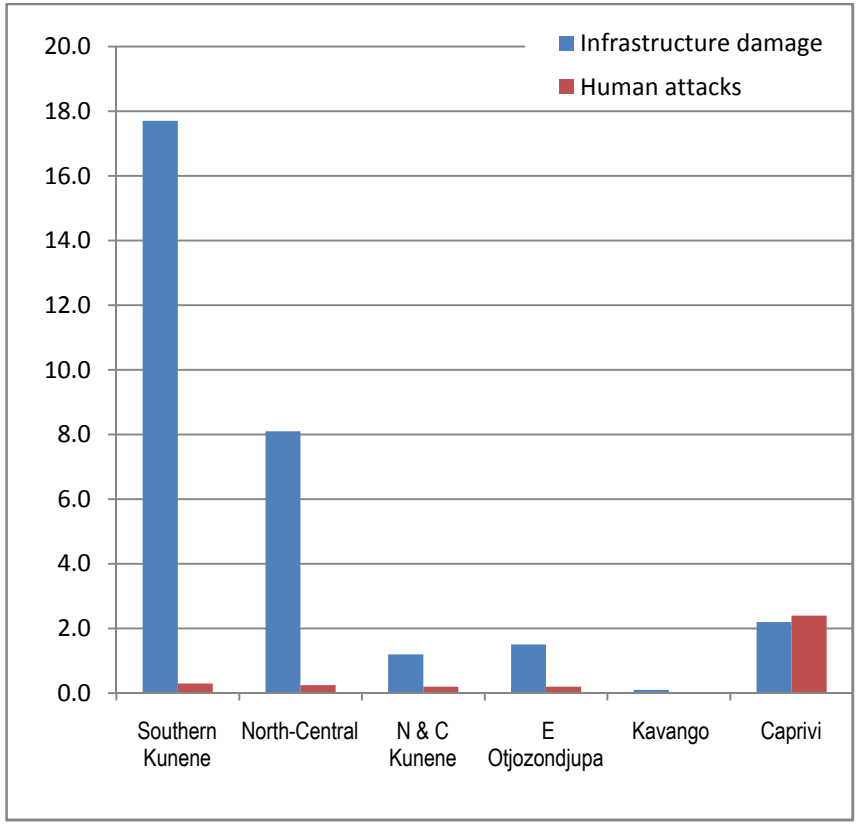


Figure A16: Average and maximum number of incidents of human attack from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.



Figures B1: Average number of incidents of HWC per region in the MCA-supported conservancies for the five-year period 2006-2010.





Explanatory notes on the costs of HWC to conservancies for the four different HWC categories

Table 2: Average costs (N$) of different types of Human-Wildlife Conflict				
HWC Impact		**Cost (N$)**	**Explanatory notes on cost**	
Garden and crop field damage	Gardens in Kunene	250	Per incident, being an estimate of average value of vegetables lost and opportunity costs including travel and health impacts.	
	Crop fields in all other regions	380	Of 384 incidents of crop damage in the Caprivi documented by MET between 1996 and 2001 an area of 764 ha was damaged, i.e. about 2 ha per incident. Assuming that only incidents of large amounts of damage were reported, and average damage is about 1 ha, with about 40% crop loss in this area, a 250 kg/ha yield and a market price of about N$3.8/kg (these being averages for maize, millet and sorghum), then the average cost per crop damage incident is about N$380.	
Local value of domestic stock	Cow	3,800	The cost of livestock varies somewhat from region to region and even within regions. A consistent set of figures should be applied at this broad national overview level for comparative purposes. More specific costs will be applied in the detailed analysis of individual conservancies. The cost applied is that of replacing lost livestock. No distinction is made between young and adult animals, as young animals are seldom marketed and are usually held until adult. The ration of animals lost varied from region to region. In the Southern and parts of the Central Kunene the ration of mortalities is horse:donkey:cow:sheep:goat about 1:3:7:10:74. This gives an average figure of N$828 per head of stock lost. In the Northern Kunene, North Central and higher rainfall regions to the east where more large-stock is farmed a ration of 1:2:20:10:40 is used, which gives an average figure of N$1,477 per livestock loss.	
	Horse	1,500		
	Goat	600		
	Donkey	550		
	Sheep	450		
Infrastructure damage	Pipes	1,500	Per incident, being the estimated average cost of new infrastructure / equipment, transport, travel and installation.	In water scarce regions (Kunene, North-Central, E Otjozondjupa) the ratio of damage to infrastructure is taken as – pipe:tap:tank:pump:windmill:water loss: livelihood cost:fence: homestead as – 50:10:3:1:1:80:10:30:5. This gives an average cost per infrastructure incident of N$1,753. In water rich regions (Kavango, Caprivi) the ration is taken as – 100:2:1:0:0:10:0:2:5. This gives an average cost per infrastructure incident of N$1,473.
	Taps	1,500	Per incident, being the estimated average cost of equipment, transport, travel and installation.	
	Tank	4,000	For 5,000 litre tank. Includes purchase, transport and installation.	
	Pump	40,000	Includes Lister diesel engine, pump, transport and installation.	
	Windmill	90,000	Includes purchase, transport and installation.	
	Actual water loss	150	Per tank of 5,000 litres, calculated at pumping rate of 2,000 litres water per hour, 6 litres diesel per hour at N$10 per litre.	
	Cost to livelihood as a result of losing water	6,100	Per 30 days of impact on livestock condition and reproduction, assuming a 5% value loss to stock over this period; and assuming an average livestock holding of 40 goats, 10 sheep, 5 cows and 4 donkeys per household; with an average of 4 households per water point.	
	Fence	350	Per incident, being the estimated average for replacement of material, transport and repair time.	
	Homestead	3,500	Per incident, being an estimate of average cost of replacement of material and rebuilding time and labour.	
Human life		5,000	This is **not** a value on human life but only the cost of funeral benefits provided.	

Figure C1: Average and maximum cost (N$) of garden and crop damage from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

