African lion *(Panthera leo)* comparative study

Prepared under Decision 19.205 paragraph b) on *African lions* (Panthera leo)



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Executive summary

This report presents a comparative study of African lion population trends and conservation and management practices, such as lion hunting, within and between countries, including the role, if any, of international trade, as called for in CITES Decision 19.205 para b). The study was informed by a preliminary assessment of African lion populations and trends and conservation as well as a questionnaire on African lion hunting, management and conservation which all African lion range States were invited to complete. The questionnaire was completed by 19 out of 24 African lion range States[1] (79%): Botswana Cameroon, Chad, Democratic Republic of the Congo, Ethiopia, Gabon, Kenya, Malawi, Namibia, Niger, Nigeria, Senegal, Somalia, Sudan, South Africa, Uganda, United Republic of Tanzania (hereafter Tanzania), Zambia, and Zimbabwe.

Then a comparative study was conducted, investigating the status of lion populations in eight selected landscapes, each in a different country. This comparative study was survey-based and considered the impact of habitat loss and fragmentation, threats to the species, income streams for actors at these sites, conservation actions needed, the importance of trophy hunting and photo-tourism, and outcomes if trophy hunting were to stop. Similar data were also collected for individual sites with different management regimes within each of those landscapes.

Each of the eight selected landscapes was also examined for its ecological and socio-political fragility, based on the metrics from Nicholson et al. (2023). Geospatial analysis was also conducted using high-resolution datasets to evaluate forest cover loss, cropland expansion, and building density for each landscape. Analysis of these metrics allowed for a comparative evaluation (within and between landscapes) of habitat quality in protected/conserved areas with varying revenue generation mechanisms, such as photo tourism and trophy hunting, and those without any protected/conserved designation "non-conserved areas or reference areas".

A summary of the key findings is provided below.

Reported lion population status and threats (questionnaire data from 19 range States)

- African lion populations were reported to be decreasing in Ethiopia, Gabon, Somalia, and Uganda; increasing in Cameroon, Kenya, Malawi, and Zambia; stable in Democratic Republic of the Congo, Namibia, South Africa, Sudan, Tanzania, Zambia, and Zimbabwe; and population trends are unclear or unknown in Botswana, Chad, Niger, Senegal, and Nigeria.

- When asked whether government allocated funding for the management of areas with lions was sufficient to achieve conservation objectives, 15 range States provided an answer. 14 (93%) of those said it was insufficient, with only Uganda saying it was sufficient.

- The most frequently reported perceived threat to African lion populations by range States was human-lion conflict, including retaliatory killing, followed by illegal killing or poaching for parts, and habitat loss and/or fragmentation. Trophy hunting was not cited by any range state as a key threat facing lions.

- When directly asked whether legal lion hunting for trophies posed a threat to lion populations in their country, 13 out of 14 range States which provided information stated it did not. Nigeria reported that it did, despite such hunting not taking place in the country. Three countries reported that legal hunting of lions in neighbouring countries threatens their lion

[1] 24 African lion range States (based on the African Lion Database): Angola, Benin, Botswana, Burkina Faso, Cameroon, Chad, Democratic Republic of the Congo, Gabon, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, South Sudan, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

populations: Chad, Kenya, and Niger.

- Nine range States reported on the number of lions killed as problem animal control (PAC). Of these, two (Gabon and Malawi) reported that none were killed – amongst the remaining 7 range States that responded, the number of lions killed in PAC between 2019 – 2023 was 158, ranging from 1 in the Democratic Republic of Congo and Ethiopia to 70 in South Africa.

- Nine range States provided data on the number of lions reportedly killed by 'unnatural causes' such as poaching and roadkill. They reported a total of 63 deaths from 2019-23, ranging from 1 in DRC to 17 in Zambia

Data gaps (questionnaire data from 19 range States)

- The most frequently reported data gap for lions and lion management were national population estimates and trends for the species, knowledge of the most appropriate methods to use for surveys, and data on mortalities, including retaliatory killing.

- The most frequently reported challenge to doing population surveys for lions was limited technical expertise and capacity to undertake these surveys and an associated lack of training. This was followed by a lack of financial resources to undertake such surveys, and a lack of equipment and technical resources to complete such surveys.

Legal hunting of lions (questionnaire data from 19 range States)

- Based on responses to the questionnaire, 9 African lion range States allow legal hunting of lions for trophies (Cameroon, Ethiopia, Namibia, Niger, South Africa, Sudan, Tanzania, Zambia, and Zimbabwe) and ten do not (Botswana, Chad, Democratic Republic of the Congo, Gabon, Kenya, Malawi, Nigeria, Senegal, Somalia, Uganda).

- The most frequently reported land designation on which the legal hunting for trophies takes place – not specific to lions – is private land and community-owned land, including conservancies, followed by game reserves, wildlife management areas (WMAs), other land designations, forest reserves and sanctuaries.

- Based on available data, in the last 5 years (2019-2023), at least 1,541 lions (both captive and wild) were legally hunted for trophies. South Africa permitted the legal hunting of the most African lions (1,371 animals), 95% of which (1,308) were sourced from the large captive lion industry in the country, comprising 85% of all trophies. From data provided, a total of 233 wild lions were reported as trophy hunted in this period across 4 countries (Cameroon, Namibia, South Africa, Tanzania).

- For countries that provided data (Cameroon, Ethiopia, Namibia, South Africa, Tanzania, Zambia and Zimbabwe), the estimated proportion of lion trophy hunters that were international clients (hunters that came from outside the respective countries) ranged from 70-100%.

- In Cameroon, Ethiopia, Namibia, South Africa, Tanzania, Zambia and Zimbabwe revenue from lion trophy hunting is shared with local communities and/or the regions where the lion(s) originated from. The proportion of revenue shared was reported to range from 50-85%.

- The most frequently stated primary aim of lion trophy hunting was revenue generation for conservation, as reported by Cameroon, Namibia, Sudan, Zambia, and Zimbabwe.

- Ten countries reported not allowing the legal hunting of lions for trophies and where reasons for this policy decision were provided, it ranged from the species having declined in the

country to others considering the practice unethical (Ten countries not allowing hunting listed in the first bullet point in this section).

- Of the 9 countries that allow legal hunting of lions for trophies, 7 use quotas to manage it: Cameroon, Ethiopia, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. Six of these countries use age-based quotas, sex-based quotas and area-based quotas.

Impact of trophy hunting import bans (questionnaire data from 19 range States)

- Eight of the responding range States felt that import bans of trophies would be negative for lion conservation, while six felt it would be positive for lion conservation, with a clear difference between countries which currently permit legal lion hunting, and those which do not.

- Of 9 responding range States with legal lion hunting, 22% said import bans would be positive for lion conservation in their country, while 67% said it would be negative and 11% said it would have no effect. Amongst the 9 responding range States which currently do not allow lion trophy hunting, 44% said that import bans would be positive for lion conservation in their country, while 22% said it would be negative and 33% said it would have no effect.

- Seventy-six percent of range States that responded to the question stated that they would strongly or slightly oppose import bans on hunting trophies if they negatively affected lion populations.

- Lion range States were asked whether import bans on hunting trophies, including but not limited to African lions, would likely increase or decrease the number of lions killed overall. Of the 13 countries who expressed an opinion on the outcome, 54% thought that import bans would increase the overall number of lions killed, 15% thought it would remain the same and 31% thought it would decrease it. An anticipated increase in retaliatory killings of lion in the absence of benefits from trophy hunting were cited by some range States as the reason why there may be an increase in the overall number of lions killed.

- Range States were asked what would happen to trophy hunting areas if one or more import bans on hunting trophies were enacted. Two scenarios appeared to be considered as the most likely: that hunting areas would change to keeping livestock or other agriculture, and that hunting areas would be returned to the Government.

Socio-political and ecological fragility of the eight selected landscapes

According to the fragility rankings from Nicholson et al. (2023), various lion populations exhibit different levels of socio-political and ecological fragility. The Kruger National Park ranks as the least fragile of our case study populations overall, with a socio-political fragility ranking of 80 out of 84 and an ecological fragility ranking of 81 out of 84. Similarly, Ruaha-Rungwa and Masai Mara are among the least fragile populations, particularly in socio-political terms, ranking 73 and 72, respectively, while also being less ecologically fragile, ranking 82 and 79. In contrast, the Parc W-Arly Pendjari (WAP) and Benoué Complex populations are more socio-politically fragile, with WAP rankings ranging from 36 to 40 and Benoué Complex ranked 39. Ecologically, WAP also shows moderate fragility, with rankings between 46 and 53, while Benoué Complex ranks 41. The Benoué Complex is the most socio-ecologically fragile population overall, with an overall fragility ranking of 40. Overall, WAP populations are more fragile than others, particularly in socio-political contexts, while areas like Kruger National Park, Ruaha-Rungwa, and Masai Mara show relatively low levels of fragility in both dimensions.

Geospatial analysis of habitat quality and land use in the eight selected lion landscapes

- Core protected areas, often national parks, generally demonstrated the lowest levels of habitat degradation, with minimal forest loss, crop encroachment, and building density.

These areas are often designated exclusively for photo tourism and are critical for lions.

- A range of protected/conserved areas exist across these landscapes, including hunting areas. In general, hunting areas maintained relatively low levels of degradation, although higher than the core protected areas with challenges from deforestation, agricultural expansion, and human settlement.

- However, the performance of hunting areas varies both between and within landscapes, with some regions, particularly with economic pressure and favourable climatic conditions, experiencing higher forest loss, settlement and agricultural expansion. In certain regions, such as Ruaha-Rungwa in Tanzania and Luangwa in Zambia, there were large differences in hunting area performance within landscapes.

- In areas with high-value photo-tourism such as the Maasai Mara in Kenya and Kruger National Park in South Africa, these conserved areas around the government-led protected areas generally performed well in maintaining habitat quality, likely due to strong tourism revenues and established conservation practices.

- Lands outside protected/conserved areas often exhibited the highest levels of habitat degradation. Non-conserved lands surrounding protected/conserved areas consistently show greater forest loss, cropland expansion, and building density compared to protected/conserved areas. For instance, in the Maasai Mara, forest loss in non-conserved lands reaches 22%, vastly exceeding the <1% in the core reserve.

- Regional variations highlight the differences in the needs of range States for lion conservation. In countries such as Kenya and Tanzania, increasing rural population densities and agricultural expansion near protected/conserved areas contribute to significant habitat pressures compared to other range States.

Comparative analysis of the eight selected landscapes

The landscape specific questionnaire was completed by 7 out of 8 African lion range States who volunteered or agreed to participate in this study: Cameroon, Kenya, Mozambique, Niger, South Africa, Tanzania and Zambia. Zimbabwe did not complete the landscape questionnaire but completed three questionnaires for the different land use types in the landscape. Key findings include:

- Human-lion conflict, bushmeat poaching, and livestock expansion are perceived as the most common major threats to lion populations in these landscapes (each being identified as major threats in 57% of the surveyed countries [four out of seven: Kenya, Niger, Zambia, and Tanzania])

- Bushmeat poaching and resource extraction were the only threats to be considered a “major” or “minor” threat in the landscapes by all seven range States.

- Five of the seven range States indicated that trophy hunting was not a threat in their selected landscapes, while two (Cameroon and Mozambique) said it was a minor threat in their landscapes.

- The results of the questionnaire highlight the perceived importance of photo tourism to income streams for different actors with most Parties indicating that this form of land use was very to moderately important to their selected landscape. Mozambique indicated that photo tourism is not at all important when it comes to revenue streams and income generation.

- Most range States that participated in the comparative analysis considered trophy hunting to be “moderately important” to revenue and income generation in these landscapes.

- Amongst countries which had trophy hunting, 100% thought that stopping trophy hunting would be strongly negative for lion conservation in the selected landscape, 80% thought it would be negative (either slightly or strongly) for biodiversity conservation in the landscape, and 80% thought it would be negative (either slightly or strongly) for local communities in the landscape.

Initial recommendations for future research and policy

Firstly, it is important to note the limitations of this study, which include the following:

- Case study sites were selected based on the population data available at a site level and whether the respective range State expressed interest in participating in the study. As population data are generally indicative of consistent monitoring efforts, our results are biased to populations that are less fragile. For future studies, it is recommended selecting sites that have been previously identified as fragile (E.g. Maze National Park in Ethiopia, Virunga/Queen Elizabeth National Park in Uganda) informed by the analyses in Section 4.13.

- It also wasn't possible in this study to explore all issues that have, and/or are, likely influencing lion population trends at sites and landscapes, including property rights regimes (and the strength thereof), institutional diversity, and the roles of, and incentives for local communities and indigenous people in African lion conservation. Focusing on these aspects could yield interesting insights into what is, what is not, and what could work for lion conservation.

- Range States were only asked about one landscape each, and selected sites within that, so these responses provide just a snapshot of the situation and would require more expansive work for a better understanding of lion management and conservation.

- The study was limited in terms of time and scope, which necessarily led to a smaller sample size and less detailed insights than could have been achieved with a longer or more in-depth study.

Nevertheless, the study still provided some valuable insights for future research and policy, with some of the key ones highlight below.

- 11 of the 19 range States that participated in the study reported stable or increasing African lion populations.

- The major threats faced by lion populations included human-wildlife conflict, bushmeat poaching, and habitat loss and fragmentation (primarily associated with livestock expansion and increased demand for land for agricultural purposes), while trophy hunting was not mentioned as a key threat by a single range State. There is a strong case for having more international policy focus on those key threats rather than the strong focus on trophy hunting, as the latter appears to be driven more by concerns from the Global North rather than from lion range States themselves.

- Despite how it is often perceived in the Global North, trophy hunting was reported by multiple range States as being important for generating revenue, helping maintain wildlife areas, recognizing the value of land for wildlife relative to competing land uses, and for local communities, but this varies between sites. It is important to recognise these local perspectives and ensure that local values are not subsumed by international ones.

- Though trophy hunting was not reported as a key threat by any State, it was cited as a minor threat for populations in two countries. It is important to ensure that regulations are as effective as possible, with systems such as adaptive age-based quotas, which have been used successfully in Mozambique and Zimbabwe. The age limits on trophy hunted animals reported here were sometimes as young as 5, but the best available evidence suggests a

minimum of 6 years and ideally a minimum of 8 years where populations face various anthropogenic pressures. Therefore, it could be worth examining and revisiting the age regulations where relevant.

- There were clear concerns about proposed import bans amongst range States, both for conservation and livelihoods - two thirds of countries which used trophy hunting said import bans would be negative for lion conservation in their country, while all the landscape-level respondents which used trophy hunting reported that stopping it would be negative for lion conservation, and 80% said it would be negative for wider biodiversity and livelihoods. These concerns should be listened to and carefully considered when politicians are weighing up the pros and cons of restrictions such as trophy import bans.

- It was clear that photo-tourism areas tended to deliver better conservation outcomes than trophy hunting areas did in terms of key metrics such as forest cover, extent of cropland and density of buildings, while trophy hunting areas tended to deliver better outcomes than unprotected land[2]. Therefore, the impact of trophy hunting bans or import bans will depend strongly on whether hunting areas would switch to photo-tourism or convert to a non-wildlife based land use. The likely outcome will differ by site, but overall, the highest-likelihood predicted outcomes were that hunting areas would change to livestock-keeping or agriculture, and that hunting areas would be returned to the Government. Given the major threat posed by livestock expansion and conflict, and that 93% of countries felt that Government funding for conservation was already insufficient, these would be very concerning outcomes for lions and wider conservation. It is vital that policymakers consider the risks of unintended consequences from undermining trophy hunting without a viable plan for helping maintain those areas under a wildlife-based land use.

- Similarly, more than half the responding countries felt that import bans would increase the number of lions killed, and over three-quarters of responding range States expressed opposition to trophy import bans if they negatively affected lion populations. Ensuring that policy is well-informed, including the potential outcomes and impacts on conservation and livelihoods, is crucial for avoiding harmful unintended consequences.

- Countries highlighted the lack of data on lion populations and trends as a key data gap and noted the limitations they experienced due to insufficient technical expertise, equipment and financial support. There is a clear need for national and international partners to increase the level of technical and financial assistance to range States improve the understanding of the status and threats facing African lions.

- Most range States reported relatively low numbers of lions killed through problem animal control or 'unnatural causes' such as poaching or illegal retaliatory killing. Given that range States reported these factors as threats to lions, this suggests that the data do not adequately capture the true level of lion mortality. It would be valuable for range States and conservation partners to collate data from at least certain key landscapes on these other forms of killing, to enable better understanding of these threats in the future.

- Throughout the report, it was evident that there were considerable variations in conservation contexts between countries, between landscapes and even within landscapes. This nuance and site-specificity is critical and should be at the heart of all future lion management and conservation policies, alongside the views and needs of the countries and communities who do the hard work of conserving Africa's iconic lion populations.

[2] The protection status of areas where activities take place should be taken into consideration. In many cases, photo-tourism takes place in protected areas, which generally has a higher protection status and benefit from funding from government, while trophy hunting takes place either on private or communal land or within wildlife management areas that do not always have a formal protection status and do not benefit from government funding.

A. Introduction

At the 19th meeting of the Conference of the Parties to CITES (Panama City, 2022), the Parties adopted Decision 19.205-19.210 on African lions (*Panthera leo*, hereafter African lion or lion). Decision 19.205 directs the CITES Secretariat, subject to external funding, in collaboration with African lion range States, the Convention on Migratory Species (CMS) and the International Union for Conservation of Nature (IUCN) and, as appropriate, taking into consideration the joint CITES-CMS African Carnivores Initiative and the Guidelines for the Conservation of Lions in Africa in information document CoP18 Inf. 10 (EN, FR), to undertake the following activities:

a) support the implementation of activities in joint African lion conservation plans and strategies that relate to trade in African lion specimens and the implementation of CITES and as needed, the review of such plans and strategies;

b) jointly with the CMS Secretariat, undertake a comparative study of African lion population trends and conservation and management practices, such as lion hunting, within and between countries, including the role, if any, of international trade;

c) support capacity-building in African lion conservation and management including where appropriate, in the making of non-detriment findings by range States according to Resolution Conf. 16.7 (Rev. CoP17) on Non-detriment findings and the implementation of Resolution Conf. 17.9 on Trade in hunting trophies of species listed in Appendix I or II;

d) assist in maintaining a joint CITES-CMS web portal on African lions, that also allows for the posting and sharing of information and guidance on the conservation and management of African lions;

e) share any relevant update of the Guidelines for the Conservation of Lions in Africa with the Animals Committee for its review; and

f) report on the implementation of the present Decision to the Animals Committee and the Standing Committee and to the Conference of the Parties at its 20th meeting.

Decision 19.206 directs the Animals Committee to, among other things, review the information reported by the Secretariat under Decision 19.205 and submit recommendations to the Secretariat, the Standing Committee and African lion range States, as appropriate. Decision 19.207 directs to the Standing Committee to a) review any reports received from the Secretariat and the Animals Committee under Decisions 19.205 and 19.206 and, b) make recommendations to the Conference of the Parties, the Animals Committee, the Secretariat and/or African lion range States to improve the implementation of the Convention for African lions, as appropriate.

In March 2024, the CITES Secretariat appointed researchers at the University of Oxford as consultants to support the Secretariat to implement Decision 19.205 para b), that is, to undertake a comparative study of African lion population trends and conservation and management practices, such as lion hunting, within and between countries, including the role, if any, of international trade.

This report presents the comparative study on African lion population trends and conservation and management practices, such as lion hunting, within and between countries, including the role, if any, of international trade. **The aim of the study was to compare African lion population trends and conservation and management practices, in particular lion trophy hunting, within and between selected countries, and sites, including the role of international trade.** The study was informed by a preliminary assessment of African lion population numbers, trends, habitat status, and conservation and management practices, undertaken by the consultants in the period May–November 2024. It was also informed by input from African lion range States through an online meeting held on 3 May 2024 to discuss the design of the comparative study. To generate knowledge of, and data on, African lion

populations and conservation and management of the species, the consultants asked all African lion range States to complete a questionnaire, and analysed CITES trade data. Countries with landscapes and sites selected as case studies for the comparative study were then asked to complete further questionnaires and take part in bilateral meetings with the consultants and the CITES Secretariat, to discuss the chosen landscapes and sites, lions and factors affecting lions and their conservation in more detail. Recognising the impact of habitat loss and fragmentation on lion populations, mapping of habitat change and loss in and around the selected landscapes was also undertaken. Further details on the methods used in the comparative study can be found in Section 2.

B. Methodology

1. Questionnaire with African lion range States

To generate knowledge of African lion conservation and management within and between countries, all range States were asked to complete a questionnaire to serve as a baseline and provide context for the comparative study. Range States were asked to self-select a respondent who has expertise on lions and lion conservation and management in the country. The questionnaire included open, closed, multiple choice, and rating questions on African lion populations, use and trade of the species, trophy hunting and management, the impact of import restrictions, quotas, data gaps and challenges, and additional documentation (see Section 6.1). The questionnaire was available for completion from mid-August-November 2024 in English and French using the University of Oxford's JISC platform. The study was reviewed by, and received ethics clearance from, a subcommittee of the University of Oxford Central University Research Ethics Committee (R92900/RE001).

2. CITES trade data

To complement the data generated from the questionnaire, CITES trade data for the lion were analysed. Data on the international trade in lions were downloaded on 7 August 2024 from the CITES Trade Database (CITES, 2024) in the form of a comparative tabulation report. This included data for the period 1977-2024 for *Panthera leo* for all exporting and importing countries, all sources, all purposes, and for all trade terms. Direct trade for the last 5 years (2019-2023) was then summarised using exporter reported quantities for each range State using purpose code H (hunting trophy), the terms bodies, skeletons, skins, skulls and trophies only, and the units number of specimens and units=blank. This method follows Harfoot et al. (2018) and Challender et al. (2024) and assumes that one trophy using these terms equates to one lion, which is likely to be an over-estimate of the number of lions given that each lion could lead to multiple different body parts exported as trophies. The data were summarised in relation to the number of lions reported as legally hunted for trophies in range States.

3. Comparative study

The comparative study includes 8 different landscapes, with each including several sites within it. These sites were chosen based on 1) input from African lion range States in the online meeting in May 2024, 2) informed by an assessment of available data on African lion populations by the Oxford team, 3) to ensure regional representation of landscapes within the range of the African lion, and 4) to ensure a range of management models (e.g., landscapes where trophy hunting does and does not take place). The selected landscapes and sites are:

i) Central Africa – Bénoué Complex (Cameroon)

a. National Parks

b. Hunting Concessions surrounding the National Parks

c. Inactive Hunting Concessions surrounding the National Parks

ii) Eastern Africa – Maasai Mara (Kenya)

a. Maasai Mara National Reserve

b. Conservancies outside Maasai Mara National Reserve

c. Non-conserved land surrounding the MMNR

iii) Southern Africa – Niassa Reserve (Mozambique)

a. Niassa Reserve (excluding hunting concessions)

b. Hunting concessions within the reserve

c. Other concessions within the reserve

iv) Eastern Africa – Ruaha-Rungwa (United Republic of Tanzania)

a. Ruaha National Park

b. Village land around Ruaha National Park

c. Rungwa hunting blocks

v) Southern Africa – Kruger (South Africa)

a. Kruger National Park

b. Private reserves adjoining Kruger National Park (with trophy hunting)

c. Private reserves adjoining Kruger National Park (without trophy hunting)

vi) Southern Africa – Luangwa (Zambia)

a. Luangwa National Park

b. Game Management Areas surrounding the National Park

c. Village land outside of the Park

vii) Southern Africa – Hwange (Zimbabwe)

a. Hwange National Park

b. Hunting blocks surrounding the National Park

c. Village land surrounding the National Park

viii) West Africa – W-Arly-Pendjari Complex (Niger)

a. National Parks

b. Hunting reserves within the complex

3.1 Literature review

For each of the eight landscapes, a micro-review of the published literature was undertaken with a primary focus on lions and their conservation management, including reviewing IUCN Regional Strategies for lions, National Action Plans for lion range States, and Guidelines for the Conservation of Lions in Africa.

3.2 Questionnaires on chosen landscapes and sites and meetings with range States

Informed by the literature review, a list of questions was developed through which to try and identify some of the key factors affecting lion population status and conservation, either positively or negatively, at the chosen landscapes and individual sites with different land uses within those landscapes. Range States were asked to complete one questionnaire focused on the landscape level (see Section 6.2), that is, including the sites within it (e.g., for Tanzania;

Ruaha National Park, village land around Ruaha National Park, and Rungwa hunting blocks) and a questionnaire for each of these sites individually (see Section 6.3). Range States were also invited to a meeting with the consultants and the CITES Secretariat to discuss the questionnaire results, provide additional details, and answer queries from the consultants. It was not possible to hold meetings with all range States with chosen landscapes, but meetings were held with Mozambique, Zambia, and Zimbabwe.

3.3 Ecological and socio-political fragility of lion populations in chosen landscapes

For each landscape an ecological and socio-political fragility score for the lion population was calculated, building on recent published work (Nicholson et al. 2023). This enabled an assessment of how fragile, that is, vulnerable to harm or damage, each of the selected landscape-level lion populations was. A summary of the methods is provided below. See Nicholson et al. (2023) for the full methodology.

This element of the comparative study used a variety of methods to estimate lion populations and assess their fragility. Initially, lion population estimates, and their geographic range were derived from the IUCN's Guidelines for the Conservation of Lions in Africa (GCLA), which was developed with inputs from African Lion Range States and other lion experts in 2018 (IUCN SSC Cat Specialist Group, 2018). The IUCN SSC Cat Specialist Group's African Lion Database provided additional information. In the absence of recent survey data, expert opinions from conservation biologists with extensive regional lion knowledge were used to provide population estimates and distribution. The analyses focused on free-ranging lion populations, defined as those inhabiting contiguous habitats.

The study considered only 'wild' lion populations, i.e. unfenced lion populations and those that were partially fenced but were at least 500 km² in size. Fully fenced populations of at least 1,000 km² were also included. This threshold was somewhat arbitrary but was designed to ensure that the populations assessed could still support ecologically functional lion populations. Only areas where lions had been confirmed to be present in the last two lion generations (approximately 15 years, since 2006) were included, as the goal was to evaluate the fragility of extant lion populations. The spatial boundaries for the study were obtained from the Global Administrative Areas database (GADM 2016), and all spatial analyses were performed using ArcMap 10.4. It is important to note that the resultant map does not provide a conclusive depiction of current lion ranges nor a comprehensive estimate of wild lion populations in Africa, but rather focuses on areas where sufficient data were available to assess population fragility. Lion populations were analysed at three spatial scales:

i) The 'geographic population' scale, representing the entire population regardless of national boundaries.

ii) The 'national' scale, where transboundary populations were divided into subpopulations based on national borders, as countries are the management units for policy and decision-making.

iii) The country level, where national populations and subpopulations were averaged.

Fragility scores were calculated at each scale based on two categories: ecological and socio-political fragility. These scores were composite measures formed by summing individual variables that were standardized as z-scores. Higher scores indicated greater fragility. In cases where higher values of a variable corresponded to lower fragility (e.g., larger population size), the z-scores were inverted to reflect this. The decision to sum z-scores to create composite fragility measures is based on established practices, although it was acknowledged that some factors might merit greater weight than others. The ecological fragility score of each lion population was calculated using ten variables, which were standardized to z-scores before being summed (see Nicholson et al. 2023). The exposure to bordering countries variable was only relevant at the national and country scales, not the geographic population scale. These scores offered insights into which lion populations were most vulnerable, considering factors

such as habitat, population size, and human pressures.

3.4 Habitat loss and fragmentation and land use quality

To evaluate habitat and land use quality within lion range across the eight landscapes, geospatial data was collated from several high-resolution datasets: Google's Open Buildings dataset, the Global Forest Change (GFC) dataset, and the Global cropland-extent product (GCEP30). The data were integrated with a protected area database to analyse building density, forest loss, and cropland area within protected areas, providing insights into habitat fragmentation, deforestation, and agricultural encroachment. These metrics were assessed based on land-use type, including protected areas designated for photographic tourism, trophy hunting, or non-protected landscapes. Further details are provided below.

3.4.1 GIS data preparation

For each of the eight landscapes, a protected area database was created and split into relevant categories for analysis (Table 2.1, below). This database integrated spatial data from the African Lion Database, the World Database on Protected Areas (WDPA), Range State provided data, and regional sources. Protected areas were reviewed in collaboration with Range States to identify key landscapes and sites.

Where a "reference area" was required for comparative analysis, buffer zones were created using the following criteria:

i) Buffers were set at a width of 20 km.

ii) Buffer zones did not overlap with any other protected areas.

iii) Buffer zones remained within the boundaries of the respective countries to retain comparability.

Table 2.1. Landscapes, countries, and sites within landscapes selected for spatial analysis, including and the prevalent land-use type in the site.

Landscape	Country	Sites within Landscapes	Land-use
Ruaha-Rungwa	Tanzania	Ruaha National Park	Photographic Tourism
Ruaha-Rungwa	Tanzania	Ruaha village land	Non-conservation (Reference Area)
Ruaha-Rungwa	Tanzania	Rungwa hunting blocks	Trophy Hunting
Luangwa	Zambia	Luangwa National Parks	Photographic Tourism
Luangwa	Zambia	Game Management Areas surrounding the national park	Trophy Hunting
Luangwa	Zambia	Village land outside of the park	Non-conservation (Reference Area)
Hwange	Zimbabwe	Hwange National Parks[1]	Photographic Tourism
Hwange	Zimbabwe	Hunting areas surrounding the national park	Trophy Hunting and Photographic Tourism
Hwange	Zimbabwe	Community land surrounding the national park	Non-conservation (Reference Area)
Kruger	South Africa	Kruger National Park	Photographic Tourism
Kruger	South Africa	Private reserves adjoining Kruger National Park (where TH does not take place)	Photographic Tourism

Landscape	Country	Sites within Landscapes	Land-use
Kruger	South Africa	Private reserves adjoining Kruger National Park (where TH takes place)[2]	Trophy Hunting
Benoue Complex	Cameroon (only[3])	National Parks	Photographic Tourism
Benoue Complex	Cameroon (only[3])	Hunting Concessions surrounding the national parks	Trophy Hunting
Benoue Complex	Cameroon (only[3])	Inactive Hunting Concessions surrounding the national parks[4]	Non-conservation (Reference Area)
Niassa	Mozambique	Niassa Reserve (excluding hunting concessions)	Photographic Tourism
Niassa	Mozambique	Hunting concessions within the reserve	Trophy hunting
Niassa	Mozambique	Other concessions within the reserve	Non-conservation (Reference Area)
W-Arly-Pendjari Complex	Niger and Benin	National Parks	Photographic Tourism
W-Arly-Pendjari Complex	Niger and Benin	Hunting Reserves within the complex	Trophy Hunting
Maasai Mara	Kenya	Maasai Mara National Reserve (MMNR)	Photographic Tourism
Maasai Mara	Kenya	Conservancies outside Maasai Mara National Reserve	Photographic Tourism
Maasai Mara	Kenya	Non-conserved land surrounding the MMNR	Non-conservation (Reference Area)

[1]Including other National Parks in the complex such as Kazuma Pan and Zambezi NPs.
[2]With the available spatial data we could not distinguish between photographic and trophy hunting private reserves, the results are therefore pooled.
[3]Only data from Cameroon was incorporated from feedback from range states.
[4]With the available spatial data we could not distinguish between vacant and active hunting concessions.
[5] Feedback was received from Niger, we also included Benin data for comparability

3.4.2 Habitat quality data

Understanding the status of habitat within the lion range requires robust, high-quality datasets that offer insights into anthropogenic impacts across these complex landscapes. To support this, an initial scoping review was conducted of freely available datasets that met specific criteria: high accuracy and reliability, relevance to lion conservation, broad geographic coverage, and clarity for interpretation by non-specialist stakeholders. Datasets were then evaluated based on their ability to align with the study's geographic scope, resolution, and quality. Temporal datasets were largely excluded from this analysis. While such datasets are invaluable for understanding drivers of change, detecting change points, and conducting trend analysis, they require a level of local context and understanding beyond the scope of this study. This led to the selection of three key metrics—building density, forest cover and loss, and cropland area- each chosen for its reliability, resolution, and relevance to lion conservation in the study regions. Table 2.2 provides a breakdown of the relevance of each metric.

Table 2.2 Metrics used to map habitat quality

Metric	Impact on Lions	Land-use Impact	Citation
Forest Cover Loss	This leads to habitat fragmentation, isolation of prides, reduced genetic diversity, and limited prey access.	In protected areas that have inadequate management capacity, forest cover loss tends to be higher.	Mills et al. (2023); Cotterill et al. (2023); Elliot et al. (2023); Lindsey (2018)
Agricultural Expansion	Reduces prey availability and increases human-lion conflicts due to livestock predation near croplands.	Agricultural expansion is high in areas with high opportunity costs, and when PAs generate low returns for local communities and national governments.	Van der Meer et al. (2023); Cotterill et al. (2023); Elliot et al. (2014)
Human Settlements	Heightens habitat fragmentation increases human-wildlife conflict and reduces access to prey and water.	Human settlement can be more extensive in different categories of protected areas.	Abade et al. (2023); Elliot et al. (2023); Elliot et al. (2014)

3.4.3 Human settlements

Human Settlement was calculated using building density from the Google Open Buildings dataset, a global dataset of building footprints developed using high-resolution satellite imagery and machine learning algorithms (Gorelick et al., 2017). Covering over 500 million buildings globally, the dataset includes footprint boundaries and metadata such as area and year of construction. It is hosted on Google Earth Engine, which enables advanced spatial filtering and analysis. The dataset was filtered to include only buildings within the boundaries of the eight lion conservation landscapes. Then the total number of buildings within each area was calculated using a spatial counting function. The dataset, including building counts for each area, was exported as a CSV for integration with forest and cropland datasets.

3.4.4 Forest cover loss

The Global Forest Change (GFC) dataset[3] (Hansen et al., 2013) was used to assess forest loss. This dataset provides annual global data on forest canopy extent, loss, and gain derived from Landsat imagery with a 30-meter resolution. Canopy cover thresholds classify forested areas, while loss is identified by the first year of canopy reduction. The analysis focused on cumulative forest cover and loss up to 2023, with 2000 as the baseline year. Areas with a canopy cover threshold of ≥20% were classified as forested. To exclude small, ecologically insignificant patches, a minimum contiguous forest area threshold of 0.5 hectares (six pixels) was applied. Initial forested areas were mapped using the 2000 canopy cover data, and areas with forest loss were identified and subtracted from the initial forested areas to estimate the remaining forest cover. For each of the eight key lion conservation landscapes, the total lost forest area and remaining forest area in 2023 were calculated in hectares, and a percentage loss was calculated.

3.4.5 Agricultural Expansion

The Global cropland-extent product (GCEP30; Thenkabail, 2021) was used to evaluate cropland extent within the eight selected lion conservation landscapes. This dataset, part of the

[3] Some range States indicated that this dataset may have limitations in terms of application to a savanna system and although useful within Miombo Woodlands it may not be appropriate within savanna systems. The following dataset was proposed as an alternative but due to time and budget constraints could not be explored: https://landcarbonlab.org/insights/new-monitoring-system-land-ecosystem-disturbances/?utm_medium=social&utm_source=linkedin&utm_campaign=distalert2024

USGS Global Croplands project, provides global cropland classification at a 30-meter resolution, derived from Landsat and MODIS imagery. The classification incorporates multi-temporal imagery, spectral indices, and ancillary data, achieving high accuracy for cropland delineation. The dataset was clipped to the boundaries of the eight lion conservation landscapes, retaining only cropland pixels. The total cropland area within each zone was calculated by summing the areas of cropland pixels and converting the total to hectares, the percentage of each protected area or site with cropland was then calculated.

3.4.6 Data Analysis

After compiling the dataset, data cleaning and tidying were conducted in R using the sf and tidyverse packages. The tidyverse suite (Wickham et al., 2019) was used for data manipulation, including handling missing values, standardising variable names, and reshaping data to ensure a tidy format. Geospatial data were processed with the sf package (Pebesma, 2018), which allowed for efficient spatial data handling, such as transforming coordinate reference systems, clipping spatial features to study boundaries, and filtering out irrelevant features.

These tools enabled the creation of maps, tables, summary statistics, and graphs. Maps were generated using ggplot2, with layers for protected areas, land use, and human infrastructure. Summary statistics and tables were created to provide descriptive insights into metrics such as building density, forest cover, and cropland extent.

C. African lion hunting, management, and conservation

The questionnaire was completed by 19 out of 24 African lion range States (79%): Botswana Cameroon, Chad, Democratic Republic of the Congo, Ethiopia, Gabon, Kenya, Malawi, Namibia, Niger, Nigeria, Senegal, Somalia, Sudan, South Africa, Uganda, United Republic of Tanzania (hereafter Tanzania), Zambia, and Zimbabwe. Not all these Parties answered each question, or part thereof, and the results to certain questions are therefore presented using the responses from a subset of Parties based on the available data. Responses to question 12 (see Annex 1) are not presented here because this question was a ranking question, which appeared to be misunderstood by nearly all Parties.

1. African lion populations

1.1 Population trends

Based on the information provided by Parties in response to the questionnaire, which asked them to use the best information available to them at the time, the population trend for African lions in the last 5 years was reported as **increasing** in four range States (Cameroon, Kenya, Malawi, and Zambia) and **stable** in 6 others (Democratic Republic of the Congo, Namibia, South Africa, Sudan, Tanzania, Zambia, and Zimbabwe). Populations were reported to be **decreasing** in Ethiopia, Gabon, Somalia, and Uganda. Five countries reported that the population trend is **unknown** (Botswana, Chad, Niger, Senegal, and Nigeria). Ten lion range States provided additional information on populations of the species, which is summarised in Table 3.1.

Table 3.1. Additional information on African lion populations provided by range States.

Range State	Additional information
Cameroon	Lion-herder conflicts have contributed to the reduction of lion populations in Cameroon. The range of the species has been considerably reduced, contributing to the isolation of certain lion populations.
Democratic Republic of the Congo	Hunting tourism does not exist in the DRC. It has been suspended since 1983 with the emergence of insecurity following the beginning of the circulation of weapons of war in the country. As a precaution, the government suspended all tourist hunting: a highly political reason. Private farmers have a few specimens in captivity.
Gabon	Historically, Gabon had a widespread lion population in the savannah zone. However, this population was hunted to near extinction during and just after the colonial era. Efforts are currently underway to restore the lions in Gabon.
Kenya	The historical range [of the lion] continues to shrink but conservation efforts by government institutions and conservation partners have reversed the decline. From the recent surveys, the lion population is gently increasing.
Malawi	Historically lions were widespread in Malawi. However, large-scale habitat loss, prey depletion, and human-predator conflict resulted in the decline of the lion. In recent years, Malawi has taken steps to reverse this trend through public-private partnerships for the management of protected areas with lion. This strategy has attracted major inward flows of investment and expertise and has resulted in dramatic turnarounds in the fortunes of several of the country's protected areas. Reintroductions have been undertaken in Majete Wildlife Reserve and Liwonde National Park where lion populations are increasing. In

Range State	Additional information
	Majete, the current population is estimated 80-100, and in Liwonde ~35 lions.
Namibia	Namibia is home to a small lion population of around 1,000 animals, and the population has been increasing over the past 20 years. Historically, lions were distributed throughout Namibia, with sightings recorded in the Swakop River, south of Windhoek, Keetmanshoop, and many other areas by early travellers.
Niger	In Niger, in the 1960s, lions were found in many parts of the country in common areas (forests). As a result of natural and man-made phenomena, lions have disappeared from village outskirts. Today, only the Niger National Park is home to lions in Niger.
South Africa	Within South Africa, lions are restricted to state and private protected areas that are fully or partially (i.e. Kruger National Park) fenced. The distribution of lions in the country is thus fragmented. South Africa manages the national lion population as a metapopulation and metapopulation guidelines exist to manage the species. Both the regional Red List assessment for lions in South Africa, as well as the NDF are currently being revised and a process to revise the national biodiversity management plan for the species has started.
Sudan	In Sudan, the range of lions is decreasing due to miss use of land and resources, exploitation, and war, so lion conservation projects are highly needed. This requires funds from international organizations and partnership with the national and regional private sector.
Zambia	Lions have disappeared from some of their historical range due to poaching leading to a lack of prey and encroachment of habitats by humans.

1.2 Threats to African lion populations

The most frequently reported perceived threat to African lion populations by range States was human-lion conflict, including retaliatory killing, followed by illegal killing or poaching for parts, and habitat loss and/or fragmentation (Fig. 3.1). All remaining threats, which were reported by 7 range States or fewer, included prey base depletion, incorporating the limited availability of prey, as well as climate change, disease, and drought. None of the range States mentioned trophy hunting when asked to list threats.

When specifically asked whether legal hunting for trophies threatens lion populations in their country, 13 out of 14 range States that responded to this question reported that it did not: Botswana, Cameroon, Democratic Republic of the Congo, Ethiopia, Namibia, Niger, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. Nigeria reported that it did, despite the legal hunting of lions for trophies not taking place in the country (Fig. 3.2).

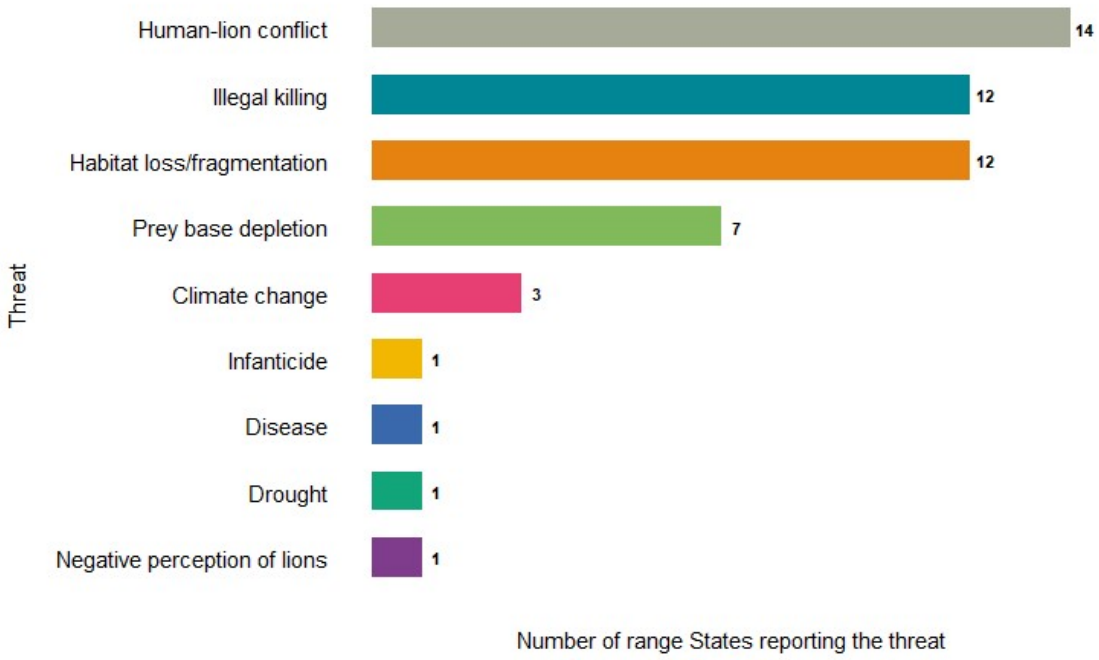


Fig. 3.1. Greatest perceived threats to African lions. Range States were asked to list the three greatest perceived threats to lion populations in the country. Human-lion conflict includes retaliatory killing and prey base depletion includes limited availability of prey.

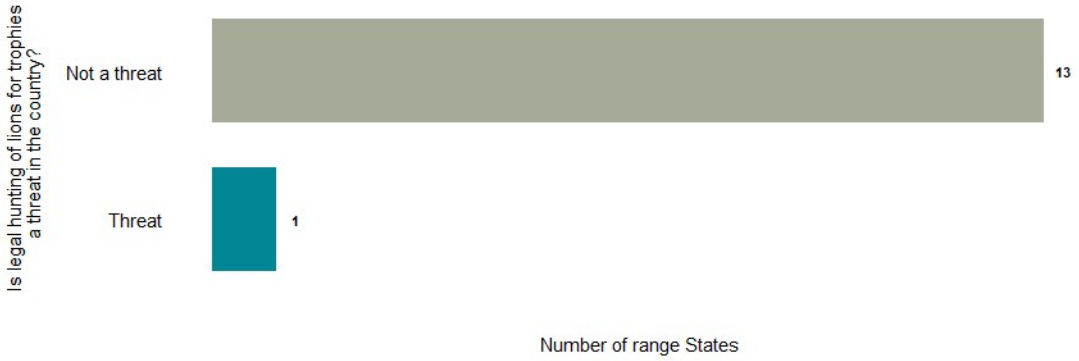


Fig. 3.2. Number of African lion range States that consider legal hunting of trophies to be a threat to the species in the country, or not. Nigeria reported that trophy hunting is a threat to the species despite the legal hunting of lions for trophies not taking place in the country.