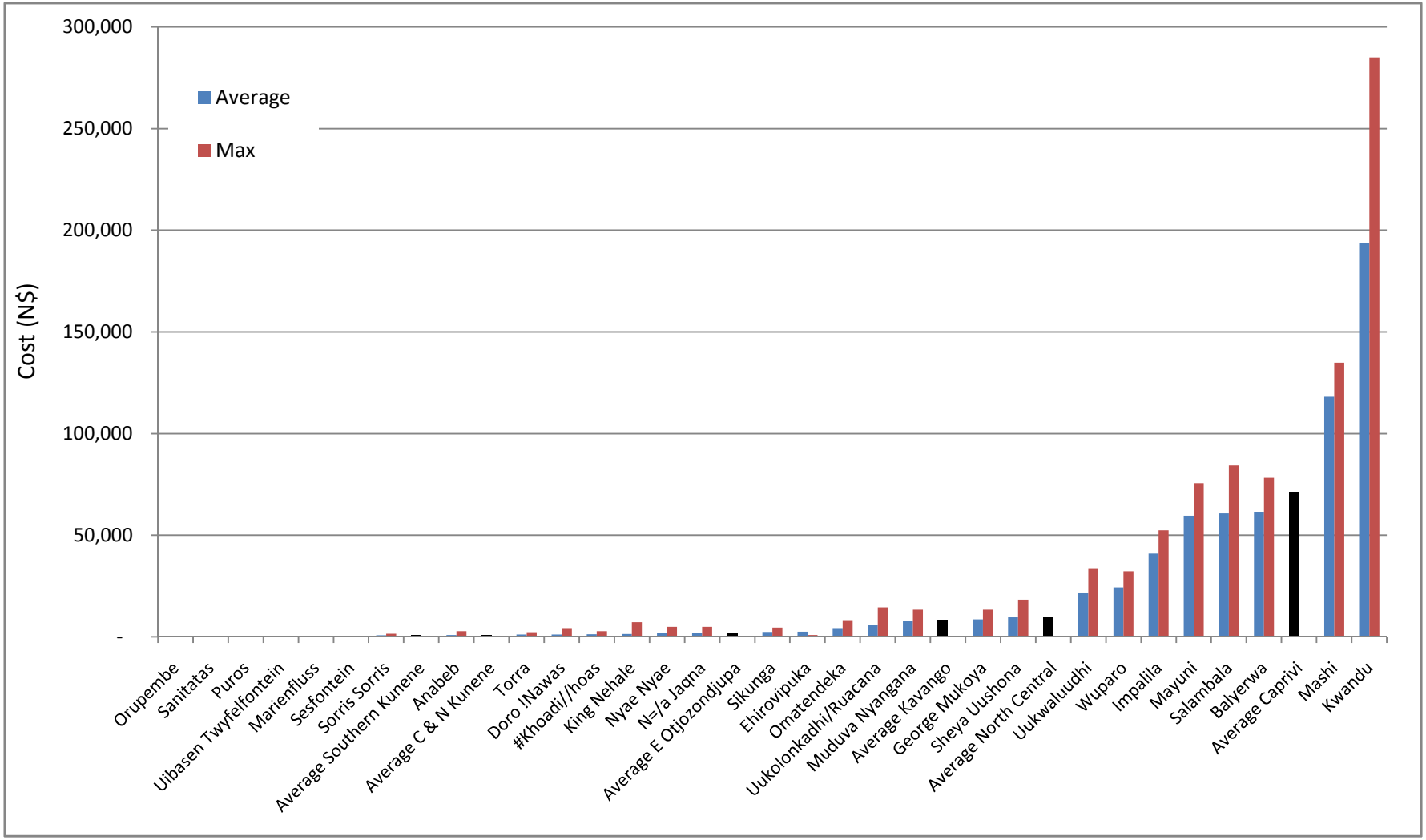


Figure C2: Average and maximum cost (N$) of garden and crop damage from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

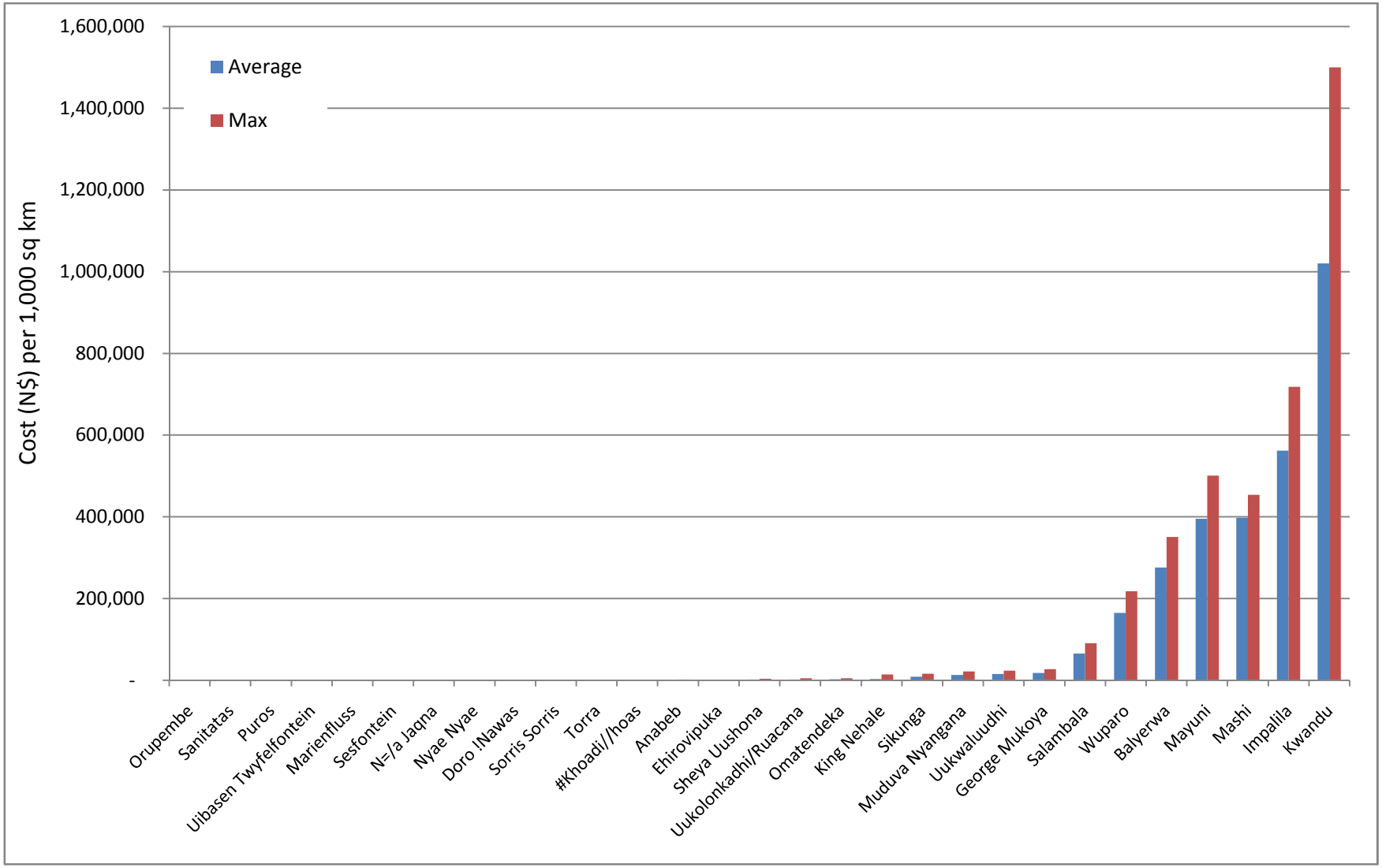


Figure C3: Average and maximum cost (N$) of garden and crop damage from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

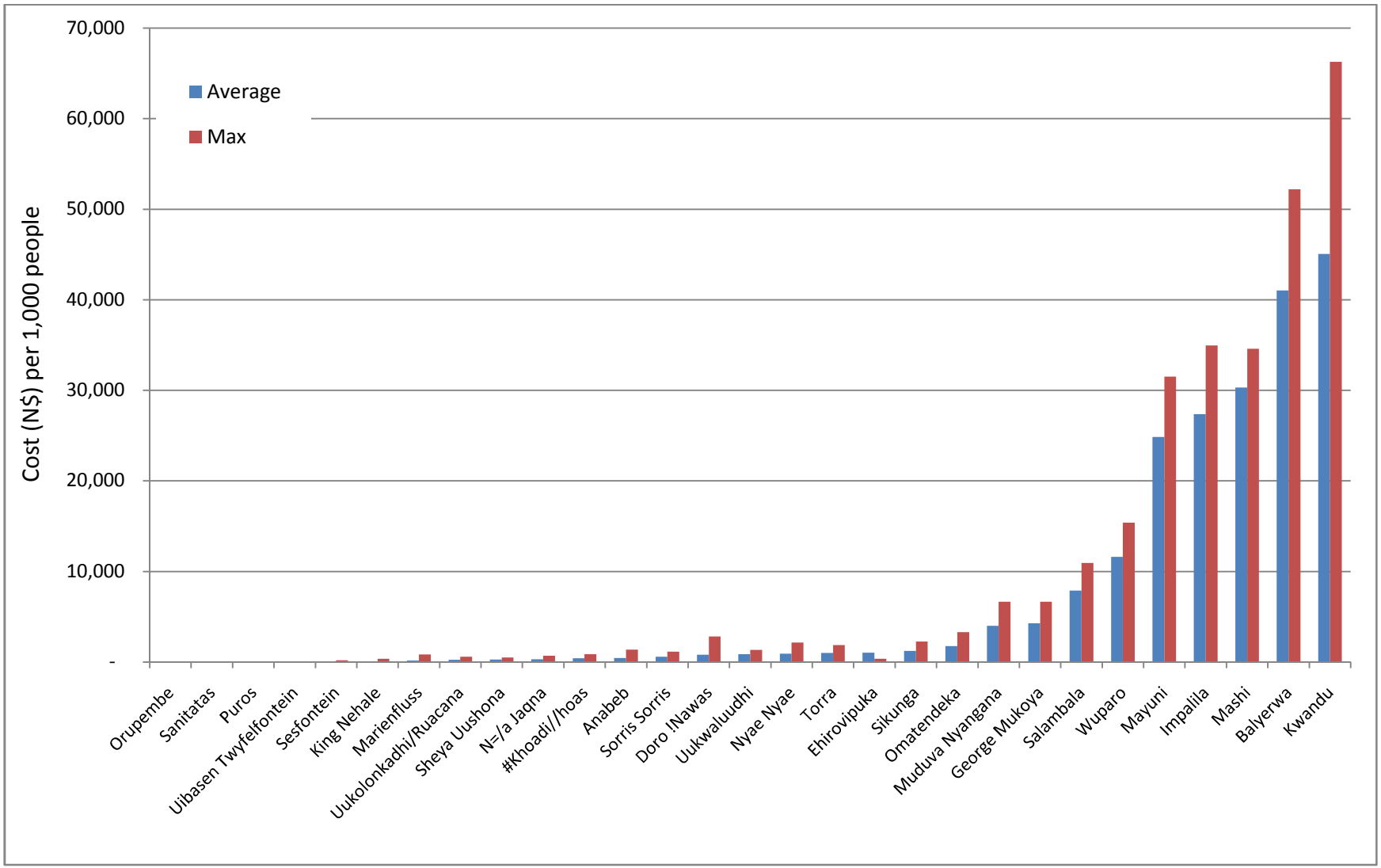


Figure C4: Average and maximum cost (N$) of livestock losses from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

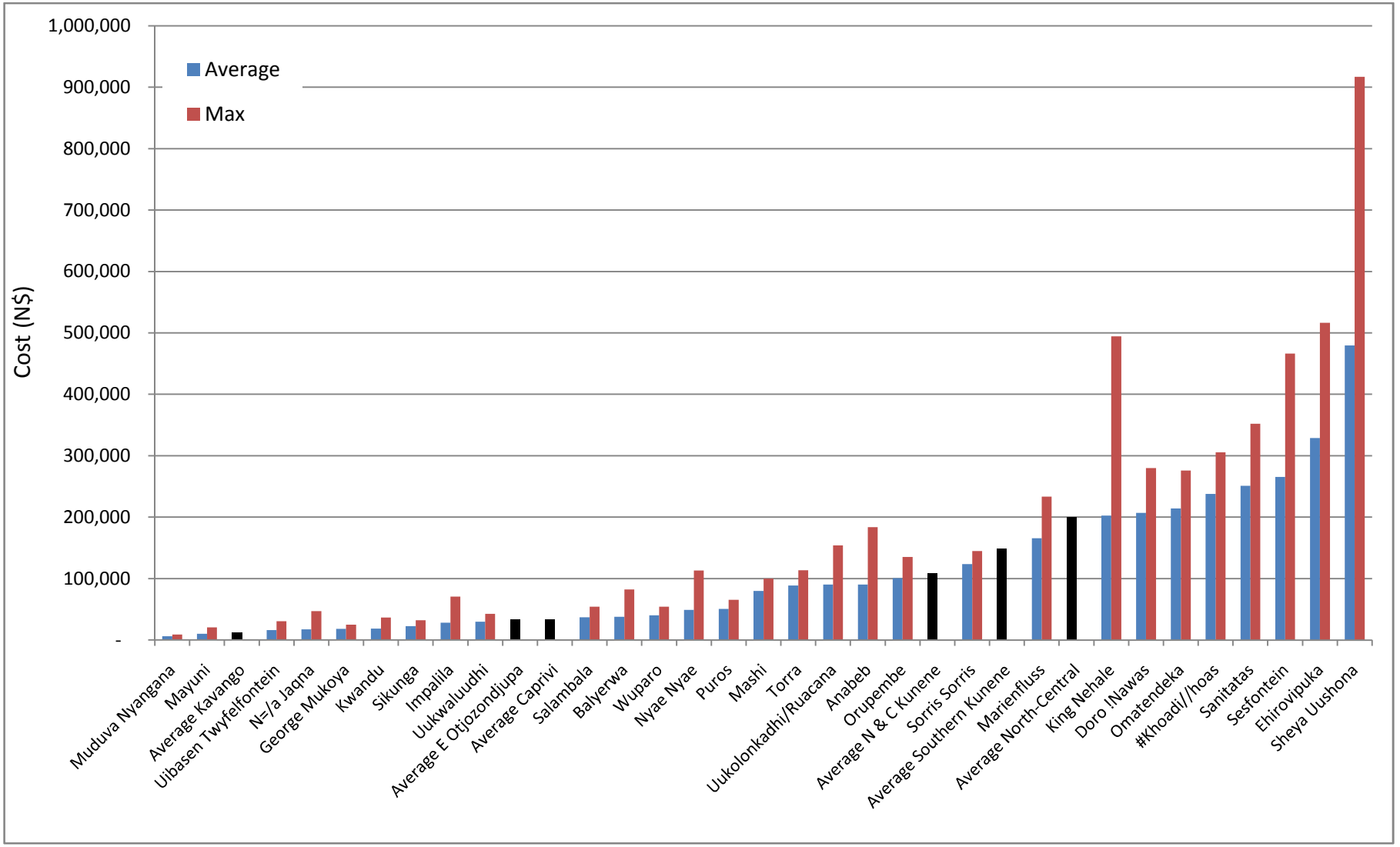


Figure C5: Average and maximum cost (N$) of livestock losses from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