Three countries reported that legal hunting in neighbouring countries threatens lion population in their country (Chad, Kenya, and Niger). Chad highlighted that lions protected in the country can be killed in Cameroon's hunting zones, and Niger noted that lions in the W National Park may be hunted in Benin or Burkina Faso – neither of these countries completed the questionnaire. Kenya reported that dispersing males are killed in Tanzania, which they stated affects gene flow before these animals can establish territories. No other range States reported that legal hunting for trophies in neighbouring countries threatened their lion populations.

2. Legal hunting of African lions

2.1 African lion trophy hunting policies and characteristics

Based on responses from 19 range States to the questionnaire, 9 of those African lion range States allow legal hunting of the species for trophies (Cameroon, Ethiopia, Namibia, Niger, South Africa, Sudan, Tanzania, Zambia and Zimbabwe); the remaining ten do not (Botswana, Chad, Democratic Republic of the Congo, Gabon, Kenya, Malawi, Nigeria, Senegal, Somalia and Uganda; Fig. 3.3). Regarding Niger, the lion is one of the species that can be hunted in designated areas, but they are present only in the W National Park – an IUCN category II protected area – and consequently lion hunting is therefore not authorized in practice.

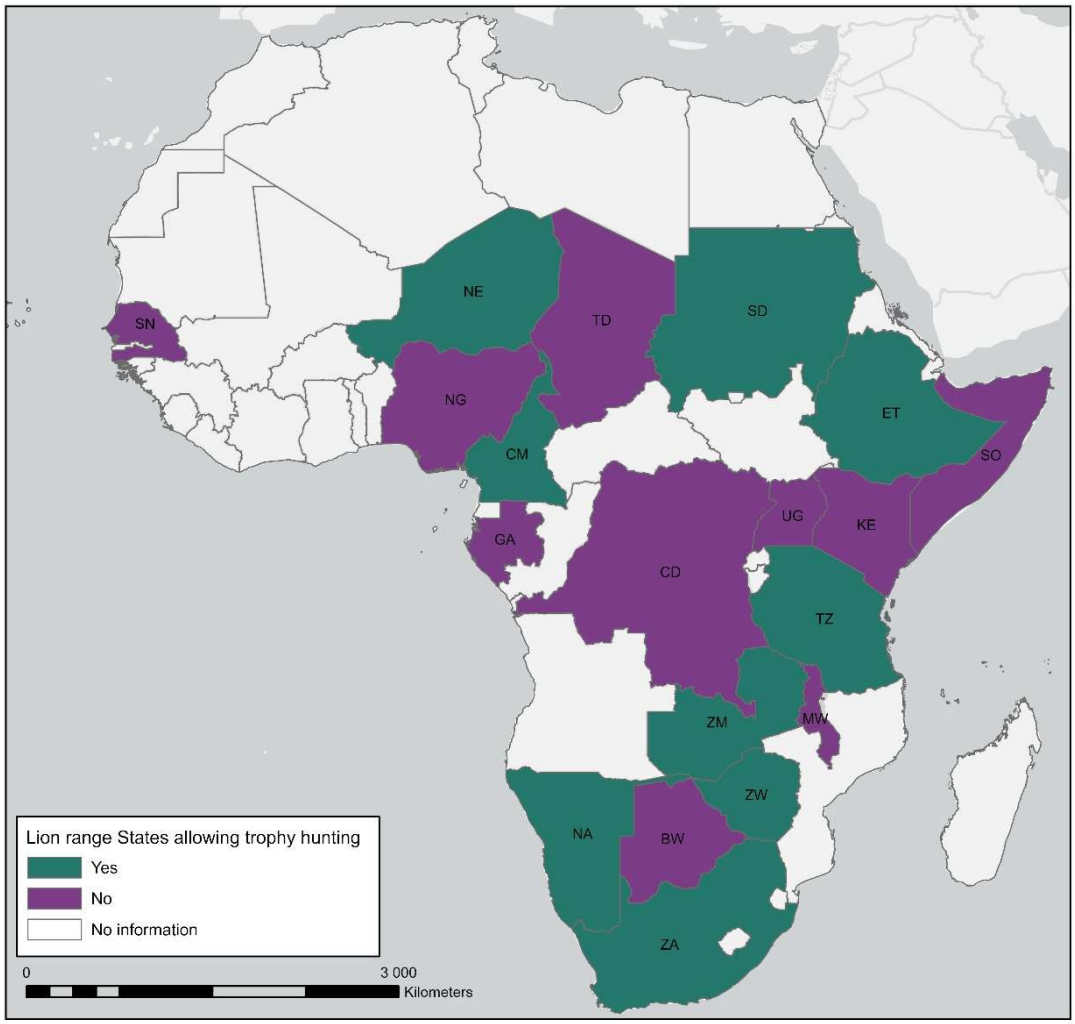


Fig. 3.3. African lion range States that allow and do not allow trophy hunting of the species based on questionnaire responses from 19 range States.

2.1.1 Land designation

The most frequently reported land designation on which trophy hunting takes place – not specific to lions – is private land and community-owned land, including conservancies, followed by game reserves, wildlife management areas (WMAs), other land designations, forest reserves and sanctuaries (Fig 3.4). Other land designations include a controlled hunting areas (CHA) in Ethiopia, game-controlled areas in Tanzania, and communal wildlife conservation areas in Zimbabwe. Of the 15 range States that responded to this question, all reported that

trophy hunting does not take place in national parks. South Africa stated that trophy hunting is legally allowed on appropriately fenced properties under permit, including national parks, but none of the national parks practice trophy hunting at present.

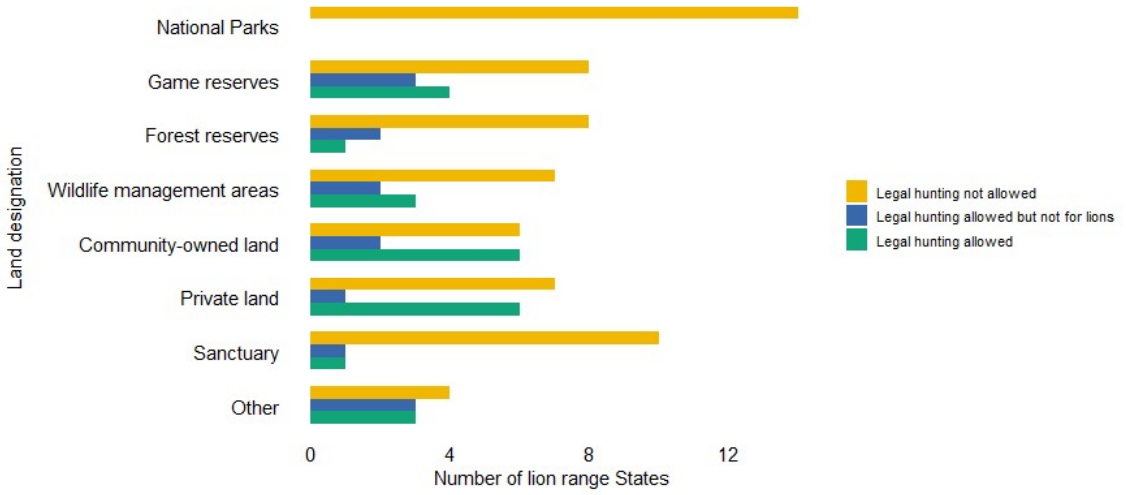


Fig. 3.4. Land designations on which legal hunting for trophies is permitted in lion range States based on information provided in questionnaire responses.

2.1.2 Legal hunting of lions and trophy exports in the last 5 years

Based on data provided, at least 1,541 lions (whether wild or captive) were legally hunted for trophies in the last 5 years (2019-2023). South Africa permitted the legal hunting of the most African lions (1,371 animals), 95% of which (1,308) were sourced from the large captive lion industry in the country (Fig. 3.5). This comprised 85% of all trophies reported from the responding countries. Therefore, from data provided from 4 countries, a total of 233 wild lions were reported as trophy hunted in the five years from 2019-2023. Data were not available for South Africa for 2023. Tanzania reported that between 21 and 36 lions were legally hunted for trophies annually in this period (Fig. 3.5). Namibia and Cameroon reported the legal trophy hunting of 24 and 3 lions over this period, respectively (Fig. 3.5). Zimbabwe reported that on average 40 male lions were hunted annually in the last 5 years (not charted). No permits to hunt lions were issued in the last 5 years in Sudan because no applications were made. Ethiopia and Zambia did not provide data on the number of lions legally hunted.

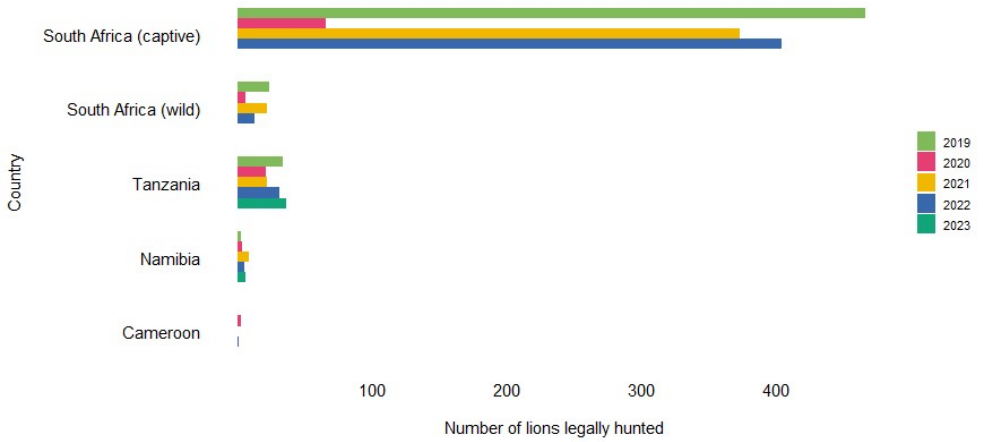


Fig. 3.5. Number of lions legally hunted for trophies in 4 range States in each of the last 5 years based on data from the countries concerned submitted via the questionnaire.

The patterns reported by range States are reflected in the CITES trade data for lions exported as hunting trophies (purpose code = H) across all range states in the period 2019-2023 (Table 3.2). On the basis that one animal equates to one hunting trophy (Section 2.2), most exports (79%, 1,759/2,228 trophies) were of animals bred in captivity (source code = C) in South Africa. At least 435 wild lions were exported as trophies from 9 range States over that period, including South Africa, Mozambique, Tanzania, and Zimbabwe among others (Table 3.2).

Table 3.2. Exports of lion hunting trophies from all range States (2019-2023) using purpose code H based on exporter reported quantities. Source: CITES Trade Database.

Country/Source	C*	F*	W*	(blank)	Grand Total
Burkina Faso			9		9
Benin			1		1
Cameroon			6		6
Kenya	1				1
Mozambique			13	29	42
Namibia			21		21
Tanzania			62		62
South Africa	1759	4	170		1933
Zambia			49		49
Zimbabwe			104		104
Grand Total	**1760**	**4**	**435**	**29**	**2228**

*C = Animals bred in captivity, F = animals born in captivity, W = specimens taken from the wild.

2.1.3 Hunter nationality and revenue allocation

Seven range States provided information on the proportion of hunters in the country (domestic vs. international) that legally hunt African lions for trophies. Most hunters in countries that provided data were international (Table 3.3). Niger highlighted that to date there have not been any trophy hunts for lions in the country, whether involving national or international hunters.

Table 3.3. Estimated proportion of lion trophy hunters: domestic vs. international.

Country	Domestic	International
Cameroon	0	100
Ethiopia	0	100
Namibia	5	95
South Africa	30	70
Tanzania	5	95
Zambia	1	99
Zimbabwe	1	99

All lion range States that provided information on whether there had been a noticeable change in the nationality of hunters – not specific to lions – over the past five years reported that there had not been, including Botswana, Cameroon, Chad, Democratic Republic of the Congo, Ethiopia, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe.

Eight lion range States provided information related to whether there is a national policy on allocating revenue from lion trophy hunts to stakeholders beyond the government and hunting

operators. The revenue allocation model expectedly differs by country, but substantial portions of revenue was reportedly allocated to local communities in several countries including Cameroon, Tanzania, and Zambia (Table 3.4).

Table 3.4. Details of reported revenue allocation from lion trophy hunts in range States.

Country	Details
Cameroon	50% of wildlife royalties are provided to the communes and communities bordering the hunting area. This is in addition to social work for the benefit of these communities.
Ethiopia	85% of the revenue is directly allocated to the respective regions and the regions are expected to use the collected revenue for local community development activities.
Namibia	Revenue generated from trophy hunting directly goes to communal conservancies.
Niger	Revenue from the sale of hunting permits, possession patents, slaughter and capture taxes, hunting guide and concessionaire licenses is divided as follows: Public Treasury 20%, Local authorities 50%, Wildlife Management Fund 30%.
South Africa	The South African Constitution allows for property ownership as well as for sustainable use of natural resources. The Game Theft Act gives effect to the conditional ownership of game when a property is appropriately fenced. The South African model thus allows for private ownership of land and where communities own game farms or African lions, they obtain 100% of revenue of hunts. Trophy hunting takes place on private or communal lands and apart from permit fees which goes to the provincial conservation authority, all hunting revenue generated is retained by the landowner.
Tanzania	The Government has established revenue schemes depending on the status of hunting blocks and land tenure. The government returns 25% of hunting revenue from game fees from hunting blocks located in Game Reserves and Game Controlled Areas blocks. These revenues are channelled to communities via District councils to support community-initiated project and conservation. For wildlife management areas, the Wildlife Management Areas Regulations of 2018 provide a framework for benefit sharing between the government and communities. In this framework, 75% of hunting revenue from block fees, 15% from hunting permit fees and 45% from game fees in Wildlife Management Areas (WMAs) blocks are returned to communities forming WMAs. District Commissions (DCs) receive 15% of the revenue returns from game fees in WMAs blocks. For the past three years (2020/21 to 2022/23) revenue from hunting tourism to WMAs has been USD 2,546,295. Additionally, hunting companies support ant-poaching activities, health care services, construction of water ponds and paying college fees for youth coming from these areas. In areas where other land use cannot add economic value, these returns are vital to sustain community livelihoods and ensure community support in resource conservation and protection.
Zambia	50% of hunting revenue given back to local community.
Zimbabwe	Revenue is allocated to the communities and CBNRM associations.

2.1.4 Aims and importance of legal hunting of African lions for trophies

The most frequently stated primary aim of legal hunting of African lions for trophies was revenue generation for conservation, as reported by Cameroon, Namibia, Sudan, Zambia, and Zimbabwe. Niger reported the same but, as discussed under Section 3.2.1.3, Niger has not permitted any trophy hunts of lions. Other aims stated by range States included to remove problem animals (Ethiopia), for leisure/to obtain trophies (Tanzania), for economic gain (South Africa), and to increase the economic value of land compared to other land uses (Zimbabwe).

Regarding the importance of revenue generation from lion trophy hunting for the management of sites where it takes place, 10 range States rated this as very important, and 3 as moderately important, mainly countries in which legal hunting of lions for trophies takes place (Fig. 3.6). This includes Malawi rating revenue generation being very important despite the trophy hunting of lion not being permitted in the country. Gabon, where trophy hunting of the lion also does not take place, was the only country to rate revenue generation as not at all important.

A similar patten is evident regarding revenue generation from lion trophy hunting for the management of sites where such hunting does not take place; 7 range States rated revenue generation as very or moderately important (Fig. 3.6). Eleven range States rated income generation for the government and state wildlife agencies and income generation for local communities as very or moderately important respectively; this was predominantly countries that permit the trophy hunting of lions (Fig. 3.6). Ten countries also rated lion trophy hunting as very or moderately important for problem animal control (Fig. 3.6). Tanzania reported that legal hunting of lions is moderately important for controlling surplus male lions.

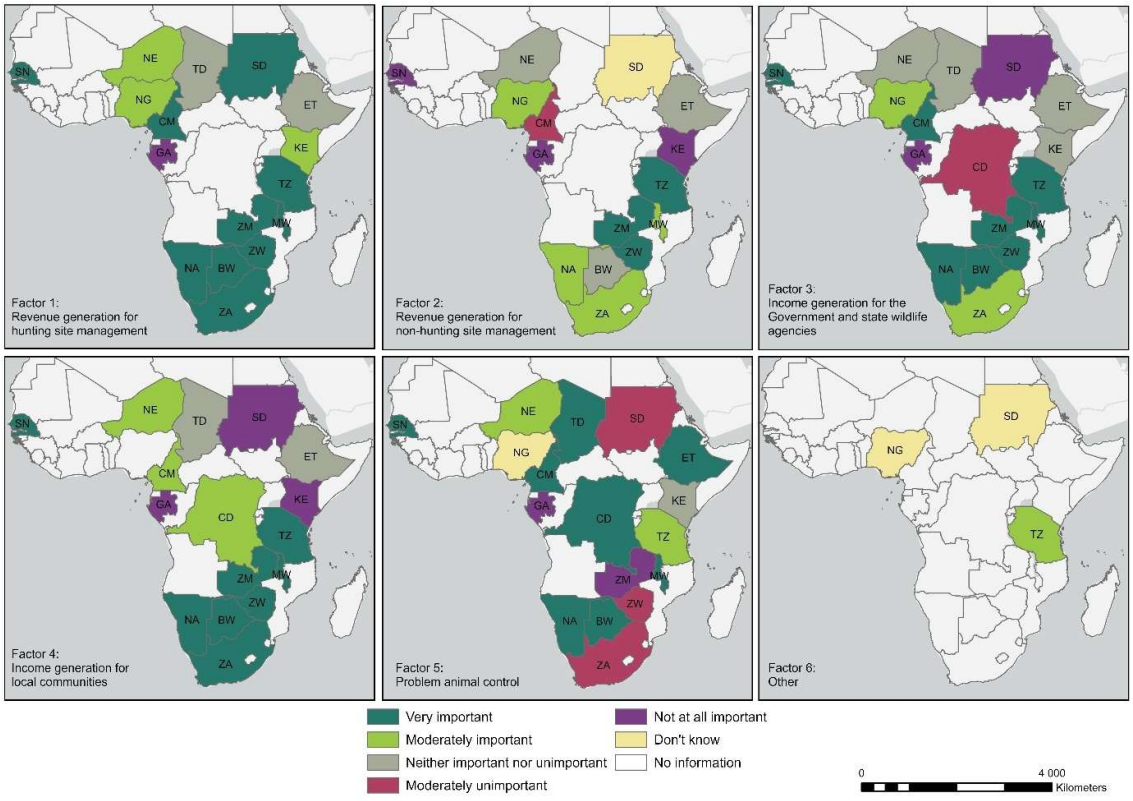


Fig. 3.6. The relative importance of legal hunting of lions for trophies to selected factors.

2.1.5 Countries where legal hunting of African lions for trophies does not take place

Ten countries reported not allowing the legal hunting of African lions for trophies. Reasons for the introduction of these policies range from the species having declined in the country (Malawi) to others finding the practice unethical (Uganda) (Table 3.5). Conversely, Zimbabwe, which does allow legal hunting of African lions for trophies, reported that hunting is part of the Zimbabwean culture, and believes in the principles of sustainable use. In Zimbabwe, hunting is allowed is some areas to generate revenue for lion conservation and to sustain livelihoods.

Table 3.5. When, and for what reasons, policies to disallow hunting of African lions for trophies were introduced, if they were, in range States that provided information.

Range State	When the policy was introduced, if this information is available. and the reasons behind the policy
Chad	The policy was introduced in Chad due to heavy lion poaching pressure for skin, fangs, bile, whiskers, the bladder, and lion eyes.
Democratic Republic of the Congo	Hunting tourism does not exist in the DRC. This form of hunting was suspended in 1983 with the emergence of insecurity following the beginning of the circulation of weapons of war. As a precaution, the government suspended all tourist hunting: a highly political reason.
Kenya	Trophy hunting in Kenya was banned in 1977. This was mainly because of overharvesting and abuse of the legal framework and provisions allowed on hunting quotas.
Gabon	There has been no legal lion hunting in Gabon since independence in the 1960s. Lions are considered a rare species and have been fully protected in Gabon since 1987.
Malawi	1992. Trophy hunting of lions was prohibited in the National Parks and Wildlife Act due to the decline of the lion population in protected areas and disappearance.
Nigeria	Trophy hunting was prohibited in the National Wildlife Species Protection Act, The Endangered Species (Control of International Trade and Traffic) Amendment Act 2016. (1) All specimens of species naturally occurring within the geographical boundaries and territorial waters of Nigeria, including their parts (or trophies) and products thereof (or derivatives) are for the purposes of the ESA Act, its natural heritage. (2) No natural heritage of Nigeria shall be considered as personal or household effect unless it is legally acquired and Management Authority of Nigeria is satisfied that the specimen was obtained from not earlier than the second filial generation of a captive-bred population of registered captive breeding facility.
Senegal	The lion as an endangered species in Senegal and an emblematic species for Senegal.
Uganda	Uganda has never permitted the legal hunting of lions for trophies for because they are few and it is unethical.

2.1.6 Policy changes

Of responses from 17 range States, 6 reported that there have been, or will be, significant policy changes regarding the hunting and/or trade in African lions and their habitats in the last 5 years or the next 5 years. **Cameroon** highlighted that it would introduce the need to obtain special authorization from the relevant government minister before hunting lions in the country. **Ethiopia** reported that it is in the process of reviewing its legal frameworks, including its wildlife policy and proclamations. **Kenya** highlighted that there are efforts to reintroduce culling and consumptive use of wildlife in the country through legislation. **Niger** highlighted that it is in the process of adopting a national strategy to combat wildlife crime, with the aim of strengthening the current system and effectively combating wildlife-related fraud and money laundering in a regional context. **South Africa** indicated that it has developed a White Paper on the conservation and sustainable use of biodiversity in South Africa, a Policy Position on the Conservation and Sustainable Use of Elephant, Lion, Leopard and Rhinoceros, and that it intends on closing commercial captive breeding operations for lions. **Zambia** highlighted that it has implemented age-based hunting practices. Hunters are not allowed to hunt female lions or lions below the age of 8 years old. The trophy harvested is also subjected to an aging evaluation. Professional hunters who may have harvested an underage lion may have their practicing licences revoked. In addition, under-age lions are not eligible for export.

3. Hunting and management of African lions

3.1 Hunting concessions and operators

Among range States that allow legal hunting of lions for trophies, most allow it only in a subset of hunting concessions in the country (Table 3.6). Exceptions are Ethiopia and Tanzania, which permit lion trophy hunting in all such concessions. Sudan allows the legal hunting of lions for trophies in non-protected areas around villages inhabited by high human populations.

Table 3.6. Hunting concessions in countries that allow legal hunting of lion for trophies.

Country	Number of hunting concessions in the country	Hunting concessions currently actively managed by hunting operators	Number of hunting concessions that allow hunting of African lions for trophies	Hunting concessions that allow legal hunting of African lions for trophies that are currently actively managed by hunting operators.
Cameroon	72	49	14	14
Chad	5	4	-	0
Ethiopia	18	18	18	18
Niger	27	5	0	0
Namibia	61*	61	4	4
South Africa	0**	0**	0**	0**
Tanzania	124	84	124	84
Zambia	>20	>20	~10	~10
Zimbabwe	>100	0***	<100	0***

*This includes hunting concessions in communal conservancies and in national parks. **The South African model allows for private ownership of land and lions and thus all trophy hunting currently takes place on private or communal land. The largest hunting area is the Associated Private Nature Reserves to the west of and open to Kruger National Park. Approximately 10 private properties (reserves/game farms) within the metapopulation (counting the APNR as a single property) offer hunting of wild lions for trophies. ***In Zimbabwe, hunting areas are managed by landowners. Operators are engaged to market the quota, hunt, and manage hunting camps.

Among countries that allow the legal hunting of lions for trophies only Tanzania reported that hunting concessions have been returned by operators to the government or abandoned in the last 5 years. Tanzania reported that 23 hunting blocks have been returned to the government because of a decline in the market due to the increase in lion hunting trophy import restrictions in major markets including the United States of America and European countries. Incursions of livestock into these areas and the COVID-19 pandemic were also factors that affected the return of these hunting blocks. Other countries that allow trophy hunting of lions reported that no hunting areas had been returned to the government of abandoned in this period, including Cameroon, Ethiopia, Namibia, Niger, South Africa, Sudan, Zambia, and Zimbabwe.

Regarding whether lion range States have found it easier or harder in terms of the willingness of hunting operators to take on the management of hunting areas – not limited to areas with lions – in the last 5 years, Namibia and Zambia reported that they had found it easier than in the past and Senegal, Tanzania and Zimbabwe stated that there had been no difference. Ethiopia was the only country to report that it had been harder than in the past. All other range States stated that they did not know or that this was not applicable.

All lion range States that provided information on whether there had been a noticeable change in the nationality of hunting operators over the past five years reported that there had not been, apart from Botswana. Botswana highlighted that following the introduction of a citizen empowerment policy in 2019 when the hunting ban was lifted in the country, there have been more citizens involved in hunting as operators than before the ban. Countries that reported no change in the nationality of hunting operators include Cameroon, Chad, Democratic Republic of the Congo, Ethiopia, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe. Zambia did report that most of the prime hunting areas have been given to non-Zambians over the past five years.

3.2 Quotas

3.2.1 Quota use and type

Of the 9 countries that allow legal hunting of lions for trophies, 7 use quotas to manage such hunting, details of which are provided in this section. This includes Cameroon, Ethiopia, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. Sudan highlighted that the applications for hunting trophies are neither numerous nor significant enough to warrant establishing an annual quota. In Niger, the lion is not part of the hunting plan because it is only found in W National Park, where hunting is prohibited, and there is no quota for the species.

Six countries reported using age-based quotas, sex-based quotas and area-based quotas: Ethiopia, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. **Sudan** also reported using these quota types despite stating that quotas are not used. Adaptive quotas were also reported to be used by **Ethiopia** and **Namibia**. South Africa provided further details on its use of quotas. In **South Africa**, there is no formal quota in terms of CITES requirements, but offtake including trophy hunts are managed on a property basis through the permit system based on known population numbers. Within Adjoining Private Nature Reserves (the largest hunting area) the Greater Kruger Hunting Protocol restricts hunting to male lions 6 years and older. Within the metapopulation trophy hunting is used as a management tool, to mimic natural process absent in fragmented landscapes and restricted to those properties that actively participate within the metapopulation. Metapopulation guidelines have been developed and are currently implemented. All properties within the metapopulation report annually on numbers, demographics, and all offtakes. Data is reviewed and collated by SANBI, the South African National Biodiversity Institute. SANBI is also in the process of developing a national species population database for the reporting and collation of all mammal species population data. Further details of the quotas used to manage legal hunting of lions are provided in Table 3.7.

Table 3.7. Details of quotas used to manage legal hunting of lions for trophies.

Country	Quota details
Cameroon	No details provided
Ethiopia	No details provided
Namibia	The hunting quota is set based on the available scientific information, and hunting is restricted to male lions over 6 years old, with a minimal skull size (length & width) of 52 cm.
South Africa	South Africa manages offtakes adaptively on a case-by-case basis through the permitting system and national monitoring. Within the Adjoining Private Nature Reserves (APNR), the Greater Kruger Hunting Protocol restricts trophy hunting of lions to male lions of 6 years and older. Within the metapopulation, there are no age restrictions. Trophy hunting is restricted to males (mostly adult males) and females >10 years of age. For the metapopulation trophy hunting used as a management tool and specific guidelines have been developed to guide metapopulation management and evaluation.
Tanzania	The lion hunting quota is set based on the available science, research and best practice. Tanzania sets its lion quota in accordance with sustainable limits (e.g., 1 lion/2,000 km^2 for normal density or 1 lion/1,000 km^2 for high density areas (see Packer et al. 2011). Considering the latest available estimate of lion population size in Tanzania (16,800 lions; Mésochina et al. 2010), the quota for lion is 200 individuals per year. Hunting is conducted only for males that are 6 years old and older. To achieve this, Tanzania has been implementing a lion monitoring programme since 2011 to assess the lions hunted to ensure that they are of minimum age. Since this system was introduced in 2010, enforcement of the regulations has been developed through a participatory process involving representatives of various stakeholders in Tanzania. Given the current state of knowledge regarding the age diagnosis of lions, it is well recognized by the scientific community that a lion's age cannot be assessed without uncertainty (Whitman and Packer 2007; Ferreira and Funston 2010). Tanzania has amended its regulation to accept, with penalties, export of trophies from lions aged 4-5 years. Assessment of the age of lions in the previous three years revealed that 80% of lions hunted were 6 years old and above, 12.5% were 4-5 years old and 8% were below 4 years old. Therefore, 92.5% of the lions hunted are eligible for export as per the Tourist Hunting Regulations 2024. Since 2012, Tanzania has maintained a lion quota of 200 specimens and it has proven to be not detrimental to the survival of the lion.
Zambia	Only male lions over the age of 8 years are hunted.
Zimbabwe	Hunting of males over 5 years old; hunting of females in some closed populations.

3.2.2 How quotas are set

Seven range States provided details on how quotas are set for lions that are trophy hunted.

These details are summarised in Table 3.8.

Table 3.8. Details of how quotas are set for the legal hunting of lions for trophies.

Country	Quota details
Cameroon	Per year
Ethiopia	In Ethiopia hunting is carried out in accordance with the Wildlife Conservation and Utilization Regulation Number 163/2008 and with the following Guidelines: 1) Revised Guideline No.31/2009 E.C., Wildlife Hunting Utilization Guideline, and 2) Guideline No.26/2007 E.C.. Huntable Wild Animals Census and Quota setting Guideline. Since the quota setting directive was designed to consider the ecological conditions such as carrying capacity of a specific controlled hunting area (CHA), it has been difficult to allocate a quota for the last five years.
Namibia	The Namibian Ministry of Environment, Forestry and Tourism (MEFT) coordinates the setting of hunting quotas with support from members of the Namibia Association of CBNRM (Community-Based Natural Resource Management) Support Organizations (NACSO), researchers and conservancies. Quotas are issued on a three-year cycle, with annual reviews. The off-take quotas are determined based on the best available scientific information regarding specific species and their populations. Namibia must demonstrate a rigorous process for setting quotas for trophy hunting to scientifically justify the proposed off-take and to avoid boycotts and import bans. MEFT has adopted a science-based approach to setting quotas for game utilization in conservancies. The determination of off-take quotas for communal conservancies follows an adaptive management approach, where off-take numbers are derived from gathered information and feedback loops. *Quota Setting Coordination Committee* The Quota Setting Coordination Committee (QSCC) is appointed by the MEFT and includes members from the Directorates of Wildlife and National Parks, Directorate of Scientific Services, and NACSO-NRWG. This committee is responsible for compiling all necessary information to inform quota decisions by consulting with conservancies, support organizations, experts, and partners. They develop scientifically justified quotas for all identified species, including those related to trophy hunting and other forms of use. *Task Teams* Each task team is led by a member of the QSCC. Their role is to advise on sustainable off-take quotas based on defined methodologies and the best available information. Additionally, they recommend sustainable off-take quotas for each species and conservancy based on all accumulated data. *Technical Committee* The Technical Committee consists of the members of the QSCC, joined by the Directors of the Department of Parks and Wildlife Management (DPWM) and Department of Scientific Services (DSS), as well as a NACSO representative. *Factors Considered When Setting Quotas*

	When establishing quotas, the following factors are taken into account: - Population estimates from the latest game count data, along with a three-year average. - Population trends. - Environmental conditions, such as drought. - Sex-age ratios, particularly for elephants and predators. - Trophy quality. - Previous quotas and off-take rates. - Ecological carrying capacity. - Social impacts and benefits. It is important to note that quotas are not issued based on Human-Wildlife Conflict (HWC) incidents, as there is a separate process for declaring protected areas (PAs). *Monitoring Systems* Monitoring is done through a permitting system, whereby every hunt must be reported to the Ministry within 72 hours after the hunt. *What Happens When Data for a Species Is Lacking?* If data for a particular species is not available, no quota will be issued. The precautionary principle is applied, meaning that conservative quotas are established and adaptive management is implemented when scientific evidence is lacking.
South Africa	South Africa does not have a formal quota as per CITES requirements but manages offtakes adaptively on a case-by-case basis through the permitting system and national monitoring. Offtakes are determined on a property level based on known population numbers through the permit system.
Tanzania	Tanzania affirms that the lion population within its jurisdiction is maintained at biologically sustainable levels, with a sufficient size to support a low sport hunting quota. The country employs scientifically informed management practices, including population assessments in terms of numbers and demographics, to ensure that hunting quotas are set at sustainable levels. The hunting quota is determined annually by the Quota Allocation Advisory Committee comprised of wildlife conservation experts from CITES Scientific Authority, universities, and the CITES Management Authority of Tanzania. The Committee receives input on the wildlife utilization and population status from various stakeholders including researchers and meet once a year. The hunting quota is set in accordance with the National Wildlife Utilization Quota Setting Manual 2020. Some of the parameters used for quota setting include search effort, population size, hunting success, poaching data, and recommendations from researchers. Based on the recommendations from researchers and the level of quota utilization, the authority has maintained a quota 200 lions per year since 2011. The utilization of this quota is on average 19% every year. Therefore, the hunting offtake has been biologically negligible and of zero concern for the conservation of lions.
Zambia	We use data from surveys, patrol sightings, and community sightings in a hunting area. The quota is usually less than 0.5% of the estimated population of the area.
Zimbabwe	Quotas are set annually through an age based quota setting system.

3.2.3 How quotas are updated

Seven range States provided details on how quotas are updated for lions that are legally hunted for trophies. The details are summarised in Table 3.9. See also Table 3.8 on how quotas are set.

Table 3.9. Details of how quotas are updated for the legal hunting of lions for trophies.

Country	Quota details
Cameroon	Per year
Ethiopia	Directives are reviewed normally any time when there are concrete reasons to do so. For example, the couple of directives on hunting were reviewed following the prevalence of Covid-19 (taking the into account the tourist flow by then).
Namibia	Every 3 years and through adaptive management during non-quota setting years.
South Africa	Quotas are adaptive and assessed case-by-case for each hunting application.
Tanzania	The quota is revised every year. However, based on the recommendations from researchers and the level of quota utilization, the authority has maintained a quota of 200 lions per year since 2011. The utilization of this quota is on average 19% every year. Therefore, the hunting offtake has been biologically negligible and of zero concern for the conservation of lions.
Zambia	Annually through a consultative process with the operator, local community and department of wildlife.
Zimbabwe	Quotas are set annually through an age based quota setting system

3.2.4 How quotas are monitored

Seven range States also provided details on how quotas are monitored for lions that are legally hunted for trophies. These details are summarised in Table 3.10.

Table 3.10. Details of how quotas are monitored for legal hunting of lions for trophies.

Country	Quota details
Cameroon	Once the quota has been allocated, controls are carried out upstream by issuing a special authorization for slaughter before the hunt takes place, followed by the issue of CITES export permits and unannounced field checks of the hunting register at the hunting operator's premises.
Ethiopia	The effect of hunting is negligible. Furthermore, there are regular monitoring and evaluation mechanisms, in addition to regular censuses to inform quota setting.
Namibia	Hunting reports from the hunter, Conservancy event logs, ticketing system, predator hunting regulations, adaptive management feedback, and quota usage database.

South Africa	Through direct population numbers. Application to hunt must be accompanied with population numbers for a property and assessed by the provincial authority. All lion metapopulation properties report annually to the province and SANBI on population numbers and demographics as well as all offtakes. Offtakes are thus also monitored on a national level to ensure sustainability.
Tanzania	The monitoring of lion hunting is carried out through the implementation of a specific database and a specific safari return form. Based on all hunting permits issued by (and compulsorily returned to) Tanzania Wildlife Management Authority, a specific database has been set up to record lion hunting harvests. Regularly updated, the database is used to follow-up lion safari hunting activity and trophy skulls that must be presented to the Wildlife Division for inspection. Since mid-August 2011, all professional hunters conducting lion hunting safaris are required to fill in the safari return form for both successful and unsuccessful hunts. With this form general information on the course of the safari, the lion population status and lion safari hunting success are collated. For the successful lion hunting safaris, additional information like the hunting effort, specific measurements (total length and shoulder height) and specified photographs are taken. Safari return forms and trophy photographs are compulsorily provided by the hunting companies to the Wildlife Division. Likewise, during the hunting expedition, hunters are accompanied by a duly certified professional hunter and ranger to ensure compliance with the Tourist Hunting Regulations. All offtakes are reviewed by the CITES Scientific Authority (TAWIRI) to ensure the offtakes and subsequent exports are not detrimental to the survival of the species. No CITES export permit can be issued without compliance.
Zambia	A Ranger is present at every hunt and cancels the permit when the hunt is done or when an animal is injured but not killed. Export permits are only issued for the quota established.
Zimbabwe	Through research and monitoring of the species. Monitoring offtake and hunting areas.

3.3 Other causes of African lion mortality

Based on information provided by 9 lion range States, at least 158 lions were killed legally through problem animal control in the last 5 years (2019-2023) (Table 3.11). The highest proportion of these (44%, 70/158 animals) were in South Africa and were animals that repeatedly escaped from reserves. Twenty-eight percent (44/158) were in Namibia and 21% (33/158) were in Tanzania. The remaining countries reported low numbers of animals killed as part of problem animal control efforts (Table 3.11). Zimbabwe also reported that an average 5 lions a year were killed for this purpose. Gabon and Malawi both reported that no lions were killed as part of problem animal control in the country in this period.

Table 3.11. Number of lions killed legally as problem animals by country (2019-2023).

Country	2019	2020	2021	2022	2023	Total
South Africa	20	10	11	29	No	70

					data	
Namibia	3	10	11	13	7	44
Tanzania	4	14	5	7	3	33
Zambia	3	3	3	No data	No data	9
Ethiopia	1	0	0	0	0	1
Democratic Republic of the Congo	0	0	0	0	1	1
Total	30	37	30	49	11	158

At least 63 lions were killed by unnatural causes in the last 5 years, including mortalities through poaching and roadkill but not disease based on data from 9 range States (Table 3.12). Approximately two-thirds of these animals were killed in Tanzania, South Africa, and Zambia with fewer animals killed in other countries (Table 3.12).

Table 3.12. Number of lions killed by unnatural causes by country (2019-2023)

Country	2019	2020	2021	2022	2023	Total
Zambia	13	1	0	3	No data	17
Tanzania	1	2	0	1	9	13
South Africa	2	3	4	3	No data	12
Namibia	3	3	0	1	2	9
Ethiopia	2	0	1	2	1	6
Malawi	0	1	0	1	1	3
Niger	2	0	0	0	0	2
Democratic Republic of the Congo	0	0	0	0	1	1
Total	23	10	5	11	14	63

4. Data gaps and challenges

4.1 Population surveys and data gaps

African lion range States were asked about the three greatest challenges to implementing population surveys for the species in the country. The most frequently reported challenge was limited technical expertise and capacity to undertake lion population surveys and an associated lack of training (Fig. 3.7). This was followed by a lack of financial resources to undertake such surveys, and a lack of equipment and technical resources to complete such surveys. This includes basic equipment such as vehicles highlighted by Botswana and camera traps noted by Zimbabwe. Other challenges reported by two or fewer range States include lack of standardised survey methods, lack of coordination with other range States, and security issues (Fig. 3.7).

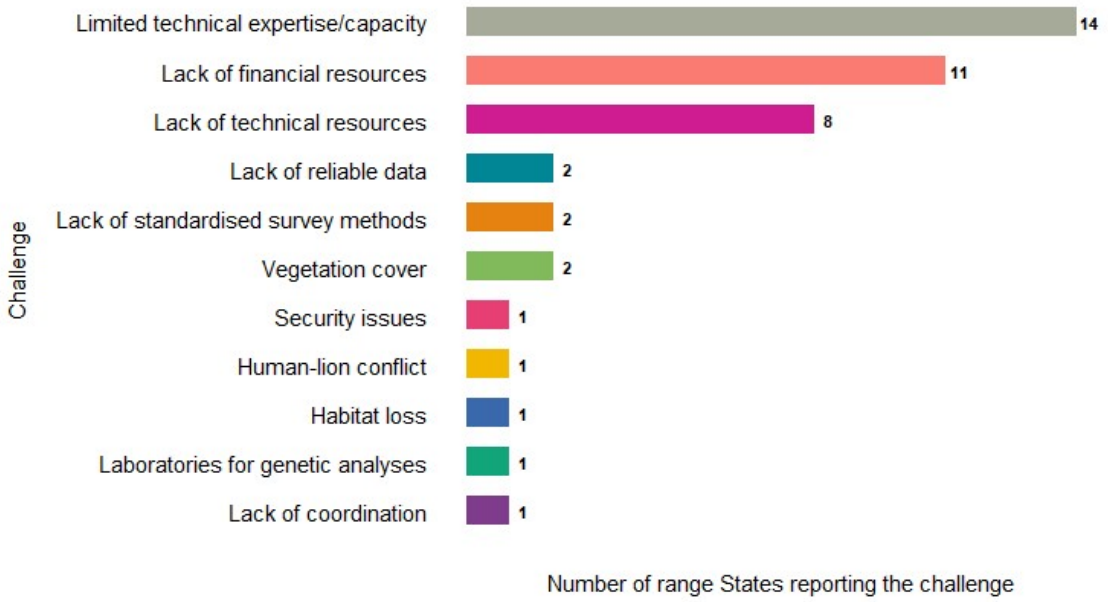


Fig. 3.7. Challenges to implementing lion population surveys reported by range States.

Similarly, range States were asked about the top three data gaps for lion conservation and management that need filling in the country. South Africa reported that there are no data gaps at present. The most frequently reported data gap otherwise was national population estimates and trends for lions, followed by knowledge of the most appropriate methods to use for surveys, and data on mortalities, including retaliatory killing. Other data gaps include knowledge of lion distribution and habitat, lion demographics, population dynamics, and genetics, human-wildlife conflict data, threat data, and information on ecology, for example, effects of habitat loss and fragmentation and dispersing males and lion prides (Fig. 3.8).

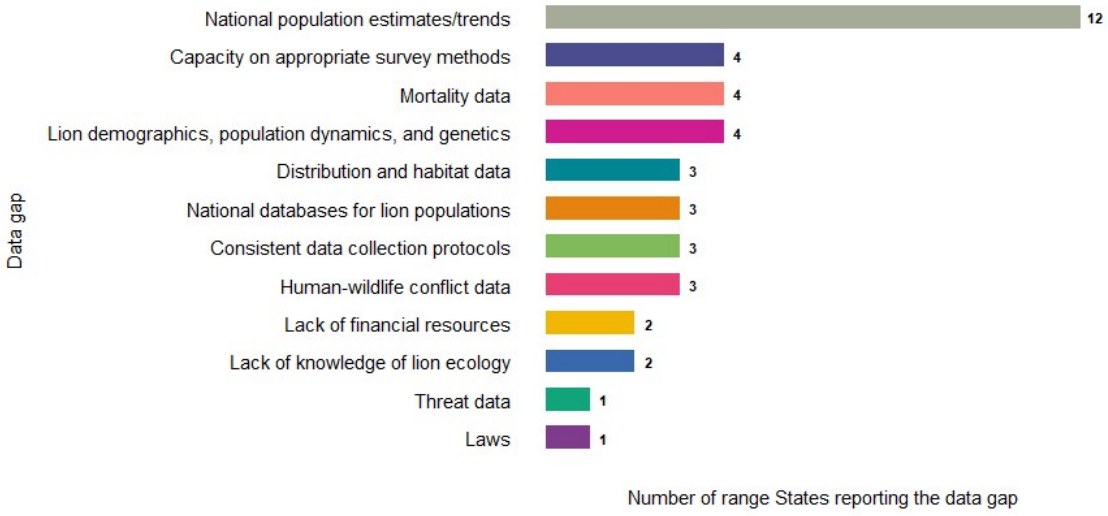


Fig. 3.8. Top data gaps for lion conservation and management reported by range States.

4.2 Transboundary populations

Eleven of 17 lion range States that responded to questions on transboundary populations stated that there are unique challenges to managing and conserving these populations. Only

Cameroon, Malawi, Nigeria, Senegal, and Zimbabwe indicated that this was not the case. These challenges are summarised in Table 3.13 and mainly relate to different policies and/or land uses in neighbouring countries meaning that lions that cross borders frequently end up being killed by legal hunting or retaliatory killing in countries with different land uses or management policies, such as around trophy hunting.

Table 3.13. Challenges faced by lion range States with transboundary populations.

Country	Details
Botswana	Different land uses across the border. In the north-east and south-west of Botswana are Chobe National Park and Kgalagadi Transfrontier Park respectively, which both border Namibia. Across the border is communal land and lions move across the border to the other side, prey on livestock, and end up being killed by farmers.
Chad	Chad shares a border with Cameroon, a country where lions are hunted. The problem is that lions protected in Chad can be killed in Cameroon by hunting.
Ethiopia	There are transboundary populations of lion between Alitash National Park in Ethiopia and Dinder National Park and Biosphere Reserve in Sudan, Gambella National Park in Ethiopia and the Boma landscape of South Sudan, and Borana-Gerale landscape in Ethiopia and Melkameri National Park in Kenya. However, implementations of the previously signed agreements and agreed concepts between the respective countries regarding sound conservation and management of these transboundary protected areas have not been effective due to a lack of capacity and various unforeseen factors.
Kenya	There are transboundary areas such as the Serengeti-Maasai Mara, Amboseli-West Kilimanjaro, and Tsavo-Mkomazi where populations of lions may be hunted across the border thus posing a conservation challenge to neighbouring ecosystems.
Namibia	Human-Lion Conflict: Lions come from neighbouring countries, causing conflict and return to these countries, which leads to tensions in Namibia.
Niger	The lions in the W National Park in Niger are part of the large lion population of the W-Arly-Pendjari complex straddling Burkina Faso, Benin and Niger. On the Burkina Faso and Benin sides are hunting zones and hunting concessions contiguous with W National Park in Niger. Wild animals, including the lion, are move freely between the various protected areas of these three countries.
South Africa	The cost of monitoring populations that are transboundary. Agreements are in place with neighbouring countries, but cost of managing transfrontier conservation areas is very high.
Sudan	The transboundary population of lions in Dinder National Park in Sudan and Alitash National Park in Ethiopia presents challenges in monitoring and managing their numbers due to the absence of transportation means like vehicles, communication devices, and modern technologies (e.g., drones and GPS devices), and a shortage of capacity.
Tanzania	Differences in policy between neighbouring countries affect the way in which lions in transboundary ecosystems are managed. In the country where lions are not legally hunted, the level of retaliatory killings is higher because communities do not see the value of the lion in their communal

Country	Details
	lands.
Uganda	The poisoning and killing of cubs by male lions from DRC.
Zambia	There are five challenges: i) a lack of robust research on transboundary genetic variability; ii) incompatible policies of the different countries (e.g., neighbouring countries may not hunt lions); iii) lack of corridors for the free movement of animals across boundaries, iv) differing land-use practices across borders, and v) cross border poaching.

5. Funding for lion conservation

Asked whether government allocated funding for the management of areas with lions was sufficient to achieve conservation objectives, 14 out of 18 range States reported that it was insufficient: Botswana, Cameroon, Democratic Republic of the Congo, Ethiopia, Gabon, Kenya, Malawi, Namibia, Niger, South Africa, Sudan, Tanzania, Zambia, and Zimbabwe. Uganda reported that the government allocated funding in the country was sufficient. Chad, Nigeria, and Senegal were not able to indicate if funding was sufficient or not. Twelve range States elaborated on a lack of funding, details of which are summarised in Table 3.14, but these predominantly relate to a lack of funding for effective protected area management.

Table 3.14. Details on insufficient government funding to manage areas with lions.

Country	Details
Botswana	The budget given for management of protected areas is not enough to implement the workplan of the areas or support law enforcement efforts. Resources such as vehicles are not enough for rangers to patrol and to promptly attend lion PAC cases. This leads to increased retaliatory killings by farmers.
Cameroon	Most lion populations are found in national parks, where the operating budget allocated by the state is very low to support the needs of optimal wildlife management and conservation, including inadequate or absent logistical arrangements, few staff, and no means of travel.
Democratic Republic of the Congo	The operational management budget for national parks, reserves and hunting grounds is insufficient because protected areas face countless challenges.
Ethiopia	There have been considerable limitations to delivering the main objectives of the lion conservation strategy because the conservation approaches in Ethiopia are ecosystem focused (instead of focusing on specific key species).
Gabon	Lack of a funding tool for the management of lion refuges. Initiatives such as the African Carnivore Initiative do not have the funds to implement the work plan defined and validated by governments.
Kenya	Major threats such as habitat loss, and human-wildlife conflict long term mitigation measures are not adequately funded. Nevertheless, there is an updated recovery action plan for the population and different actors are working within their capabilities to ensure the population thrives.
Malawi	Generally, the funding is inadequate for the management of protected areas including law enforcement, protected area infrastructure (roads,

Country	Details
	ranger housing, and equipment), research and monitoring, and community programs.
Namibia	Namibia has successfully established and funded several vital programs, including the Lion Rangers program, lion surveys, the Human-Wildlife Conflict Self-Reliance Scheme, Wildlife Credits for lion products, and various monitoring and research initiatives aimed at mitigating conflicts. However, securing consistent funding will always pose a challenge.
South Africa	Overall budgets to provincial conservation agencies have been decreasing, which hampers conservation efforts and specifically the monitoring of lion populations within State-protected areas.
Sudan	Wildlife management, which includes lions, lacks a dedicated national or local fund within the main budget. The only exception is a modest sum earmarked for game species like birds and Dorcas gazelles, intended to facilitate the hunting season from early November to late May.
Tanzania	Conservation of wildlife is a cost undertaking because it needs trained personnel, equipment, technology, and funding. 32.5% of Tanzania is protected areas where lions roam freely, but funds to conserve these areas has never been sufficient. The Government has been working with conservation partners in leveraging the needed resources to manage wildlife in those areas.
Zimbabwe	The wildlife management in Zimbabwe is quasi-parastatal and the funding from government is insufficient. The wildlife management authority needs to generate funding for wildlife conservation.

6. The impact of import restrictions

This section discusses import restrictions on hunting trophies, including but not limited to lion hunting trophies, and support for these policies as they may affect different outcomes for lions and indigenous peoples and local communities.

6.1 Outcomes for lions, lion conservation, and trophy hunting areas

6.1.1 Impact of import bans on lion conservation efforts

Lion range States were asked whether import bans on African lion hunting trophies (e.g., by European countries) would be positive, negative or have no effect on lion conservation in the country. Six countries, 4 of which do not permit the legal hunting of lions for trophies, stated that they thought that the impact would be positive (Fig. 3.9). These indications were supported by the following statements:

- **Chad:** [These policies will] reduce cross-border lion poaching.
- **Kenya:** Reduced demand will reduce the illegal hunting of lions.
- **Niger:** This measure may contribute to the demotivation and discouragement of trophy-hunting clients for African lions, whose population needs special attention to prevent further decline.
- **Nigeria:** [Import bans] will aid lion conservation.

- **Senegal:** [These policies will] considerably reduces pressure and illegal hunting of lions.

- **Sudan:** The endangerment of lions has led to the implementation of hunting trophy bans, which aid in the population recovery of African lions and their conservation from extinction. These bans help regulate species that may otherwise increase to numbers high enough to cause issues for other animals, such as baboons in Dinder National Park.

Eight range States stated that the impact would be negative, mainly countries that permit the trophy hunting of lions (Fig. 3.9). These responses were supported by the following statements:

- **Botswana:** By [implementing these policies], you are devaluing lion species and disincentivizing rural communities who are co-existing with the species. This will lead to zero tolerance by communities to co-exist with lions. Hunting generates direct and indirect benefits to communities. It is likely that retaliatory killings would increase because of the import bans. There is a possibility of change of land use by operators and communities to ventures into something that can give better economic returns.

- **Cameroon:** [Import bans on lion hunting trophies] will have repercussions on the promotion of hunting tourism activities in the country. Hunting is a wildlife management tool in Cameroon and professional hunting guides are partners in wildlife management and conservation.

- **Namibia:** Communities are unlikely to value or coexist with lions unless they benefit from trophy hunting.

- **South Africa:** Trophy hunting generates income to further the protection and management of lions in South Africa, including the management of the lion metapopulation. Reduced income generated means that there is limited funding to protect or manage lions, i.e. [this will] reduce the number of rangers that can be deployed to remove snares, etc. State protected areas are limited in South Africa and a substantial part of species numbers and land are managed by the private sector. Trophy hunting is a major income source for the private sector. Increased trade restrictions and bans reduce incentives for the private sector to participate in biodiversity friendly land uses and will likely lead to increased land use changes to the detriment of lions and biodiversity in general.

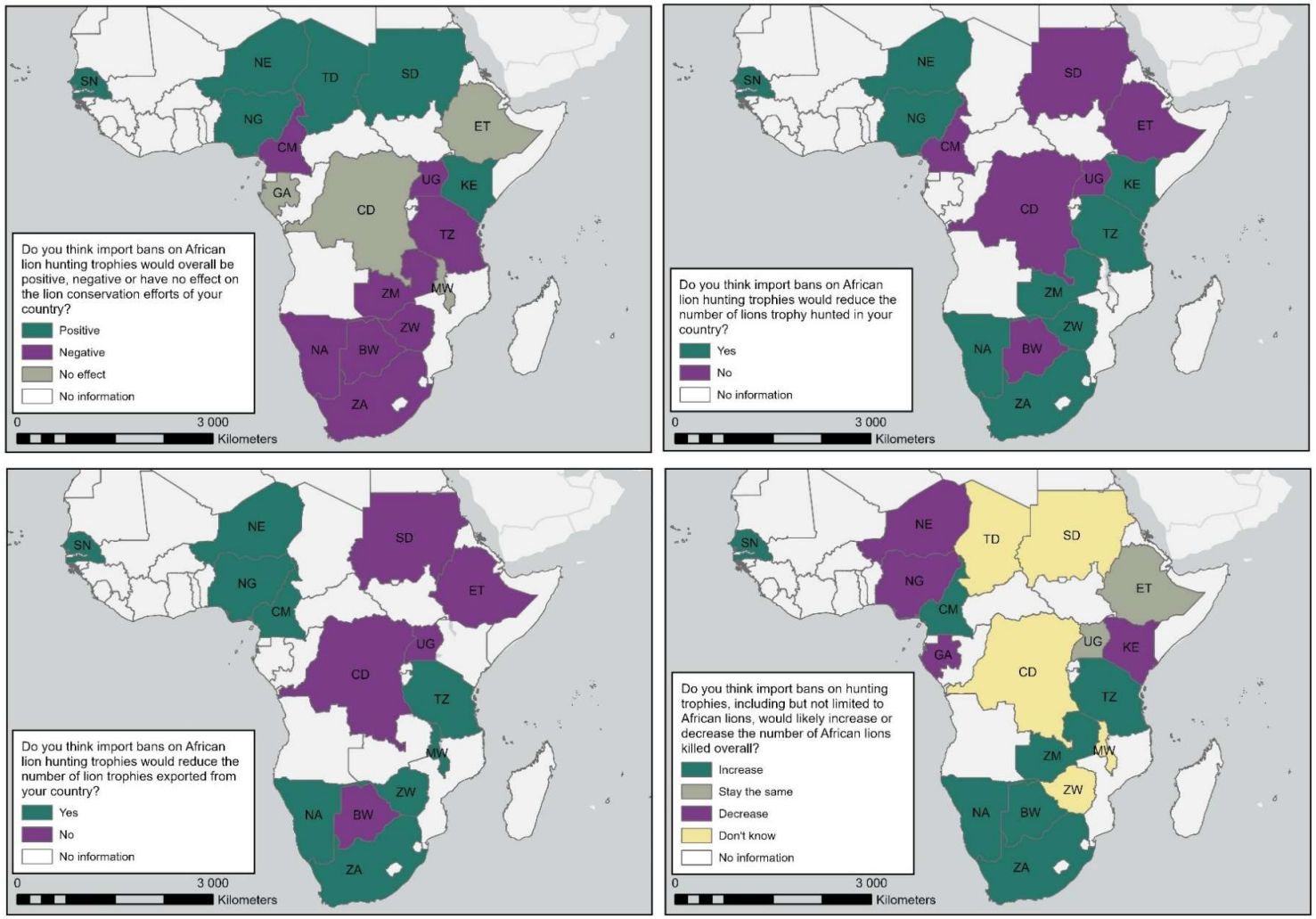


Fig. 3.9. Responses by lion range States on the potential impact of import bans for lion hunting trophies on lion conservation efforts, the number of lions trophy hunted, the number of lion trophies exported, and on the number of lions killed overall.

- **Tanzania:** Trophy hunting in Tanzania is conducted in an area totalling around 304,000 km^2 of the land surface. Hunting in Tanzania is carried out in accordance with the Wildlife Conservation Act No. 5 of 2009 R.E 2022, Wildlife Conservation (Tourist Hunting) Regulations of 2024, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

    - Hunting generates revenue needed to support conservation and habitat protection, mitigation of human-wildlife conflict, and support livelihoods of the adjacent local communities residing in the wildlife-dominated landscapes. Without regulated hunting and the associated revenue, the effect on biodiversity loss will be irreversible because there will be inadequate resources to protect wildlife and therefore rural communities will convert these areas into other forms of land uses, including agriculture, mining, settlements and livestock maintain and sustain their livelihoods.

    - Tanzania can maintain the 30% of its land surface goal for conservation areas that has been set by the Convention on Biological Diversity (CBD). In fact, Tanzania has surpassed this goal through protection of wilderness areas devoted to hunting. This has been achieved as revenues accrued from trophy hunting are reinvested in biodiversity conservation and support to community livelihoods. Likewise, revenue generated from trophy hunting is used to support mitigation of human-wildlife conflicts in Tanzania. These conflicts (crop raiding, livestock depredation, injuries to people and loss of life, and damage to property such as water infrastructures) are increasing because protected areas are not fenced and wildlife populations, especially elephants, have increased.

    - Tanzania has developed and is implementing the National Human-Wildlife Conflict Mitigation Strategy 2020–2024, to address increasing human-wildlife conflict and promote co-existence between people and wildlife. Under this strategy, the government pays consolation to victims of human-wildlife conflict as a way of showing empathy and concern to the damages. In the period 2019–2023, an estimated USD 3,792,365 was paid to victims of human-wildlife conflict as consolation. Moreover, tourist hunting is providing direct and tangible benefits to rural communities through provision of 25% of the revenue generated from game harvested to support their livelihood enhancement projects. This benefit-sharing model is used as a tool for community engagement in wildlife management. Through this model communities have gained a sense of ownership towards conservation and protection of wildlife resources and hence poaching has reduced.

    - It is evident that regulated and legal hunting is one of the most powerful tools to achieve sustainable biodiversity conservation and livelihood improvement in many parts of rural Africa and Tanzania is no exception. The major markets for tourism hunting in Tanzania are Europe and North America. Most of the hunters prefer premium safari packages that allow for hunting of all major CITES species including lions. Import bans will negatively affect not only the hunting industry but the livelihoods of many Tanzanians in the rural areas who depend on hunting industry for employment, markets for their products, and support to social infrastructure such as education, health, and water. Bans on the import of lion trophies will remove the incentive for lion management in Tanzania and increase dependence on donors for conservation and deprive the country of its ability to look after its own protected areas.

- **Uganda:** Hunting countries have viable populations.

- **Zambia:** Fifty percent of revenue generated from trophy hunting in Zambia is given to communities. This money is used to pay salaries and buy rations and equipment for over

1200 community scouts (about 50% of rangers in the country) involved in anti-poaching efforts. The funds are also used for developmental projects in these often-poor communities such as improving roads and providing boreholes for clean drinking water. This creates tolerance among communities for lions which in all circumstances are considered dangerous animals. The lion is a prized trophy for hunters who bring this money for conservation. Removing the trophy hunting monetary incentives from communities will take away their motivation to conserve lions and lead to retaliatory killing of problem lions and/or illegal harvest of the skin for trade. Further, more than half of the country's rangers would be out of employment leaving prime protected areas vulnerable.

- **Zimbabwe:** The import bans influence other countries to impose bans and restrictions which makes it difficult to import trophies by the hunters. This will have a negative impact in lion conservation efforts resulting in reduced revenue for conservation and reduced value of lions to the local people which might result in reduced tolerance of the species.

Four range States stated that import bans on lion hunting trophies would have no effect (Fig. 3.9.). Ethiopia reported that this is because the practice of trophy hunting of lions in the country is negligible. The Democratic Republic of Congo, Gabon and Malawi indicated that this is because the legal hunting of lions for trophies does not take place in the country.

Overall, of the 9 responding range States which currently permit the legal hunting of lions for trophies (including Niger, which does not practice it), 2 (22%), said that import bans would be positive for lion conservation in their country, while 6 (67%) said they would be negative for lion conservation and 1 (11%) said it would have no effect. Meanwhile, amongst the 9 responding range States which currently do not allow the trophy hunting of lions, 4 (44%) said that import bans would be positive for lion conservation in their country, while 2 (22%) said it would be negative for lion conservation and 3 (33%) said it would have no effect.

6.1.2 Impact of import bans on the number of lions trophy hunted

Lion range States were asked whether import bans on African lion hunting trophies (e.g., by European countries) would reduce the number of lions trophy hunted in the country. Nine countries stated that they thought it would, and 6 that they thought it would not (Fig. 3.9). These indications were supported by the following statements.

The countries stating that the number of lions trophy hunted in the country would reduce:

- **Kenya:** Though African culture the killing of lions is a show of might but has contributed to lion deaths; education and awareness has worked perfectly. The [import] bans would be an added effort to ensure no commercial use of the trophies.

- **Namibia:** It will impact the number of trophies hunted, as most international hunters in Namibia are from European countries. Import ban could result in a decline in the number of hunters and, in revenue to the conservancies.

- **Niger:** Niger doesn't organize trophy hunts for African lions, but this measure will concern all range States for the species because most trophy lion hunts are organized by hunters from western countries. No imports, no exports, and no trophy hunts for lions.

- **Nigeria:** [Import bans] will aid lion conservation.

- **Senegal:** The ban makes it possible to control and identify the origin of trophies, and therefore to act in these areas to better curb the scourge.

- **South Africa:** [This outcome is] most likely but it could also result in a shift in the trophy hunting market to areas that do not have a long history of sustainable and ethical hunting,

which could further impact on the sustainability of trophy hunting and the persistence of high value hunted species.

- **Tanzania:** Europeans and Americans constitute about 70% Tanzania's hunting market (though see Table 3.3). Most hunters from these areas prefer premium safari packages that allow for hunting of all major CITES species including lions. Import bans will have a disincentive for them to visit Tanzania. This will result in a decline in the number of hunters and, in turn, revenue.

- **Zambia:** If a hunter cannot bring their trophy back home then there is no motivation to spend thousands of dollars to go in the jungle to hunt. The trophy is the ultimate motivation and prize for hunters spending a lot of money to hunt.

- **Zimbabwe:** Yes and no. With increased restrictions there is increased paperwork, which might result in frustrations from the hunters and agents, which might result in some hunters not travelling to hunt. However, with the elephant ban there was a continued hunting of the species, hunters would hunt knowing that the trophies will not be imported but the trophy fees were reduced. There was an increase in need for storage space, which also results in increased storage costs and security costs.

The countries stating that the number of lions trophy hunted in the country would not reduce, include the following as well as Botswana, Democratic Republic of Congo, and Sudan, which either provided no relevant response or stated that trophy hunting lions does not occur.

- **Cameroon:** Hunting lion trophies goes some way to controlling populations and mitigating human-lion conflicts.

- **Ethiopia:** [The outcome is because] the practice of trophy hunting of lions in the country is negligible.

- **Uganda:** [These policies would be] a disincentive for countries [to trophy hunt lions].

6.1.3 Impact of import bans on the number of lion trophies exported

Range States for the lion were asked whether import bans on hunting trophies for the species (e.g., by European countries) would reduce the number of lion trophies exported from the country. Nine countries stated that they thought it would, and 5 that they thought it would not (Fig. 3.9). These indications were supported by the following statements.

The countries stating that the number of lion trophies exported from the country would reduce, include the below. Senegal provided no comment but stated that exports would reduce.

- **Cameroon:** Most of the hunters we welcome come from European countries.

- **Namibia:** [Import bans] will impact the number of trophies obtained, as most international hunters in Namibia are from European countries.

- **Niger:** Niger doesn't organize trophy hunts for African lions, but this measure will concern all range States for the species because most trophy lion hunts are organized by hunters from western countries. No imports, no exports, and no trophy hunts for lions.

- **Nigeria:** [Import bans] will aid lion conservation.

- **South Africa:** Trophy hunting in South Africa is generally linked to the export of the trophy. While we do have a local trophy hunting market, most trophy hunters come from the United States of America and the European Union. There does, however, seem to be a trend of

trophy hunters not exporting the actual hunted trophy but opting for a produced trophy. This will have financial implications (e.g., hamper income generation) for the country and any other subsequent byproduct from hunting trophies.

- **Tanzania:** Decline in number of lions hunted per year (see response in Section 3.6.1.2.) will result in a decline of lion hunting trophies being exported.

- **Zambia:** [This will be the outcome] because hunters would not be able to export the trophies back home.

- **Zimbabwe:** Yes and no. This will depend on client. Some clients will still come for the hunting experience (see response in Section 3.6.1.2.).

The countries stating that import bans would not reduce the number of lion hunting trophies exported from the country included Botswana, Democratic Republic of the Congo, Ethiopia, Uganda, and Sudan. For Ethiopia's response see Section 3.6.1.2. Sudan stated that the scarcity of recorded trophy hunting from European countries is notable.

6.1.4 Impact of import bans on the number of lions killed overall

Lion range States were asked whether import bans on hunting trophies (e.g., by European Countries), including but not limited to African lions, would likely increase or decrease the number of lions killed overall. Seven range States stated that they thought these measures would increase the number of lions killed overall; 2 countries thought the number of lions killed would stay the same; 4 countries thought the number of lions killed would decrease, and 5 stated that they did not know what the outcome would be (Fig. 3.9). Therefore, of the 13 countries who expressed an opinion on the outcome, 54% thought that import bans would increase the overall number of lions killed, 15% thought it would remain the same and 31% thought it would decrease it. These indications were supported by the following statements though not all responding countries provided written comment.

The countries stating that the number of lions killed overall would increase and associated statement are below. Senegal and Zambia did not provide written comment.

- **Botswana:** Retaliatory killings are likely to increase because of declining tolerance for the species by communities if they see no value in it. Lack of policing by communities which can lead to increase in poaching of the species.

- **Cameroon:** Trophy hunting helps reduce lion-cattle conflicts.

- **Namibia:** Without the benefits of trophy hunting, communities may resist coexisting with lions and take matters into their own hands, potentially harming or destroying these lions, resulting in conflict.

- **South Africa:** With limited incentives to coexist with lions it is likely that the number of lions killed as damage causing animals and in retaliation to livestock killings will increase. Further, lions and other charismatic species, though hunted in limited numbers, generate the highest income. If funding through these hunts is not available it can have far reaching implications for communities depending on trophy hunting income, i.e. increased bushmeat hunting (to recuperate lost income, possible land use changes, i.e., increase in livestock numbers), all of which would have a negative impact on lion population numbers.

- **Tanzania:** Tanzania can maintain 30% of its land surface for conservation that has been set by the Convention on Biological Diversity (CBD). Tanzania has surpassed this goal through the protection of wilderness areas devoted to hunting. This has been achieved as revenues accrued from trophy hunting are reinvested in biodiversity conservation and support to community livelihoods. Likewise, revenues generated from trophy hunting is

used to support mitigation of human-wildlife conflicts in Tanzania. These conflicts (crop raiding, livestock depredation, injuries to people and loss of life, and damage to property such as water infrastructures) are on increase because protected areas are not fenced and wildlife populations, especially, elephants, has increased. Import bans will remove the incentive for lion conservation, will lead to the habitat change. Most areas currently used are hunting blocks and will be encroached into because they are not suitable for photographic tourism because of poor infrastructure, difficult terrain, and habitat type (mostly miombo vegetation). The only suitable economic activity is hunting.

The countries stating that the number of lions killed overall would decrease and their associated comments are below. Kenya did not provide a written comment.

- **Gabon:** If fewer countries in the world allow the import of lion trophies, fewer wild lions will be killed in Africa. So, without trophy hunting, we should expect an increase in the number of lions in Africa.

- **Niger:** The main threats to the African lion are poaching and habitat destruction. Trophy hunting, if well-organised and informed by scientific data, has proven to be effective in guiding conservation and management decisions (management plans, population size, mapping of threats, and pressure on species); this can help reduce conflict and achieve a balanced population.

- **Nigeria:** [Import bans] will aid lion conservation.

Ethiopia and Uganda stated that they thought the number of lions killed overall would stay the same (see also Ethiopia's response to 3.6.1.2.). Chad, Democratic Republic of the Congo, Malawi, Sudan, and Zimbabwe did not know what the outcome would be. Zimbabwe provided additional information below.

- **Zimbabwe:** Import bans may increase or decrease lion conflict. Overall, with reduced benefit, this will have a negative impact in lion conservation efforts as it results in reduced revenue for conservation and reduced value of the lions to the local people which might result in reduced tolerance of the species.

6.1.5 Impact of import bans on trophy hunting areas

Range States were asked what would happen to trophy hunting areas if one or more import bans on hunting trophies were enacted (e.g., by European countries) regarding 6 outcomes.

i. **There would be no change:** Two range States thought this outcome would be very likely or likely; 8 thought it would be unlikely or very unlikely (Fig. 3.10).

ii. **Hunting areas would change to photo-tourism:** Eight countries thought this outcome would be very likely or likely; 6 thought it would be unlikely or very unlikely.

iii. **Hunting areas would change to crop farming:** Eight countries thought this outcome would be very likely or likely; 5 thought this would be very unlikely.

iv. **Hunting areas would change to keeping livestock or other agriculture:** Nine range States thought this outcome would be very likely or likely; 4 thought it would be very unlikely.

v. **Hunting areas would be degazetted:** Seven range States thought this outcome would be very likely or likely; 5 thought it would be unlikely or very unlikely.

vi. **Hunting areas would be returned to the government:** Eight countries thought this outcome would be very likely; 4 thought it would unlikely or very unlikely.

Therefore, the two scenarios with the greatest level of agreement that they would be likely, compared to unlikely, were scenario 4 – that hunting areas would change to keeping livestock or other agriculture, and scenario 6 – that hunting areas would be returned to the Government.

Additional comments were made by 4 countries on the impact of import bans on trophy areas. See also Tanzania's response under Section 3.6.1.1.

- **Ethiopia:** If one or more import bans on hunting trophies for all huntable species were enacted, the burden falls on the public institutions since the sense of ownership of the local communities declines as the benefits generated from hunting dwindles. Moreover, human-wildlife conflict would become prominent as prevalence of anthropogenic activities increases over time. In other words, the 'common property' becomes the 'commons' and ends up with tragedy.

- **Namibia:** The hunting concessions exist within a shared landscape where people and lions have coexisted for many years and are hesitant to change their farming and other practices.

- **South Africa:** Because the South African model is based on private ownership of land and game, private landowners have a choice in land use practice. If wildlife is not profitable, it is highly likely that landowners would opt for another land use (e.g., agriculture, livestock, and mining), that is more profitable. Increased restrictions and bans reduce incentives and increase the cost of managing or coexisting with lions in the landscape.

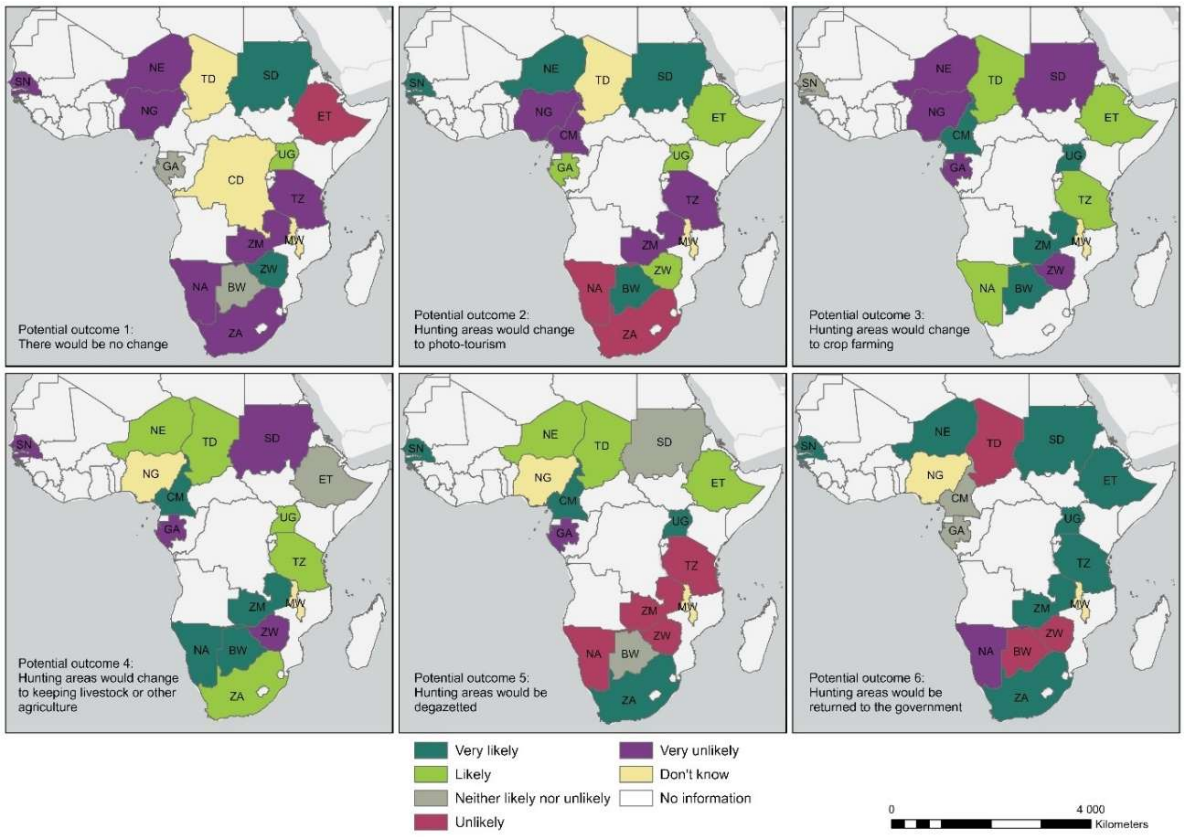


Fig. 3.10. Range State responses to the likelihood of different outcomes regarding trophy hunting areas if one or more import bans are enacted.

6.2 Support for, and opposition to, import bans on hunting trophies

Lion range States were asked how supportive they would be of import bans on hunting trophies (e.g., by European countries), including but not limited to African lions, if these policy measures resulted in positive or negative outcomes for lion populations, and separately, positive or negative outcomes for indigenous peoples and local communities.

Six countries strongly or slightly supported import bans if they would positively affect lion populations: Ethiopia, Gabon, Kenya, Niger, Nigeria, and Sudan (Fig. 3.11). In contrast, 6 countries either strongly or slightly opposed these measures if they would positively affect lion populations. These countries mainly comprised those that allow the trophy hunting of lions, including Namibia, Tanzania, Zambia and Zimbabwe, as well as Senegal (Fig. 3.11). For each outcome, a small number of countries neither supported nor opposed import bans or responded that they did not know whether they would be supportive of these policies or not.

One country reported that it would slightly support import bans on hunting trophies even if they negatively affected lion populations: Uganda (Fig. 3.11). Most range States that responded (13) stated that they would strongly or slightly oppose import bans on hunting trophies if they negatively affected lion populations (Fig. 3.11). Chad, Malawi and Sudan did not know whether they would be supportive of these measures or not.

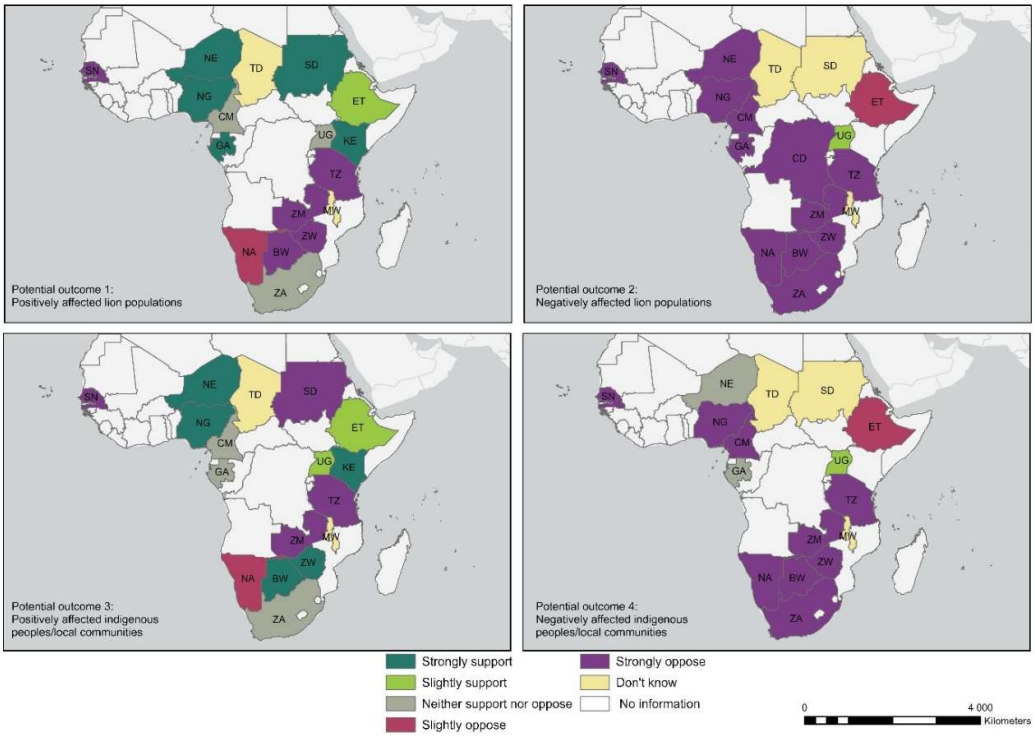


Fig. 3.11. Range State responses regarding support for, and opposition to, import bans on hunting trophies (e.g., by European countries)

Regarding support and opposition for import bans if they would positively or negatively affect indigenous peoples and local communities: Seven range States stated that they would strongly or slightly support impact bans if they positively affected indigenous peoples and local communities (Fig. 3.11). Five countries would slightly or strongly oppose these measures, even if they positively affected indigenous peoples and local communities: Namibia, Senegal, Sudan, Tanzania, and Zambia. Nine range States responded that they would slightly (Ethiopia) or strongly oppose (Botswana, Cameroon, Namibia, Nigeria, South Africa, Tanzania, Zambia, and Zimbabwe) import bans if they negatively affected indigenous peoples and local

communities. As above, Chad, Malawi and Sudan did not know if they would support these measures or not.

In relation to this question, South Africa highlighted that hunting bans, whether they have positive or negative impacts on lion populations or communities, impact on the sovereignty of a range State and its ability to make decisions within country to the benefit of its people and nature. Answering this question was therefore difficult because from the onset the ability of a country to decide has been removed.

6.3 The importance and cost of lion conservation

Lion range States were asked about the importance of lion conservation to the citizens of the country and among citizens of countries beyond Africa. They were asked to rate the importance of lions from very important to not at all important. All 19 range States that responded rated the importance of lions to citizens of the country as very important or moderately important. Seventeen range States rated the importance of African lion conservation to citizens of countries beyond Africa as very or moderately important. Zimbabwe responded that this was neither important nor unimportant and Gabon that this was not at all important.

Lion range States were also asked whether maintaining African lion populations was net positive (i.e., beneficial) or negative (i.e., a cost) to the county. Sixteen countries reported that maintaining lion populations was strongly positive or positive: two range States reported that it was neutral (Chad and Democratic Republic of the Congo), while one country (Sudan) reported that maintaining the lion population was a net negative for the country.

D. Comparative study – Introduction to study landscapes

In this section, an introduction to lions is presented for each sub-region of the African continent that they occupy followed by information about the 8 landscapes selected for this study, considering habitat, ecological significance, significant threats, management and land use, lions within the site, and resource use and trophy hunting.

1. West Africa

West Africa is a diverse and ecologically rich region, characterized by a range of ecosystems from savannas to dense forests. Despite its natural wealth, the region faces significant conservation challenges, including habitat loss, human-wildlife conflict, and illegal poaching. Rapid population growth and expanding agricultural activities have intensified pressure on the land, threatening the survival of many wildlife species. It faces a range of critical issues, including political instability, violent extremist groups, economic disparities, and environmental degradation (Lhoest et al., 2022; S. Nicholson, Dickman, et al., 2023; Sogbohossou, 2023). Key environmental challenges include deforestation, desertification, and water scarcity, which are aggravated by climate change and accelerated by high population growth rates (Olagunju, 2015). Additionally, the region contends with significant health challenges and food insecurity (Vasseur et al., 2021), which impact human well-being and pose obstacles to sustainable development and ecological stability.

The lion in West Africa is currently regionally listed as Critically Endangered due to population declines and the largest population being less than 250 mature adults (Henschel et al., 2014). The region's lion populations are now fragmented and isolated, making them particularly vulnerable to extinction (S. Nicholson, Bauer, et al., 2023). In Southern and Eastern Africa, large carnivore populations often thrive outside of protected areas, whereas in West Africa, these species are typically restricted to protected zones (Sogbohossou, 2023). In this region of Africa, conservation is not considered as an urgent priority for governments, and protected areas face significant pressure from human activities, which threaten the survival of species even within the region's protected areas (Bauer et al., 2020; Sogbohossou, 2023).

Lions have been confirmed in just four protected areas in West Africa, with current estimates indicating that less than 400 lions remain (S. Nicholson, Bauer, et al., 2023). The confirmed range for lions in West Africa covers approximately 49,000 km^2, representing 1.1% of their historical range in West Africa (Henschel et al., 2014). Senegal's Niokolo-Koba National Park is estimated to have less than 50 individuals (Bauer et al., 2018). Two small and isolated populations occur in Niger: Kainji Lake National Park and Yankari Game Reserve (Bauer et al., 2018; S. Nicholson, Bauer, et al., 2023). The largest population of lions in West Africa occurs in the transboundary W-Arly-Penjari Ecosystem (Benin, Burkina Faso, Niger) where there are less than 250 individuals (S. Nicholson, Bauer, et al., 2023). Recent genetic studies demonstrate that lions in West Africa have unique genetic value and conservation significance (Bertola et al., 2022; Henschel et al., 2014). Molecular and morphological research, spanning the species' entire historical range, indicates that lions in Central, West, and North Africa (with the latter now extinct) differ from those in Eastern and Southern Africa and share a common ancestor with lions in Asia (Bertola et al., 2011; Henschel et al., 2014).

1.1 Benin

Benin, bordered by Togo, Nigeria, Burkina Faso, and Niger, is home to a variety of landscapes, from coastal plains to savannas and forests (Cheke, 2001). The country is known for its rich biodiversity, including a significant portion of the W-Arly-Pendjari Complex, an important conservation area for West African lions (Henschel et al., 2014; S. Nicholson, Bauer, et al., 2023). However, Benin faces considerable conservation challenges, such as habitat degradation, human encroachment, and poaching, which threaten the survival of its wildlife (IUCN WCPA, 2018). Benin is currently estimated to have a human population of about 14.5 million people (worldometers.info) and a human density of ~108 people / km2. The country has several gazetted national parks, including the Pendjari National Park, which is part of the larger

W-Arly-Pendjari (WAP) complex, a UNESCO World Heritage site known for its diverse wildlife and key role in preserving endangered species (IUCN WCPA, 2018). Benin's economy is primarily agricultural (Assouto & Houngbeme, 2023), with a growing focus on sustainable farming practices to protect its natural resources, including its forests and coastal ecosystems.

1.2 Burkina Faso

Burkina Faso has a population of approximately 23 million people, with a human density of around 86 people / km2 (https://worldpopulationreview.com/countries/burkina-faso). The country is characterized by a Sahelian climate, with savannahs and semi-arid regions that are particularly vulnerable to desertification and land degradation (Kima et al., 2015; Nyamekye et al., 2018). Climate change is a huge threat to the agricultural industry of Burkina Faso, which contributes highly to the country's overall GDP (Kima et al., 2015). Burkina Faso is committed

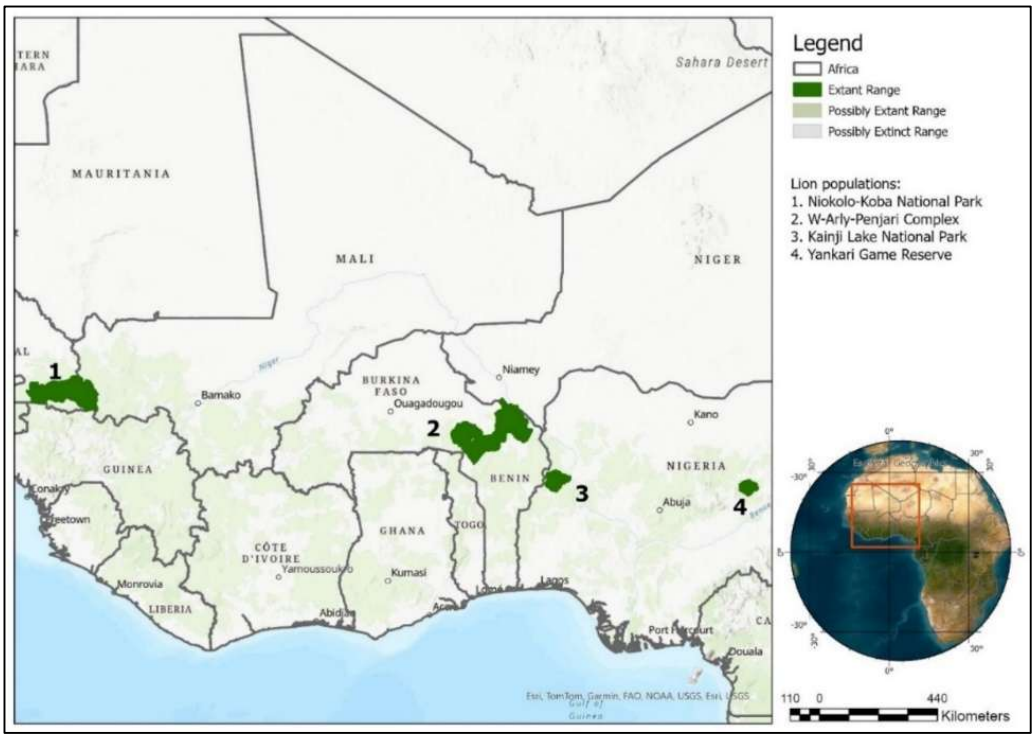


Fig 4.1 Four populations of African Lions (*Panthera leo*) remain in West Africa

to combating these environmental challenges through reforestation projects and sustainable land management practices, such as agroforestry, to improve soil fertility and reduce erosion (Nyamekye et al., 2018). Despite these efforts, the country faces ongoing environmental pressures from population growth, overgrazing, and the effects of climate change, which threaten its natural ecosystems. National parks like the Arly and W National Parks are vital for preserving biodiversity, offering refuge to wildlife such as elephants and lions (Amahowé et al., 2013). Burkina Faso is considered to play a crucial role in the conservation of West African lions, particularly within the W-Arly-Pendjari Complex, one of the region's most important wildlife reserves (Henschel et al., 2014).

1.3 Niger

Niger, a vast and largely arid country in West Africa, is characterized by its expansive deserts and savannas (Nutini et al., 2013). Despite its challenging environment, Niger is home to critical wildlife habitats, including parts of the W-Arly-Pendjari Complex, a key stronghold for West African lions. However, Niger holds the smallest number of lions for the complex (Bauer et al.,

2018; S. Nicholson, Bauer, et al., 2023). With a population of around 27 million and a population density of 21 people per km2 (https://worldpopulationreview.com/countries/niger), the country faces significant environmental challenges, such as desertification, deforestation, and water scarcity (Nutini et al., 2013), which are compounded by the impacts of climate change and rapid population growth (Garba & Abdourahamane, 2023). With only 12% of its land being arable, Niger relies on initiatives like the "Great Green Wall" project to restore degraded land and combat desert expansion through reforestation and sustainable practices (Turner et al., 2021). National parks, including the Termit and Tin Toumma National Nature Reserve, are essential for the protection of endangered species like the Addax (*Addax nasomaculatus*) and Dama gazelle (*Dama gazelle*) (Rabeil et al., 2008; Stabach et al., 2017). Niger is estimated to have a human population of about 27 million (Munshi, 2023) and a low human density of around 22 people / km2 (https://worldpopulationreview.com/countries/niger), is largely characterized by its vast desert landscapes, including the Sahara.

Landscape: W-Arly Pendjari (WAP) Complex

The W-Arly Pendjari (WAP) complex, located between 0.41°E and 3.151°E and 12.61°N to 10.71°N, is an extensive area covering ~30,000 km2 of important lion range in West Africa (Sogbohossou, 2023). The WAP complex is transboundary, being made up of hunting areas and national parks within Benin, Burkina Faso and Niger. The WAP complex encompasses 1,714,831 ha of natural habitat and is a contiguous mosaic of nine protected areas (Sogbohossou, 2023). It includes the trinational complex of W Regional Park (shared between Benin, Burkina Faso and Niger), Arly National Park (Burkina Faso), Pendjari National Park (Benin) and the hunting zones of Koakrana and Kourtiagou (Burkina Faso) and Konkombri and Mékrou (Benin). The hunting areas in Benin and Burkina Faso cover approximately 40.6% of the complex while national parks across the three countries cover 58.6% and one game reserve in Niger (0.8% of the complex) (Bouché et al., 2016). The WAP complex is one of the last refuges in West Africa for a number of threatened species and it is of critical importance for the conservation of Sahelian and Sudanese mammal populations (Sogbohossou, 2023). The WAP complex is considered to represent an important area for wildlife conservation in West Africa (Sogbohossou, 2023).