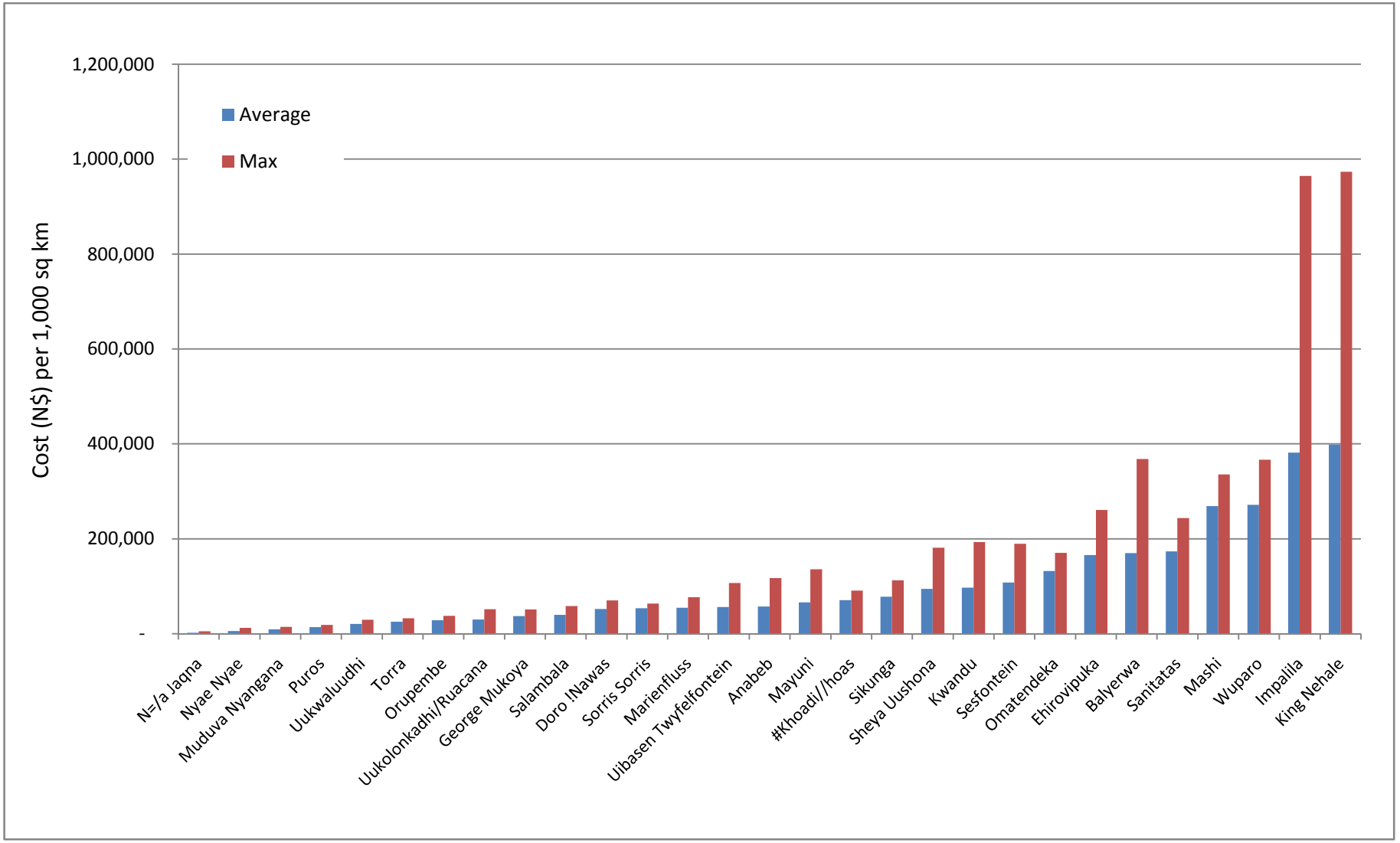


Figure C6: Average and maximum cost (N$) of livestock losses from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

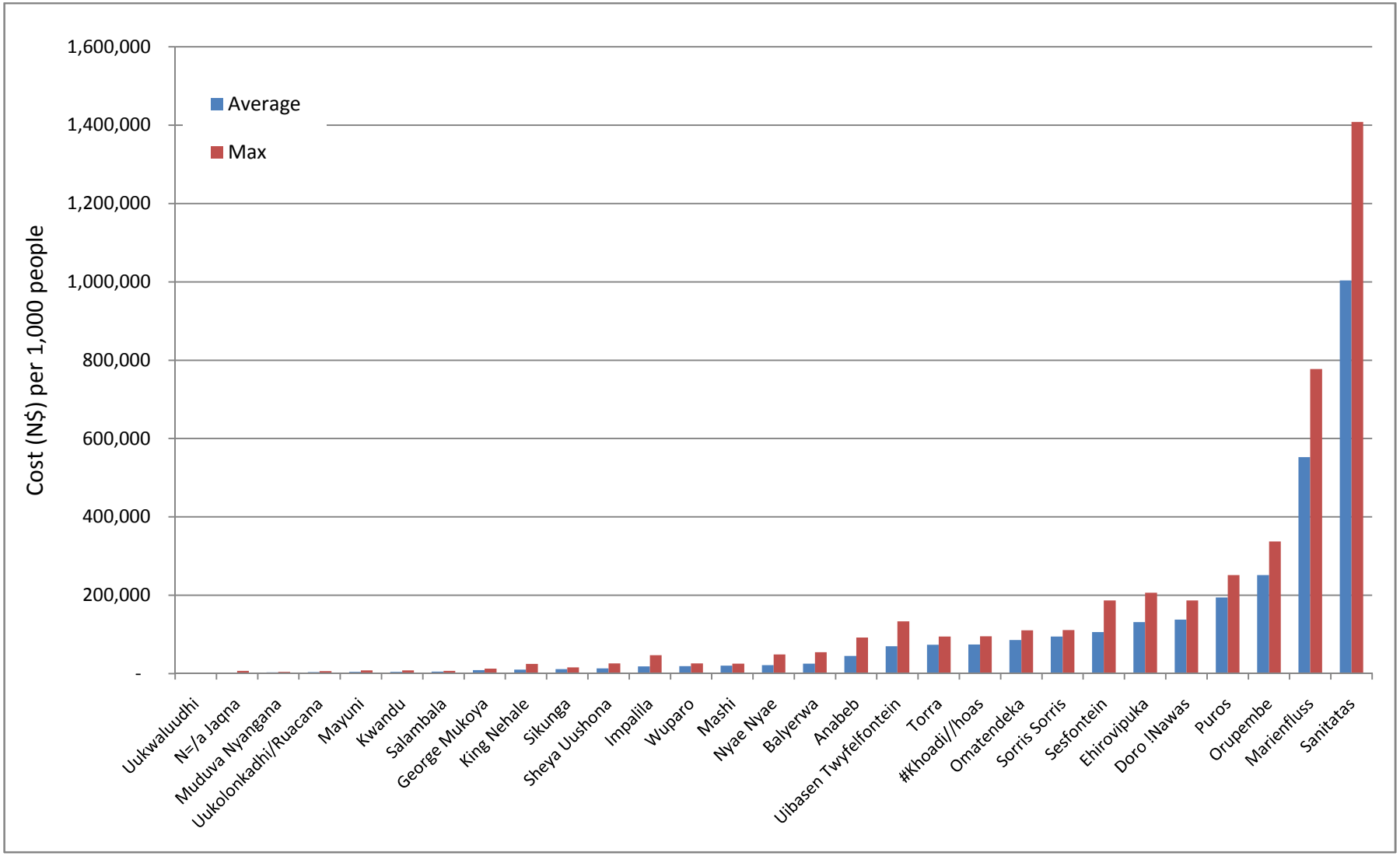


Figure C7: Average and maximum costs (N$) of infrastructure damages from HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