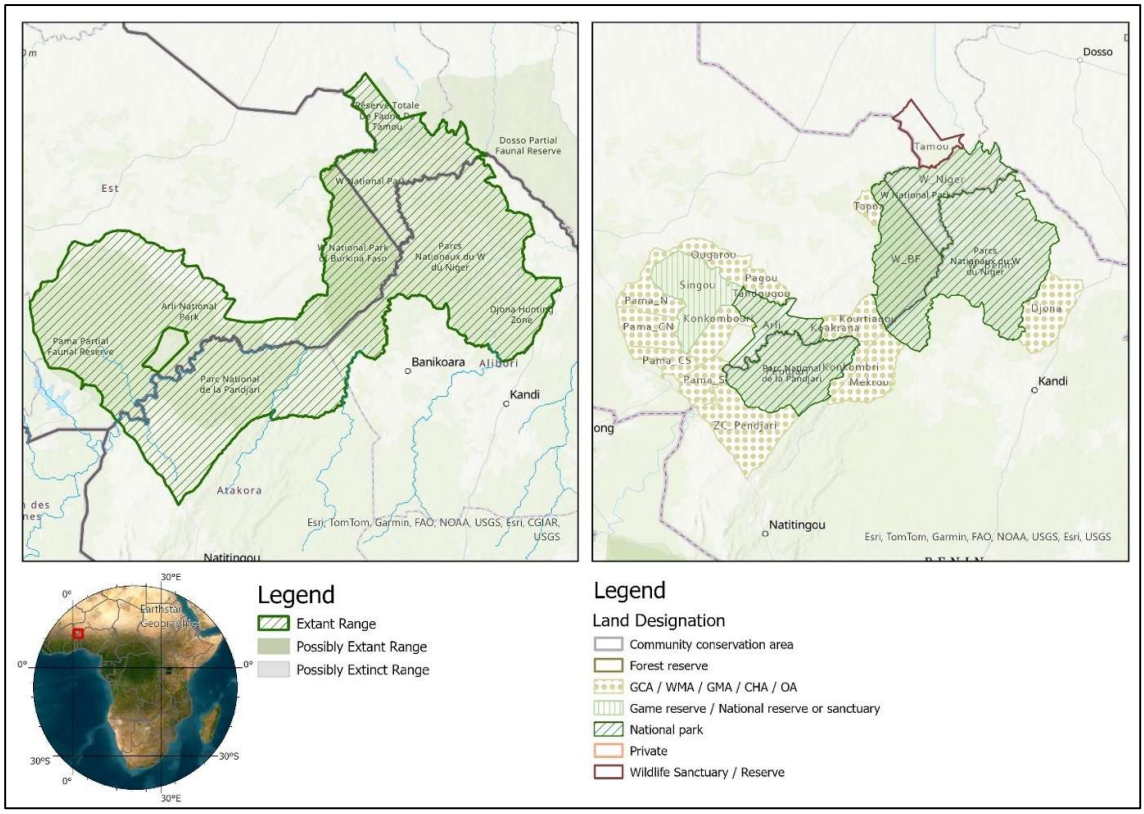


Fig. 4.2. Land use types and lion distribution in the W-Arly-Penjari Complex

a) Habitat

The landscape primarily features savannah woodlands dominated by *Combretum* and *Terminalia* species, with forest galleries lining the major rivers (Clerici et al., 2007). In some areas, these forests are bordered by grassy floodplains composed of *Andropogon* and *Hyparrhenia* (Bouché et al., 2016). In the northern part of the WAP complex, the vegetation is primarily characterized by grasslands and open shrublands (brousses) that gradually transition into open savanna woodlands with scattered trees (Clerici et al., 2007). The northern areas are typically dominated by bush species and members of the Combretum–Terminalia association, including *Acacia ataxacantha*, *Combretum glutinosum*, *Bombax costatum*, and *Anogeissus leiocarpus*. Moving from the central to the southern part, the landscape shifts from shrub savanna to more dense savanna woodlands. The herbaceous layer is often comprised of species such as *Loudetia* and *Andropogon*. In the southern regions of the complex, trees become more prevalent, and the vegetation is characterized by species like *Anogeissus leiocarpus*, *Terminalia avicennioides*, and *Isoberlinia* species (Clerici et al., 2007).

Buffers around some areas of the WAP complex are lacking, allowing reserves and hunting concessions to directly connect to adjacent villages and agricultural areas (Clerici et al., 2007). This increases the level at which wildlife and humans interact, resulting in increasing anthropic pressure around the reserve (Bauer et al., 2020).

b) Ecological significance

The WAP complex is the largest expanse of protected habitat in West Africa and harbours some of the last remaining viable populations for many species (Henschel et al., 2014; Sogbohossou, 2023). The complex is one of the most important areas for the conservation of western African ecosystems and fauna. The complex is refuge to the only viable populations of West African lion, cheetah (*Acinonyx jubatus hecki*), dwarf buffalo (*Syncerus caffer brachyceros*) and

korrigum antelope (Damaliscus lunatus lunatus) and the largest elephant (*Loxodonta africana*) population remaining in West Africa, in addition to many other species (Sogbohossou, 2023).

c) Significant threats

In recent years, the WAP has been under severe threat from extremist groups in Niger and Burkina Faso (Lhoest et al., 2022). There have been several incidents where armed groups have attacked and killed rangers within the WAP complex (see: incident 1, incident 2). These threats make conservation action and protected area management challenging, and protected areas occupied by such groups generally lack park management and experience increased and unmanaged livestock invasion, habitat loss due to increased crop planting, and increased bushmeat poaching (Lhoest et al., 2022). This threat needs to be closely monitored and mitigated because if the situation in the complex remains unchanged, wildlife populations may likely become significantly reduced, if not extinct altogether (Lhoest et al., 2022; S. Nicholson, Bauer, et al., 2023).

Other threats to lions in the WAP complex include bushmeat poaching and direct poaching (Nicholson, 2024; Sogbohossou, 2023). Lions are indirectly affected by poaching, as prey species like antelopes are hunted for bushmeat. The reduction in prey availability can lead to starvation or push lions into conflict with humans. Direct poaching can occur when lions are directly targeted for their body parts, which are used in traditional medicine and rituals.

d) Management and land use

The protected areas within the complex have varying conservation designations, such as biosphere reserves, national parks, hunting zones, wildlife reserves, and World Heritage sites, leading to differences in management approaches (Sogbohossou, 2023). Management within the WAP Complex largely relies on projects that are frequently funded by international donors (Sogbohossou, 2023) and partner organisations (e.g. African Parks). The land uses within the complex can be broadly categorized into three types: national parks (Arly, Pendjari, and W National Parks), wildlife/game reserve (Tamou Game Reserve in Niger) and hunting concessions (Burkina Faso and Benin). Since the WAP lion population is transboundary, the three countries implemented a collaborative action plan for the conservation of large carnivores within the complex, following IUCN guidelines (Bouché et al., 2016). This regional plan establishes coordinated management practices aimed at protecting large carnivores (including cheetah, lion and African wild dog (*Lycaon pictus*) throughout the entire complex, regardless of national borders. The plan involves input from the three governments, NGOs, and trophy hunting operators.

The WAP complex has been managed through a collaborative effort involving various organizations and governments. Despite the W National Park (Benin) being declared a UNESCO World Heritage Site, this remote region has suffered from a historical lack of management and financial resources. The complex was inscribed as a UNESCO World Heritage Site in 1996, recognizing its global significance. Recognizing the advancements achieved by African Parks in Pendjari National Park, the Government of Benin made a substantial, long-term commitment by partnering with African Parks to safeguard the W National Park. This collaboration aims to protect biodiversity and maintain the ecosystem's sustainability for the benefit of both the local population and wildlife. According to Sogbohossou (2023), the ongoing consultation framework within this complex likely played a key role in the recent inclusion of the Benin and Burkina Faso sections on the World Heritage List, following the designation of the Niger portion of W Park as a World Heritage site in 1996. In June 2020, African Parks officially assumed co-management of the Benin portion of W National Park, covering nearly 7,000 km2. African Park's involvement includes law enforcement, community engagement, and biodiversity monitoring to ensure sustainable conservation. Additionally, parts of the complex have been designated as Ramsar sites, beginning in 1987, under the Ramsar Convention on Wetlands of International Importance. The governments of Benin, Burkina Faso, and Niger have been integral to these efforts, working alongside international organizations to implement conservation strategies, enforce regulations, and promote eco-

tourism, establishing the WAP complex as a model for cross-border environmental management.

Photographic and game-viewing tourism is not as prolific in West Africa when compared to the rest of Africa. This is largely due to the absence of international professional operators, limited presence of certain iconic species and a lack of suitable infrastructure and effective marketing drawing international tourists (Bauer et al., 2017; Bouché et al., 2016). As a result, trophy hunting has remained the most viable method for preserving these ecosystems. In fact, (Bouché et al., 2016) reported that trophy hunting represented >99% of the 2 million Euros in taxes generated by the wildlife industry in the WAP.

e) Lions within the site

The WAP currently harbours 88% of West African lions (Bouché et al., 2016). Multiple surveys have been carried out across the WAP complex to determine the population size of lions throughout the complex. Generally, the lion population in the WAP has increased over recent years. However, it needs to be noted that in recent surveys (2019 and 2021), the Burkina Faso sides of the complex could not be surveyed due to the dangers posed by armed conflict groups. As the presence of these groups has increased, it can be assumed that this has placed additional pressure on the remaining population which may no longer be increasing (Nicholson, 2024).

Population studies of lions at a regional scale have emphasized the highly threatened nature of lions within West Africa and the importance of the WAP complex for lion conservation within the region (Henschel et al., 2010, 2015; Sogbohossou, 2023).

The 2014 population survey found that lions were generally more abundant and better distributed in the Arly-Pendjari block of the WAP than in the W block and appears to be at least stable (Sogbohossou, 2023). Repeat surveys were carried out in 2019 and 2021 on the Benin side of the Pendjari and W National Parks and surrounding areas, covering 14,793 km² (Funston et al., 2023). These surveys estimated the lion population at 155 (range: 57-242) in 2019, with a slightly higher estimate of 187 (range: 24-329) in 2021. This suggests that the ~300 lions believed to have inhabited the W-Arly-Pendjari Complex in 2012/14 may have been reduced to 150-180 in recent years and could decline further if jihadist groups overrun the entire complex (Funston et al., 2023).

Table 4.1. Population information for the WAP complex (Benin, Burkina Faso, Benin).

Year	Management Unit	Number of individuals
2012	Entire WAP complex	311 (123 - 498) *
2014	Entire WAP complex	418 (230 - 607) *
2019	Benin side of the complex across the Pendjari and W National Parks and surrounds	155 (57 – 242)**
2021	Benin side of the complex across the Pendjari and W National Parks and surrounds	187 (24 – 329)**

*Bouché P, Crosmary W, Kafando P, Doamba B, Kidjo FC, Vermeulen C, et al. (2016). Embargo on Lion Hunting Trophies from West Africa: An Effective Measure or a Threat to Lion onservation? PLoS ONE 11(5): e0155763.doi:10.1371/journal.pone.0155763

** Funston P. J., Bürki R., Nicholson S., Brouwer E., Roy S. & Breitenmoser U. 2023. Spatially Explicit Strategic Action Plan for the recovery of the northern lion in Africa 2023–2027 -Part A: Technical and Scientific Review. IUCN SSC Cat Specialist Group, 113 pp.

f) Resource use and trophy hunting

Hunting zones, established to reduce the risk of conversion of habitat to farmland, are given in concession by governments to local entities (Clerici et al., 2007). In the wildlife reserves some exploitation activities are allowed, such as hunting, fishing and fruit collection. These activities

are not allowed in the national parks, with some regional exceptions (such as ritual hunting in some regions of Pendjari National Park or commercial fishing in certain reserves in Burkina Faso (Clerici et al., 2007)). Hunting areas leased to private operators presently account for 40.6% of the WAP complex (Bouché et al., 2016), and these areas only occur within Benin and Burkina Faso as Niger does not allow trophy hunting within its W National Park. Trophy hunting is one of the management decisions that varies significantly between the countries of the WAP (Sogbohossou, 2023).

Lion hunting packages and the associated trophy fees contribute to wildlife authority revenue, although the revenue is relatively low, with only US$1,600 generated in Burkina Faso (Bauer et al., 2017). Lion hunting in Burkina Faso ranks among the least lucrative in Africa (UICN/PACO, 2009). In Benin, the average number of lions killed annually in trophy hunting was 4.2, though the period this refers to is uncertain (UICN/PACO, 2009). Burkina Faso, which accounts for 36% of the W-Arly-Pendjari (WAP) Complex, had a hunting quota of around 20 lions, with an average of 11.9 lions trophy hunted each year (1996-97–2005-06) (UICN/PACO, 2009). The hunting blocks, covering approximately 7,000 km², generated about US$42 per km² for the Burkinabe government during the 2005/2006 hunting season (IUCN/PACO, 2009). However, this quota was significantly reduced to six lions per year beginning in 2015, following the implementation of a large carnivore conservation strategy in the WAP (Sogbohossou, 2023). In Benin, lion hunting was temporarily banned for two years in the early 2000s (Lindsey et al., 2016) and was suspended again for the 2019-2020 hunting season.

Burkina Faso lion hunting (Pellerin, 2009):

- In 2004-2005: 16 lions, for a total levy of 44% of the national quota;
- In 2005-2006: 8 lions, for a total levy of 40%;
- In 2006-2007: 16 lions, for a total harvest of 80%;
- In 2007-2008: 13 lions, for a total levy of 65%;
- In 2008-2009: 11 lions, for a total harvest of 55%

In 2016, Bouche et al. assessed the impact of trophy hunting on lion populations across the WAP complex by analysing the trends in harvest rates and the lion abundance. The study investigated whether the hunting areas with higher initial hunting intensity experienced steeper declines in lion harvest between 1999 and 2014, and whether lion densities in hunting areas were lower than in national parks. The lion harvest rate within the WAP complex remained generally stable. When initial hunting intensities were below 1.5 lions per 1,000 square kilometres, most hunting areas saw an increase in the lion harvest rate, though the increase was less pronounced in areas with higher initial hunting intensities. Conversely, the proportion of hunting areas experiencing a decline in lion harvest rate grew when initial hunting intensities exceeded 1.5 lions per 1,000 km2. In 2014, a spoor count estimated the WAP's lion population at 418 adults and sub-adults (ranging from 230 to 648), which was similar to the 311 individuals (ranging from 123 to 498) estimated in the previous 2012 survey. Comparing the two surveys, no significant differences were found in lion spoor density between national parks and hunting areas. The results of the study suggested that the lion population within the WAP was not significantly affected by hunting and concluded that a quota of 1 lion/1,000 km2 would be sustainable for the complex (Bouché et al., 2016). Based on the results by Bouché et al. (2016), an embargo on import lion trophies from the WAP would not be justified and could potentially ruin the incentive of local actors to conserve lions in hunting areas, and lead to a drastic reduction of lion range in West Africa.

2. Central Africa

Central Africa, encompassing a range of ecosystems from dense rainforests to savannas, is a region of significant biodiversity (Aleman & Fayolle, 2020). Central Africa is rich in natural

resources, including minerals, timber and oil (Abernethy et al., 2016). The region faces considerable conservation challenges, driven by habitat loss due to deforestation, illegal hunting, and increasing human-wildlife conflict (Nicholson, 2024). Lion populations in Central Africa are particularly at risk, with numbers declining as a result of shrinking habitats and anthropogenic pressures (Nicholson, Bauer, et al., 2023). Effective conservation strategies in Central Africa are essential for the preservation of wildlife species and the maintenance of ecological balance within the region's ecosystems (IUCN, 2006).

In Central Africa, lions are found in the Bénoué Complex and Waza National Park in Cameroon, with a few individuals reported south of Bénoué near Mpem and Djem National Park, and in Sena Oura National Park in Chad (S. Nicholson, Bauer, et al., 2023). Chad's largest lion population is located in Zakouma National Park and its vicinity. The exact lion numbers in the Central African Republic and South Sudan are less clear. In the Central African Republic, lions are present in several national parks, including Bamingui-Bangoran, Andre Felix, and Yata-Ngaya Faunal Reserve, as well as the Chinko Conservation Area (CCA), which is estimated to have the largest population of around 150 lions (Aebischer et al., 2020; S. Nicholson, Bauer, et al., 2023). Conservation reports indicate that the lion population in the CCA is the only one in eastern Central African Republic that is increasing, whereas other populations may be stable or declining significantly (T. Aebischer, pers. comm., 2023). In South Sudan, small lion populations are found in Southern National Park, Badingilo National Park, Zaref Game Reserve, and Boma National Park (S. Nicholson, Bauer, et al., 2023). The Democratic Republic of the Congo hosts four lion populations in the following parks and landscapes: Garamba National Park and the adjoining hunting complex extending into Lantoto in South Sudan, Virunga National Park, Bolobo-Maindombe landscape and in Lac Tumba.

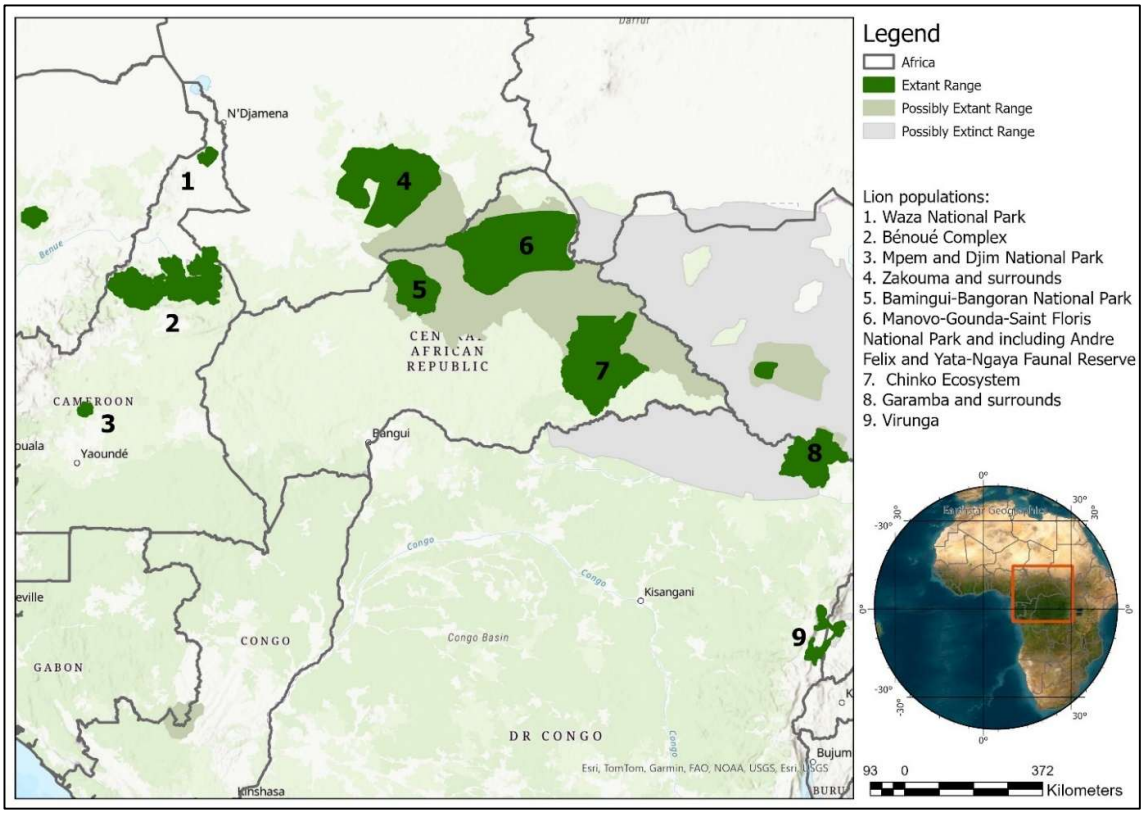


Fig. 4.3. Lion populations in Central Africa

2.1 Cameroon

Cameroon, with a population of approximately 28 million people and a human density of around

40 individuals / km2 (https://worldpopulationreview.com/countries/cameroon), is known for its ecological diversity, ranging from coastal regions to dense rainforests and savannas (Mesmin et al., 2020). The country faces significant environmental challenges, including deforestation, soil degradation, and loss of biodiversity, driven by agricultural expansion, logging, and urbanization (IUCN, 2006; Nicholson, 2024). Cameroon is home to critical conservation areas, such as the Dja Faunal Reserve, a UNESCO World Heritage site, which supports a wide array of species, including forest elephants (*Loxodonta cyclotis*), Endangered tree pangolins (*Phataginus tricuspis*) and primates (Tudge et al., 2022). Despite these protected areas, illegal hunting and habitat destruction pose ongoing threats to wildlife (IUCN, 2006). The government of Cameroon has initiated various conservation programmes, but enforcement and sustainable resource management remains challenging (Nana et al., 2022). Addressing these environmental issues is crucial for preserving Cameroon's rich biodiversity and ensuring long-term ecological stability.

In northern Cameroon, lions are found exclusively within the Bénoué Complex and Waza National Park, located in the far northern region (Nicholson, Bauer, et al., 2023). The lion population in Waza National Park is under severe threat, and without significant intervention, there is a high risk that lions could be entirely lost from this park within the next five years (Tumenta, 2012; Tumenta et al., 2010, 2013). In recent years, ad hoc occurrences of lions have occurred around Mpem and Djim National Park in Central Cameroon (Bauer et al., 2019). However, it is expected that this population occurs in low density and wide-ranging (Bauer et al., 2019; S. Nicholson, Bauer, et al., 2023).

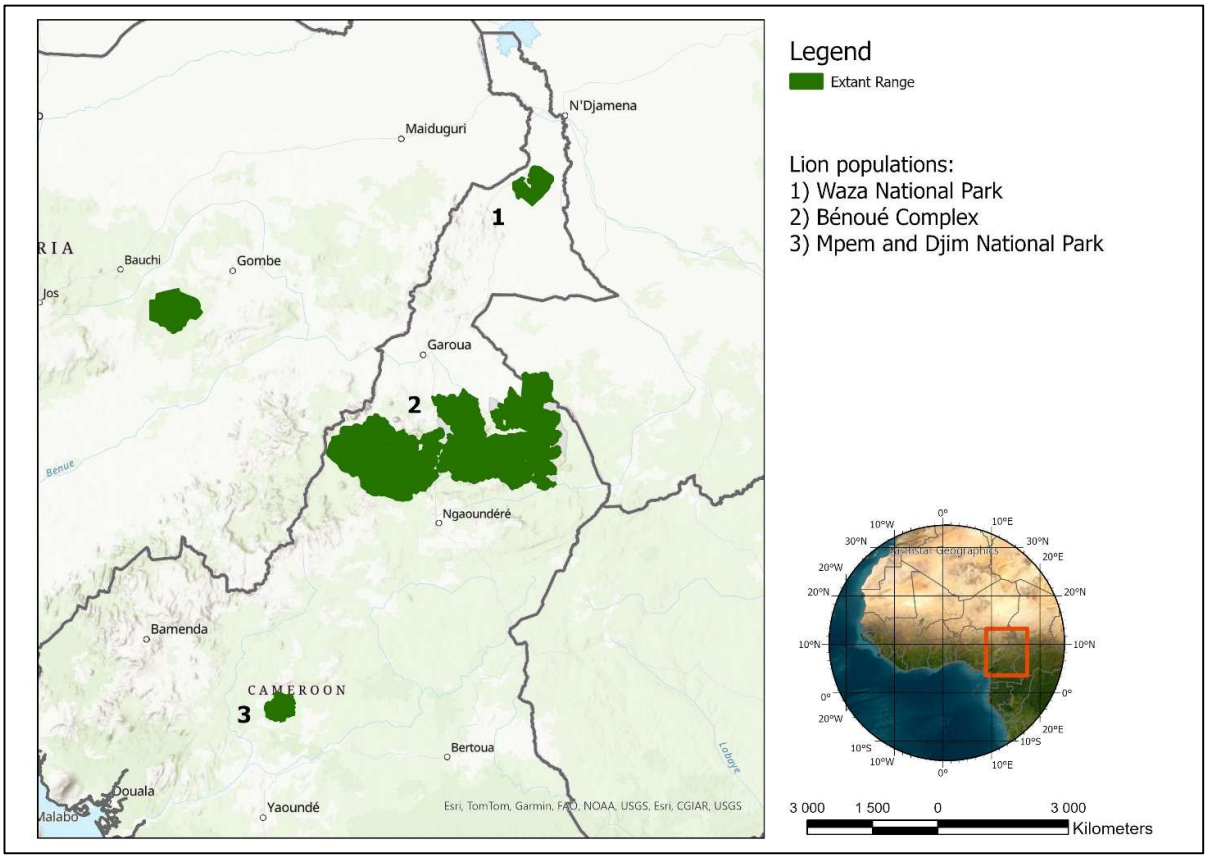


Fig. 4.4. Lion populations in Cameroon

Landscape: Bénoué Complex

The Bénoué Complex in Cameroon is a vast and ecologically significant area that includes

three national parks and approximately 32 hunting zones (Bauer, Kamgang, et al., 2016). Central to the complex is the Bénoué National Park, which spans approximately 1,800 km2 and was gazetted as a National Park in 1968 (Bauer, Kamgang, et al., 2016). In 1981, the Bénoué, the area was named a UNESCO biosphere reserve. This park is renowned for its rich biodiversity, including elephants, lions, and various antelope species. Adjacent to Bénoué is Bouba Ndjida National Park, covering about 2,200 km2 and gazetted in 1968, known for its extensive savannahs and wildlife (Bakker et al., 2020). Bouba Ndjida National Park forms a continuous landscape with Sena Oura National Park in Chad. To the west, the complex extends to Gashaka Gumti National Park in Nigeria. Faro National Park, the largest in the complex at around 3,300 km2, was established in 1993 and is recognized for its varied landscapes and wildlife. In addition to these parks, the complex includes 28 hunting concessions that cover a significant area. Notably, Mayo-Oldiri, which spans approximately 770 km2, and Campement Forestier, covering about 590 km2, are among the active hunting concessions. These concessions are managed to balance wildlife conservation with sustainable hunting practices, contributing to the overall preservation of the region's biodiversity. The complex is under significant anthropogenic pressure but encouragingly, wildlife is not as depleted as in the rest of West and Central Africa (Bauer, Kamgang, et al., 2016).

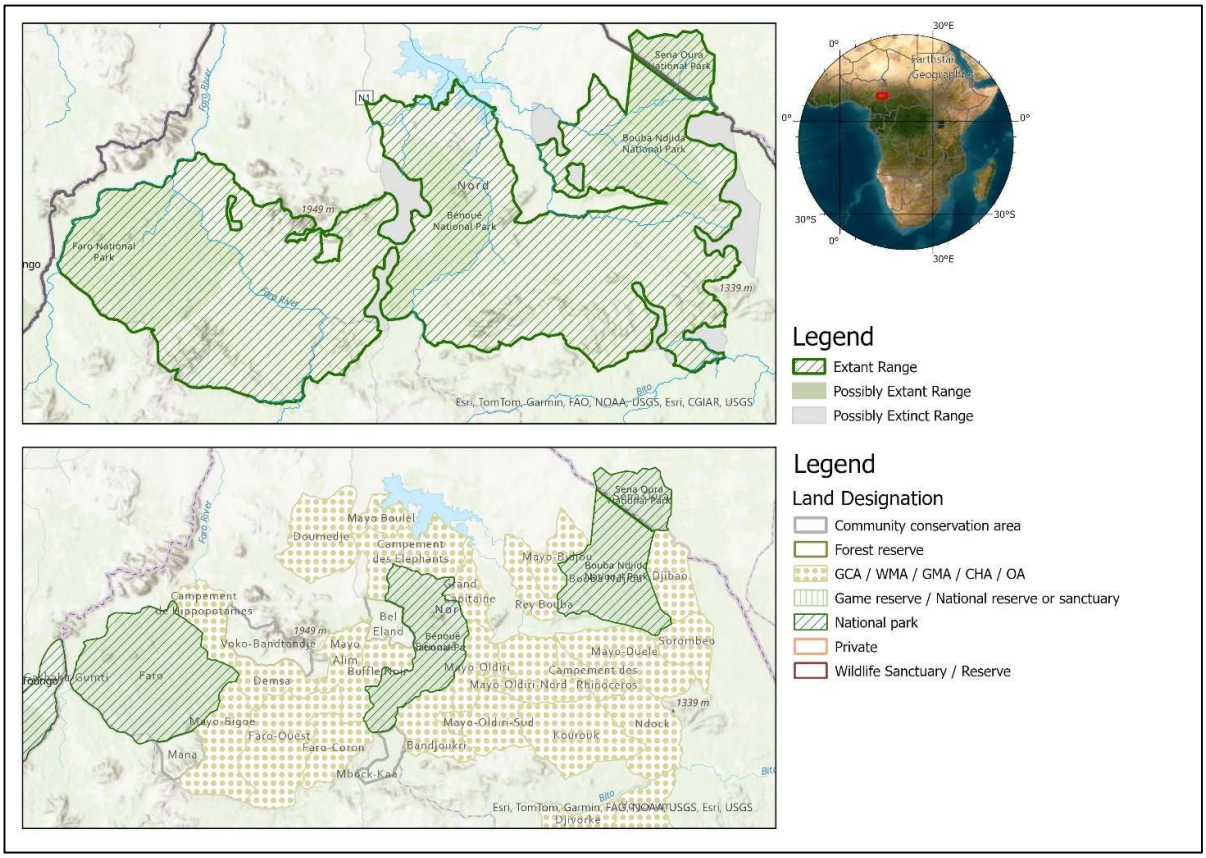


Fig. 4.5. Land use types and lion distribution in the Bénoué Complex

a) Habitat

The Bénoué Complex is located in the Sudanian wooded savanna region of northern Cameroon (Croes et al., 2011). The complex features a diverse range of habitats that contribute to its rich ecological landscape. Dominated by savannahs, the complex includes vast expanses of grasslands interspersed with scattered trees and shrubs (Croes et al., 2011). These open plains are crucial for grazing herbivores like elephants and antelope. Alongside the savannahs, the complex contains riverine forests and wetlands, particularly around the Bénoué River and

its tributaries. These lush, moist areas support dense vegetation and provide essential water resources for wildlife. Additionally, the complex features dry, deciduous woodlands, characterized by a mix of drought-resistant trees and shrubs, which offer cover and food for various species. The varied habitats within the Bénoué Complex create a mosaic of ecological niches, supporting a wide range of plant and animal life and contributing to the region's overall biodiversity and ecological health. The complex is predominantly densely wooded savanna, comprising *Isoberlinia doka* dominated woodland savanna and *Anogeissus leiocarpus* dominated riparian forests along watercourses (Croes et al., 2011).

b) Ecological significance

The Bénoué Complex in Cameroon holds immense ecological significance due to its diverse habitats and rich biodiversity. As a crucial part of the Central African ecosystem, it encompasses savannahs, woodlands, and riverine forests, providing vital habitats for a wide array of species. The complex supports a range of large mammals, including lions, leopards (*Panthera pardus*) and spotted hyaena (*Crocuta crocuta*) (Bakker et al., 2020), elephants and various antelope species, which play key roles in maintaining ecological balance through grazing, predation, and seed dispersal. The presence of these species helps to regulate vegetation and maintain the health of the ecosystem. Additionally, the Bénoué Complex serves as a critical corridor for wildlife movement and migration, connecting different habitats and promoting genetic diversity. The Bénoué Complex is the last remaining stronghold for lions in Central Africa (Riggio et al., 2013). In addition to lions, Bénoué is also an important region for the Critically Endangered Kordofan giraffe (*Giraffa camelopardalis antiquorum*) (Parks et al., 2024) and the Vulnerable common hippopotamus (*Hippopotamus amphibius*) (Scholte & Iyah, 2016).

c) Significant threats

The Bénoué Complex faces several significant threats (Nicholson 2024). Poaching of key species such as elephants and lions poses a serious risk, leading to declines in wildlife populations and disrupting the ecosystem (Nicholson 2024). Habitat loss due to agricultural expansion and human settlement further diminishes available space for wildlife and fragments critical habitats. Human-wildlife conflict, often resulting from animals damaging crops or livestock, can lead to retaliatory killings and increased pressure on wildlife. Climate change impacts habitat conditions and water availability, affecting wildlife distribution and abundance. Additionally, illegal mining activities contribute to environmental degradation and habitat destruction, while invasive species can disrupt local ecosystems by outcompeting native flora and fauna (Bakker et al., 2020). Addressing these threats requires a multifaceted approach, including enhanced law enforcement, habitat conservation, community involvement, and climate adaptation strategies (IUCN, 2006).

Other anthropogenic pressures, include seasonal grazing by livestock and threats from gold panning, poaching, and agricultural activities (Bauer, Kamgang, et al., 2016). These pressures are particularly pronounced in the central Bénoué Block, compared to the eastern Bouba Ndjida Block and the western Faro Block (Bauer, Kamgang, et al., 2016).

While lions rarely prey on livestock from local herders, they are vulnerable to indiscriminate killing methods, such as poisoning, which does occur within the complex (Croes et al., 2011). The growing presence of nomadic pastoralists, who frequently move large herds of cattle and sheep into untouched habitats, heightens the risk of conflicts between these herders and large carnivores. It has become increasingly more evident that the number of nomadic pastoralists moving through the complex is increasing retaliatory killing of lions, spotted hyaena and leopard as well as accidental poisoning of large carnivores and other predatory animals, and could become a major threat to such wildlife populations. In addition, Croes et al. (2011) raise the concern regarding the increasing targeted poaching of lions for body parts.

Due to many of these threats, wild dogs and cheetah have been extirpated from the complex (Bauer, Kamgang, et al., 2016). An overall decline in the spoor density of lions has been

observed, indicating a possible decline of lion numbers (Bakker et al., 2020). This is to be expected considering the ecosystem has endured decades of increasing human pressures, including poaching, retaliatory killings, illegal cattle grazing, mining, and agricultural expansion (Bakker et al., 2020). The intensification of these threats is likely exacerbated by the influx of people and livestock from neighbouring countries (e.g. Nigeria, Chad, and the Central African Republic) (Bakker et al., 2020). For example, a 2015 aerial survey conducted by Wildlife Conservation Society uncovered the presence of > 500,000 cattle within the complex, along with numerous gold mining camps in the Bénoué and Bouba Ndjida regions (Bakker et al., 2020). In Bénoué, approximately 736 ha has been impacted by gold mining (Sylvain et al., 2018). In addition, the survey also highlighted the severe impact of poaching on the elephant population. The observations of this aerial survey demonstrate the intense anthropogenic pressure facing the Bénoué Complex.

In recent years, the strain on the Bénoué Complex's natural resources has intensified due to the expansion of existing villages and the establishment of new ones and without a shift towards more sustainable land use practices, this has led to significant encroachment into protected areas (Bakker et al., 2020). This will inevitably increase the occurrence of human-wildlife conflict incidents, resource competition and habitat degradation (Bauer et al., 2020).

d) Management and use

The management and land use of the Bénoué Complex are strategically designed to balance conservation goals with sustainable use. The complex is overseen by the Ministry of Forestry and Wildlife (MINFOF), which implements conservation measures to protect its diverse ecosystems and wildlife (Croes et al., 2011). Land use within the complex is carefully regulated to minimize human impact, with designated areas for national parks and hunting concessions. The national parks, including Bénoué, Bouba Ndjida, and Faro, are managed to preserve their natural habitats and biodiversity, while hunting concessions are regulated to allow for sustainable trophy hunting and mitigate illegal activities (Bakker et al., 2020). Additionally, local communities are often involved in conservation efforts, providing support and monitoring to ensure that land use practices align with ecological preservation objectives. This integrated approach aims to maintain the ecological health of the Bénoué Complex while accommodating both conservation and livelihood needs (Fouth et al., 2017). Community members were involved in the surveillance of the ecotourism activities, and are entitled to a portion of the bushmeat attained from the game hunting activities (Fouth et al., 2017). The local communities are also involved in some of the management decisions for the complex (Fouth et al., 2017). The hunting blocks within the Bénoué Complex totals ~15,814 km2, resulting in a total protected area of 23,394 km2 (Croes et al., 2011).

e) Lions within the site

Few repeatable lion population estimates exist for the Bénoué Complex. However, it is assumed that the population has likely declined since the 1970's, due to widespread declines of their preferred prey species (Croes et al., 2011). In 2011, it was estimated that within the hunting zones of the complex, there are ~80 lions and all three national parks combined were estimated to hold ~120 lions (Croes et al., 2011). Croes et al. (2011), thereby estimated ~200 lions for the entire complex. A study by Bauer et al. (2015) found that there was no significant difference in density between national parks and hunting zones for lions. This survey estimated the national parks to have ~77 lions while the hunting concessions/zones had ~177 individuals.

Table 4.2. Lion population estimates for the Bénoué Complex in Cameroon

Year	Protected Area Name	Land use	Pop Estimate	Density_per 100km2	Reference
2007	Bénoué National Park	National Park	36 (23 – 49)	Unknown	Croes B, Funston P, Rasmussen G, Buij R, Saleh A, et al. (2011)
2008	Boubandjida National Park	National Park	63 (46 -81)	Unknown	
2010	Faro National Park	National Park	38 (25 – 42)	Unknown	
2007	Bénoué National Park Hunting Zone 1,2,3,4,7,8,9	Hunting zones	21 (5 – 38)	Unknown	
2008	Boubandjida National Park Hunting Zone 10,11,23	Hunting zones	12 (2 – 21)	Unknown	
2010	Faro National Park Hunting Zone	Hunting zones	4 (1 – 7)	Unknown	
2015	Bénoué ecosystem	Entire ecosystem	250 (243 – 258)	1.03	Bauer H., Kamgang S.A., Kirsten I., Tumenta P., Saleh A., Henschel P. & Sillero– Zubiri C. 2015.
2015	Faro Block	Hunting zones	112 (102 – 122)	1.39	
2015	Bénoué National Park	National Park	82 (75 – 89)	1.28	
2015	Boubandjida Block	Hunting zones	57 (51 -64)	0.59	
2015	Bénoué ecosystem national parks	National Park	72 (61 – 83)	0.99	
2015	Bénoué ecosystem Hunting Zones	Hunting zones	177 (170 – 184)	1.05	
2004	Bouba Ndjida National Park – southern sector	National Park	40	0.028	Bauer, H., 2007.
2004	Bouba Ndjida National Park	National Park	60		Bauer, H., 2007.
2017	Bouba Ndjida National Park and adjoining hunting zones	Entire ecosystem	66	0.898083	Kirsten, I., Bakker, E., Kamgang, S & de Iongh, H. 2017

2010	Bénoué Complex – National Parks	National Park	137 (94 – 172)	1.81 (1.17-2.45)	Croes B, Funston P, Rasmussen G, Buij R, Saleh A, et al. (2011)
2010	Bénoué Complex – Hunting Zones	Hunting zones	81 (17 – 145)	0.56 (0.12-100)	

A spoor study by Bakker et al. (2020) found that lion abundance has declined over time across the complex. Spatial analysis revealed that spoor abundances also varied significantly across different areas within the Bénoué Complex (Bakker et al., 2020). This trend was also observed between different management types. Spoor densities were notably higher in Bouba Ndjida National Park and in the hunting zones surrounding Faro (Bakker et al., 2020). Bakker et al. (2020) found higher lion spoor densities in the Bouba National Park compared with the neighbouring hunting zones which may be the result of increased prey availability.

f) Resource use and trophy hunting

Local communities have relied on the Bénoué Complex for various resources, including firewood, thatch, fish, gold, medicinal plants, grazing land for livestock, and bushmeat (Croes et al., 2011). Bushmeat accounts for approximately 24% of the animal protein consumed in the region. With the North Province experiencing a population growth rate of 5.1%, the Bénoué Complex is highly vulnerable to over-exploitation and encroachment (Croes et al., 2011). There are approximately 26 villages (ca. 25,000 inhabitants) within the Bénoué Complex.

Lion hunting in Cameroon is tightly regulated under the country's wildlife laws, primarily governed by "Law No. 94/01 of January 20, 1994" and has been practices in the area for decades (Bauer, Kamgang, et al., 2016). Hunters are required to obtain permits from the Ministry of Forestry and Wildlife (MINFOF), which sets annual quotas based on population assessments to prevent overhunting. Hunting seasons are defined to avoid impacting breeding periods, and methods such as baiting and hunting from vehicles are prohibited to ensure ethical practices. MINFOF, along with conservation organizations, monitors hunting activities and enforces regulations through patrols and inspections. Additionally, local communities often assist in monitoring and reporting illegal activities, contributing to the sustainable management of lion populations and overall wildlife conservation in the region.

The lion hunting quota was approximately 30 individuals per year (Bauer, Kamgang, et al., 2016; Croes et al., 2011). Quota setting is not based on robust and reliable data that has been obtained through scientific means (Croes et al., 2011). However, in response to recent studies (Bauer et al., 2015), the quota was reduced to 11 and then raised to 14 individuals per annum (Bakker et al., 2020). As a result, managers of the relevant hunting concessions could obtain a quota of up to three lions, based on the concessions own wildlife monitoring figures (Croes et al., 2011). Lion trophies account for 60% of the number of large carnivores hunted in the Bénoué Complex (Croes et al., 2011). It is estimated that hunting zones would be two male lions (over the age of five) per year at the abundance estimates achieved in 2011 (~200 individuals; Croes et al. 2011). In 2011, an immediate moratorium was recommended for a period of five years to provide the lion population in the complex the opportunity to recover (Croes et al., 2011). This same study recommended hunting quota settings should be based on scientific survey work. Alternatively, in case scientific quota setting cannot be implemented, a restricted lion quota based on a maximum off-take (e.g. 0.5–1.0/1000 km2), with a minimum 6-year age limit for hunted individuals should be implemented (Croes et al., 2011).

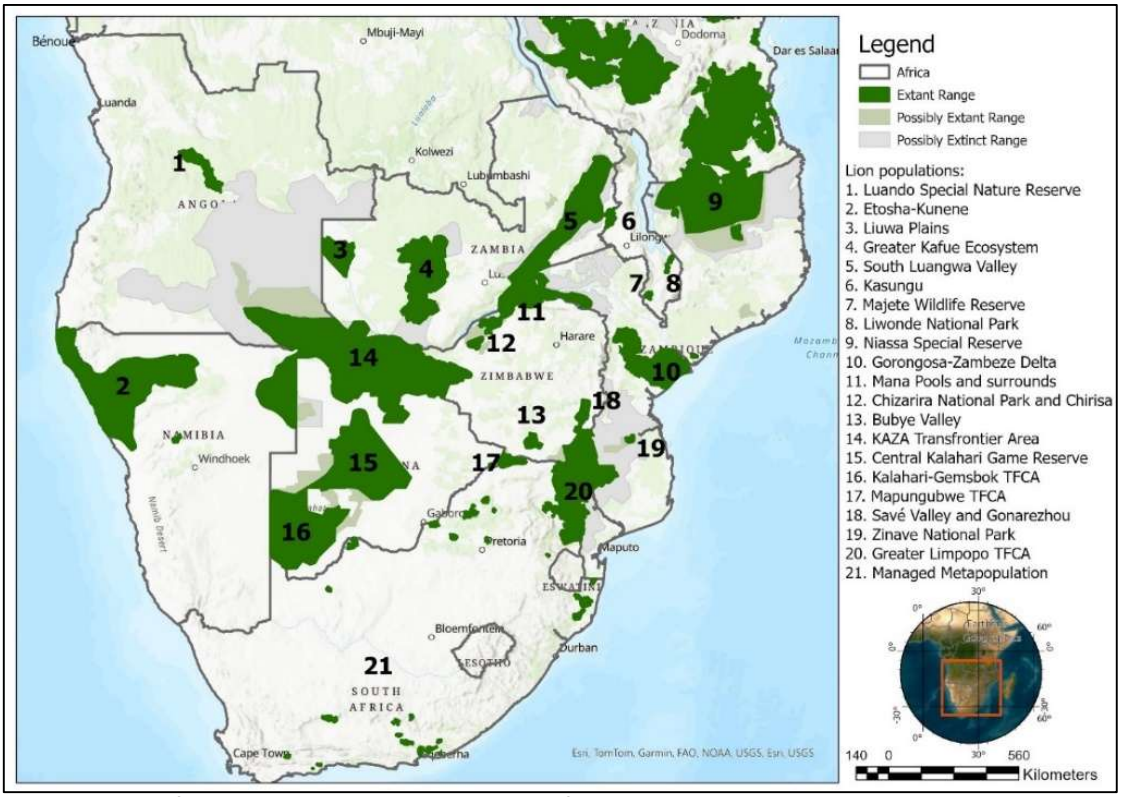
A study by Bauer et al. (2015) found that there was no significant difference in density between national parks for lions. This same study found that the quota for lions is potentially set higher

than it should be as the quotas are inadequately regulated.

3. Southern Africa

Southern Africa, a region characterized by vast savannas, diverse landscapes, and extensive wildlife reserves, is a critical stronghold for lion populations on the continent (Bauer, Packer, et al., 2016; Riggio et al., 2013). This region includes several key conservation areas, such as the Kruger National Park in South Africa and the Okavango Delta in Botswana, which support some of the largest and most stable lion populations in Africa (Funston 2014). However, Southern Africa also faces conservation challenges, including habitat fragmentation, human-wildlife conflict, and the impacts of poaching (Nicholson 2024). Despite these pressures, the region has made significant strides in conservation through transboundary initiatives and community-based management practices (Chitakira et al., 2022). These efforts are essential for maintaining healthy lion populations and preserving the ecological integrity of Southern Africa's ecosystems.

Fig. 4.6 Lion populations in Southern Africa.



In Southern Africa, lions are present in several fenced reserves in Malawi where they have been reintroduced, though each population comprises fewer than 50 individuals (S. Nicholson, Bauer, et al., 2023). In Zambia, lions are found in Kafue National Park, Liuwa Plains National Park, Sioma Ngwezi National Park, and the South Luangwa Valley, but are believed to have been recently extirpated from Northern Zambia (Nicholson, Bauer, et al., 2023). Namibia hosts lions in Etosha National Park, along the Skeleton Coast, and in the Kunene and Zambezi regions. South Africa's largest lion populations are located in the Transfrontier Parks of Kruger and Kalahari Gemsbok National Park, as well as within a large network of managed fenced reserves. In Botswana, lions inhabit the Central Kalahari and Okavango Delta regions. Zimbabwe's largest lion population is found in the Hwange ecosystem, with additional populations in Gonarezhou National Park and the surrounding areas, including Savé Valley Conservancy and Bubye Valley Conservancy, a significant fenced protected area (Groom et al., 2014; Mandisodza-Chikerema et al., 2022). Lions also occur in northern Zimbabwe within the Zambezi Valley protected area complex, bordering Zambia, and in areas south of Lake

Kariba (Van Der Meer et al., 2016). In Mozambique, lions have been largely extirpated from their historical range, including Quirimbus National Park and Tete Province (Nicholson, Bauer, et al., 2023). The largest remaining population in Mozambique, estimated at over 800 lions, is found in Niassa Reserve, with additional populations in the Zambezi Delta, extending north towards Coutada 9, Limpopo National Park, Lebombo Conservancy, Zinave National Park, and a restricted area south of Tete Province.

3.1 Mozambique

Mozambique, with a population of approximately 33 million people and a human density of about 28 individuals /km2, is characterized by its vast coastline along the Indian Ocean, diverse ecosystems, and significant biodiversity (Ngwenya, 2024). The country is home to critical conservation areas such as the Gorongosa National Park and the Niassa Reserve, which support a wide range of species, including elephants, lions, and marine life. However, Mozambique faces substantial environmental challenges, including deforestation, illegal wildlife trade, and the degradation of marine and coastal ecosystems (Mole & Newton, 2020). These issues are exacerbated by climate change, which increases the frequency of natural disasters such as cyclones and floods, further threatening the country's natural resources (Virtanen et al., 2022). Mozambique has implemented conservation initiatives, including community-based natural resource management and cross-border conservation projects, yet challenges in enforcement and sustainable development persist (Everatt et al., 2014; Mole & Newton, 2020). Ensuring the conservation and sustainable use of Mozambique's biodiversity is crucial for both the country's ecological stability and the well-being of its population.

Lion populations in Mozambique are relatively stable but populations are under threat from various anthropogenic threats (Nicholson 2024). These threats include targeted poaching for parts, bycatch in snares, human-wildlife conflict and poaching (Anderson & Pariela, 2005; K. T. Everatt et al., 2014; Mole & Newton, 2020). The largest lion population within the country occurs in Niassa Special Reserve where lions number ~1,000 individuals (S. Nicholson, Bauer, et al., 2023). Gorongosa National Park's lion population has increased in the last decade following increased monitoring and conservation efforts and as a result, the population is ~180 individuals (Bouley et al., 2018). Zambeze Delta (made up of several Coutadas) reintroduced lions in 2018 and now have an increasing population of ~60 individuals (S. Nicholson, Bauer, et al., 2023).

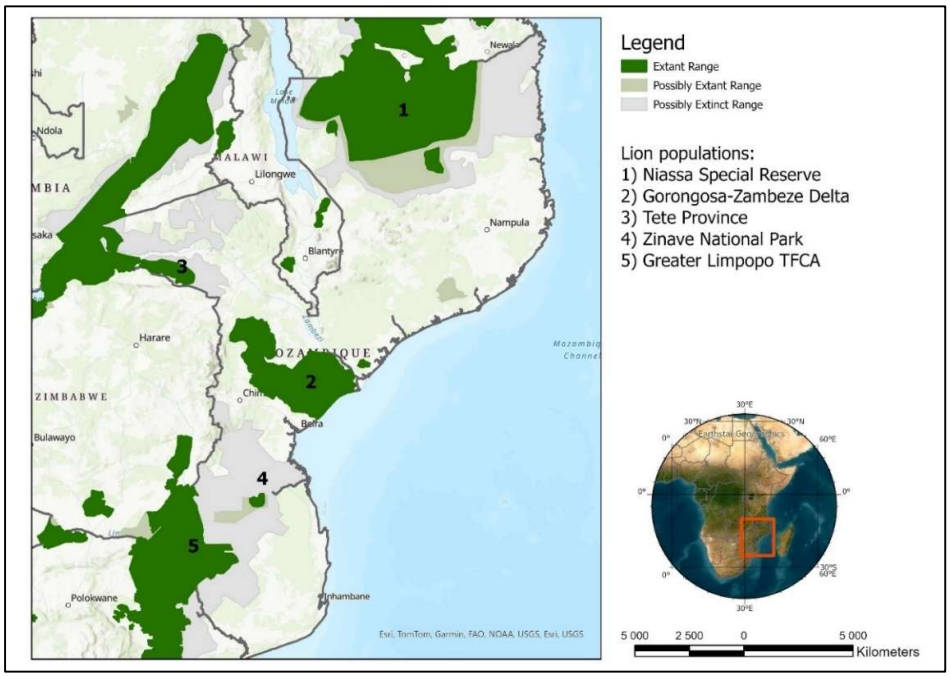


Fig. 4.7. Lion populations in Mozambique.

Lions have recently recolonized the sanctuary area of Zinave National Park, although this population is a dispersal group of male lions (Abrao, Pers Comm. 2024). Lions still remain in Tete province although their distribution and population within the province is unknown, and survey work is required. Finally, lions occur at low densities in the Limpopo National Park and on the community areas surrounding it, however these lions are under severe pressure from human-wildlife conflict and do not number more than 50 individuals (K. Everatt et al., 2019; K. T. Everatt et al., 2014).

Landscape: Niassa National Reserve

Niassa National Reserve, situated in northern Mozambique, represents one of Africa's most expansive and ecologically significant conservation areas (Allan et al., 2017; Baldus & Hahn, 2009). The reserve was initially proclaimed in 1954, but then abandoned between 1975 and 1992 during Mozambique's civil conflict (Allan et al., 2017). Once a peace accord was signed, the Mozambican government made a series of agreements with private companies and nongovernmental organisations (NGOs) to manage Niassa. Encompassing approximately 42,000 km2 (Begg et al., 2018), this reserve is characterized by a diverse array of ecosystems, including Miombo woodlands, riverine forests, and granite inselbergs. It serves as a critical refuge for a wide range of wildlife species in addition to lions, such as African elephants and African wild dogs, both of which are classed as Endangered on the IUCN Red List. Niassa's largely undisturbed landscapes not only contribute to global biodiversity but also support ongoing conservation initiatives aimed at safeguarding its unique fauna and flora. Niassa is connected to the Selous Game Reserve in Tanzania to its north, via the Selous-Niassa corridor (Baldus & Hahn, 2009). This corridor allows wildlife to move between the two reserves (Baldus & Hahn, 2009). The reserve sustains the livelihoods of more than 40,000 people who utilise its natural resources (Allan et al., 2017). The reserve plays a pivotal role in preserving the cultural heritage of the indigenous communities that inhabit this remote region (Jones, 2005).

a) Habitat

Niassa falls within a high rainfall area and the vegetation is predominantly made up by Miombo woodlands (Anderson & Pariela, 2005). The reserve is dominated by extensive Miombo woodlands, a type of savanna woodland that is prevalent across southern Africa. These

woodlands consist mainly of tall trees, particularly species from the *Brachystegia* and *Julbernardia* genera, which create a dense canopy during the wet season and a more open landscape in the dry season (Baldus & Hahn, 2009).

Allan et al. (2017) analysed forest and woodland loss patterns in Niassa for a period between 2001 to 2014 using high-resolution global tree-cover change maps and compared these trends with those in the surrounding region. Their findings indicated that Niassa experienced an estimated loss of 108 km² of forest - representing 0.9 % of its total forest area of 11,970 km². Most of this loss (89 km²) could be attributed to the expansion of agriculture near settlements and along main roads (Allan et al., 2017). While this loss is significant, it is lower compared to

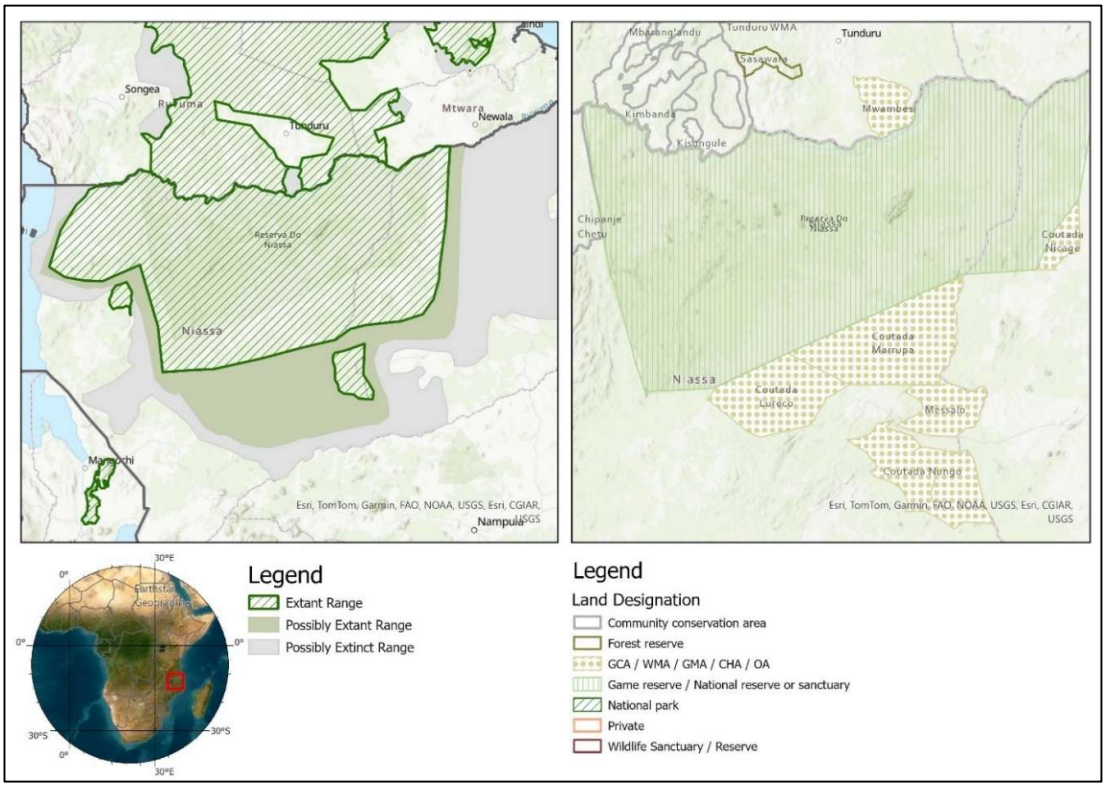


Fig. 4.11. Land use and lion range in Niassa

the broader region, where adjacent districts and provinces lost 200 km² (3.2 %) and 6,594 km² (5.7 %) of their forest areas, respectively. In the African context where deforestation rates are estimated to be five times higher than the global average, the results for Niassa are relatively encouraging. Despite these changes, Niassa's diverse Miombo ecosystems remain largely intact and capable of supporting large megafaunal populations (Allan et al., 2017). This can possibly be attributed to the fact that Niassa is a formally protected area which may have prevented large-scale land clearing that has occurred throughout the country.

b) Ecological significance

Niassa's vast and varied landscapes, encompassing miombo woodlands, riverine forests, and granite inselbergs, support a rich diversity of flora and fauna, many of which are endemic to the region (Baldus & Hahn, 2009). Niassa plays a vital role in maintaining ecological balance by preserving large, interconnected habitats that allow for the natural movement and genetic exchange of wildlife populations. This connectivity is crucial for the resilience of species in the face of environmental changes (Baldus & Hahn, 2009). Niassa's intact ecosystems contribute to essential ecological processes such as carbon sequestration, water regulation, and soil conservation (Macave et al., 2022), making it a globally important area for conservation efforts.

Niassa supports Mozambique's largest populations of threatened and endangered fauna, including viable populations of the African lion (800-1000 individuals) and the African wild dog (more than 350), as well as important populations of leopard and spotted hyaena (S. Nicholson, Bauer, et al., 2023; Riggio et al., 2013). The transboundary area encompassing Niassa and Selous holds the second largest African wild dog population remaining in Africa. In addition, Niassa Reserve provides the core and source of largely unprotected lion and African wild dog populations extending from the east coast of Mozambique to the western boundary with Malawi at Lake Niassa and extending 100 km southwards. The reserve is an important region for much of the country's herpetofauna. The granite inselbergs housed within the reserve are a stronghold for a breeding population of threatened Taita falcon (*Falco fasciinucha*).

c) Significant threats

Although the lion population occurs within a formally protected area, it is still threatened with many anthropogenic pressures, including human-wildlife conflicts, particularly with local communities involved in livestock farming, and significant threats from illegal hunting and poaching (Anderson & Pariela, 2005; K. Everatt et al., 2019; Mole & Newton, 2020). Other anthropogenic threats in Niassa including artisanal mining, land-use change, bushmeat poaching, commercial poaching, wildfires, climate change, and selective logging.

In recent years, the lion population in Mozambique has experienced an increase in targeted poaching for parts for the illegal wildlife trade (K. Everatt et al., 2019). Parts that are usually taken include the paws and teeth (K. Everatt et al., 2019). This threat has been increasing in Niassa since 2017 (Almeida et al. In prep).

Conservation strategies within the reserve are primarily aimed at addressing these conflicts, preserving critical habitats, and promoting sustainable hunting practices. These efforts are essential to ensure the long-term viability of the lion population in this ecologically significant area.

d) Management and land use

Niassa is divided into 18 management units which are allocated for ecotourism and sport hunting (Allan et al., 2017; Begg et al., 2018). Hunting fees fund 30% of the annual operational costs of the reserve as well as anti-poaching and management activities (Begg et al., 2018). Sustainable use of wildlife is permitted within Niassa, and eight concessions are currently leased for hunting tourism and two are vacant (Allan et al., 2017). One concession within Niassa is designated for community use, four are leased for photo tourism, one is vacant and the remaining two concessions are strictly protected for conservation purposes.

Until 2012, the reserve was managed by Sociedade de Gestão e Desenvolvimento da Reserva do Niassa (SRN) and has since been co--managed by Mozambique's National Administration for Conservation Areas (ANAC) and Wildlife Conservation Society (WCS) (Begg et al., 2018).

e) Lions within the site

Niassa is one of Africa's six lion populations with more than 1,000 lions (Riggio et al., 2013) and is one of the continent's lion strongholds. Between 1993 and 2015, Niassa's lion population is estimated to have increased by over 250% (Bauer et al., 2015; Bauer, Packer, et al., 2016). During the Mozambican Civil War, excessive bush-meat poaching caused significant prey depletion, possibly causing the reserves lion population to remain small. Following the end of the civil war, the lion population benefited from extensive ivory poaching which provided them with large quantities of elephant meat from poached individuals which could explain this rapid increase in population (Bauer, Packer, et al., 2016). Since 2012, the lion population has remained fairly stable (Table 4.3).

Table 4.3. Lion population estimates for Niassa Nature Reserve

Year	Protected Area	Population estimate
1993	Niassa Reserve	~380[1]
2005	Niassa Reserve	693 (577 - 810)[2]
2008	Niassa Reserve	871 (730 - 1,013) [2]
2012	Niassa Reserve	1071 (951 - 1,191) [2]
2015	Niassa Reserve	973 (842 - 1,104) [2]
2018	Niassa Reserve	932 (810 - 1,054) [2]

[1]Bauer H, Packer C, Funston P, Henschel P, Nowell K (2015) Panthera leo in the 2015. IUCN Red List of Threatened Species. Available at ww.iucnredlist.org/details/15951/0.
[2]Niassa Carnivore Project, TRT Conservation Foundation, 2018 Annual Report

f) Resource use and trophy hunting

Trophy hunting can legally occur across 27,986 km2 of the Niassa area; this includes six concessions designated since 2003 (covering 20,424 km2) and three concessions added for sport hunting in 2010–2011 (covering an additional 7,562 km2) (Begg et al., 2018). Depending on lion hunting quota allocations, hunting concessions vary between active and inactive each year (Begg et al., 2018).

The annual hunting quota for male lions in Niassa increased from 14 in 2003 to 22 in 2015, driven by the expansion of active hunting concessions and the corresponding increase in land available for hunting (Begg et al., 2018). These proportional adjustments in the lion quota and hunting areas maintained a relatively stable land area per lion allocated throughout the study period, with a maximum variation of ± 278 km² per lion allocated annually, and an overall range of 924 to 1,362 km² per lion allocated, along with the offtake per 1,000 km². Between 2003 – 2015, 138 lion trophy hunts were conducted in Niassa, and 87 lion trophies were harvested (Begg et al., 2018).

Table 4.4. Hunting quotas, concessions and harvest outcomes from 2003 to 2015 in Niassa National Reserve, Mozambique (from Begg et al. 2018).

	Year												
Metric	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Lion quota	14	16	16	16	15	16	16	19	21	21	22	22	22
Number of active hunting concessions	4	5	5	6	6	6	7	8	8	9	9	7	8
Area of active hunting concessions (km^2)	12,936	17,119	17,119	20,424	20,424	20,424	23,064	25,735	25,735	27,986	27,936	21,621	24,531
Number of lion hunts	11	10	12	12	12	11	13	11	9	9	13	6	9
Number of lions harvested (offtake)	11	9	9	9	8	4	6	8	8	6	10	4	6

The Niassa Carnivore Project, in agreement with the Niassa managing authority, has been monitoring lion trophy hunting and the ageing of hunted individuals (Begg et al., 2018). The minimum age threshold for lions in Mozambique is six years old and only males can be legally hunted. Under the points system, operators are "penalised" with quota reductions in the following season if underage lions are hunted or "rewarded" with quota increases if all the lions hunted are > 6 years (Begg et al., 2018). If a hunting operator harvests one lion aged between 4 to 6 years within a season, it is considered a minor error that does not lead to a reduced quota for the following year (Begg et al., 2018). If all harvested lions are within this age range, the quota will be reduced. This system encourages hunters to target older lions, which are easier to identify visually, rather than younger lions at the minimum age, who are harder to accurately

assess (Begg et al., 2018). New hunting concession areas are initially assigned a quota of two lions to prevent overhunting in the first year and to allow new operators time to develop the skill of accurately aging lions (Begg et al., 2018). The quota can only be increased if both harvested lions are older than six years.

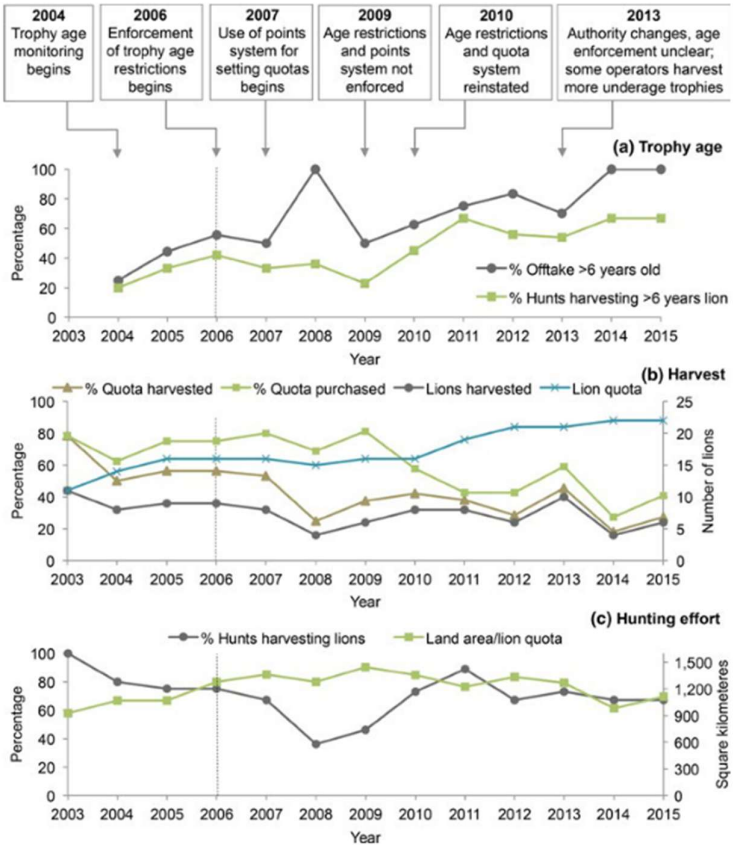


Fig. 4.12. Enforcement of age restrictions and quotas in Niassa National Reserve, Mozambique between 2003 and 2015 and responses in (a) trophy age, (b) harvests and quotas, and (c) hunting effort. Dotted vertical line represents the year when age restrictions were first enforced (2006). Taken from a study by Begg et al. (2018).

A study by Begg et al. (2018) found that age restrictions combined with the Niassa Lion Points system (which is an incentive-based points system) regulated sport hunting and reduced pressure on the lion population. The researchers show that implementing age restrictions when trophy hunting lions can enhance the selectivity in trophy hunting, leading to reduced trophy offtakes (Begg et al., 2018). This approach helps mitigate the risk of unsustainable hunting practices that could harm species populations. The authors attributed the successful implementation of the management system to:

1) committed, consistent enforcement by management authorities,

2) genuine involvement of all stakeholders from the start,

3) annual auditing by an independent third party,

4) the reliable, transparent, straightforward ageing process and

5) the simple, pragmatic points system for incentivising hunter compliance.

The Niassa Lion Points system, through the Niassa Carnivore Project, demonstrated that the successful implementation of an age-based hunting system effectively incentivised hunters to select older individuals, reduce the total offtakes and the overall risk of unsustainable harvests (Begg et al., 2018). It should be noted that this demonstrates that the willingness and ability of hunting operators to harvest suitably aged lions is, in part, due to concerted efforts by NCP to engage with local hunting operators and professional hunters from the start to address concerns, build trust and educate hunters on aging lions. This is an effective case to demonstrate that the cooperation between local NGOs, government and hunting organizations can achieve sustainable hunting practices. Other examples of legal livelihood activities in Niassa National Reserve include fishing and honey collection. However, many households also depend on illegal subsistence bushmeat hunting, and some generate income through artisanal mining and other unlawful activities.

Niassa has a Community-Based Natural Resource Management (CBNRM) programme. The project was initially created to ease the management issues that arose from having communities reside within the reserve (Jones, 2005). This approach involves local communities in the management and conservation of natural resources within the reserve. The program aims to balance conservation efforts with the socioeconomic needs of the people living in and around Niassa. Under the CBNRM framework, communities are given a role in decision-making processes related to the use and protection of natural resources. This includes involvement in sustainable hunting, fishing, and the management of other resources such as timber and non-timber forest products. The goal is to create incentives for communities to participate in conservation by ensuring they receive direct benefits, such as income from legal resource use and employment opportunities (Jones, 2005). Niassa's CBNRM initiatives also focus on reducing human-wildlife conflict, improving livelihoods through sustainable practices, and promoting environmental education. By involving local communities in conservation efforts, the programme seeks to enhance the long-term sustainability of the reserve's ecosystems while supporting the well-being of its residents. One such example of a CBNRM initiative in Niassa is a beekeeping project within Niassa. Niassa Special Reserve's beekeeping project is a key component of its CBNRM strategy, aimed at providing sustainable livelihoods for local communities while promoting conservation. The project involves training community members in modern beekeeping techniques, enabling them to produce honey as a source of income (Jones, 2005). By offering an alternative to illegal activities such as poaching or logging, the beekeeping initiative not only improves household incomes but also fosters a deeper connection between the communities and the environment. The project helps reduce human-wildlife conflict, as the presence of beehives deters elephants from raiding crops, and encourages the conservation of natural habitats, as healthy forests are crucial for successful beekeeping (Jones, 2005). Through this initiative, the reserve can promote both economic development and the protection of its rich biodiversity.

3.2 South Africa

South Africa has a population of ~64 million people and a human density of about 53 individuals / km2 (https://worldpopulationreview.com/countries/south-africa). It is recognized for its rich biodiversity and diverse ecosystems, ranging from savannas and grasslands to coastal and marine environments. The country is home to several globally significant conservation areas, including the Kruger National Park and the Cape Floral Region, both of which harbour unique species and play a vital role in global biodiversity conservation (Department of Environmental Affairs, 2008; Holechek & Valdez, 2018). However, South Africa faces environmental challenges such as habitat loss, pollution, and the impacts of climate change, which threaten its natural resources and wildlife (Nicholson 2024). The country has implemented extensive conservation programmes and legal frameworks aimed at protecting its biodiversity, yet issues like poaching and land degradation persist (Department of Environmental Affairs, 2008). In addition, South Africa is actively engaged in transboundary conservation initiatives, which are crucial for the preservation of migratory species and the maintenance of ecological corridors. The continued success of these efforts is essential for ensuring the long-term sustainability of South Africa's ecosystems and the protection of its unique wildlife.

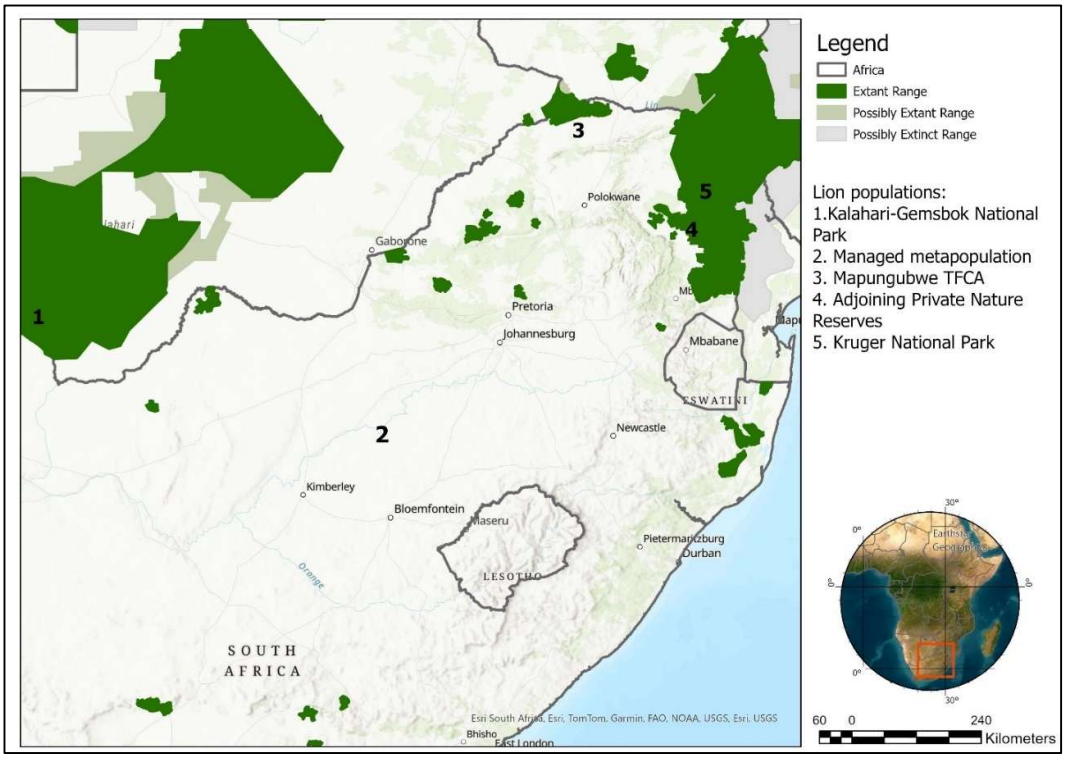


Fig. 4.8. Lion populations in South Africa

South Africa is very broadly considered to have two lion populations (Miller et al., 2016; S. Nicholson, Bauer, et al., 2023). The first is a largely wild and unmanaged population which exists in the Kruger National Park (transboundary with Mozambique) and the Kalahari Gemsbok National Park (transboundary with Botswana). The second is an intensively managed metapopulation which consists of more than 50 small (<500 km2), fenced reserves across the country (Miller et al., 2016; Miller, S et al., 2013). In the last decade, lion populations in the country have increased, resulting in the country's lion population being listed as "Least Concern" (Miller et al., 2016). Based on an assessment done by Selier et al. (2024) the metapopulation approach to wild lion management in small, fenced reserves is effective at conserving lions and contributing to lion conservation more broadly.

Landscape: Kruger National Park

The Kruger National Park (hereafter Kruger) is a 19,194 km2 national park in the low-lying savannah of the eastern areas of South Africa. The Kruger forms part of a Transfrontier Conservation Area with Limpopo National Park in Mozambique. The Kruger is one of Africa's largest national parks, and has a rich history dating back to its establishment in 1898 as Sabie Game Reserve by then South African Republic president Paul Kruger (Peake & Carter, 2014).

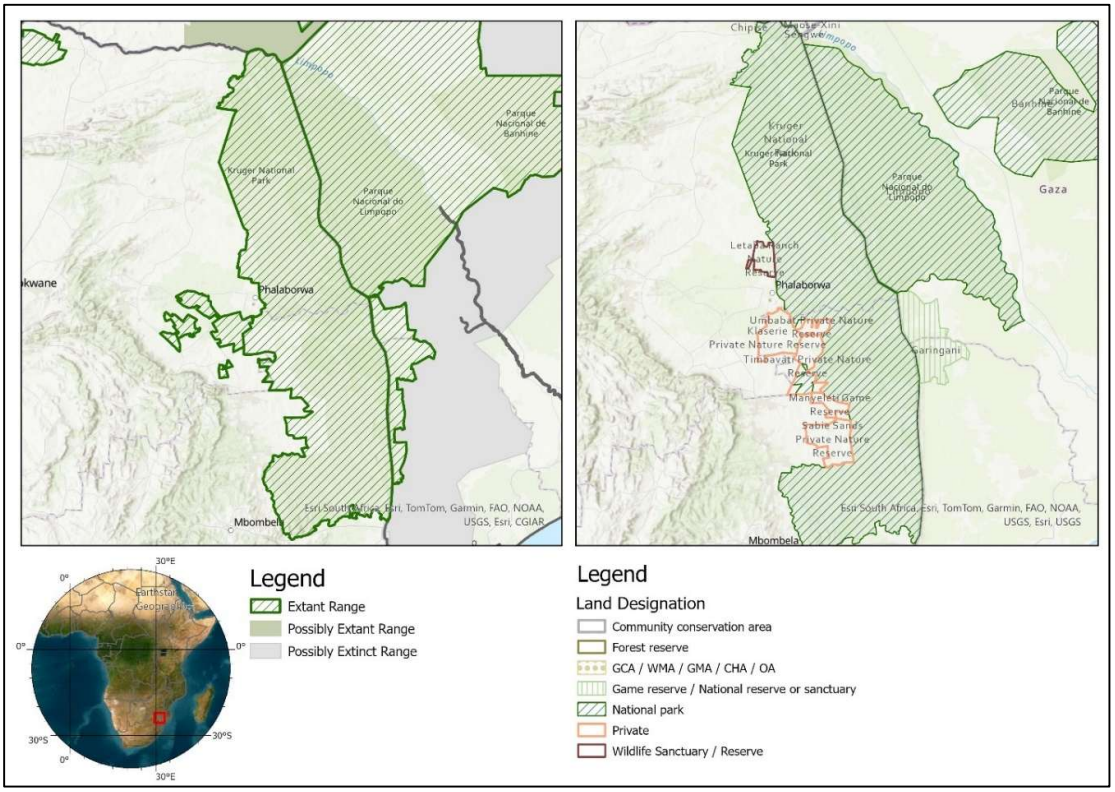


Fig. 4.13. Land use types and lion distribution in the Kruger National Park

Originally founded as the Sabie Game Reserve to protect wildlife from over-exploitation, it expanded over the years to become a cornerstone of South African conservation. In 1926, it was renamed Kruger National Park when it officially became the country's first national park. Spanning nearly 20,000 km2, the park has played a pivotal role in preserving Africa's "Big Five" and other species, making it a renowned destination for wildlife enthusiasts worldwide. By 1976, the park was fenced in its entirety, defined by political and managerial incentives rather than ecological boundaries. Its history reflects a broader evolution in wildlife conservation and the development of sustainable tourism in South Africa.

The Kruger was officially gazetted as a national park on 2 September 1926 (Government Gazette No 1576 dated 2 September 1926). This marked the formal establishment of the park under the National Parks Act by the South African government, following its earlier designation in 1898. The gazetting of the park was a significant step in the development of South Africa's national parks system and in the protection of the region's wildlife and natural landscapes.

a) Habitat

The Kruger is located within two biomes: the Savanna and Grassland Biome. The vegetation in the park is generally made up of grassy plains and open savanna in the southern section of the park to mopane woodlands from the Orpen area northwards (Watermeyer, 2012). The park features a diverse range of habitats, including savannas, woodlands, and riverine forests, which support a wide variety of wildlife species. The park is characterized by a mix of grasslands and scattered trees, with several major rivers, such as the Sabie and Olifants, providing vital water sources. This variety of ecosystems within the park creates a rich biodiversity, making it an ideal environment for numerous plant and animal species to thrive.

The vegetation on the southern basaltic region of the Kruger primarily consists of wooded savannah, where *Sclerocarya caffra* and *Acacia nigrescens* are the dominant trees (Young-Overton et al., 2014). On the southern granitic areas, a mix of Combretum species and Acacia species prevails (Ferreira & Viljoen, 2022). In the northern regions, *Colophospermum mopane*

woodland is the predominant species on both basaltic and granitic substrates. However, taller *C. mopane*, along with Combretum and Acacia species, are more frequently found on granitic soils, while the basaltic soils support more stunted, or shrub-like *C. mopane* sparsely mixed with *S. caffra.*

b) Ecological significance

The ecological significance of the Kruger is predominantly its role as a major biodiversity hotspot, preserving a wide array of species and ecosystems within its boundaries. There are almost 2,000 plant species in the park, including about 400 trees and shrubs, and 220 grasses. Among these, are 4,000-year-old Baobab trees (Peake and Carter, 2014) and one of the largest remaining wild populations of the Pepper-bark tree (*Warburgia salutaris*) (Scheepers et al., 2011). The park protects a vast range of habitats, from savannas and woodlands to riverine environments, supporting iconic wildlife like the "Big Five" and numerous other species. It serves as a critical refuge for wildlife, allowing for the natural processes of predator-prey dynamics, migration, and breeding to occur undisturbed. Kruger is also home to more than 250 culturally significant sites, 130 rock art sites and many archeologically important sites including those where dinosaur fossils have been discovered and areas used during the Early, Middle and Late Stone Ages (Peake & Carter, 2014). Additionally, Kruger plays a key role in regional ecological stability, acting as a carbon sink and contributing to climate regulation, while also supporting important research and conservation efforts that benefit broader environmental preservation initiatives. Kruger is known for its vast biodiversity and significant role in carbon sequestration (Yessoufou, 2017). Kruger potentially stores a mean density of up to 104 tonnes C ha−1, with an above-ground carbon density of 70 tonnes C ha−1 (Yessoufou, 2017). This highlights the park's critical contribution to mitigating climate change through carbon storage in its extensive savanna and woodland ecosystems.

c) Significant threats

Even though the Kruger is a formally protected area, there are still various anthropogenic threats to lions (Nicholson 2024). An emerging and concerning threat is the targeted poaching of lions for body parts. South African National Parks (SANParks) has confirmed that lions are being intentionally poisoned by poachers in the northern Kruger Park for body parts, presumably for the 'muti' (local cultural) trade. Between January 2020 to July 2023, a total of eight lions were found poisoned in the Xanatseni north region of the Kruger. This trend has continued in 2024 with several more lions being poached, with body parts removed. The parts are predominantly the paws, teeth and in some cases, the internal organs. Snaring for bushmeat has also become prolific in many areas of the Kruger which has resulted in hundreds of wildlife mortalities, some of which are lions. SANParks confirmed that between January 2023 to June 2023, a total of 1,987 snares were removed in the Xanatseni north region (Pafuri, Punda Maria, Shingwedzi, Vlakteplaas, Shangoni and Woodlands sections). Lion-human conflict around the boundaries of Kruger (including with Limpopo National Park in Mozambique) results in either lions being killed illegally or as Damage Causing Animals or being relocated to other areas of Kruger. Everatt et al. (2019) recorded a total of 49 human-induced lion mortalities along Kruger and Limpopo National Park boundary and surrounding areas between October 2011 and December 2018 (Fig. 4.14). These included both human-wildlife conflict and poaching incidents.

d) Management and land use

The properties around the Kruger are made up of a matrix of various land use types (Page-Nicholson et al., 2017). These include private and communal lands and various human settlements (Page-Nicholson et al., 2017). There are approximately 2.9 million people who live within 50 km of the Greater Kruger National Park's western boundary fence (Chidakel et al., 2020), living in ~120 different villages neighbouring the park (Watermeyer, 2012). Each community varies in distance from the boundary of the park. Communal and pastoral land border the south-western corner of the park, north of Phalaborwa. The western and southern boundaries of the park are predominantly (66%) bordered by communal lands and private

agricultural farms which are managed by South Africa's Department of Agriculture, Land Reform and Rural Development (formerly – Department of Agriculture, Forestry and Fisheries) (Watermeyer, 2012). Private nature reserves, wildlife ranching farms, estates and private lodges are the main land use types bordering the boundary (~34% of total boundary) between Phalaborwa and Paul Kruger Gates and stretching further west (Watermeyer, 2012). These areas are considered to be the "Adjoining Private Nature Reserves" (APNRs) and have been open to the park for the last 20 years when the fences were removed to add an additional ~3,000 km2 of protected land to the Kruger ecosystem. The southern boundary is approximately 122 km and the area south of the Kruger at this point is solely made up of sugar cane and fruit farms (Watermeyer, 2012). In addition, the creation of the Greater Limpopo Transfrontier Park in 2002 has added 36,000 km2 of conservation land to Kruger. This expansion connects Kruger National Park in South Africa with the Limpopo National Park in Mozambique and Gonarezhou National Park in Zimbabwe, creating a vast protected area aimed at promoting biodiversity and cross-border conservation efforts.

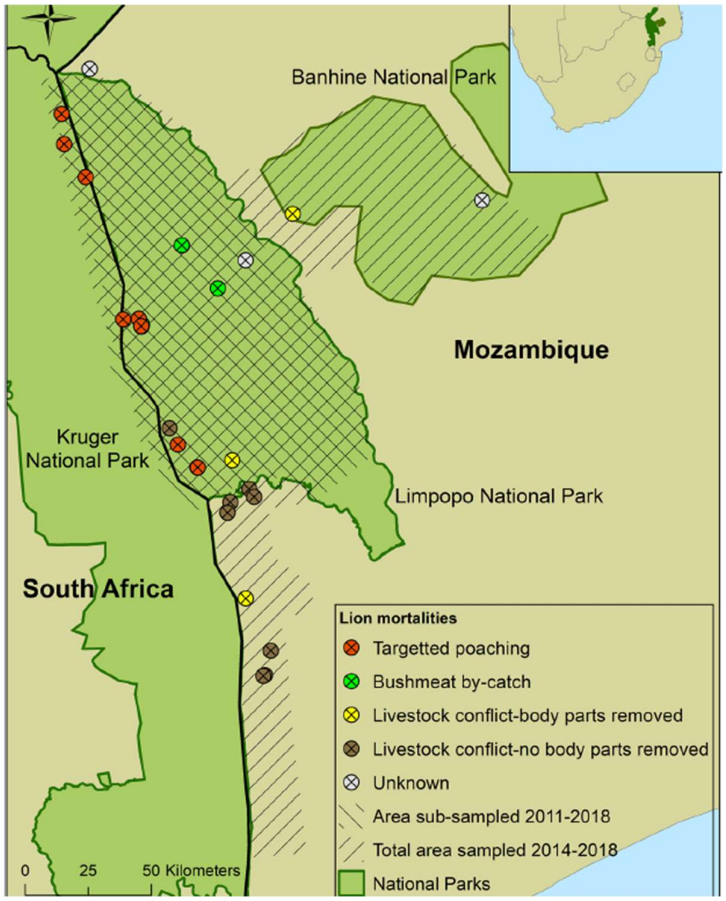


Fig. 4.14. Lion mortality events as described in Everatt et al. (2019).

The Kruger generates significant revenue primarily through tourism, including entrance fees, accommodation, guided tours, and other services. Although exact figures can vary from year to year, it's estimated that the park generates hundreds of millions of South African Rand annually. For instance, in recent years, Kruger's revenue has been reported to be in the range of approximately ZAR 1.5 billion to ZAR 2 billion per year. This income is vital for the park's conservation efforts, infrastructure maintenance, and community development programs. In total, the Kruger contributed ZAR 2.6 billion to South Africa's Gross Domestic Profit for 2016/17, including 55 million USD (ZAR 975 million) in tax revenue (Chidakel et al., 2020). When chain multipliers and induced spending of wage-earners is considered, then this contribution is estimated to almost triple to ~ZAR 6.6 billion to the national economy (Chidakel

et al., 2020). A study by Chidakel et al. (2020) found that the "partnership in the Greater Kruger National Park between private reserves and the national park is key, not only for branding but for stabilizing the system's high-performing economic engine with political and cultural ballast."

Table 4.5. Estimated summary figures for the Greater Kruger National Park for the 2016/2017 season. Source: (Chidakel et al., 2020)**.**

Direct contribution to GDP	R 2.6 billion
Total contribution to GDP (including multipliers)	R 6.6 billion
Direct tax revenue	R 1.0 billion
Total tax revenue (including multipliers)	R 1.5 billion
Employment created	10,388 jobs
Wages and salaries	R 1.2 billion
Private reserves (±12% land area)	± 60% contribution of revenue and jobs
Total bed nights and day visits	3.5 million

The history of Kruger Park's establishment can be briefly summarised as follows:

1) 1898 – proclamation of Government Game Reserve between Sabie and Crocodile rivers, but during the ensuing Anglo-Boer war (South African) the proclamation was nullified;

2) 1902 – after the war the area was reproclaimed as the Sabie Game Reserve;

3) 1903 – Shingwedzi Game reserve proclaimed between Letaba and Limpopo Rivers;

4) 1916 – Sabie and Shingwedzi GRs consolidated; and

5) 1926 – National Parks Act was promulgated and KNP was formally proclaimed.

e) Lions within the site

Lions have historically been present throughout much of Kruger which is considered as a stronghold for lions in Africa (Riggio et al., 2013). Of the 66 Lion Conservation Units that remained in Africa in 2013, only 19 were viable and six were thought to have more than 1,000 individuals (Riggio et al., 2013). The entire Greater Limpopo Transfrontier Conservation Area is estimated to have approximately 2,000 individuals (Bauer & Van Der Merwe, 2004; Ferreira & Funston, 2010).

Even though lion population estimates for the Kruger population exist, none of the earlier surveys (Smuts 1976, 1978; Mills 1995; Funston et al. 2003) were conducted at a park-wide scale but rather focused on the Central District (Table 4.6).

The lion population is considered fairly stable. Between 1976 and 2006, a growth rate of +0.3% was estimated for the Central District (Ferreira & Funston, 2010). The park's population significantly increased between 2008 and 2015 (Ferreira & Funston, 2020; Young-Overton et al., 2014) and subsequently stabilized in some areas (Ferreira & Viljoen, 2022). However, increasing anthropogenic threats within the park, especially in the north, may be placing increasing pressure on this population which may result in population declines in the future.

Table 4.6. Lion population estimates for Kruger National Park

Year	Protected Area Name	Population Estimate	Reference
1925	Kruger National Park - Central District	205	Ferreira, S.M., & Funston, P.J. 2010. Estimating lion population variables: prey and disease effects in Kruger National Park, South Africa. Wildlife Research: 37:194–206.
1956	Kruger National Park - Central District	454	
1976	Kruger National Park - Central District	708	
2006	Kruger National Park - Central District	632 (568 - 696)	
2006	Kruger National Park	1,684 (1,617 - 1,751)	
2008	Kruger National Park	1,016 (862 - 1,180)	Young-Overton, K.D., Funston, P.J. & Ferreira, S.M. (2014). Rainfall driven changes in behavioural responses confound measuring trends in lion population size. Wildlife Biology, 20, 344–355.
2015	Kruger National Park	1,803 (1,715 - 1,891)	Ferreira SM and Funston P. 2020. African Lion and Spotted Hyaena Changes in Kruger national Park, South Africa. African Studies Quarterly, 19(2): 37-50.

f) Resource use and trophy hunting

As the Kruger is a South African National Park, hunting is strictly prohibited to conserve wildlife and maintain ecological balance. However, trophy hunting is permitted in some private game reserves and hunting concessions outside the boundaries of Kruger within the APNRs (Adjoining Private Nature Reserves), for example in Balule and Umbabat Private Nature Reserves. There it is regulated by South African laws and conservation guidelines. Kruger itself is dedicated to conservation, research, and eco-tourism, with a focus on protecting species like lions from exploitation.