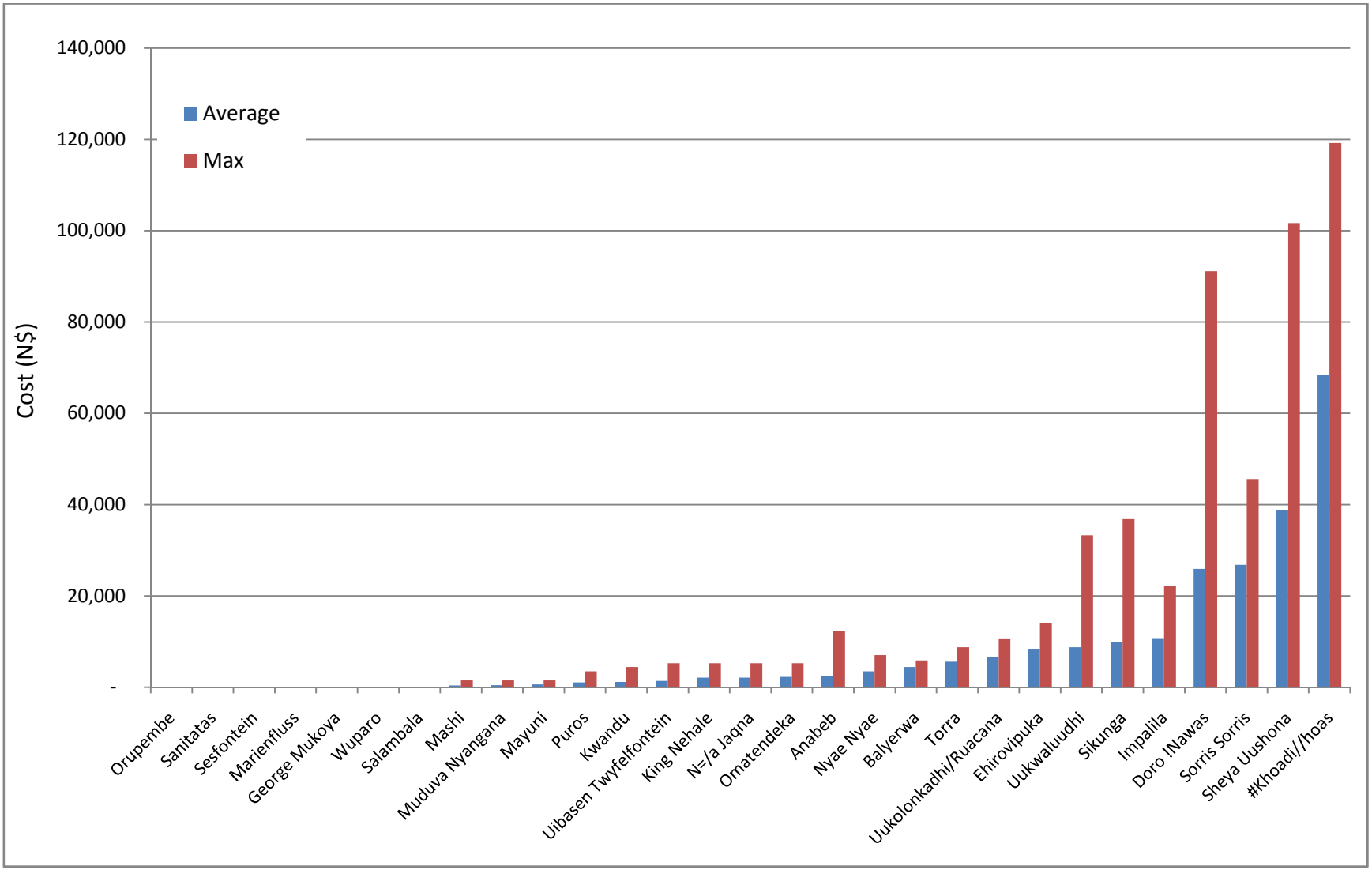


Figure C8: Average and maximum cost (N$) of infrastructure damage from HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

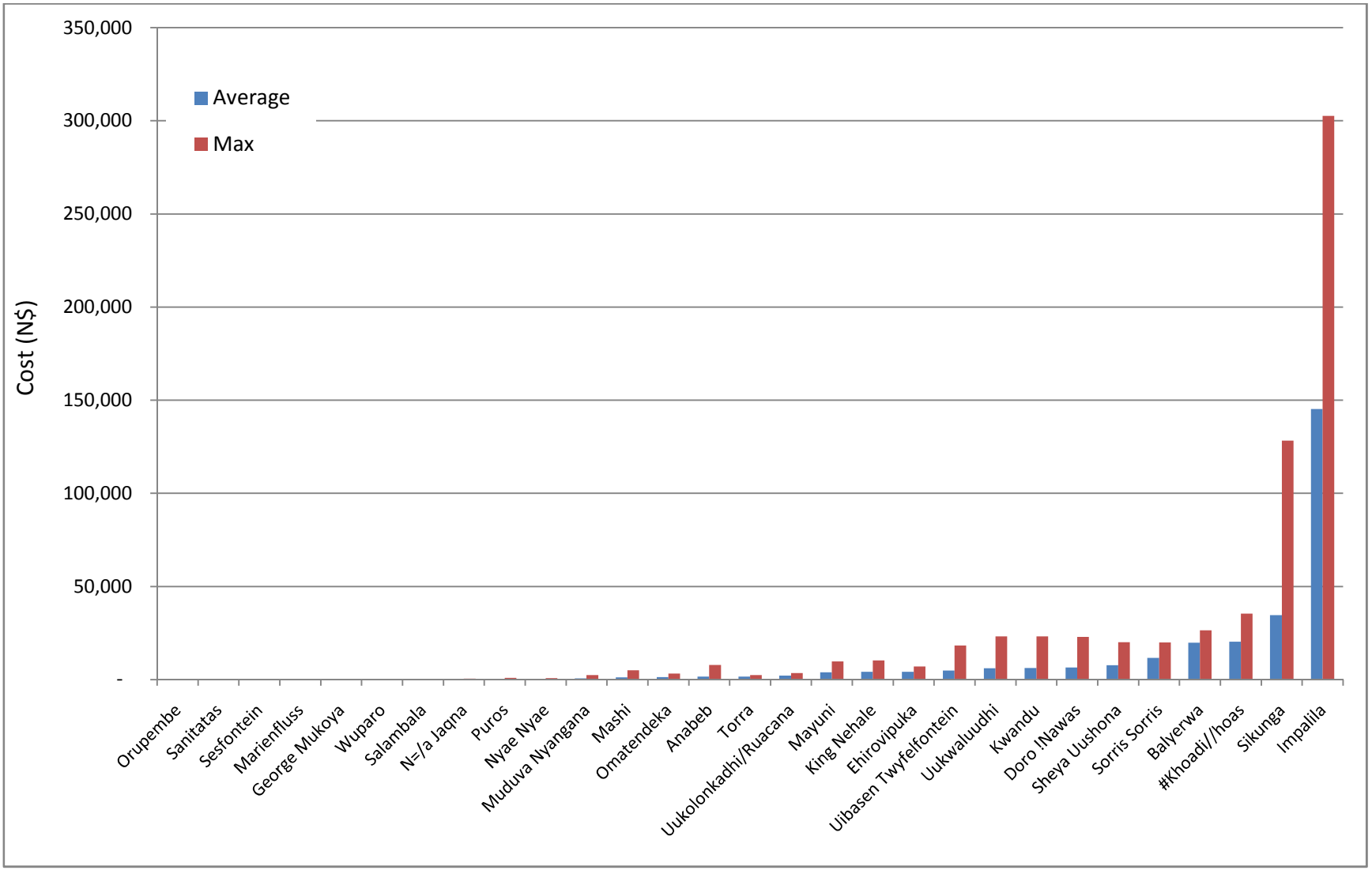


Figure C9: Average and maximum cost (N$) of infrastructure damage from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