3.3 Zambia

Zambia, with a population nearing 21.5 million and a relatively low human density of about 29 people / km^2 (https://worldpopulationreview.com/countries/zambia), is a country marked by its rich natural heritage and diverse ecosystems, and abundant natural resources (Mvula et al., 2024). The nation boasts renowned conservation areas such as South Luangwa and Kafue National Parks, which are vital for protecting key species, including large mammals like elephants and lions (Rosenblatt et al., 2014; White & Van Valkenburgh, 2022). Despite its natural wealth, Zambia faces significant environmental pressures, including widespread deforestation, soil erosion, and the adverse effects of climate change (Mvula et al., 2024). As agricultural expansion and human settlement increase, so does the frequency of human-wildlife conflicts, especially in regions adjacent to protected areas (Milupi et al., 2023; Phiri et al., 2024). The Zambian government, alongside local communities, has initiated various conservation strategies, including the development of wildlife corridors and sustainable land-use practices (Adeyanju et al., 2021). However, ensuring the balance between environmental conservation and the country's economic aspirations remains a complex and ongoing challenge.

Zambia is one of the few lion range States with population of lions that is considered viable (Mweetwa et al., 2018; Riggio et al., 2013). Lions in Zambia occur in a few remaining

populations, the largest being in the Luangwa Valley in eastern Zambia where there are ~600 individuals (Bauer et al., 2018; Mweetwa et al., 2018). The Greater Kafue Ecosystem has approximately 380 individuals (Bauer et al., 2018). Lower Zambezi borders northern Zimbabwe and Mozambique and lions likely number a few hundred, but rigorous surveys are needed (Bauer et al., 2018). Liuwa Plains National Park recently reintroduced lions and now have a population of ~20 individuals (S. Nicholson, Bauer, et al., 2023). A small population of lions occurs in Sioma Ngwezi National Park which forms part of the Kavango-Zambezi (KAZA) Transfrontier National Park (Fig. 4.9).

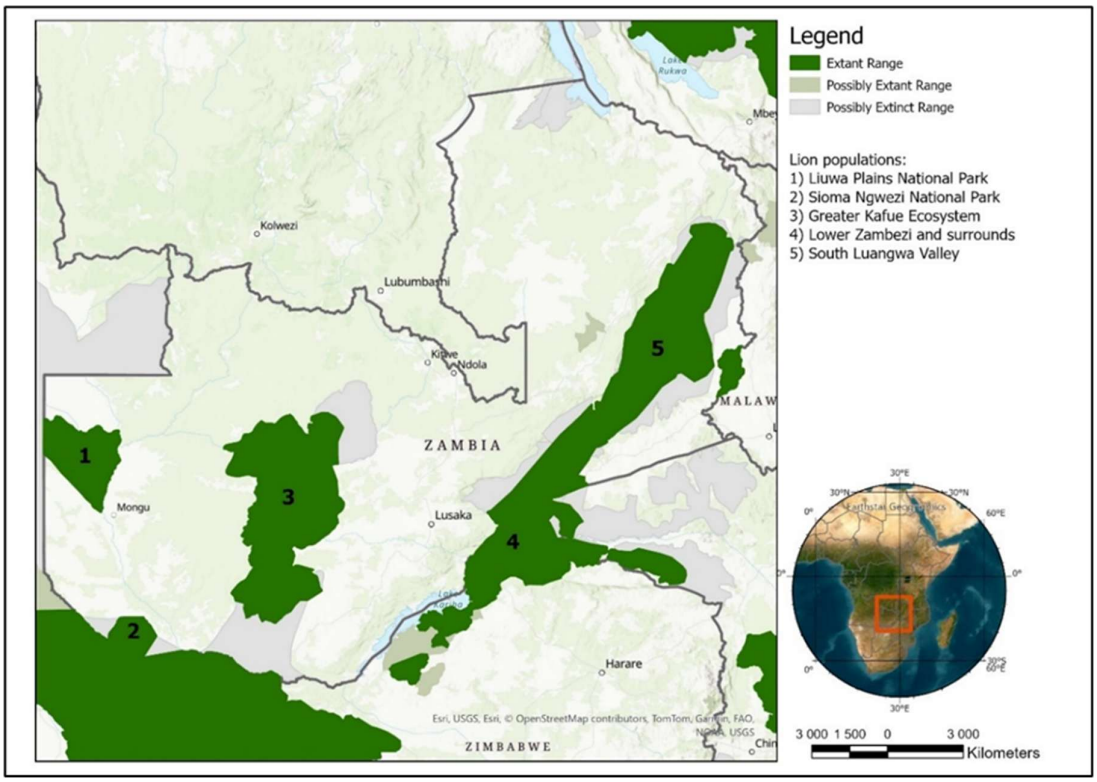


Fig. 4.9. Lion populations in Zambia.

Landscape: South Luangwa National Park

South Luangwa National Park, located in the Luangwa Valley of eastern Zambia, is a critical conservation area, recognized for its exceptional biodiversity and ecological significance (Rosenblatt et al., 2016; Zyambo et al., 2024). The unfenced park is ~9,050 km^2 and was initially designated as a game reserve in 1938, and its status was elevated to that of a national park in 1972. Surrounding the park are several Game Management Areas (GMAs), which were gazetted to function as buffer zones that mitigate human-wildlife conflict while promoting the sustainable use of wildlife resources. The GMAs play a vital role in maintaining ecological connectivity and supporting the dispersal of species between protected areas. Both the national park and the surrounding GMAs are managed by the Department of National Parks and Wildlife (DNPW), formerly known as the Zambia Wildlife Authority (ZAWA). Together, the GMAs and the South Luangwa National Park form the broader, South Luangwa Valley (Fig. 4.16). Management efforts focus on the conservation of biodiversity, the protection of habitats, and the involvement of local communities in sustainable resource utilization, thereby ensuring the long-term viability of the South Luangwa Valley. The national park itself and the surrounding GMAs are densely populated with ungulates (Mweetwa et al., 2018).

a) Habitat description

The South Luangwa Valley is characterized by a diverse and ecologically rich habitat. The valley features a mix of *Combretum* thicket, mopane forests, and savannah woodland, wetlands and *Terminalia-Erythrophleum (Chabwela et al., 2017)*, along with the Luangwa River. This valley is predominantly a low-lying floodplain interspersed with seasonal swamps and rivers, including the Luangwa River, which is a crucial water source for the area's wildlife (Chabwela et al., 2017). The landscape features a mosaic of habitats, including open grasslands, miombo woodlands, and dense riparian forests along the riverbanks (Nyirenda et al., 2013). The seasonal variations in water levels create dynamic and varied environments, from lush, green floodplains during the rainy season to dry, sparse landscapes in the dry season. These habitat types support a wide range of flora and fauna, contributing to the valley's reputation as one of Africa's premier wildlife destinations. Mopane woodlands (dominated by the species *Colophospermum mopane*), scrublands, open grasslands, and riparian woodlands are the most common vegetation types in the South Luangwa Valley (Mweetwa et al., 2018).

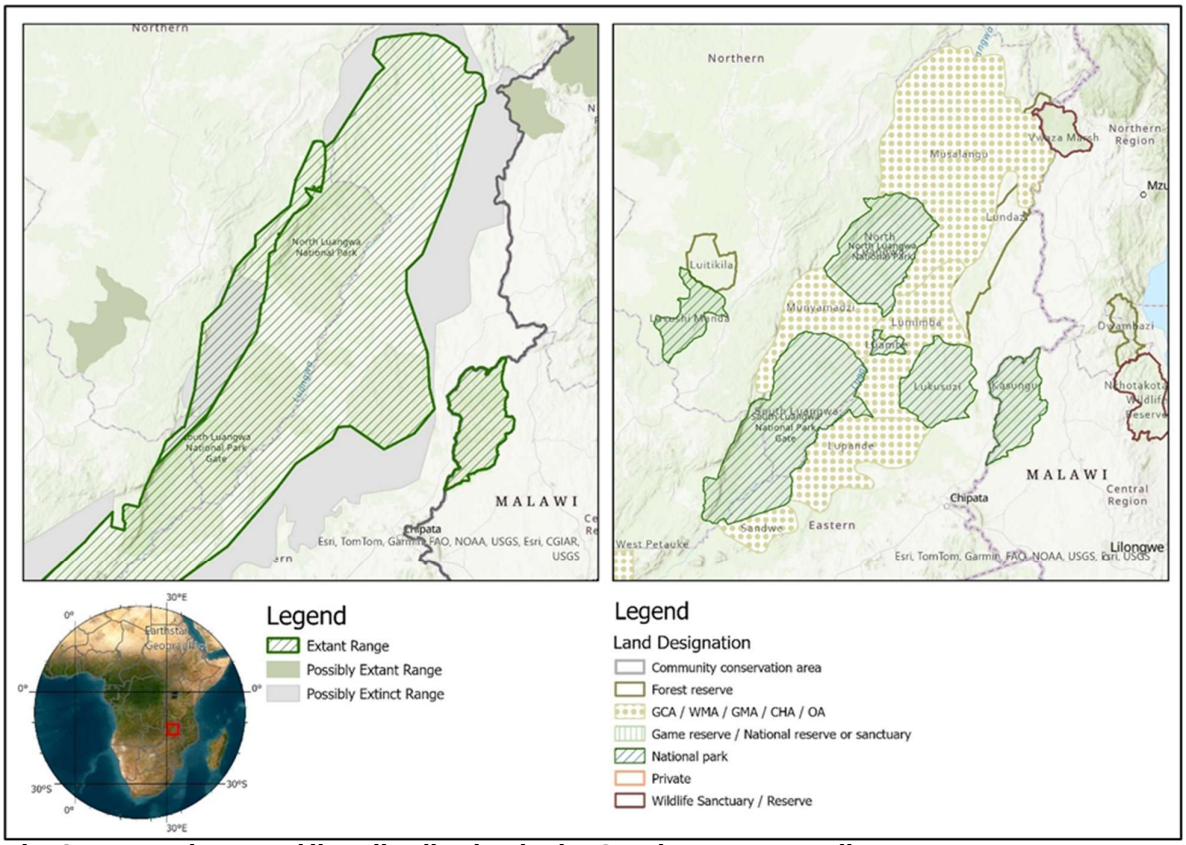


Fig. 4.15. Land use and lion distribution in the South Luangwa Valley.

b) Ecological significance

The Luangwa Valley is one of Africa's most significant ecological regions due to its diverse ecosystems and rich biodiversity. This area supports populations of a wide variety of species, including large populations of elephants, hippos, crocodiles, and various species of antelope. It also supports predators like lions, leopards, and African wild dogs. The Valley is also said to contain one of the highest concentrations of leopards in Africa (Rosenblatt et al., 2016). The Valley's rich biodiversity makes it a crucial area for wildlife conservation in Africa. The Luangwa Valley includes several protected areas, such as South Luangwa National Park and North Luangwa National Park (Booth et al., 2020; Rosenblatt et al., 2016). These parks are critical for the conservation of endangered species and serve as important refuges for wildlife, safeguarding them from human activities like poaching and habitat destruction. South Luangwa

contains populations of the endemic Thornicroft Giraffe (*Giraffa camelopardalis thornicrofti*), as well as the endemic Cookson's Wildebeest (*Connochaetes taurinus cooksoni*) and Crawshay's zebra (*Equus quagga crawshayi*) (Curry et al., 2019). Furthermore, it is an important stopover site for White Storks (*Ciconia ciconia*) as they migrate from their breeding sites in Europe to southern Africa (Gerkmann et al., 2008). The Luangwa Valley is also one of the most important regions for the history of human evolution (Rector et al., 2023).

c) Significant threats

As with most lion populations, the primary threats to lions are largely anthropogenic, including habitat loss and human encroachment, human-wildlife conflict, bushmeat poaching, illegal hunting, over-utilization, and prey depletion through poaching (Bauer et al., 2020; M. Becker et al., 2013; Mweetwa et al., 2018). Lions being caught as bycatch in snares set for ungulates occurs throughout most of the South Luangwa Valley but particularly in the GMAs where trophy hunting occurs (M. S. Becker et al., 2013). Interestingly, as male lions are generally more wide-ranging than females, they were found to be more commonly carrying snares than females (Becker et al., 2013). Illegal poaching is one of the main drivers of species decline in South Luangwa, as a result of the unmet need for sustaining livelihoods of surrounding communities (Zyambo et al., 2024). According to a study by White and Van Valkenbergh (2022), 29% of adult male lions in Luangwa were involved in snaring events, 23% of adult male lions were involved in non-lethal shotgun incidents and 7% of adult male lions were involved in shotgun and snaring events.

d) Management and land use

The Game Management Areas (GMAs) surrounding South Luangwa National Park are integral to the conservation landscape, each serving specific ecological and socio-economic roles (Mweetwa et al., 2018). The GMAs surrounding South Luangwa National Park in Zambia are crucial buffer zones that help protect the park's rich biodiversity while also supporting local communities. These GMAs include Lupande (5,660 km^2), Munyamadzi, and Lumimba, covering an area of approximately 15,000 km^2 (Rosenblatt et al., 2016). The GMAs are designated for sustainable land use, balancing wildlife conservation with human activities such as agriculture, fishing, and settlement. While the primary purpose of these areas is to manage and conserve wildlife, they are also home to several villages and communities that rely on the land for their livelihoods. The presence of settlements within these GMAs poses challenges for wildlife management, as human-wildlife conflict can arise, particularly with crop raiding by elephants and other animals. However, sustainable practices and community engagement initiatives aim to mitigate these conflicts, promoting coexistence between people and wildlife. The GMAs play a critical role in maintaining the ecological integrity of the region, acting as transition zones where conservation and development goals intersect. The management of these GMAs falls under the Department of National Parks and Wildlife (DNPW), which works in partnership with local communities and conservation organizations to oversee their sustainable use and protection (Kapembwa, 2020). Land use within these GMAs is carefully regulated to balance conservation goals with community livelihoods (Kapembwa, 2020). Activities such as controlled hunting, tourism, and sustainable agriculture are permitted, provided they adhere to guidelines designed to minimize ecological impact and promote sustainable development (Kapembwa, 2020). This management approach ensures that the GMAs contribute to the overall conservation strategy while supporting local socio-economic needs.

Within the national park, settlement is not allowed, and photographic tourism is considered as the main land use (Mweetwa et al., 2018). The GMAs have mixed land used and are mostly photographic and hunting safaris. Local residents are dependent, either partially or fully, on the tourism industry alongside subsistence agriculture (Mweetwa et al., 2018).

e) Lions within the site

A long-term monitoring study by Mweetwa et al. (2018) individually identified 386 lions from 21 prides and 24 male coalitions between 2008 to 2015, while the number of known lions observed

in any single year ranged from a low of 76 in 2008 to a high of 198 lions in 2015. Forty-six lions were harvested by hunting concessions from 2008 – 2012 (Mweetwa et al., 2018). During the hunting moratorium, lion numbers increased from 116 individuals in 2012 (before the moratorium), to 209 lions in 2015, the third (and last) year of the moratorium (Mweetwa et al., 2018). This increase can be attributed to an increase in male survival (due to no hunting) and a large number of cubs produced in every year during the moratorium (due to decreased infanticide) (Mweetwa et al., 2018). A summary of the lion population estimate is displayed in Table 4.7.

Table 4.7. Lion population estimates for the South Luangwa Valley in Zambia.

Year	Protected area/Management unit	Population estimate	Reference
2009	South Luangwa National Park & adjacent Lupande & Lumimba GMAs (study area)	125 (108 – 167)	Rosenblatt et al., 2014
2012	South Luangwa National Park & adjacent Lupande & Lumimba GMAs (study area)	94 (92 – 106)	
2008	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	106 (108 – 191)	Mweetwa et al., 2018
2009	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	108 (110 – 159)	
2010	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	94 (111 – 132)	
2011	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	123 (136 – 179)	
2012	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	100 (104 – 141)	
2013	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	105 (150 – 172)	
2014	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	128 (174 – 195)	
2015	South Luangwa National Park & adjacent Lupande & Lumimba GMAs	170 (203 – 221)	
2017	North Luangwa National Park	Unknown	Dröge & Becker, 2017
2008	South Luangwa National Park & adjacent Lupande & Lumimba GMAs (study area)	102 (90 – 123)	Rosenblatt et al., 2014
2010	South Luangwa National Park & adjacent Lupande & Lumimba GMAs (study area)	118 (106 –142)	
2011	South Luangwa National Park & adjacent Lupande & Lumimba GMAs (study area)	116 (106 – 171)	

f) Resource use and trophy hunting

In the South Luangwa Valley, trophy hunting of lions occurs primarily within the GMAs that border South Luangwa National Park (Booth et al., 2020). Specifically, trophy hunting of lions has been permitted in certain GMAs such as the Luambe and Lungwa GMAs (M. S. Becker et al., 2013; Booth et al., 2020). These areas are managed under regulated hunting programmes that aim to balance conservation efforts with sustainable wildlife management practices (Booth et al., 2020; Zyambo et al., 2024). The DNPW, in collaboration with local communities and conservation organizations, oversees these programmes to ensure that hunting activities are conducted within legal frameworks and are aligned with broader conservation objectives. The management strategies are designed to mitigate negative impacts on lion populations and maintain ecological balance while providing revenue and benefits to local communities (Booth et al., 2020).

Rosenblatt et al. (2014) monitored the South Luangwa's lion population and found that trophy hunting was the leading cause of death for male lions and was limiting the population. The median age of males harvested was found to be 4.86 years old and annual harvests ranged from 1.86 – 2.56 lions / 1,000km^2 (Mweetwa et al., 2018; Rosenblatt et al., 2014). Recommendations for this system by DNPW include a 6-year minimum age limit and a harvest limit of 0.5 lions / 1000km^2 (Rosenblatt et al., 2014). A study by (Creel et al., 2016), found that male lions were generally shot 900m from the South Luangwa National Park boundary, creating a source-sink dynamic between the national park and the GMAs. This and growing concerns over population declines, resulted in the Government of Zambia through the Ministry of Tourism and Arts to implement a three-year moratorium on lion trophy hunting between 2013-2015 (Booth et al., 2020; Mweetwa et al., 2018).

3.4 Zimbabwe

Zimbabwe, with a population of about 17 million people and a human density of approximately 43 individuals / km^2 (https://worldpopulationreview.com/countries/zimbabwe), is known for its rich biodiversity and significant conservation areas, including Hwange National Park and Mana Pools National Park, both of which are key habitats for large mammals like elephants and lions (Dube, 2019; Van Der Meer et al., 2016). The country faces critical environmental challenges, including deforestation, soil erosion, and the impacts of climate change, which threaten its natural landscapes and biodiversity. Poaching and human-wildlife conflict are persistent issues, particularly as communities expand into wildlife habitats (Nicholson 2024). Zimbabwe has established a robust network of protected areas and has implemented community-based conservation initiatives to address these challenges (Shereni & Saarinen, 2021). However, economic instability and resource constraints have hampered conservation efforts, making it difficult to maintain and enforce protective measures effectively. Ensuring the long-term sustainability of Zimbabwe's natural resources and biodiversity remains a priority for the country's ecological and socio-economic future (S. Nicholson, Dickman, et al., 2023).

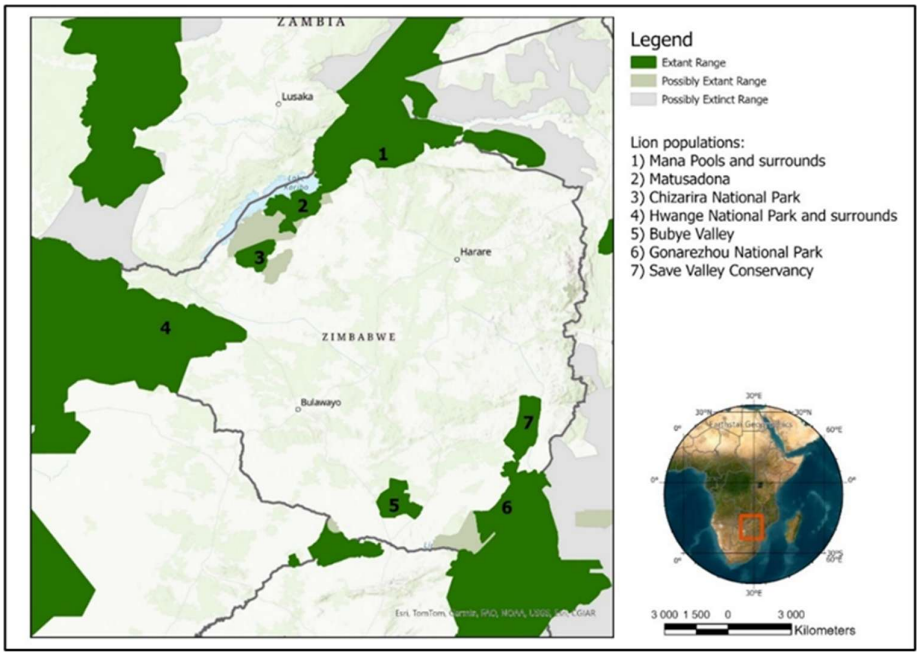


Fig. 4.10. Lion populations in Zimbabwe.

Lions are found in several of Zimbabwe's national parks and concessions (Fig. 4.10) and dispersal groups can occur outside of formally protected areas. Hwange is estimated to have the largest population of lions in the country (Bauer et al., 2018). Hwange and the surrounding concessions form part of the Kavango-Zambezi Transfrontier Conservation Area – a critical

stronghold for lions. Bubye Valley Conservancy is a private conservation area where trophy hunting of lions is permitted. Extending from the Greater Limpopo Transfrontier Conservation Area, lions occur in Gonarezhou National Park and Savé Valley Conservancy (Bauer et al., 2018; S. Nicholson, Bauer, et al., 2023). These populations are considered to be fairly stable but Gonarezhou National Park has experienced increased levels of poaching, particularly of small game in order to supplement the communities surrounding the park (Musakwa et al., 2020). A small population of lions occurs in Chizarira National Park where dispersal males have been known to move south towards Hwange. Lions occur in Matusadona National Park and the surrounding areas, although in small numbers (< 40 individuals) (S. Nicholson, Bauer, et al., 2023). Mana Pools National Park and the surrounding safari areas (Sapi, Hurungwe, Chewore, Dande) form a contiguous population with the Lower-Zambezi in Zambia.

Landscape: Hwange National Park

Hwange National Park (hereafter Hwange), originally gazetted as a game reserve in 1928 and officially transformed into a national park in 1930, is the largest wildlife reserve in Zimbabwe, covering approximately 14,651 km^2 (Loveridge et al., 2007). Situated in the northwest corner of the country in Matabeleland, bordering Botswana and Zambia (between latitudes 18°30' and 19°50' and longitudes 25°45' and 27°30'). In 2011, Hwange became part of the Kavango-Zambezi Transfrontier Park (KAZA TFCA) which includes protected areas in Zambia, Botswana, Namibia, Angola and Zimbabwe (Van Der Meer et al., 2016) (Fig. 4.14). Hwange has a rich history rooted in conservation. Initially established to protect wildlife and regulate hunting, the park's status was elevated to a national park to prioritize broader conservation efforts. Hwange is managed by the Zimbabwe Parks and Wildlife Management Authority (ZimParks).

a) Habitat description

Hwange boasts a diverse range of habitats that support its rich biodiversity. Vegetation within Hwange is largely woodland and scrubland (predominantly *Baikiaea plurijuga*, *Terminalia sericea*, *Combretum* spp. and *Coleospermum mopane*) (Loveridge et al., 2007). It is estimated that less than 10 % of the entire area comprised open grassland or bushed grassland (Loveridge et al., 2007). Most of the park (~66 %) is covered by Aeolian Kalahari sands, while the remaining third is situated on Batoka basalt and Karoo sediments, which are part of the Zambezi drainage basin (Loveridge et al., 2006). Seasonal wetlands and natural waterholes occur throughout the landscape, sustaining wildlife during the dry season.

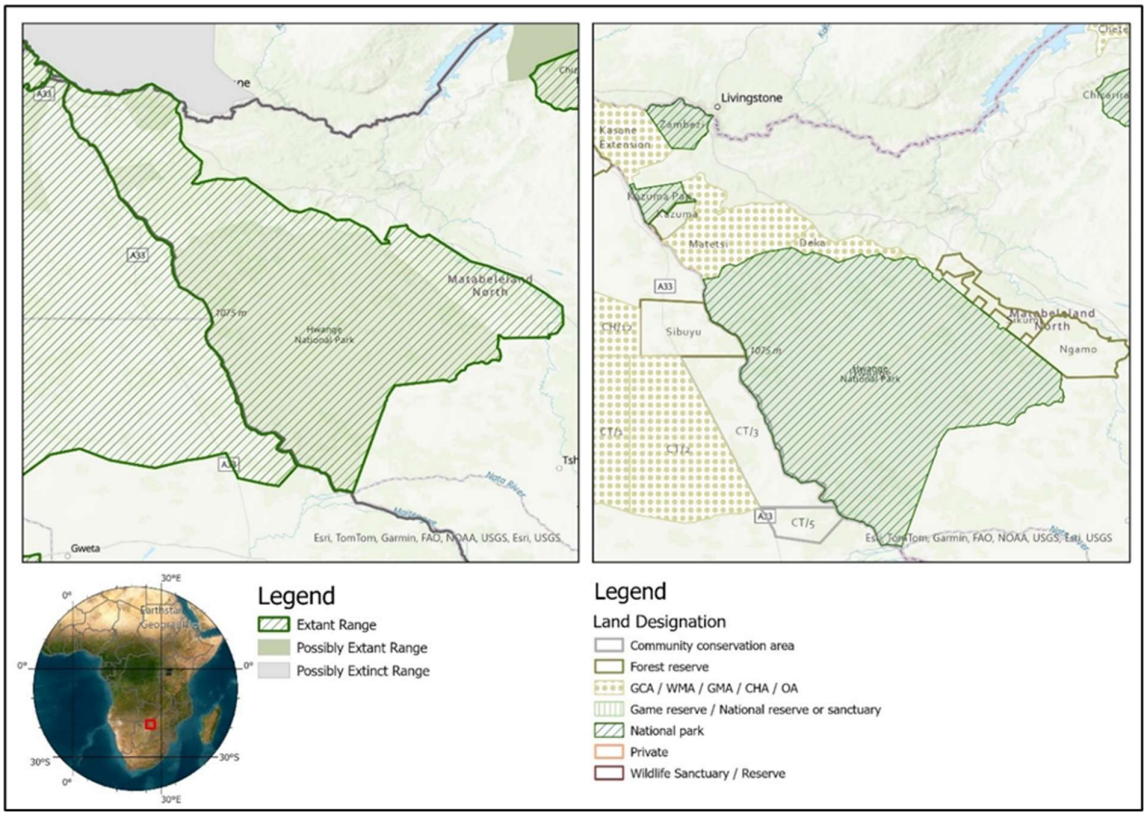


Fig. 4.16. Land use and lion range in Hwange National Park.

b) Ecological significance

Hwange is one of Zimbabwe's most important conservation areas and hosts a diverse array of wildlife species. It supports the second largest concentration of elephants (*Loxodonta africana*) in Africa, as well as large populations of buffalo (*Syncerus caffer*), giraffe (*Giraffa camelopardalis*), and several species of antelope. Within Hwange, there is a diversity of predators, including lions, leopards, and wild dogs. It is also home to a population of the Vulnerable Temminck's pangolin (*Smutsia temminckii*) (Sabashau et al., 2024).

Hwange is home to rich lime deposits and salt pans, which are one of the natural wonders of southern Africa and attracts wildlife into the area. Hwange contains many important archaeological and culturally significant sites (Elton Sagiya, 2019). This includes Bumbusi and Mtoa remains, which is culturally important to the local communities in the area (Sagiya, 2019). These sites also include historic fossilized forests that are approximately 200 million years old, as well as walled structures from the past few centuries (Elton Sagiya, 2019). Among these, two of the more recent structures are designated as national sites and are protected by the Museums and National Monuments.

c) Significant threats

Hwange lions face several significant threats that impact their populations (Loveridge et al., 2017, 2023; Montgomery et al., 2023). One major threat is human-wildlife conflict, particularly with local communities who live near the park and may suffer livestock losses due to lion predation. This often leads to retaliatory killings of lions. Between 2008 and 2013, approximately 50 lions were killed in conflict-related incidents (Loveridge et al., 2017). Conflict-related killings are modelled to occur more frequently in communal lands adjacent to the protected area (Loveridge et al., 2017). Additionally, habitat loss and fragmentation, driven by agricultural expansion and infrastructure development, reduce the space available for lions and

their prey (Loveridge et al., 2022). Poaching and poisoning is also a pressing problem for wildlife in Hwange (Muboko et al., 2016). Trophy hunting, while regulated, poses a risk, especially given the high hunting quotas historically set for the region (Loveridge et al., 2007). Furthermore, disease outbreaks, such as those affecting prey species, can indirectly impact lion health and survival. These threats collectively challenge the stability of the lion population in Hwange and require ongoing conservation efforts to mitigate their impact.

d) Management and land use

Hwange is a significant revenue source for the Parks and Wildlife Management Authority (PWMA), primarily through photographic tourism. However, this industry is subject to fluctuations due to political and economic conditions. As a parastatal organization, the PWMA relies on income-generating activities like tourism to fund its management and conservation efforts. Additionally, PWMA operates on a national scale, where income from high-revenue parks like Hwange is used to support other areas with lower visitation and revenue generation.

In the General Management Plan for Hwange[4] it was highlighted that PWMA does not generate sufficient income to adequately fulfil its conservation mandate. This leads to reduced effectiveness across the landscape, which can lead to a degraded resource base, fewer tourists and then less income. In 2013 it was estimated that, even if Hwange was able to retain all its income for the year, it would not have been enough to fund the management of the park.

Hwange is encircled by safari areas and hunting concessions, although trophy hunting is not permitted within the park itself (Loveridge et al., 2007). These concession areas serve as buffer zones between the park and human settlements, including Forestry land, Deka and Matetsi Safari Areas, and the Gwaai Intensive Conservation Area (Loveridge et al., 2007). Some of these areas are communal lands, such as Tsholotsho Communal Land, where subsistence agriculture is the main activity, and wildlife management follows the Communal Areas Management Plan for Indigenous Resources (CAMPFIRE). The main reason for the establishment of CAMPFIRE was to give the local communities an opportunity to weigh in on the management of natural resources, and to allow them to benefit from these tourism activities (Dube, 2019). These communal areas typically have lower wildlife densities. PWMA provides water for wildlife at artificial water points throughout the northern and western regions of Hwange (Loveridge et al., 2006). Introduced in the 1930s, this intervention is crucial for managing water availability, enabling water-dependent species to inhabit areas that would otherwise be extremely dry during the dry season (Loveridge et al., 2006). These artificial water sources are heavily frequented by wildlife during this period.

The northern part of the park is bounded by safari areas under the control of PWMA. To the east are Forestry Commission areas, state land, large scale commercial farming areas (most given over to wildlife utilisation) and (but without a direct boundary) the Hwange Communal Land. CAMPFIRE sites are community-managed areas where local residents are given the authority to sustainably manage and benefit from wildlife resources (Dube, 2019; Shereni & Saarinen, 2021). These sites focus on conservation and generating revenue through activities like eco-tourism and regulated trophy hunting, with profits used for community development. CAMPFIRE aims to promote both conservation and economic empowerment by involving local communities in wildlife management decisions. The whole of the southern boundary is the Tsholotsho Communal Land while the whole of the western boundary is shared with Botswana (mostly wildlife management areas and a Forestry reserve). Trophy hunting is carried out in the communal lands, the safari areas, parts of the forestry estate and on the large-scale commercial farming areas. Since 2010, the Hwange Main Camp area has seen visitor numbers and income grow by approximately 20% annually. The number of international visitors, who pay four times the entry fee compared to locals, has also risen. As a result, tourism revenue increased from about US$400,000 in 2010 to more than US$1 million by 2014.

[4] https://www.zimparks.org.zw/wp-content/uploads/2024/07/Hwange-GMP.pdf

e) Lions within the site

The lion population in Hwange National Park is notable for its size and significance both within Zimbabwe and more broadly, their African range (Riggio et al., 2013). Hwange is considered to be the largest lion population within Zimbabwe, with estimates often exceeding several hundred individuals (Bauer et al., 2018; Van Der Meer et al., 2016). This substantial population is part of a larger regional population that spans northwestern Zimbabwe and adjacent areas. Hwange is considered an important lion conservation unit due to its status as one of the largest protected areas in the region. It is a key component of the Kavango-Hwange lion conservation unit, which is among the last strongholds for lion populations in Africa (Riggio et al., 2013).

Hwange's lions benefit from the park's extensive and varied habitat, which provides ample prey and sufficient space for large pride territories. The park's well-managed water sources also support the lions, particularly during the dry season when natural water is scarce. However, despite the robust numbers, the lion population faces challenges from human-wildlife conflict, habitat loss, and disease, which can impact its stability and growth (Groom et al., 2014; Muboko et al., 2016).

Efforts are ongoing to monitor and manage the lion population through conservation programs and research, aimed at ensuring their long-term survival and mitigating threats. The lions of Hwange are a key component of the park's ecological balance and play a crucial role in maintaining the health of the ecosystem.

f) Resource use and trophy hunting

In the National Park Estate, such as Safari Areas, lion hunting quotas are determined by PWMA. For other land uses, quotas are proposed by landowners or local management authorities, like those in CAMPFIRE areas, and then agreed upon by the PWMA (Loveridge et al., 2007). Quotas are typically based on population surveys, community estimates, and trophy quality, though the difficulty of accurately censusing lions and the lack of trophy quality data often make it challenging to set realistic quotas for this species (Loveridge et al., 2007). Since the 1970s, Zimbabwe has recorded some of the highest lion hunting offtakes in Africa relative to population size, with annual off-takes ranging between 90 and 141 lions from 1992 to 2002 (Loveridge et al., 2007). The lion population in northwestern Zimbabwe, including the study area, is the most heavily targeted for trophy hunting in the country, typically accounting for about 41% of the national lion quota (Loveridge et al., 2007). Between 1999 and 2015, 65 lions were killed through trophy hunting activities in Hwange (Stoddard, 2021)[5].

There is limited use of other natural resources in the park. These include wildlife (ration and management hunting, and more recently use of the ration quota by safari clients), grass by communities under special arrangement and fishing in of the dams in Hwange. The use of these resources also needs to be monitored (e.g. fish bag limits).

Trophy hunting in Hwange began in the early 20th century, when the park was initially designated as a game reserve in 1929. During this period, regulated hunting was a key management tool aimed at controlling wildlife populations and generating revenue. In the 1960s, Hwange was officially designated a national park, and the focus shifted more towards conservation and tourism. Although hunting was largely restricted within the park boundaries, hunting continued in the surrounding areas, including concessions and communal lands. These areas were managed to balance conservation goals with local economic benefits through regulated trophy hunting.

Over the decades, there has been increasing scrutiny and debate over the impact of trophy hunting on wildlife populations. High-profile incidents, such as the trophy hunting of 'Cecil' the lion in 2015, have highlighted concerns about the ethics and sustainability of trophy hunting practices, particularly for iconic species like lions (Macdonald et al., 2016; Makuyana, 2018).

[5] https://www.dailymaverick.co.za/article/2021-06-29-africans-dont-cry-for-lions-the-victims-of-human-wildlife-conflict-are-more-worthy-of-tears/

As ‘Cecil’ was fitted with a GPS collar and subject to scientific study, the event prompted discussions about the implications of hunting on research subjects and the need for careful management of hunting quotas and practices, especially concerning animals that are part of ongoing research (Groom et al., 2014; Makuyana, 2018). The incident raised concerns about the effects of trophy hunting on conservation efforts and lion populations (Macdonald et al., 2016; Makuyana, 2018). These events have led to calls for stricter regulations and a re-evaluation of hunting quotas to better align with conservation objectives. This situation underscores the complexities in balancing wildlife conservation, scientific research, and hunting activities.

4. East Africa

East Africa, a region of immense ecological diversity, features a wide range of habitats from savannas and grasslands to montane forests and wetlands (Bullock et al., 2021). This region is globally recognized for its rich wildlife populations, particularly lions, which are emblematic of the vast and iconic landscapes, such as the Serengeti (Tanzania) and the Maasai Mara (Kenya). However, East Africa’s lion populations face numerous threats, including habitat loss due to agricultural expansion, human-wildlife conflict, and illegal hunting (Bauer et al., 2020). Conservation efforts in the region have been robust, with initiatives such as protected area management, wildlife corridors, and community-based conservation playing critical roles in preserving lion habitats and lion populations (Maclennan et al., 2009). Despite these efforts, the growing pressures of human encroachment and climate change continue to challenge the sustainability of lion populations (Bullock, et al. 2021; Nicholson 2024).

In East Africa, lions are present in several regions of Ethiopia, though the exact extent of their range is uncertain (S. Nicholson, Bauer, et al., 2023). In Uganda, lions inhabit areas such as Queen Elizabeth National Park (Braczkowski et al., 2020), Murchison National Park (Omoya et al., 2014), and Kidepo Valley (Omoya et al., 2014). Rwanda hosts a small, reintroduced population of fewer than 50 lions in Akagera National Park (S. Nicholson, Bauer, et al., 2023). Lions have a broader distribution in Kenya and Tanzania, where they occupy most national parks, protected areas, and hunting concessions (Crosmary et al., 2018; Kiffner et al., 2009; Kissui, 2008; Strampelli et al., 2022) (Fig. 4.17). However, their range in Tanzania has been reduced due to the conversion of habitat into agricultural land, and many areas in the country still lack comprehensive field surveys (S. Nicholson, Bauer, et al., 2023). In Somalia, there have been reports of lion sightings, but without solid evidence, this range is considered uncertain.

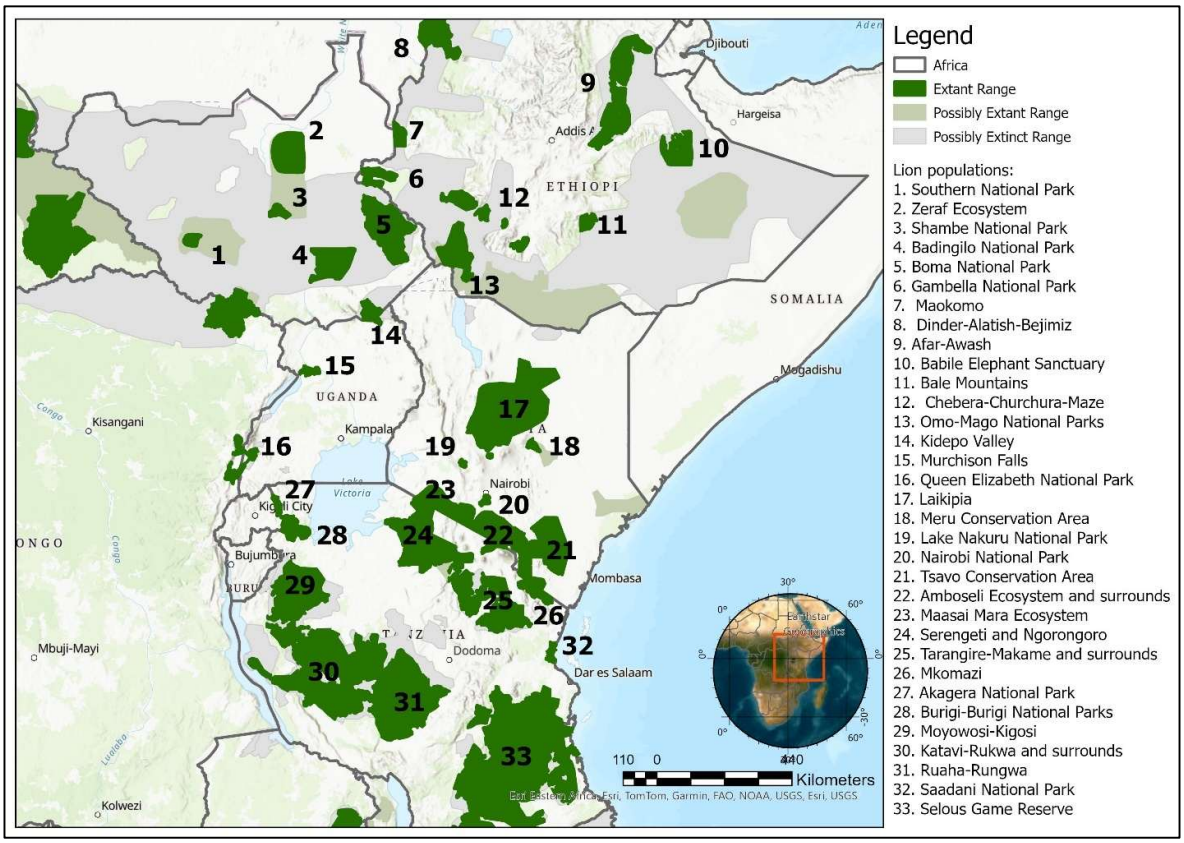


Fig. 4.17. Lion populations in East Africa.

4.1 Kenya

Kenya, with a population of approximately 57 million people, and a density of nearly 100 people per km^2 (https://worldpopulationreview.com/countries/kenya), is renowned for its diverse ecosystems, ranging from savannas and highlands to coastal and marine environments. The country is home to some of Africa's most famous wildlife reserves, including the Maasai Mara, Amboseli, and Tsavo National Parks, which support significant populations of lions, elephants, and other iconic species (Muriuki et al., 2017; Patterson et al., 2004; Shah & Mukhovi, 2019). However, Kenya faces considerable environmental challenges, including habitat fragmentation, deforestation, and the impacts of climate change, which threaten its biodiversity and natural resources (Njora & Yilmaz, 2022). Rapid population growth and agricultural expansion have increased human-wildlife conflicts, particularly in areas surrounding protected lands. To address these challenges, Kenya has implemented various conservation strategies, such as community-based conservation, wildlife corridors, and anti-poaching measures (Maclennan et al., 2009). The country is also actively involved in international conservation efforts, contributing to the preservation of migratory species and cross-border ecosystems. Despite these efforts, balancing conservation with economic development remains a critical and ongoing challenge for Kenya's sustainability.

Between 2018 and 2020 a nation-wide large-carnivore census was conducted across ten of Kenya's most important source populations of lions (N. Elliot et al., 2021). The largest lion populations in Kenya were estimated to be in the Maasai Mara Ecosystem (~556 individuals), Tsavo Conservation Area (~460 individuals) and Laikipia ranches, Ol Pejeta Conservancy and Solio Ranch (~306 individuals) (N. Elliot et al., 2021) (Fig. 4.18).

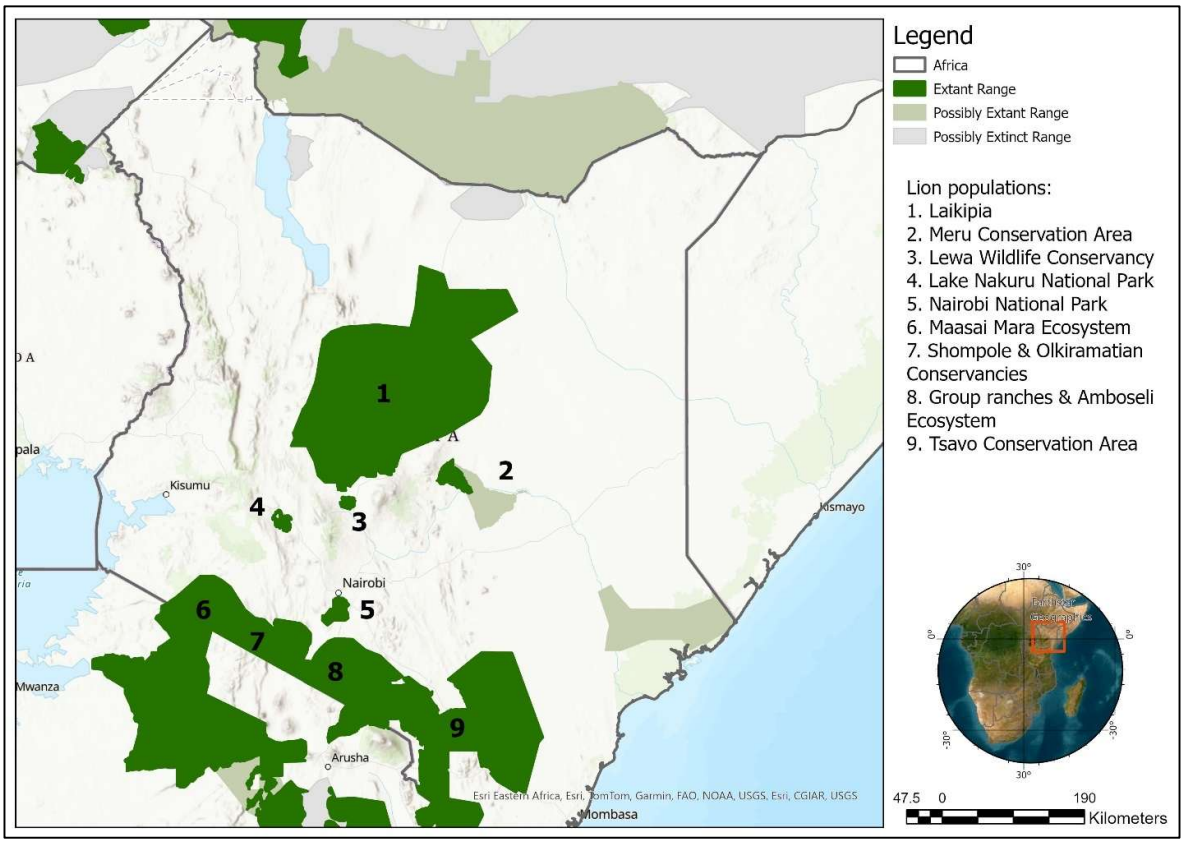


Fig. 4.18. Lion populations in Kenya.