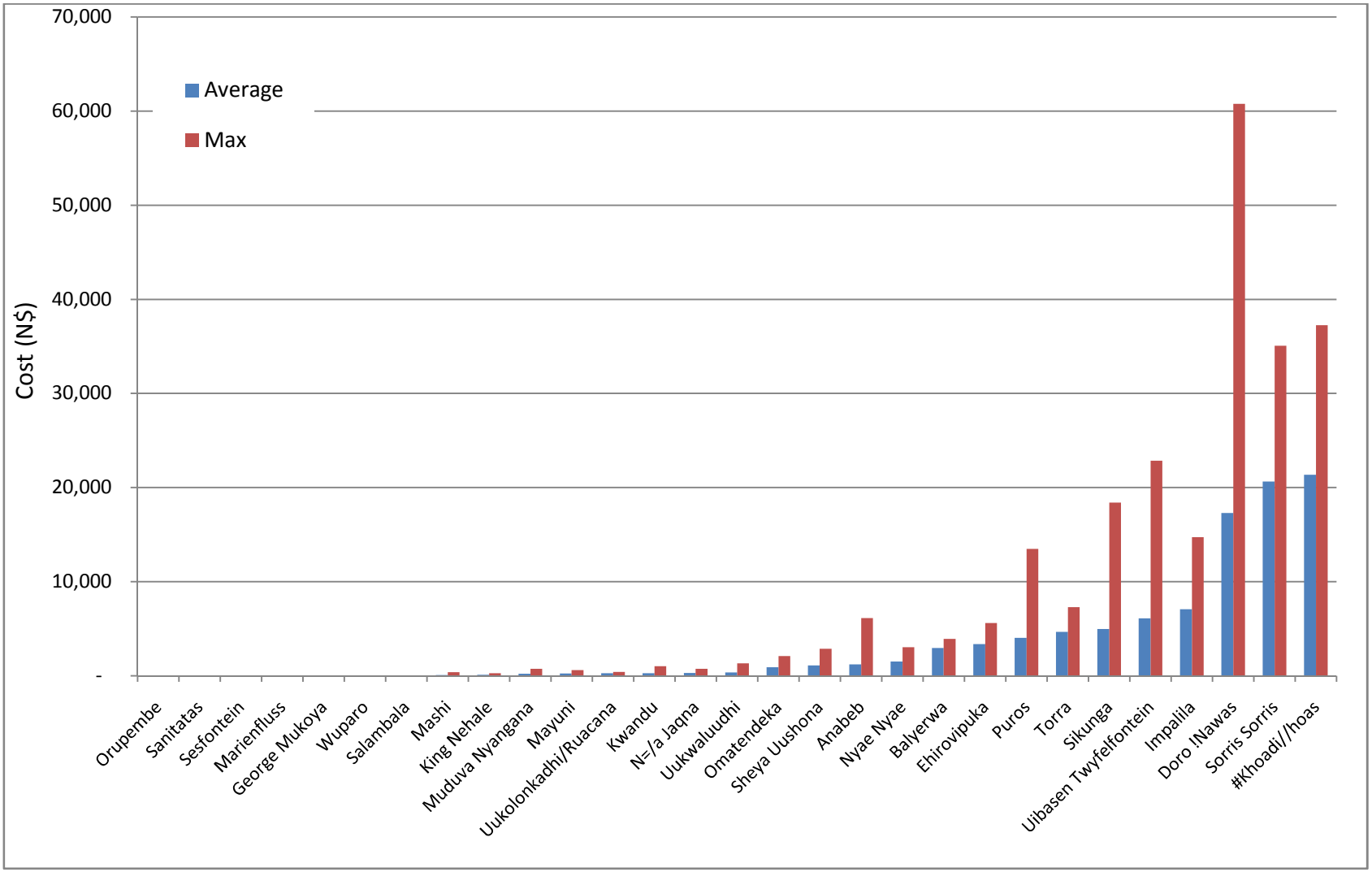


Table 3: The 10 most seriously impacted conservancies (position 1 being worst impacted) from HWC in the MCA-supported conservancies for the five-year period 2006-2010 for each of the four categories of (i) garden & crop damage, (ii) livestock losses, (iii) infrastructure damage and (iv) human attacks.

Conservancies experiencing the greatest average HWC damage to gardens & crops			
Position	**Incidents per conservancy**	**Incidents per 1,000 sq km**	**Incidents per 1,000 people**
1	Kwandu	Kwandu	Kwandu
2	Mashi	Impalila	Balyerwa
3	Balyerwa	Mashi	Mashi
4	Salambala	Mayuni	Impalila
5	Mayuni	Balyerwa	Mayuni
6	Impalila	Wuparo	Wuparo
7	Wuparo	Salambala	Salambala
8	Uukwaluudhi	George Mukoya	George Mukoya
9	Sheya Uushona	Uukwaluudhi	Muduva Nyangana
10	George Mukoya	Muduva Nyangana	Omatendeka

Conservancies experiencing the greatest average HWC damage to livestock			
Position	**Incidents per conservancy**	**Incidents per 1,000 sq km**	**Incidents per 1,000 people**
1	Sheya Uushona	King Nehale	Sanitatas
2	Ehirovipuka	Impalila	Marienfluss
3	Sesfontein	Wuparo	Orupembe
4	Sanitatas	Mashi	Puros
5	≠Khoadi //Hoas	Sanitatas	Doro !Nawas
6	Omatendeka	Balyerwa	Ehirovipuka
7	Doro !Nawas	Ehirovipuka	Sesfontein
8	King Nehale	Omatendeka	Sorris Sorris
9	Marienfluss	Sesfontein	Omatendeka
10	Sorris Sorris	Kwando	≠Khoadi //Hoas

Conservancies experiencing the greatest average HWC damage to infrastructure			
Position	**Incidents per conservancy**	**Incidents per 1,000 sq km**	**Incidents per 1,000 people**
1	≠Khoadi //Hoas	Impalila	≠Khoadi //Hoas
2	Sorris Sorris	Sikunga	Sorris Sorris
3	Doro !Nawas	≠Khoadi //Hoas	Doro !Nawas
4	Uibasen Twyfelfontein	Balyerwa	Impalila
5	Sheya Uushona	Sorris Sorris	Uibasen Twyfelfontein
6	Uukwaluudhi	Sheya Uushona	Sikunga
7	Uukolonkadhi/Ruacana	Doro !Nawas	Torra
8	King Nehale	Kwandu	Puros
9	Impalila	Uukwaluudhi	Ehirovipuka
10	Sikunga	Uibasen Twyfelfontein	Balyerwa

Conservancies experiencing the greatest average HWC attacks on people			
Position	**Incidents per conservancy**	**Incidents per 1,000 sq km**	**Incidents per 1,000 people**
1	Impalila	Impalila	Uibasen Twyfelfontein
2	Kwandu	Kwandu	Impalila
3	Sikunga	Wuparo	Marienfluss
4	Salambala	Sikunga	Sikunga
5	Wuparo	Balyerwa	Kwandu
6	Mashi	Mashi	Omatendeka
7	Balyerwa	Uibasen Twyfelfontein	Balyerwa
8	Mayuni	Salambala	Wuparo
9	Uibasen Twyfelfontein	Omatendeka	Mashi
10	≠Khoadi //Hoas	Uukolonkadhi/Ruacana	Torra

Figure C10: Average and maximum cost (N$) of all HWC per MCA-supported conservancy for the five-year period 2006-2010. The conservancies are sorted in order of ascending average costs.

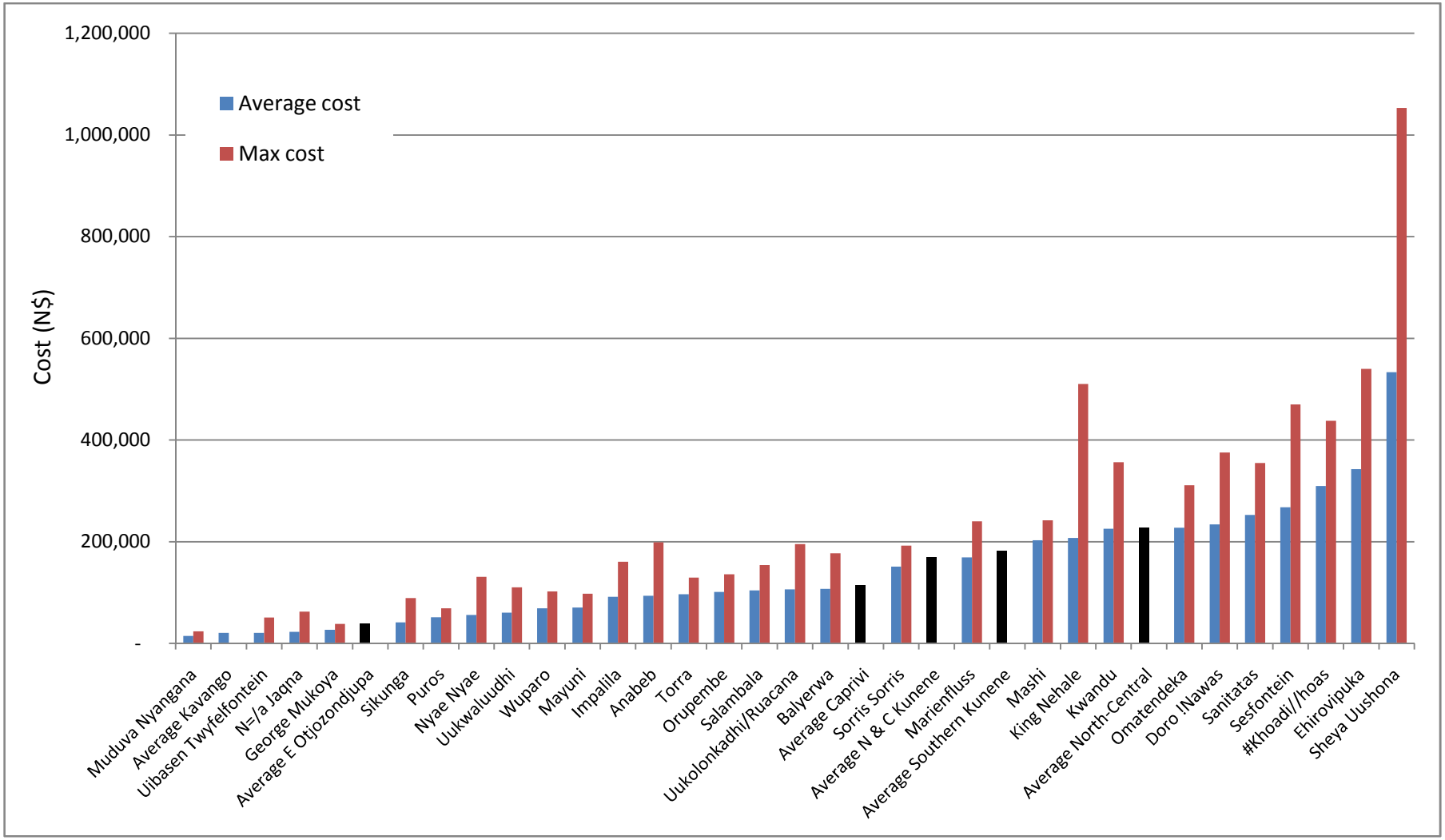


Figure C11: Average and maximum costs (N$) of all HWC per 1,000 sq km in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

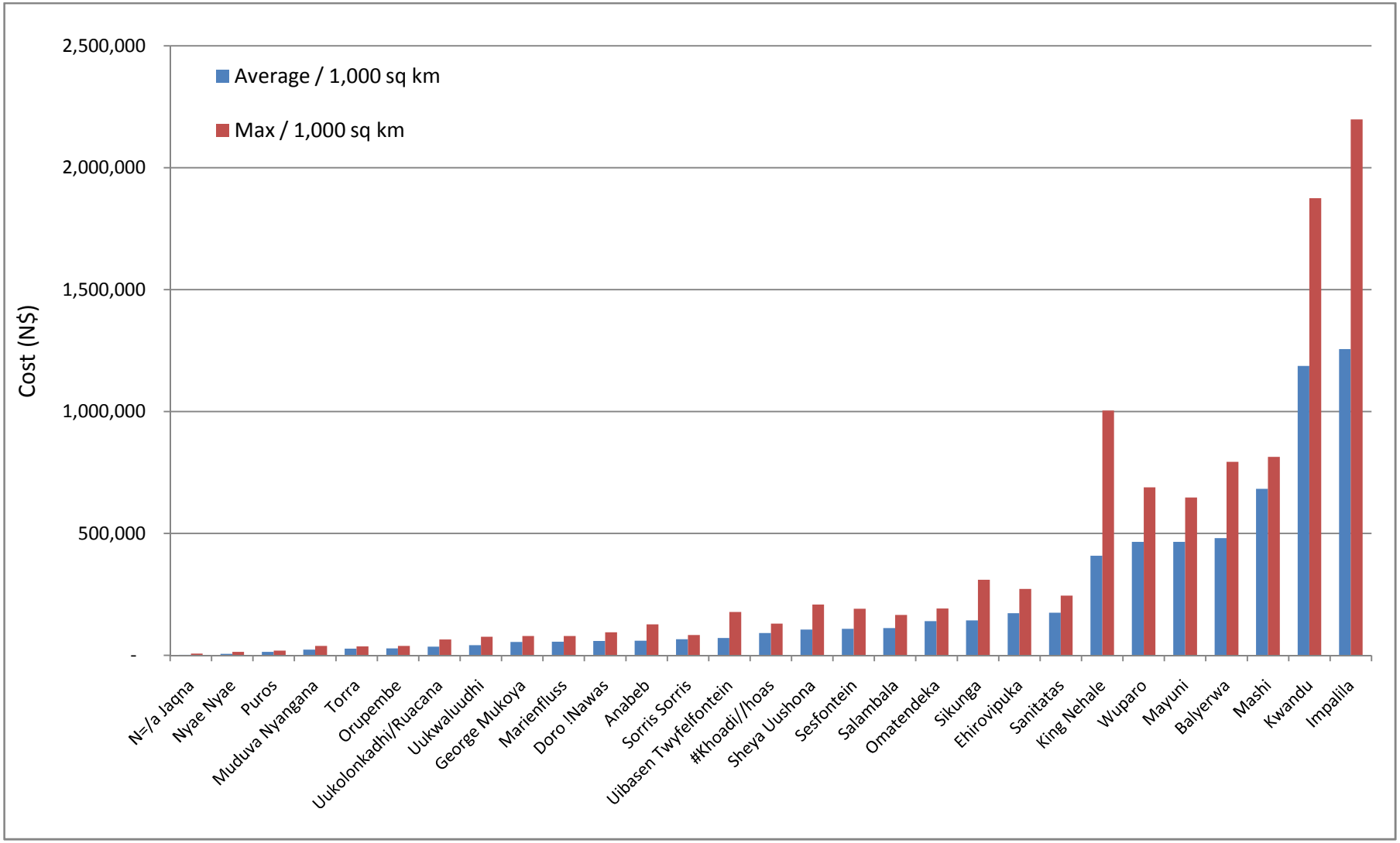


Figure C12: Average and maximum costs (N$) of all HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average costs.