Landscape: Maasai Mara Ecosystem

The Maasai Mara Ecosystem is located in south-western Kenya and divided by the Mara and Talek rivers into the Triangle (Ogutu & Dublin, 2002). It is located in the Narok County west of the Rift Valley (N. Elliot et al., 2021). The Ecosystem is considered to consist of the Maasai Mara National Reserve (which includes the Mara Triangle) and eleven neighbouring wildlife conservancies (N. Elliot et al., 2021) (Fig. 4.19). The Maasai Mara National Reserve (MMNR) was originally established in 1961 as a wildlife sanctuary (Mojo et al., 2020). The reserve is 6,400 km^2, approximately 25% of the entire Maasai Mara ecosystem (Mojo et al., 2020). The remaining 75% of the ecosystem is largely unprotected land inhabited predominantly by Maasai pastoralist (Mojo et al., 2020).

The MMNR is overseen by the County Government of Narok on the eastern side of the Mara River and by the Mara Conservancy (N. Elliot et al., 2021). Various management companies are responsible for managing the surrounding conservancies. These conservancies were established through collaborations between Maasai landowners and tourism companies, where landowners receive a regular, fixed monthly payment in exchange for leasing their land for wildlife-focused activities (N. Elliot et al., 2021). The Maasai Mara Ecosystem borders the Serengeti National Park in the south, intensive agricultural land to the west and pastoralist settlement to the east (N. Elliot et al., 2021).

The MMNR is a crucial component of the expansive Serengeti-Mara ecosystem, which spans across Kenya and Tanzania, encompassing the Serengeti National Park and the Ngorongoro Conservation Area (Mojo et al., 2020; Mwampeta et al., 2021). This ecosystem covers approximately 25,000 km^2. The majority of this area consists of contiguous state-protected regions, including the Maasai Mara National Reserve in Kenya and several protected areas in

Tanzania, such as Serengeti National Park, Ikorongo Game Reserve, Maswa Game Reserve, Grumeti Game Reserve, and the Ngorongoro Conservation Area (Mwampeta et al., 2021).

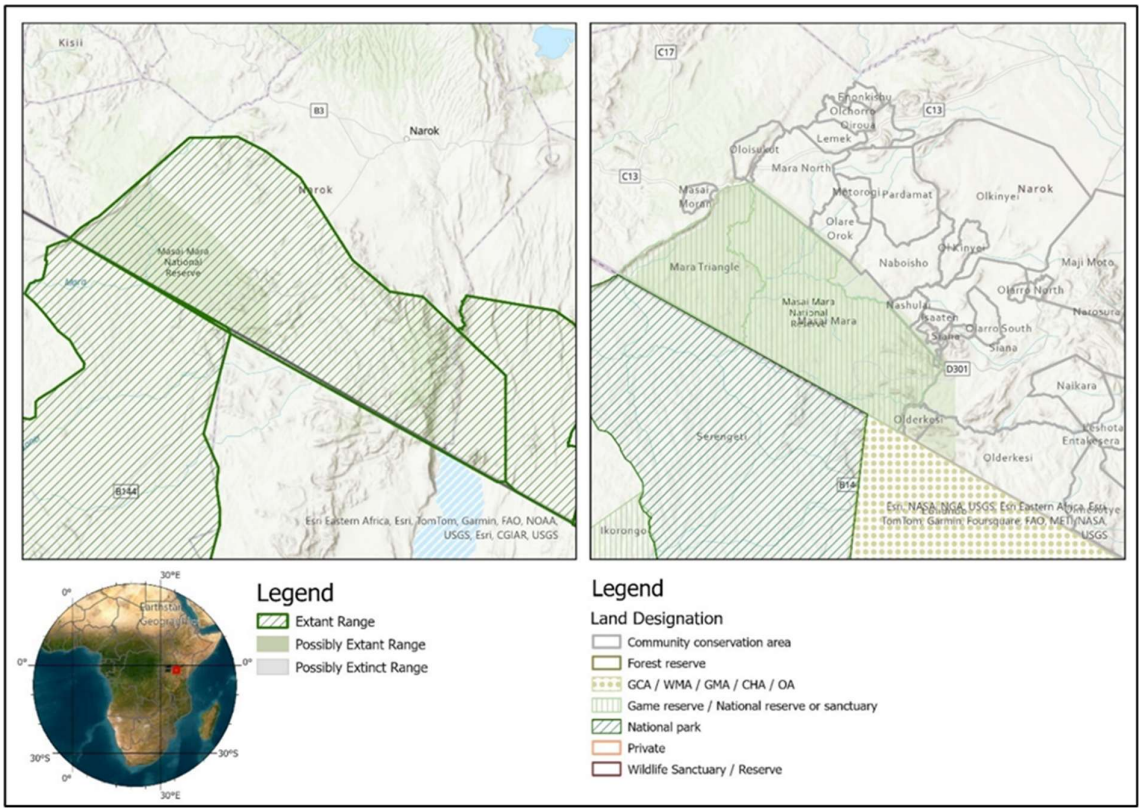


Fig. 4.20. Lion distribution and land use range in the Maasai Mara Ecosystem.

a) Habitat description

The MMNR is known for its expansive open plains and the landscape primarily ranges between grasslands, shrublands and riverine forests (Oindo et al., 2003), covered by Red oat grass (*Themeda triandra*), with scattered trees like *Acacia* and *Vachellia* species and clusters of bushes such as *Croton dichogamus* and *Euclea divinorum*. In the northern and northeastern parts of the study area, the wildlife conservancies are mainly characterized by Croton thickets (*Croton dichogamus*) and *Vachellia* woodlands (N. Elliot et al., 2021). The Mara River, a critical water source that traverses the reserve, is lined with dense riverine forests, providing refuge and breeding grounds for numerous species. Seasonal variations, including the short and long rains, influence the vegetation patterns, leading to a dynamic environment that supports migratory species like wildebeest and zebras (Bartzke et al., 2018). In the northern and northeastern regions, the habitat shifts to denser vegetation, with Croton thickets and Vachellia woodlands becoming more prevalent (N. Elliot et al., 2021). This diversity in habitat types across the Maasai Mara plays a crucial role in sustaining the complex web of life, from large mammals like elephants and lions to a myriad of bird and insect species.

b) Ecological significance

The Maasai Mara ecosystem has some of the richest species of wildlife in the world as well as the largest collection of wildlife species within the country (Shah & Mukhovi, 2019). The MMNR itself, is one of Kenya's most prominent conservation areas and is referred to as the "Jewel in the Crown" of the country's protected areas, and it is highly regarded for its ecological importance (Shah & Mukhovi, 2019). The reserve is also celebrated globally, earning recognition as the 8th Wonder of the World. The Maasai Mara is not only ecologically significant

but also culturally and economically vital. The Maasai people have coexisted with wildlife for centuries, and their traditional practices contribute to conservation (Goldman et al., 2010). Additionally, the ecosystem supports tourism, which is a major source of income for the region and provides funding for conservation efforts.

Annually, approximately 50% of tourists visiting the country choose to explore the MMNR (Shah & Mukhovi, 2019). This influx of visitors significantly contributes to the country's foreign exchange earnings and plays a crucial role in stimulating local socio-economic development. In 2014, the entry fees for the MMNR brought in KShs 3 billion into the Narok county (Shah & Mukhovi, 2019).

c) Significant threats

Lions in the MMNR face several critical threats that impact their population and conservation status (Nicholson 2024). Habitat fragmentation due to expanding agricultural activities and human encroachment reduces the available territory and prey base for these apex predators. Lion killing by the Maasai people were also traditionally part of a coming-of-age ritual (Goldman et al., 2013). Additionally, human-wildlife conflict, particularly in areas adjacent to the reserve, leads to retaliatory killings and the poisoning of lions, which further threatens their survival (Hazzah et al., 2014; Kissui, 2008). Poaching for body parts also pose a significant risk. The decline in prey populations, driven by both natural predation and competition with livestock, exacerbates these threats. Climate change-induced alterations in habitat and prey dynamics may further stress lion populations, making effective conservation measures essential to safeguard their future (Carter et al., 2018). In Kenya, the hunting of wildlife, including lions has been illegal since 1977 (Steinhart, 1989), unless the lion's involvement in killing of livestock or human attacks can be proven (Goldman et al., 2013; Maclennan et al., 2009).

d) Management and land use

The Maasai Mara ecosystem covers an area of approximately 25,000 km^2 (N. Elliot et al., 2021). This expansive ecosystem includes the MMNR, which itself is about 1,510 km^2, as well as surrounding conservancies and community lands that contribute to the overall size. The ecosystem forms part of the larger Serengeti-Mara ecosystem, which spans across Kenya and northern Tanzania, encompassing other protected areas such as the Serengeti National Park and the Ngorongoro Conservation Area (Mwampeta et al., 2021). The human population in the areas surrounding the Serengeti-Mara Ecosystem is estimated to have increased by 2.4% per year from 1999 to 2012 (N. Elliot et al., 2021).

The MMNR, wildlife conservancies and surrounding unprotected areas are not separated by physical barriers (e.g. fences or natural barriers) and this allows for movement of animals from one area to another (N. Elliot et al., 2021). In recent decades, the land subdivision has resulted in numerous fences being erected outside the wildlife areas to secure grazing for livestock and there are concerns that these fences will negatively affect the natural movement of wildlife (N. Elliot et al., 2021). MMNR is not managed by the Kenya Wildlife Service as the case of other protected areas in the country, but is managed by the Narok County. The county collects all the revenues and uses it for the benefit of the county residents (Shah & Mukhovi, 2019).

The conservancies surrounding the MMNR are managed through a collaborative approach that involves partnerships between Maasai landowners, conservation organizations, and tourism operators (N. Elliot et al., 2021). These conservancies are private or community-managed lands that are leased by Maasai landowners to conservancy management bodies, often comprising tourism companies and conservation NGOs. The conservancies around the Maasai Mara play a crucial role in extending the protected area network, supporting wildlife conservation, and enhancing the socio-economic well-being of local communities. Maasai landowners lease their land to the conservancy management, typically receiving fixed monthly payments (N. Elliot et al., 2021; Holland et al., 2022). This arrangement offers landowners a reliable income while ensuring the land is dedicated to wildlife conservation instead of being converted for agriculture or other types of development (Mojo et al., 2020).

e) Lions within the site

There has been general uncertainty and concern regarding the abundance and trend of the Mara lion population. This has largely stemmed from the methodologies employed to survey lion populations (N. Elliot et al., 2021; Ogutu & Dublin, 2002), which were inadequate for conducting a formal assessment of population trends (N. Elliot et al., 2021). However, more recent evidence indicates that the lion population is stable and exists at a fairly high density.

In 2014, Bayesian spatially explicit capture-recapture (SECR) models were used to provide robust estimates of lion density and abundance based on unstructured spatial sampling within the Maasai Mara ecosystem (Elliot et al., 2021; N. B. Elliot & Gopalaswamy, 2017). This survey estimated 17.08 lions over 1 year per 100 km^2 with an abundance of approximately 418 lions over the age of one (Elliot et al., 2021). The next comparable survey was conducted in 2018 and approximately 556 individuals over the age of one (Elliot et al., 2021). The lion population results are summarised in Table 4.8.

Table 4.8. Lion population estimate for the Maasai Mara Ecosystem

Year	Protected area/Management unit	Population estimate	Reference
1992	Maasai Mara Ecosystem	447	Elliot et al., 2021
2014	Maasai Mara Ecosystem	418	
2018	Maasai Mara Ecosystem	556 – 602	

f) Resource use and trophy hunting

Trophy hunting is not permitted within the MMNR and its surrounding conservancies. This restriction was implemented as part of a broader conservation strategy aimed at preserving the region's biodiversity and maintaining the ecological balance (Irandu & Makunyi, 2016). Historically, hunting was allowed in various parts of Kenya, including the Maasai Mara, which led to significant declines in lion populations and other wildlife due to overharvesting and habitat disruption. The shift away from trophy hunting began in the 1970s and 1980s, as conservation science increasingly recognized the detrimental impacts of hunting on wildlife populations and ecosystems (Lindsey et al., 2007). The establishment of protected areas and the implementation of stringent anti-poaching laws reflect a commitment to conservation, emphasizing non-consumptive forms of wildlife management, such as ecotourism, to support both biodiversity and local economies.

In Kenya, hunting is prohibited within national parks, reserves, or other protected areas (Irandu & Makunyi, 2016; Lindsey et al., 2007). The ban on hunting has been in place since 1977, when the Wildlife Conservation and Management Act was enacted to protect wildlife from exploitation and to ensure the conservation of biodiversity (Irandu & Makunyi, 2016; Steinhart, 1989). The focus in Kenya has shifted towards conservation strategies that emphasize wildlife protection through ecotourism and habitat preservation, rather than hunting. This approach aims to promote sustainable tourism, contribute to local economies, and ensure the long-term survival of wildlife populations.

While all hunting of lions is banned in Kenya, the killing of a lion can be considered to be legal “if the perpetrator can prove that it was in defence of life or property, including livestock” (Goldman et al., 2013). As a result, the hunting of lions by the Maasai usually occurs and is somewhat tolerated by authorities and prosecution is rare (Goldman et al., 2013).

As the reserve is contiguous with the surrounding villages, the extractive use of natural resources (timber, honey, etc.) is forbidden in the reserve (Mojo et al., 2020). In addition, villages and settlements are not permitted to be established within the reserve (Mojo et al., 2020).

4.2 United Republic of Tanzania

Tanzania, with a population of approximately 69 million people and a human density of around 77 individuals / km^2 (https://worldpopulationreview.com/countries/tanzania), is distinguished by its rich biodiversity and extensive protected areas. The country is home to globally significant ecosystems, including the Serengeti, Ngorongoro Crater, and Selous Game Reserve, which harbour large populations of lions, elephants, and other key species. However, Tanzania faces substantial environmental challenges, such as deforestation, land degradation, which exacerbates the effects of climate change, and in turn, threatens its natural resources (Doggart et al., 2020). Rapid population growth and expanding agricultural activities have intensified human-wildlife conflicts, particularly in regions adjacent to national parks and conservation areas (Nyerembe & Bushesha, 2021). To mitigate these issues, Tanzania has adopted various conservation strategies, including the establishment of wildlife corridors, community-based natural resource management, and strict anti-poaching measures (Rimaze et al., 2020; Tarimo & Olotu, 2020). Additionally, the country plays a crucial role in transboundary conservation efforts, helping to preserve migratory routes and shared ecosystems with neighbouring countries. Despite these initiatives, the pressure to balance environmental conservation with the needs of a growing population and economic development continues to pose significant challenges. Long-term sustainability in Tanzania hinges on the effective integration of conservation and development goals to ensure the preservation of its unique biodiversity. Lions can be found within 12 populations in Tanzania (Fig. 4.19).

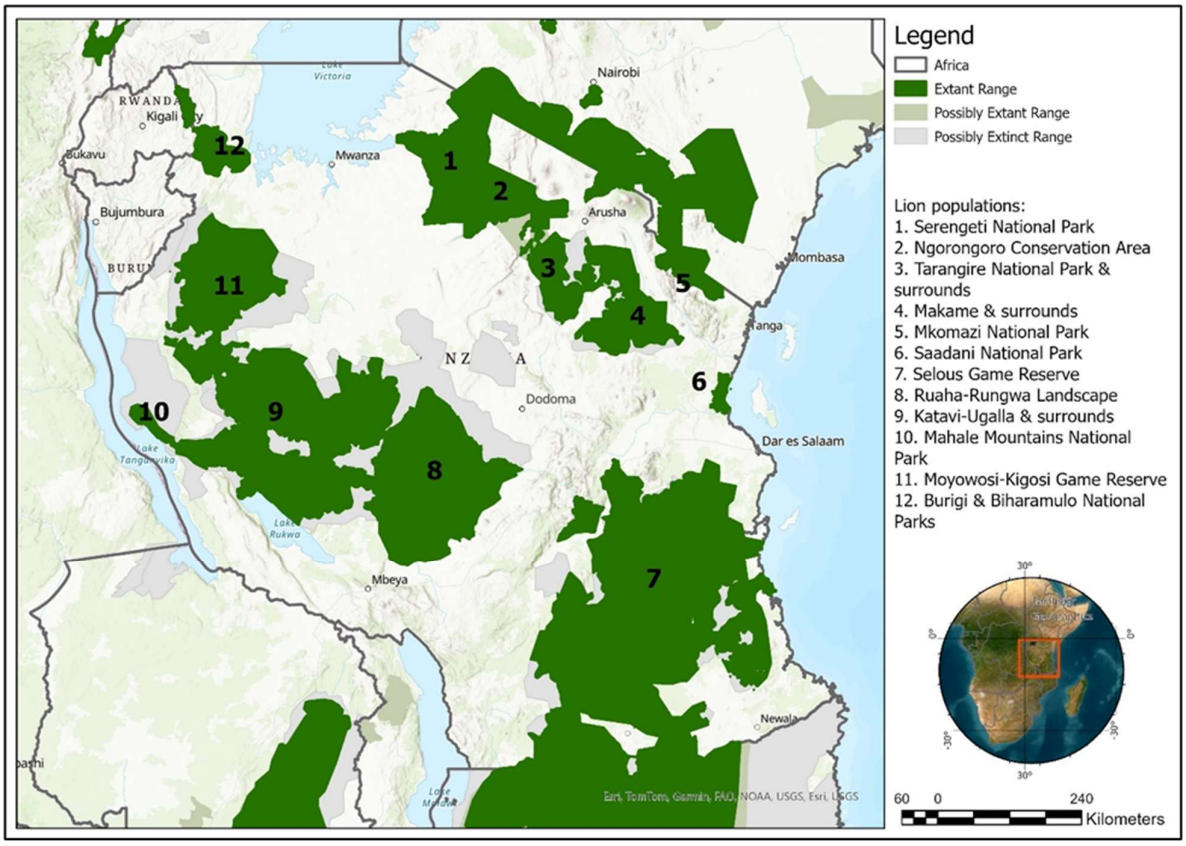


Fig. 4.19. Lion populations in the United Respublic of Tanzania.

Landscape: Ruaha-Rungwa landscape

The Ruaha-Rungwa landscape, located in south-central Tanzania, is a vast and ecologically rich area encompassing more than 45,000 km^2 (Abade et al., 2014; Strampelli et al., 2022). This landscape is a crucial conservation region, with land use primarily dedicated to wildlife conservation, sustainable tourism, and limited traditional pastoralism. Central to this area is the Ruaha National Park, which was gazetted in 1964 (Komba et al., 2021) and covers an expansive 20,226 km^2 (Smit et al., 2023; Strampelli et al., 2022). The Rungwa Game Reserve, established in 1951, spans 9,175 km^2, while the adjacent Kizigo and Muhesi Game Reserves, both gazetted in 1972, cover 5,140 and 2,720 km^2, respectively (Strampelli et al., 2022). The MBOMIPA Wildlife Management Area (777 km^2) also forms part of the landscape (Smit et al., 2023). These reserves form a contiguous ecosystem (Fig. 4.21) that supports a diverse array of wildlife, including significant populations of elephants, lions, and various ungulate species, playing a critical role in the preservation of Tanzania's natural heritage.

a) Habitat description

The dominant habitat within Ruaha National Park is a mosaic of semi-arid savannah, characterized by extensive Combretum and Acacia woodlands, interspersed with patches of miombo (*Brachystegia* spp.) woodland (Strampelli et al., 2022). Along the Great Ruaha River and its tributaries, there are well-developed riparian forests dominated by species such as *Faidherbia albida* and *Trichilia emetica*, providing critical habitats for both terrestrial and aquatic species (Strampelli et al., 2022). The varied topography, including rocky escarpments and kopjes, further contributes to the ecological diversity of the park, supporting a wide range of niches and enhancing the park's overall biodiversity.

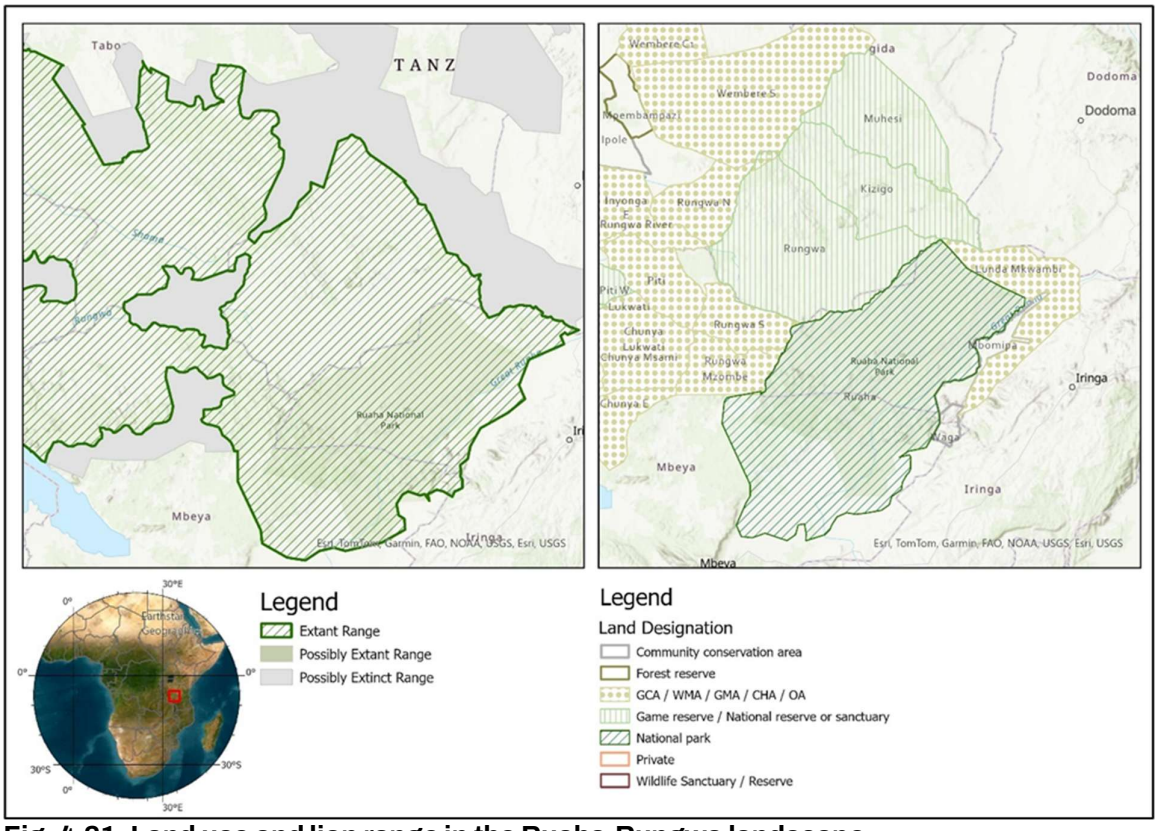


Fig. 4.21. Land use and lion range in the Ruaha-Rungwa landscape.

Rungwa Game Reserve, located in south-central Tanzania, exhibits a complex habitat structure that is predominantly characterized by miombo woodland, a vegetation type typical of the Zambezian biogeographical region (Barnes & Douglas-Hamilton, 1982). The woodland is

primarily composed of *Brachystegia, Julbernardia*, and *Isoberlinia* species, forming a dense canopy that dominates the reserve's landscape (Barnes & Douglas-Hamilton, 1982). The varied topography and the presence of permanent water sources in some areas further contribute to the ecological diversity of Rungwa Game Reserve, making it an important conservation area for a range of species.

Kizigo Game Reserve and Muhesi Game Reserve are characterized predominantly by miombo woodland, a key habitat type in the region (Searle et al., 2021; Strampelli et al., 2022). The miombo woodland in these reserves is dominated by Itigi thicket (Kiondo et al., 2019) and by species such as *Brachystegia, Julbernardia*, and *Isoberlinia*, forming a dense, deciduous canopy that supports a variety of herbivores and avian species. Within Kizigo, the woodland is interspersed with open grasslands and seasonally flooded areas, which provide important grazing grounds for large mammals, including elephants and buffalo. Muhesi Game Reserve, has slightly more rugged terrain, also features a mosaic of miombo woodlands and open savannahs.

b) Ecological significance

The Rungwa-Ruaha landscape in Tanzania has one of the largest lion populations globally, alongside significant populations of cheetahs, lions and Africa's third largest population of Endangered wild dogs (Abade et al., 2014; Searle et al., 2021; Smit et al., 2023; Strampelli et al., 2022). While some ecological research is conducted within the park itself, much of the current research and conservation work focuses on village lands to the southeast, particularly in two community Wildlife Management Areas. These village lands, inhabited by over 40,000 people, are heavily dependent on livestock, leading to historically high levels of human-carnivore conflict and carnivore killings.

c) Significant threats

Lions in the Ruaha-Rungwa landscape face several significant threats that threaten their long-term survival within the system. One of the primary threats is human-wildlife conflict, particularly in areas adjacent to protected reserves where livestock depredation by lions can lead to retaliatory killings by local communities (Abade et al., 2014). This is especially evident on the village land adjacent to the national parks (Abade et al., 2014). This conflict is exacerbated by the expansion of agricultural and pastoral activities, which reduce natural prey availability and increase encounters between lions and humans. Lion poaching for the illegal wildlife trade can occur, albeit to a lesser extent compared to other regions in Africa (K. Everatt et al., 2019). These cumulative pressures underscore the need for integrated conservation strategies that address human-lion coexistence, habitat protection, and sustainable management practices to improve the conservation of lion populations in the Ruaha-Rungwa landscape.

d) Management and land use

Ruaha-Rungwa encompasses a range of land management strategies (Searle et al., 2021). The largest protected area in the ecosystem is Ruaha National Park (20,226 km^2) which is the second largest national park in East Africa (Strampelli et al., 2022). Ruaha National Park is managed directly by the Tanzanian National Parks Authority (TANAPA), which oversees all aspects of conservation, research, and tourism within the park's boundaries. Rungwa Game Reserve, along with Kizigo and Muhesi Game Reserves, is administered by the Tanzania Wildlife Management Authority (TAWA), which implements policies for wildlife conservation, anti-poaching efforts, and regulated hunting activities. In these game reserves, land use is primarily focused on conservation and controlled trophy hunting, with annual quotas established based on ecological assessments to ensure sustainable practices. Trophy hunting is an important economic activity in Tanzania and the country has the second largest trophy hunting industry in Africa (Nelson et al., 2013).

In addition to these state-managed areas, the "Sustainable use of Wildlife Resources in Idodi and Pawaga" (MBOMIPA) referred to as the MBOMIPA WMA is a community-managed

concessions where local residents are actively involved in conservation efforts and benefit-sharing schemes. This WMA operates under agreement with TAWA, which provides guidelines for resource use, conservation practices, and revenue distribution to ensure that local communities are engaged and benefit from the sustainable management of their natural resources.

Ruaha National Park, designated exclusively for photographic tourism, is bordered to the north by Rungwa, Kizigo, and Muhesi Game Reserves, where trophy hunting is allowed under regulated conditions (Smit et al., 2023). To the east of Ruaha, across the Great Ruaha River, lie two community-managed Wildlife Management Areas (WMAs)—MBOMIPA WMA and Waga WMA. These WMAs serve as a buffer zone between the national park and the surrounding unprotected village lands. The broader landscape also includes additional, less strictly protected areas. Since the protected areas within this landscape are unfenced, wildlife frequently traverses between these protected zones and the adjacent non-protected regions.

e) Lions within the site

The lion population in the Ruaha-Rungwa landscape is one of the largest and most ecologically significant in Africa, contributing to the region's status as a critical stronghold for the species. This expansive landscape, encompassing Ruaha National Park, Rungwa Game Reserve, and adjacent protected areas, supports an estimated lion population that is among the most robust in Tanzania. The relatively undisturbed and contiguous habitats of miombo woodlands, savannahs, and riverine ecosystems provide an extensive prey base, essential for sustaining large lion prides. The population is characterized by its high genetic diversity, owing to the vast, interconnected nature of the landscape, which facilitates gene flow between subpopulations. Despite the population's size and genetic health, it remains vulnerable to threats such as human-wildlife conflict, habitat fragmentation, and, to a lesser extent, the impacts of illegal killing. Conservation efforts within the landscape are focused on maintaining the integrity of these habitats, mitigating conflicts, and ensuring that management practices, including hunting quotas, are aligned with the long-term sustainability of the lion population. Continuous monitoring and research are essential to understanding population dynamics, assessing threats, and implementing effective conservation strategies to safeguard this keystone predator within the Ruaha-Rungwa landscape.

Table 4.9. The estimated density of lions (*Panthera leo*) at four sites in the Ruaha-Rungwa landscape in 2019.

Year	Protected area/Management unit	Survey area size	Density (lions per 100 km^2)	Reference
2019	Ruaha National Park Core Area	223 km^2	6.12 ± 0.94*	Strampelli et al., 2022
	MBOMIPA WMA grid	270 km^2	4.05 ± 1.02*	
	Rungwa GR	555 km^2	2.74 ± 0.66*	
	Miombo woodland of Ruaha NP	152 km^2	1.75 0.62*	

In recent years, there has only been one systematic survey of lions in the Ruaha-Rungwa landscape. A camera trap study was conducted by Strampelli et al. (2022) at four sites across the landscape between June and November 2018 and July and October 2019. The study found that lion population density was highest in the Ruaha National Park core grid, at 6.12 ± 0.94 lions per 100 km^2, with the second highest density in the MBOMIPA WMA grid, followed by Rungwa Game Reserve and the Miombo woodland area of the Ruaha National Park (Table 4.9).

f) Resource use and trophy hunting

Rungwa Game Reserve and Ruaha National Park are both critical conservation areas in Tanzania, but they differ significantly in their management and use, particularly concerning

trophy hunting. While Ruaha National Park is a strictly protected area where hunting is prohibited, Rungwa Game Reserve, Kizigo Game Reserve and Muhesi Game Reserve (all integral parts of the landscape) all permit regulated trophy hunting, including for lions (Msigwa et al., 2023; Nachihangu et al., 2022).

The Tanzanian government sets annual quotas for lion hunting in Rungwa, based on population assessments aimed at ensuring the sustainability of lion populations (Packer & Whitman, 2006). Communities surrounding the reserve can benefit from trophy hunting through revenue-sharing programs, employment opportunities, and funding for community projects, which are designed to incentivize local support for conservation efforts (Msigwa et al., 2023). However, the effectiveness of these benefits in improving local livelihoods and ensuring sustainable lion populations remains a topic of ongoing debate and research, particularly regarding the long-term impact of hunting on lion demographics and the equitable distribution of benefits to local communities (Dickman et al., 2019; Dube, 2019; Makuyana, 2018; Nelson et al., 2013).

The history of lion trophy hunting in the Rungwa Game Reserve and the broader Ruaha-Rungwa landscape dates back to the colonial era when hunting was a prominent activity for European settlers and visiting sportsmen (Msigwa et al., 2023). During this period, hunting was largely unregulated, leading to significant declines in wildlife populations, including lions. Following Tanzania's independence in 1961, the government implemented more structured wildlife management policies, designating areas like Rungwa Game Reserve as regulated hunting zones (Msigwa et al., 2023). Over the decades, trophy hunting of lions became an important revenue-generating activity, attracting international hunters and contributing to the local and national economy (Nelson et al., 2013). However, concerns over the sustainability of lion populations and the ethical implications of trophy hunting have led to increased scrutiny and calls for stricter regulations (Makuyana, 2018; Nelson et al., 2013). Between 1996 and 2009, over 170 lion trophies were exported from Tanzania, with each trophy hunting event generating around US$70,000 per lion (Nelson et al., 2013). In response, the Tanzanian government introduced quotas and age-based restrictions, such as only permitting the hunting of older, non-breeding male lions to minimize the impact on the overall population (Packer et al., 2011; Packer & Whitman, 2006). Despite these measures, the practice remains controversial, with ongoing debates about its ecological impact and the extent to which local communities benefit from the revenue generated by hunting activities (Brink et al., 2016; Makuyana, 2018).

The Ruaha-Rungwa landscape is home to several villages located around its protected areas. Communities near Ruaha National Park, as well as those adjacent to Rungwa, Kizigo, and Muhesi Game Reserves, engage primarily in agriculture and livestock farming. These villages often experience human-wildlife conflicts due to their proximity to the park and reserves. In contrast, the villages within the MBOMIPA WMA are actively involved in community-based conservation programmes, which integrate local livelihoods with conservation efforts (Nachihangu et al., 2022). These WMAs facilitate revenue-sharing initiatives that benefit local residents, aiming to reduce conflicts and promote sustainable land use (Nachihangu et al., 2022). Access to resources is often limited to specific uses such as sustainable collection of non-timber forest products or regulated grazing under controlled conditions. However, illegal activities like poaching and unregulated resource extraction can still occur.

5. Ecological and socio-political fragility

The ecological and socio-political fragility results for each population of lions selected at a case study landscape and sites are included in Table 4.10. They are presented among score for other lion populations for context and reference.

Table 4.10. Fragility results from the 82 lion populations in Africa (source: Nicholson & Dickman et al. 2023). The study populations used in this study are in green.

	Population	*Ecological fragility score*	*Socio-political score*	*Overall fragility score*		*Population*	*Ecological fragility score*	*Socio-political score*	*Overall fragility score*
1	Maze	1.00	0.53	1.53	*45*	Gorongosa-Marromeu	0.38	0.45	0.83
2	Bush-bush	0.41	1.00	1.41	*46*	Gambella	0.29	0.53	0.82
3	Virunga	0.54	0.74	1.28	*47*	Kidepo Valley	0.29	0.53	0.82
4	Lake Manyara	0.99	0.29	1.28	*48*	Niokolo-Koba	0.39	0.40	0.79
5	Nechisar	0.65	0.53	1.18	*49*	Greater Limpopo (including Karingani, Banhine)	0.34	0.45	0.79
6	Chebera Churchura, Kaffa	0.62	0.53	1.15	*50*	Chizarira-Chirisa	0.40	0.38	0.78
7	Toro-Semiliki	0.61	0.53	1.14	*51*	Tchuma Tchato	0.33	0.45	0.78
8	Garamba Complex	0.39	0.74	1.13	*52*	Longido	0.48	0.29	0.77
9	Liwonde and Mangochi	0.55	0.57	1.12	*53*	Matusadona and Omay	0.39	0.38	0.77
10	Boma National Park	0.21	0.89	1.10	*54*	Borana and South Omo Ecosystem	0.23	0.53	0.76
11	Sena Oura	0.39	0.71	1.10	*55*	Meru Conservation Area	0.47	0.29	0.76
12	Queen Elizabeth	0.55	0.53	1.08	*56*	Lavushi Manda	0.41	0.33	0.74
13	Yankari	0.41	0.67	1.08	*57*	Mana Pools, Hurungwe, Sapi, Chewore, Dande and Doma	0.36	0.38	0.74
14	Waza	0.58	0.47	1.05	*58*	Udzungwa Mountains	0.44	0.29	0.73
15	Bili-Uere Complex	0.30	0.74	1.04	*59*	Laikipia-Samburu-Marsabit	0.43	0.29	0.72
16	Integral Nature Reserve and the Luando	0.32	0.72	1.04	*60*	Liuwa Plain	0.38	0.33	0.71

17	Vwaza Marsh	0.44	0.57	1.01	*61*	Bubye Valley	0.31	0.38	0.69
18	Babille/Eastern Hararghe	0.48	0.53	1.01	*62*	Gonarezhou-Save Valley	0.30	0.38	0.68
19	Kasungu	0.43	0.57	1.00	*63*	Moyowosi-Kigosi	0.39	0.29	0.68
20	Kainji Lake	0.33	0.67	1.00	*64*	Southern Maasai Steppe	0.38	0.29	0.67
21	Zakouma NP and Surrounds	0.29	0.71	1.00	*65*	Niassa	0.18	0.45	0.63
22	Bamingui-Bangoran	0.28	0.70	0.98	*66*	Mkomazi	0.33	0.29	0.62
23	Chinko and surroundings	0.28	0.70	0.98	*67*	Sioma Ngwezi	0.27	0.33	0.60
24	Maokomo	0.44	0.53	0.97	*68*	Hwange	0.20	0.38	0.58
25	Akagera	0.41	0.56	0.97	*69*	Shashe-Limpopo	0.51	0.07	0.58
26	Tuli Circle	0.58	0.38	0.96	*70*	Greater Kafue Ecosystem	0.22	0.33	0.55
27	Alatash, Bejemis & surroundings	0.42	0.53	0.95	*71*	Hluhluwe-Umfolozi	0.45	0.07	0.52
28	Dinder	0.31	0.63	0.94	*72*	Xaxa	0.49	0.00	0.49
29	Welmel-Genale	0.41	0.53	0.94	*73*	Luangwa Valley	0.15	0.33	0.48
30	Bale	0.40	0.53	0.93	*74*	Serengeti-Ngorongoro-Loliondo	0.14	0.29	0.43
31	Afar-Awash	0.39	0.53	0.92	*75*	Mara-Amboseli-Chyulu-Tsavo-BoniDodori	0.14	0.29	0.43
32	Luengue-Luiana and Mavinga	0.19	0.72	0.91	*76*	Khaudum-Caprivi	0.31	0.10	0.41
33	Murchison Falls	0.37	0.53	0.90	*77*	Kalahari Gemsbok	0.32	0.07	0.39
34	Swaga Swaga	0.60	0.29	0.89	*78*	Etosha-Kunene	0.29	0.10	0.39
35	Manyara Ranch	0.59	0.29	0.88	*79*	Katavi-Ruaha	0.08	0.29	0.37
36	Ogaden	0.34	0.53	0.87	*80*	Northern Tuli	0.35	0.00	0.35
37	Magoe	0.42	0.45	0.87	*81*	Selous	0.00	0.29	0.29
38	Saadani	0.58	0.29	0.87	*82*	Kruger National Park and Adjoining Private Nature Reserves	0.10	0.07	0.17
39	Burigi-Chato	0.56	0.29	0.85	*83*	Central Kalahari-Khutse-Gemsbok	0.13	0.00	0.13

40	Benoue Complex	0.38	0.47	0.85	*84*	Okavango-Chobe	0.04	0.00	0.04
41	South Omo Ecosystem	0.31	0.53	0.84					
42	WAP, Burkina Faso	0.33	0.50	0.83					
43	WAP, Benin	0.37	0.46	0.83					
44	WAP, Niger	0.35	0.48	0.83					

5.1 Ecological fragility: Case study landscapes and sites

5.1.1 Central Africa – Cameroon: Bénoué Complex

When the ecological and socio-political fragility of the Bénoué Complex was assessed and compared with other lion populations across Africa, it ranked 40th out of 84 lion populations in Africa. The complex was estimated to be of low ecological fragility and high socio-political fragility. The Bénoué Complex scored 0.38 when assessed for ecological fragility and 0.47 for socio-political fragility.

The Bénoué Complex is considered to be very isolated from other lion populations and as a result, this increases the population's ecological fragility significantly. The Bénoué Complex is made up of three national parks and several hunting zones. As the complex is largely outside of formal protected areas, it has increased its overall ecological fragility. In addition, cattle density also increased the complex's fragility. Decreasing the complex's fragility include the low human density within it, its limited shared borders with neighbouring countries and limited edge effects.

The ecological fragility score of the Bénoué Complex lion population in Cameroon reveals a moderate level of vulnerability (Fig. 4.23). The remaining lion range suggests that the population has relatively little habitat available, increasing its susceptibility to ecological pressures. With a low coverage of protected area overlap, the population has limited formal protection, further contributing to its ecological fragility. The population is well below its potential carrying capacity which implies that the lions are not utilizing their full potential habitat or are under severe anthropogenic pressure, leaving room for further recovery.

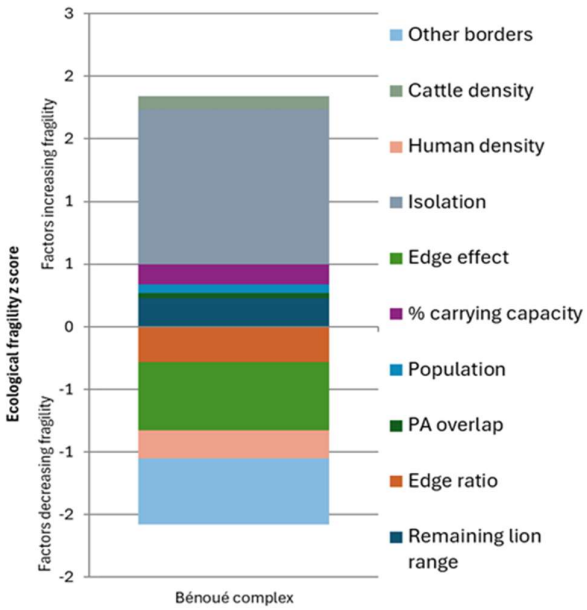


Fig. 4.23. Ecological variables contributing to the Bénoué Complex's ecological fragility.

However, the higher score for population isolation suggests that, despite this connectedness, the population may still face genetic risks from reduced dispersal or exchange. Human density around the population is relatively low, which is favourable for reducing human-lion conflicts, although the cattle density still represents a potential source of conflict. Overall, the combination of these factors results in a fragile population, but one that benefits from some mitigating factors like lower human density and edge effects.

When assessing at the national level, Cameroonian and Malawian lion populations were found to be most ecologically fragile due to their small populations and isolation from other lion populations. This is particularly the case with the Bénoué Complex as the nearest populations (Waza National Park and Zakouma) are more than 300 kms away. The driver of Cameroon's high overall fragility was very high ecological fragility, despite relatively less socio-political fragility.

5.1.2 Southern Africa – Mozambique: Niassa Special Reserve

When the ecological and socio-political fragility of Niassa was assessed and compared with other lion populations, it ranked 65 out of 84 populations. The population was considered to have low ecological fragility and high socio-political fragility.

Ecological variables increasing the fragility of Niassa included the large coverage of protected areas, and the fact that Niassa is a fairly small population size relative to potential carrying capacity. Decreasing Niassa's fragility included the fact that Niassa makes up a considerable percentage of remaining lion range and population size in Africa, low edge effects and both low densities of cattle and humans living within the population.

The ecological fragility score for the Niassa lion population in Mozambique shows a mix of vulnerabilities and strengths (Fig. 4.25). The lion population occupies a relatively large geographic range, which decreases its ecological fragility. Overlap with protected areas is moderate, indicating that some areas of the population are not fully protected. The population is at a reasonable percentage of its carrying capacity, reflecting a stable, though not fully maximized, population size. The low scores for human density and cattle density reduce the potential for human-lion conflict, further stabilizing the population. However, there is some influence from bordering countries and moderate isolation, meaning the population's connectivity with other lion groups is limited. Overall, while the small range and moderate protection raise concerns, other factors like low human and cattle density help mitigate fragility for the Niassa lion population.

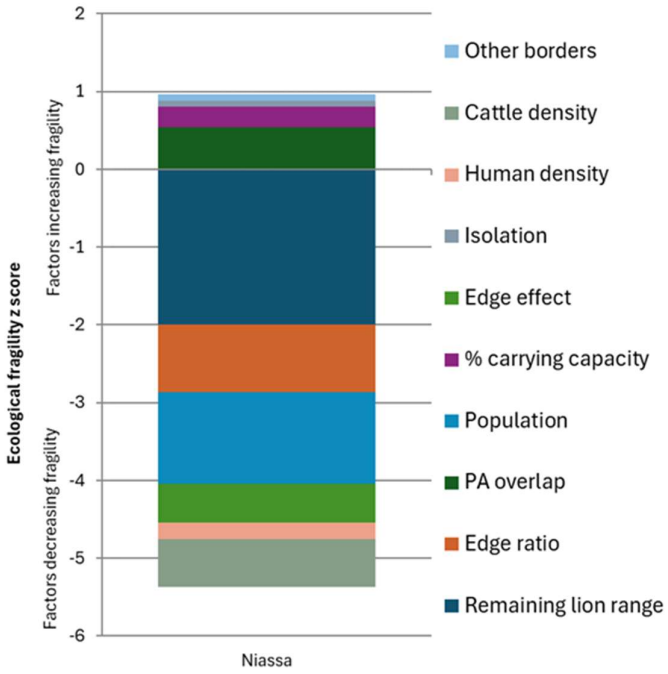


Fig. 4.25. Ecological variables contributing to the Niassa Special Nature Reserve's ecological fragility.