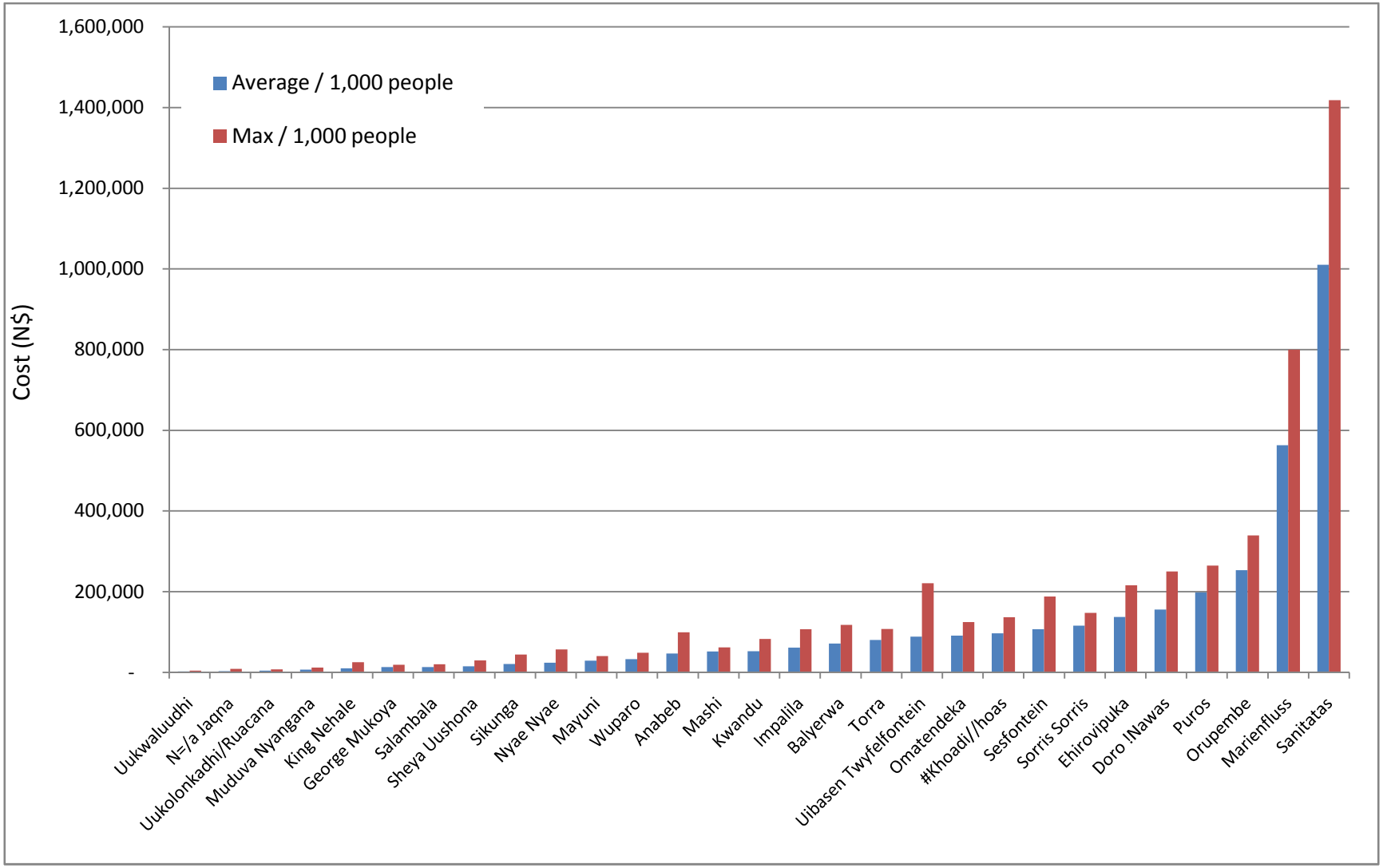


Table 4: The 10 most seriously impacted conservancies (position 1 being worst impacted) in terms of financial losses from all forms of HWC combined in the MCA-supported conservancies for the five-year period 2006-2010.

Conservancies experiencing the greatest average financial losses from all forms of HWC damage			
Position	**Costs per conservancy**	**Costs per 1,000 sq km**	**Costs per 1,000 people**
1	Sheya Uushona	Impalila	Sanitatas
2	Ehirovipuka	Kwandu	Marienfluss
3	≠Khoadi //Hoas	Mashi	Orupembe
4	Sesfontein	Balyerwa	Puros
5	Sanitatas	Mayuni	Doro !Nawas
6	Doro !Nawas	Wuparo	Ehirovipuka
7	Omatendeka	King Nehale	Sorris Sorris
8	Kwandu	Sanitatas	Sesfontein
9	King Nehale	Ehirovipuka	≠Khoadi //Hoas
10	Mashi	Sikunga	Omatendeka

Figure D1: Average and maximum HWC costs : benefit (2009) ratios for all HWC in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average benefit to cost

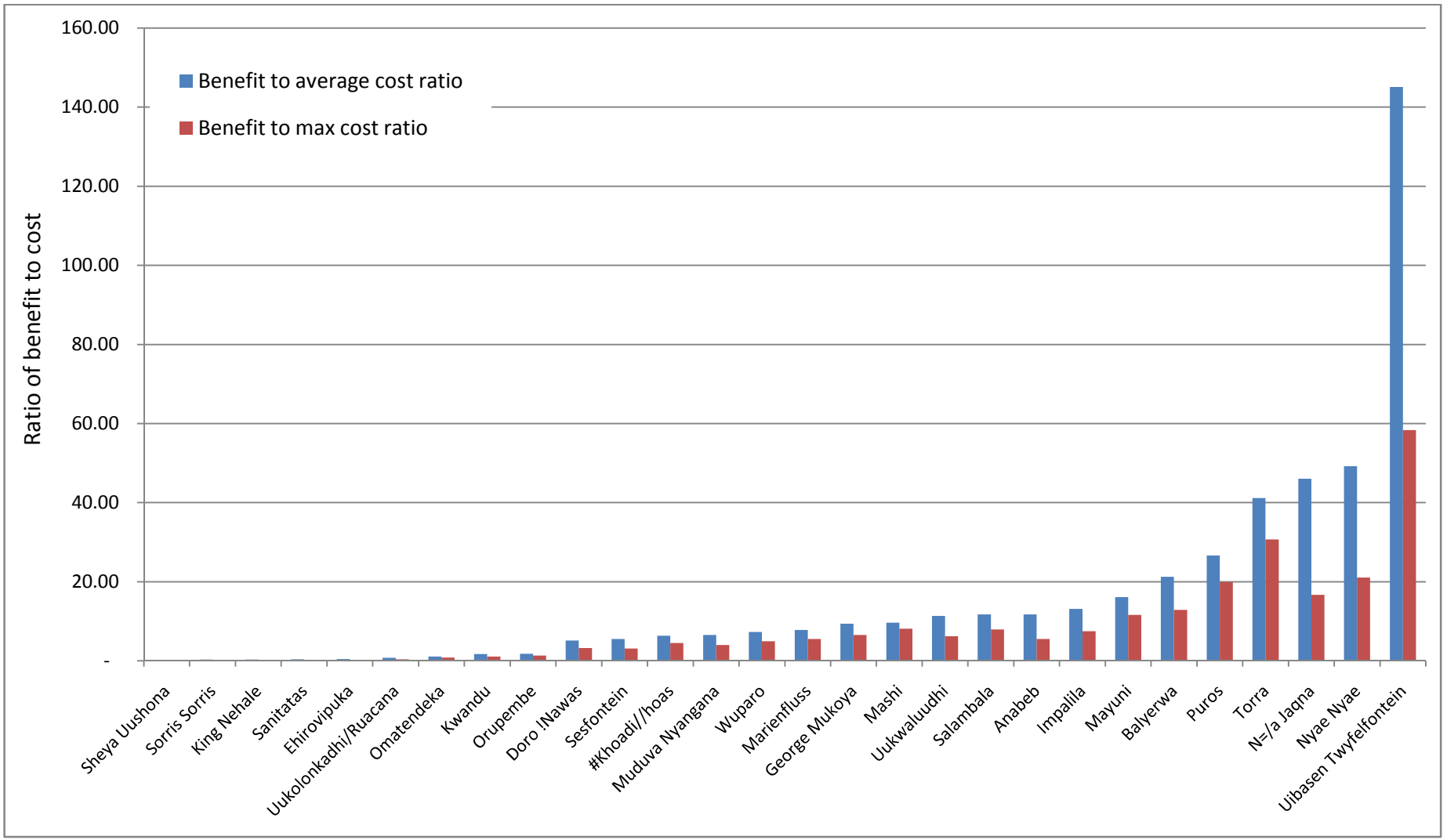


Figure D2: Average and maximum HWC costs : benefit (2009) ratios for all HWC in the nine (9) MCA-supported conservancies with the worst benefit to cost ratios for the five-year period 2006-2010. The conservancies are sorted in ascending average benefit to cost