5.1.3 Southern Africa – South Africa: Kruger National Park and Adjoining Private Nature Reserves

For the fragility analysis, the Associated Private Nature Reserves (ANPRs) to the Southwest of the Kruger National Park and the park are considered together. The lion populations in this area are considered the least fragile of our case study sites and ranked 82nd out of the 84 study populations.

Only two ecological variables were found to increase its fragility: human density within the area (although low) and its immediate exposure to the influence of bordering nations – particularly Mozambique which makes it more vulnerable to Mozambique's policies and conservation practices. Ecological variables which were found to decrease the Kruger's fragility include its fairly large lion population size, population size relative to carrying capacity and large overlap with protected areas.

The ecological fragility score of the Kruger National Park lion population indicates low fragility across most variables (Fig. 4.24). Notably, the Kruger lion population occupies a relatively large geographic range with significant overlap with protected areas and reserves, reducing the risk of edge effects and increasing protection from external pressures. Additionally, the population is at a high percentage of its carrying capacity, suggesting strong population stability and resilience. However, the slight positive score for proximity to other borders indicates some influence from neighbouring socio-political contexts, which could pose a vulnerability. Overall, the low human and cattle density within the population's range further reduce ecological fragility by limiting human-lion conflicts. Combined, these factors suggest that the Kruger lion population is ecologically robust, with a low risk of extirpation in the short term.

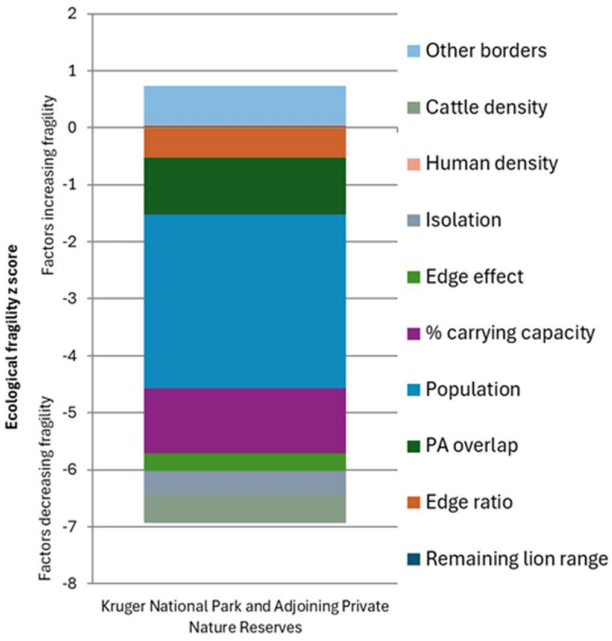


Fig. 4.24. Ecological variables contributing to the Kruger National Park's ecological fragility.

5.1.4 Southern Africa – Zambia: Luangwa Valley

It should be noted that for the fragility analysis conducted, the Luangwa Valley included North and South Luangwa National Parks and the surrounding Game Management Areas as the landscape was contiguous. For this body of work, we present the findings of the larger area as the Luangwa Valley.

When the ecological and socio-political fragility of the Luangwa Valley was assessed and compared with other lion populations, it was among the least fragile (ranked 73 out of 84 populations) (Fig. 4.27). The population was considered to have both low ecological and socio-political fragility.

Variables increasing their ecological fragility included its limited overlap with protected areas, exposure to other borders and its population size relative to its potential carrying capacity. Reducing their fragility include ecological variables such as its lack of isolation (i.e. close proximity to other lion populations), population size, limited human and cattle density within the population and reduced edge effects.

The ecological fragility of the Luangwa Valley lion population in Zambia reveals a blend of challenges and relative strengths. The population's geographic range is moderately small compared to other lion populations in Africa, contributing to its ecological vulnerability. The overlap with protected areas is moderate, suggesting that while some parts of the lion habitat are safeguarded, there is still significant unprotected area which increases its fragility and exposure to anthropogenic pressures. Notably, the Luangwa Valley lion population is less influenced by bordering countries, which is a positive factor for its stability. Overall, while the Luangwa Valley lion population faces some ecological risks, its relatively low human and cattle density, along with limited external socio-political influence, offer some degree of stability.

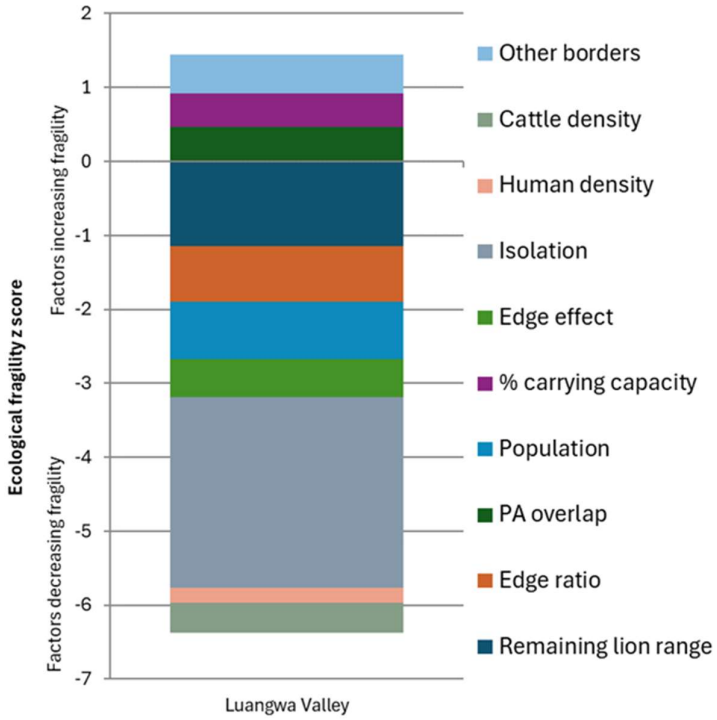


Fig. 4.27. Ecological variables contributing to the Luangwa Valley's ecological fragility.

5.1.5 Southern Africa – Zimbabwe: Hwange National Park and surrounding areas

It should be noted that for the fragility analysis conducted, the Hwange ecosystem included the National Park and surrounding GMAs and smaller national parks as the landscape was contiguous. For the purpose of this body of work, we present the findings of the larger area as Hwange National Park and the surrounding areas. Overall, Hwange ranked 68th out of 84 lion populations in Africa and is not considered as highly fragile.

The only ecological variable which was found to increase the population's fragility is its exposure to other borders (Fig. 4.26). Variables decreasing the population's fragility include its lack of isolation (i.e. close proximity to other lion populations), fairly large lion population size, limited edge effects and edge ration and large overlap with formal protected areas (namely the national parks).

The ecological fragility score for the Hwange lion population in Zimbabwe indicates several areas of concern alongside some mitigating factors. The population occupies a relatively large geographic range, which generally suggests reduced vulnerability. However, the edge-to-area ratio and the degree of overlap with protected areas reflect limited protection, which could pose risks to the population's stability. The population size is below its potential carrying capacity, indicating that it is not operating at its full potential. Despite these concerns, the low scores for human density and cattle density within the lion range help reduce the risk of human-wildlife conflict and reduce the overall ecological fragility. Overall, while the Hwange lion population benefits from a large range and low human and cattle density within its area, it faces ecological fragility due to habitat fragmentation, smaller relative population size, and limited formal protection.

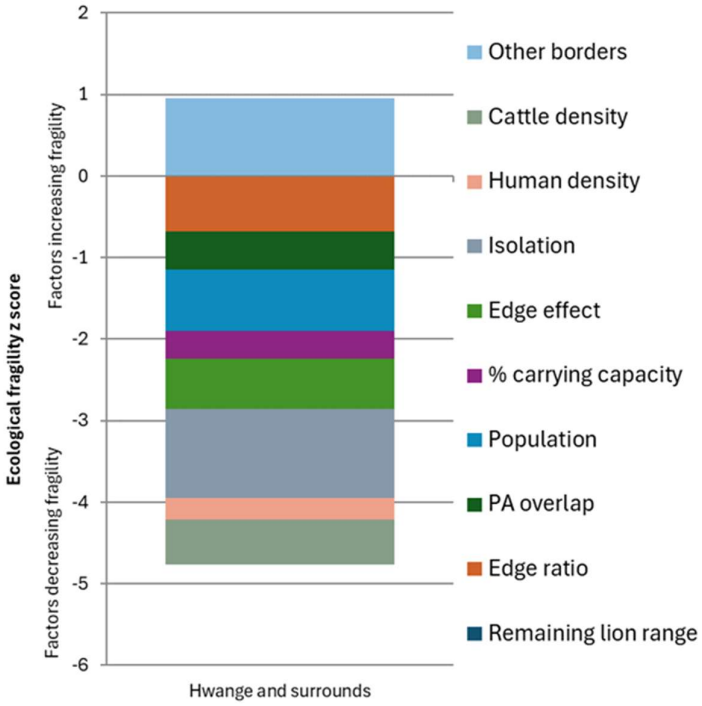


Fig. 4.26. Ecological variables contributing to Hwange's ecological fragility.

5.1.6 Eastern Africa – Kenya: Maasai Mara and surrounds

It should be noted that for the fragility analysis conducted, the Maasai Mara landscape included the Amboseli ecosystem, Chyulu Hills and Tsavo National Park as the landscape was contiguous. For this body of work, we present the findings of the larger area.

When the ecological and socio-political fragility of the extended Maasai Mara landscape was assessed and compared with other lion populations, it ranked among the least fragile (75 out of 84 populations). The landscape was considered to of low ecological and socio-political fragility.

Ecological variables contributing to the Maasai landscapes fragility included its limited overlap with formal protected areas, high edge effects, high cattle density across the landscape and exposure to other borders. Contributing to the landscape's decreased ecological fragility included its connectedness to other lion populations (e.g. Serengeti, Mkomazi National Park), large, estimated population size, and low edge-to-area ratio.

The ecological fragility score for the Maasai Mara lion population in Kenya reveals a mixed picture of vulnerability and resilience (Fig. 4.28). The remaining lion range is relatively large, which generally reduces ecological fragility, although the edge-to-area ratio indicates some level of habitat fragmentation. Notably, the population's overlap with protected areas is high, providing substantial habitat protection and reducing overall ecological fragility. However, the population size is somewhat below its carrying capacity, suggesting it is not fully protected, which could impact long-term viability. The high score for edge effects reflects significant external pressures from human activities and land use changes around the habitat. The relatively low scores for human density and cattle density could suggest minimal direct human conflict. Overall, while the Maasai Mara landscape benefits from substantial protected area overlap and relatively low human density, it faces challenges from habitat fragmentation, edge effects, and isolation that contribute to its ecological fragility.

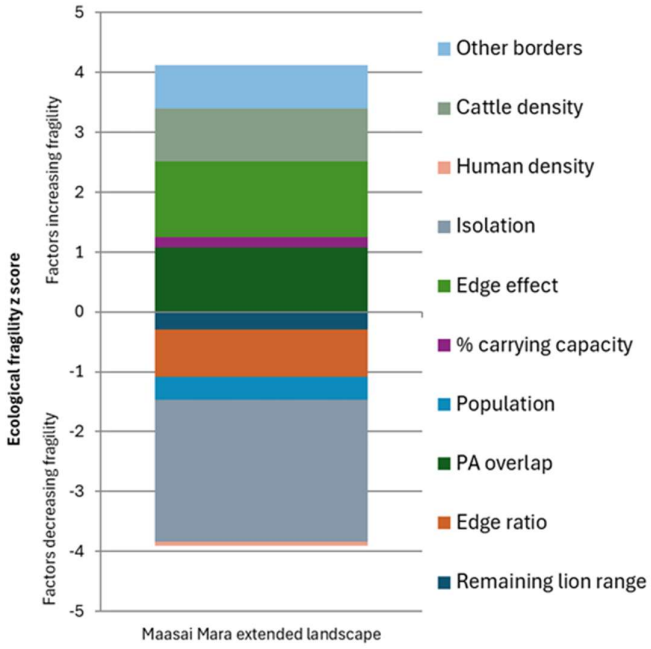


Fig. 4.28. Ecological variables contributing to the Maasai Mara Landscape's ecological fragility.

5.1.7 Eastern Africa – Tanzania: Ruaha-Rungwa Landscape

It should be noted that for the fragility analysis conducted, the Ruaha-Rungwa landscape included Ugalla, Katavi and the Mahale Mountains. For this body of work, we present the findings of the larger area.

When the ecological and socio-political fragility of the Ruaha-Rungwa landscape was assessed and compared with other lion populations, it ranked among the least fragile (79 out of 84 populations). The landscape was considered to be of low ecological and socio-political fragility.

Ecological variables which contributed to some level of fragility included its limited coverage with formal protected areas, cattle density within the population and exposure to other borders. Variables contributing to decreased fragility included its large size (relative to the species range remaining), estimated large lion population, its proximity to several other lion populations (e.g. Selous, Moyowosi-Kigosi) and low edge-to-area ratio. Ruaha-Rungwa landscape was among one of the most well-connected populations.

The Rugwa-Ruaha lion population occupies a relatively large geographic range, which greatly decreases its ecological fragility due to decreased risks associated with edge effects and habitat loss (Fig. 4.29). Although the overlap with protected areas is considerable, providing some degree of protection, the population size is notably below its carrying capacity, suggesting a higher risk of population decline. Additionally, the low scores for human density and cattle density within the lion range reduce the impact of human-wildlife conflict, but the higher scores for edge effects and proximity to other borders indicate ongoing pressures from external socio-political factors.

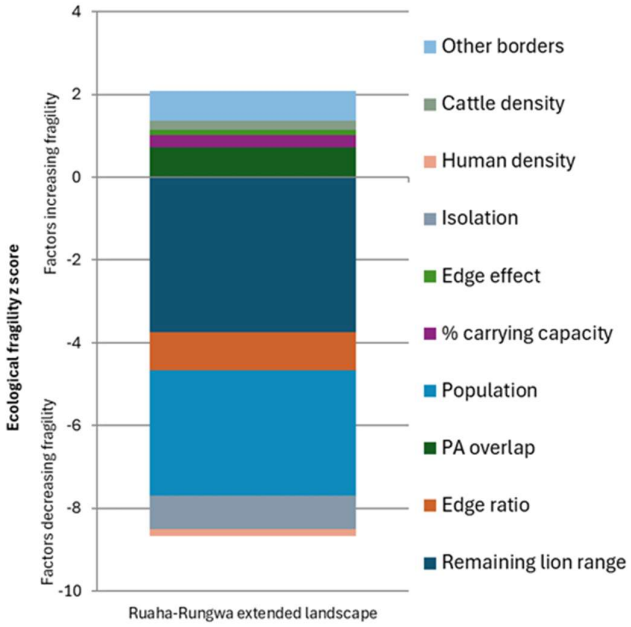


Fig. 4.29. Ecological variables contributing to the Ruaha-Rungwa's Landscape ecological fragility.

5.1.8 West Africa – Benin, Burkina Faso and Niger: W-Arly-Penjari (WAP) complex

When the ecological and socio-political fragility of the WAP was assessed and compared with other lion populations across Africa, it scored fairly average, ranking 33 out of 62 transboundary lion populations (Nicholson et al., 2023). The results of the W-Arly-Pendjari (WAP) lion populations in Benin, Burkina Faso, and Niger highlight varying levels of ecological fragility across the three countries (Fig. 4.22). The Benin component (score of 0.37) of the WAP was relatively more ecologically fragile than the Burkina Faso (score of 0.33) and Niger (score of 0.35) populations. However, socio-politically, the Burkina Faso population (score of 0.50) was estimated to be more fragile than Niger (score of 0.48) and Benin (score of 0.46). Each population within the WAP was estimated to be of low ecological fragility and high socio-political fragility.

Ecological variables which were found to increase the WAP's ecological fragility included its isolation from other lion populations and small lion population sizes relative to potential carrying capacity. Reducing the fragility of the three populations is the large overlap of the area with formal protected areas, its formal protection status has also resulted in low cattle and human density within the area which has also decreased the populations fragility.

In Benin, the lion population shows moderate fragility with a relatively low percentage of carrying capacity utilized and a mid-level remaining lion range. There is less pressure from edge effects, though the protected area overlap is low, indicating vulnerability due to limited protection. Human and cattle density within the lion range are moderately low, suggesting fewer direct conflicts with local communities.

In Burkina Faso, the fragility is higher. Despite a similar lion range, the protected area overlap is particularly low, reflecting limited coverage and a higher risk of fragmentation. The edge effect is more pronounced, which, coupled with a higher cattle density, implies increased conflict with pastoralism. While the percentage of carrying capacity is slightly lower than Benin, the ecological pressures from human populations are consistent.

In Niger, the lion population is the most ecologically fragile. Although it has the largest remaining

lion range of the three countries in the WAP, and the highest protected area overlap, its carrying capacity utilization is low. A significant edge-to-area ratio and minimal protected area overlap suggest considerable exposure to threats. The high cattle density further exacerbates potential conflicts, alongside notable isolation and human density pressures.

These variations across the WAP complex reflect how different socio-political and environmental factors interact, influencing the fragility and long-term viability of lion populations. Efforts to protect lions in the WAP Complex include anti-poaching initiatives, community-based conservation programmes, and international collaborations to strengthen law enforcement and habitat protection. However, these efforts face ongoing challenges due to the complex socio-economic and environmental factors in the region.

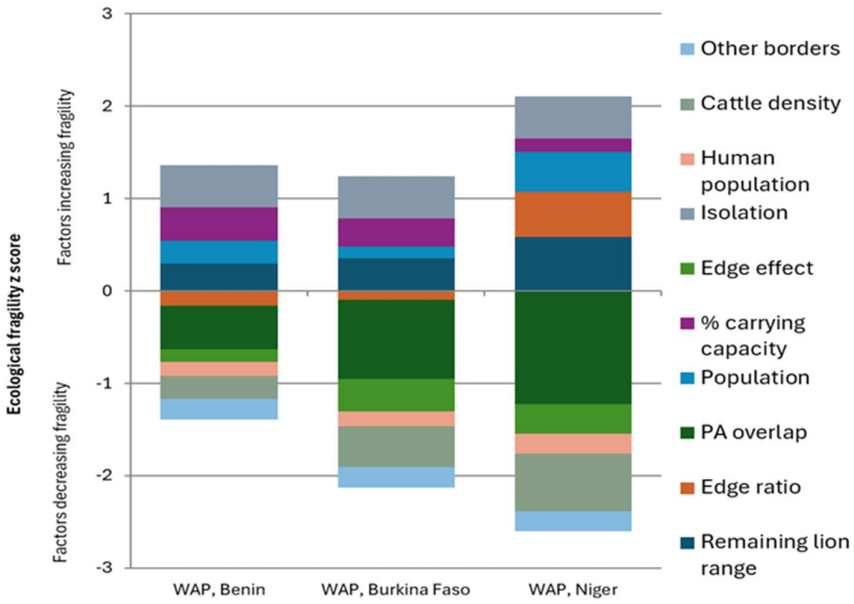


Fig. 4.22. Ecological variables contributing to the W-Arly-Penjari's ecological fragility.

5.2 Socio-political fragility at a national level

Socio-political fragility refers to the vulnerability or instability of a region or population due to social and political factors. This includes the capacity of institutions to provide basic services, maintain law and order, and manage conflicts, as well as the level of social cohesion within the population. Socio-political fragility can be influenced by factors like governance quality,

corruption, political instability, social inequality, poverty and conflict. In wildlife conservation, areas with higher socio-political fragility often face challenges such as higher poaching, illegal resource extraction, and difficulty implementing and enforcing conservation policies due to weak governance and political instability.

The analysis of the socio-political fragility of the selected countries highlights significant differences in their governance, economic, human pressure, and policy indicators, leading to varying degrees of fragility (Fig. 4.30). Burkina Faso ranks as the most fragile country with a rescaled socio-political score of 0.50. This fragility stems from challenges across several areas: a negative governance score of -0.27, modest economic performance (0.21), high human pressure (0.52), and weak policy management (-0.44). Cameroon follows as the second-most fragile country with a score of 0.47. It shows a neutral governance score (0.04), slight economic underperformance (-0.12), negative human pressure (-0.16), and modest policy performance (0.03), reflecting a relatively mixed socio-political environment.

Mozambique, ranked third with a score of 0.44, struggles due to moderate governance issues (-0.08), good economic performance (0.81), but negative scores in human pressure (-0.27) and policy management (-0.88), indicating challenges in policy stability. Zimbabwe, ranked fifth, has a fragility score of 0.38, reflecting governance issues (0.63), but weaker economic (-0.35), human pressure (-0.65), and policy management scores (-0.55), showing systemic challenges across multiple fronts.

Benin, ranked fourth with a score of 0.46, has weaker governance (-0.43) but relatively strong economic and human pressure scores (0.13 and 0.53, respectively), though it struggles with policy (-0.55). Zambia, ranked sixth, has a fragility score of 0.32, with relatively neutral governance (-0.31) but significant economic challenges (0.34) and a poor policy environment (-1.25).

In contrast, Kenya and Tanzania, both ranked seventh with fragility scores of 0.28, show some resilience. Kenya faces governance challenges (-0.60) and economic underperformance (-0.44), while Tanzania also has governance issues (-0.17) and struggles with policy management (-1.42). Lastly, South Africa, the least fragile country in this study, ranks eighth with a score of 0.07, indicating strong resilience. Despite its governance issues (-1.68), economic challenges (-0.89), and human pressure (-0.79), South Africa's stronger policy environment (0.03) helps to balance its overall fragility.

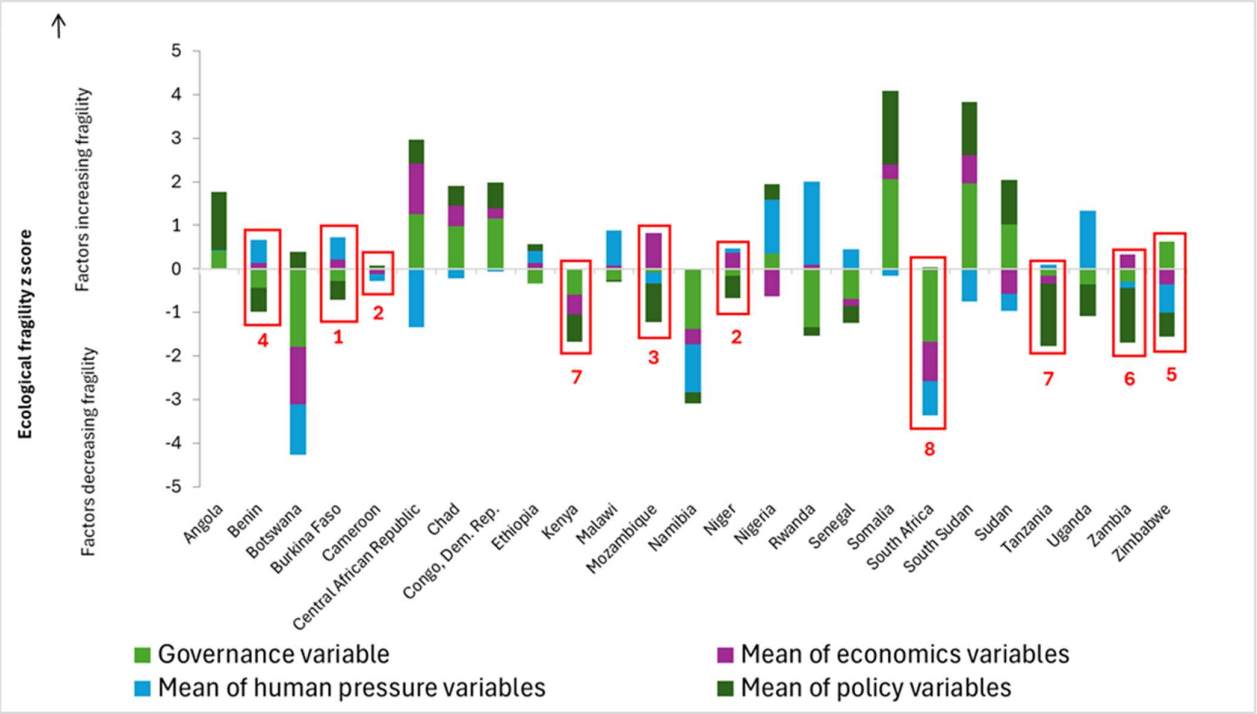


Figure 4.30. Factors contributing towards African countries socio-political fragility scores. Countries included in our case studies are squared in red and ranked according to their socio-political fragility scores (1 being the most fragile).

5.3 Geospatial analysis of habitat quality and land use in selected lion landscapes

This part of the study analysed 146 protected and conserved areas across the eight selected lion landscapes, covering a combined area of 23,344,166 hectares. The sites within the landscapes included national parks, hunting concessions, private reserves, and village lands. The Luangwa landscape was the largest in terms of total area, with over 5.1 million hectares across its national parks and game management areas. Niassa had the largest number of areas (n=36) and WAP had the least (n=6).

At a national-level, community areas and village lands consistently exhibit higher building density, crop coverage, and, in many cases, increased forest loss compared to hunting areas and national parks. For instance, the area surrounding the Maasai Mara National Reserve in Kenya records the highest levels of all three metrics, with forest loss at 22.22%, building density at 0.57 buildings per hectare, and crop coverage reaching 42.26%. These elevated levels can be attributed to the region's high rainfall and large local population density, which together drive agricultural expansion and human settlement.

Hunting concessions generally exhibit poorer habitat metrics compared to core national parks but better than the village or community areas, often exhibiting some levels of forest loss and agricultural activity. For example, Ruaha's Rungwa hunting blocks in Tanzania report a mean forest loss of 3.05%, compared to a mean of 0.62% in Ruaha National Park. However, this is still considerably lower than the 15.73% forest loss and 21.23% crop coverage in the Ruaha village land reference areas.

Similarly, Luangwa's Game Management Areas (GMAs) in Zambia show mean forest loss at 3.88%, compared to 1.73% in Luangwa National Parks. Some variation exists in Cameroon's Bénoué Complex where hunting blocks stand out with a high proportion of land under crops (6.74%), a stark contrast to the 0.22% crop coverage within its national parks. Zimbabwe's hunting areas around Hwange National Park reflect a similar trend, with crop coverage at 21.75%, highlighting the significant agricultural pressures in these regions (see Table 4.11 below for details). These findings suggest that while hunting concessions may serve as buffers to national parks, they can be relatively vulnerable to deforestation and land conversion.

Anomalies in the dataset also highlight the importance of context in interpreting conservation metrics. The high forest loss (20%) reported in W-Arly-Pendjari Complex National Parks in Niger and Benin is likely attributable to very low forest cover detected in the baseline year of 2000, rather than active deforestation.

Core national parks consistently demonstrate lower levels of forest loss, building density, and crop coverage compared to surrounding areas, reaffirming their role as anchors of conservation.

Table 4.11. Summary of the metrics calculated for each site, including the number of protected areas within the category, and the area covered in hectares. Line graphs show the mean percent forest loss from 2000 to 2023, the mean percentage crop coverage, and the mean building density for each site in red, relative to the minimum and maximum in the sample.

	Country	Landscape	Sites	Number PA in sites	Area (ha)	Forest Loss (%)	Building Density (#/ha)	Crops (%)
	Cameroon	Bénoué Complex	Hunting Concessions surrounding the national parks	25	2,126,010	2.65	0.04	6.74
	Cameroon	Bénoué Complex	National Parks	3	759,315	0.63	0.01	0.22
	Zimbabwe	Hwange	Community land surrounding the national park	1	95,068	0.61	 0.10	10.61
	Zimbabwe	Hwange	Hunting areas	3	346,598	2.02	0.13	21.75
	Zimbabwe	Hwange	National Parks	5	1,552,881	 0.07	 0.01	 0.11

	South Africa	Kruger	Kruger National Park	1	1,916,974	0.65	0.01	0.12
	South Africa	Kruger	Private reserves adjoining Kruger National Park	9	276,877	2.34	0.03	0.18
	Zambia	Luangwa	Game Management Areas surrounding the national park	7	2,853,958	3.88	0.04	0.98
	Zambia	Luangwa	Luangwa National Parks	5	1,747,730	1.73	0.00	0.05
	Zambia	Luangwa	Village land outside of the park	1	518,788	7.47	0.02	1.28
	Kenya	Maasai Mara	Conservancies outside Maasai Mara National Reserve	28	206,357	8.38	0.07	2.94
	Kenya	Maasai Mara	Maasai Mara National Reserve	1	151,119.80	0.39	0.01	0.00

	Kenya	Maasai Mara	Non-conserved land surrounding the MMNR	1	185,896	22.22	0.57	42.26
	Mozambique	Niassa	Hunting concessions within the reserve	10	2,609,692	0.48	0.00	0.03
	Mozambique	Niassa	Niassa Reserve (excluding hunting concessions)	9	977,171	1.70	0.00	0.10
	Mozambique	Niassa	Other concessions within the reserve	17	652,853	3.74	0.03	1.97
	Tanzania	Ruaha-Rungwa	Ruaha National Park	1	2,015,222	0.62	0.02	3.18
	Tanzania	Ruaha-Rungwa	Ruaha village land	1	736,715	15.73	0.18	21.23
	Tanzania	Ruaha-Rungwa	Rungwa hunting blocks	9	1,489,857	3.05	0.01	0.92
	Niger and Benin	W-Arly-Pendjari	Hunting Reserves within the complex	4	429,744	0.00	0.03	3.55

		Complex						
	Niger and Benin	W-Arly-Pendjari Complex	National Parks	5	1,695,329	20.00	0.09	6.32

5.3.1 Landscape breakdowns

5.3.1.1 Bénoué Complex (Cameroon)

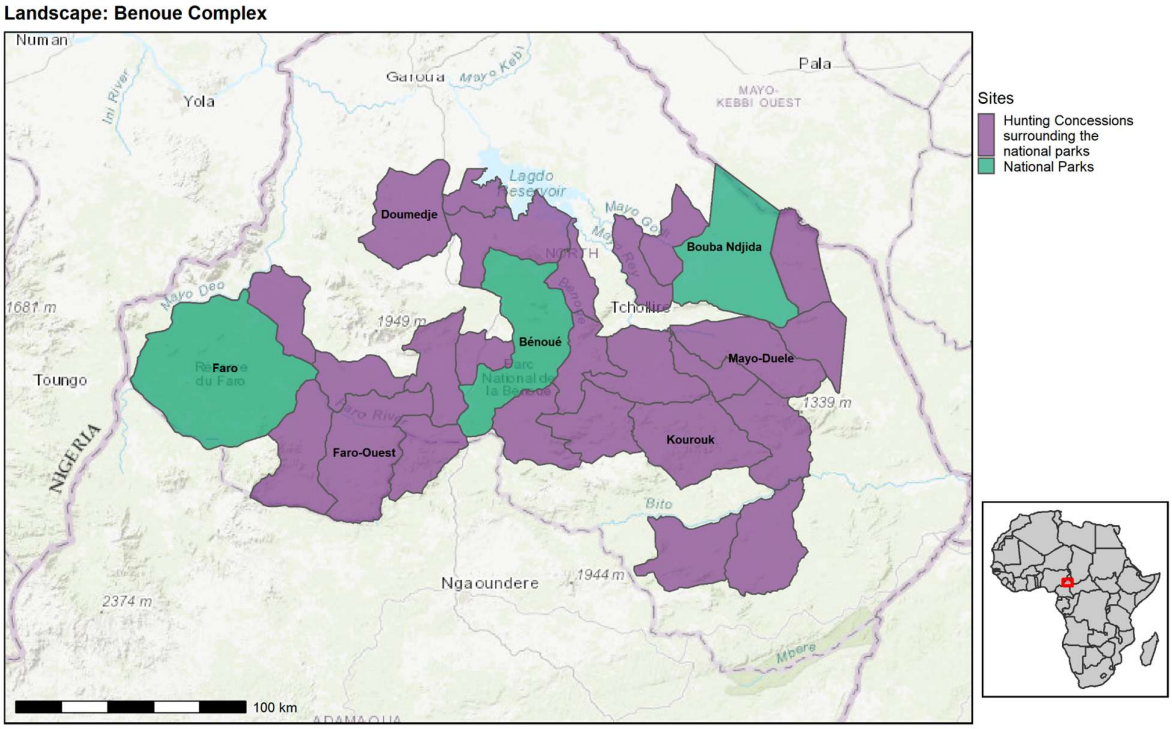


Fig. 4.33. Bénoué Complex land use

The Bénoué Complex, including only the protected and conserved areas located in Cameroon, includes hunting concessions (25 sites, 2,126,011 ha) and national parks (3 sites, 759,315.44 ha). The hunting concessions exhibit a much higher mean forest loss of 2.65% from 2000 to 2023 and crop cover averaging 6.74% than the National parks, reflecting mixed-use pressures. Forest loss was highest in the concessions north and west of Bénoué. Within the complex, the site with the highest forest loss is Campement des Elephants (13.26%), while Demsa has the lowest forest loss (0.12%). The national parks show lower forest loss (0.60%) and minimal crop presence (0.22%). Crop cover peaks in the hunting concession Mayo Boulel (48.12%). In addition, building density was highest in concessions, with Djibao recording the highest density of 0.17 buildings per hectare. This highlights a greater conservation focus within national parks compared to the surrounding concessions.

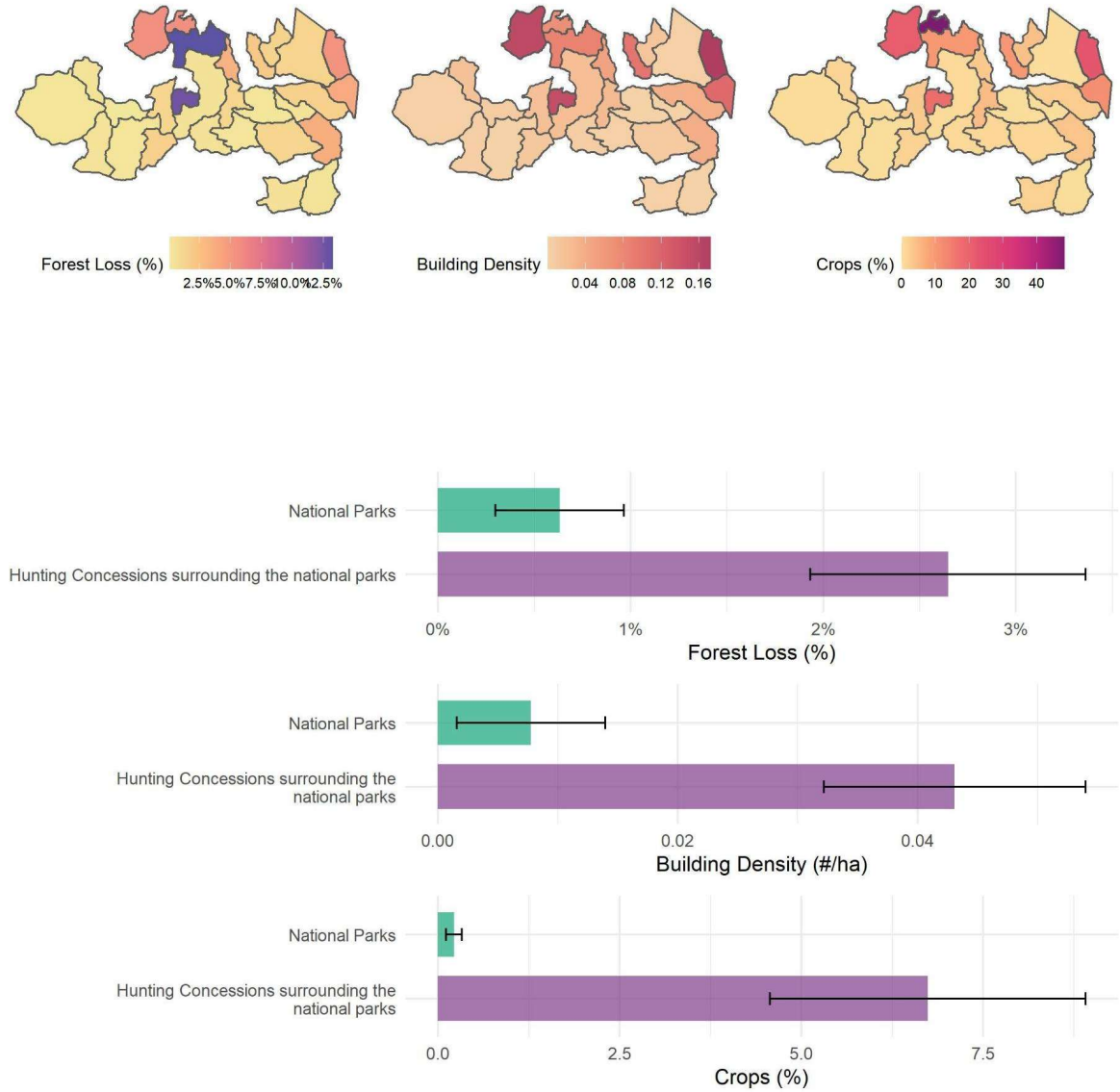


Fig. 4.34. Bénoué Complex breakdown of forest loss, building density and crop cover between different areas

5.3.1.2 Niassa National Reserve (Mozambique)

Niassa includes the Niassa Reserve and its associated concessions, spanning hunting concessions in the reserve (10 sites, 2,609,692 ha), the Niassa Reserve (excluding hunting concessions) (9 sites, 977,172 ha), and other concessions within the reserve (17 sites, 652,853 ha). These other areas include settled concessions.

Hunting concessions within the reserve show the lowest average forest loss (0.48%), minimal building density, and negligible crop cover (0.025%), indicating limited human activities and a focus on maintaining conservation objectives. The Niassa Reserve excluding hunting concessions experiences moderate average forest loss (1.70%) and slightly higher building density (0.001112 buildings/ha) and crop cover (0.102%), reflecting some degree of mixed-land use. In contrast, other concessions within the reserve face the highest pressures, with forest loss at 3.74%, building density at 0.0328 buildings/ha, and crop cover reaching 1.97%. These trends suggest that while hunting concessions and the concessions in the reserve maintain relatively low levels of disturbance, other concessions experience significant human impact, likely driven by mixed-use activities.

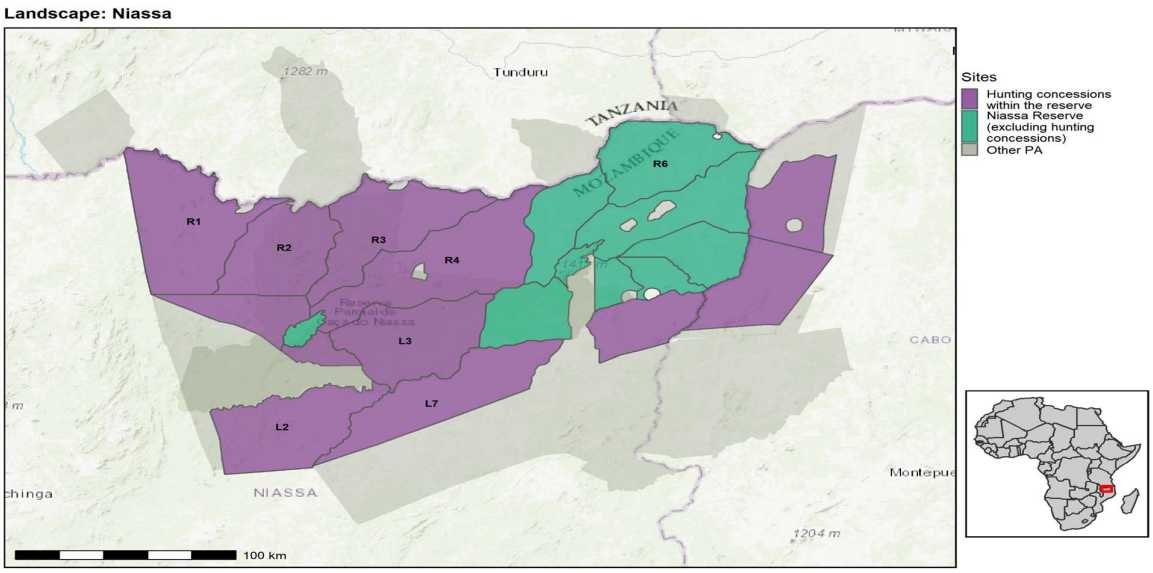
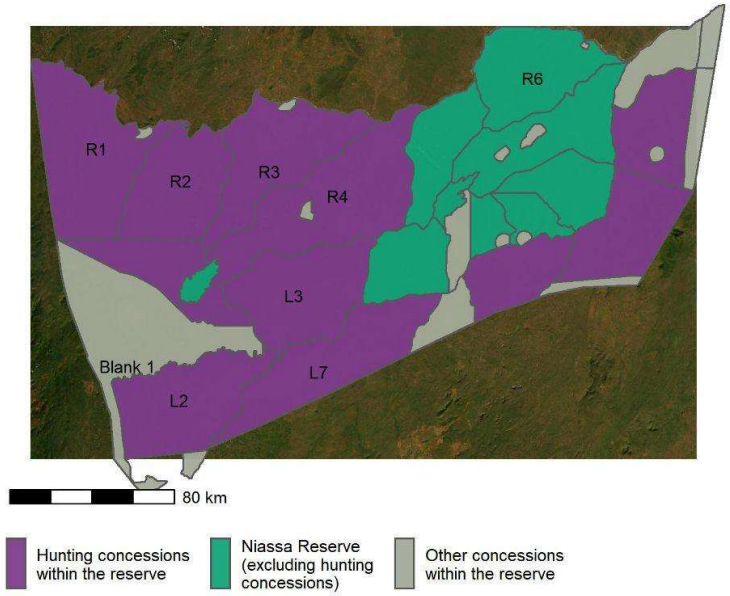
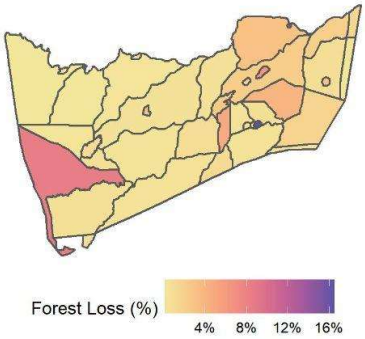


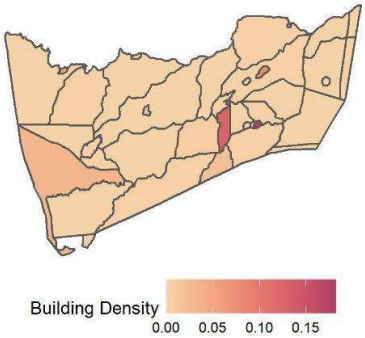
Fig. 4.37. Niassa land use

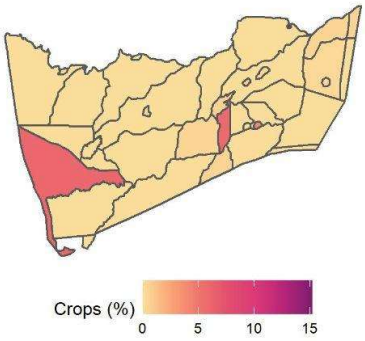
The Niassa Reserve Community Development Area 11 ('other' concessions) exhibits the highest forest loss (16.51%), while R1 (hunting concession) has experienced the lowest (0.12%). Crop cover peaks in NSR Community Development Area 3 (15.20%; other concessions), while some sites, such as L4-L6 (photo-tourism), have none. Building density is highest in NSR Community Development Area 11 (0.18 buildings/ha).

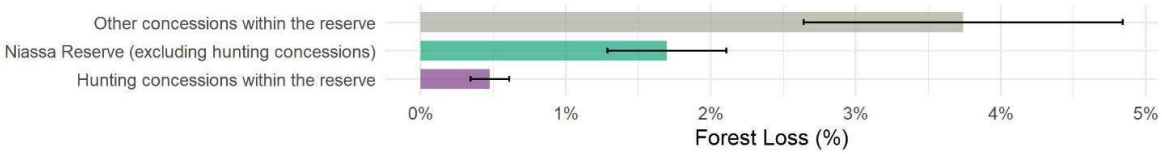
Landscape: Niassa

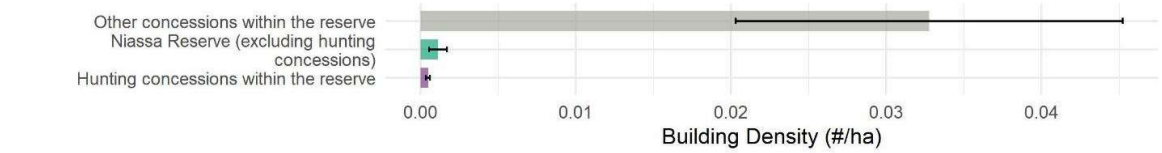














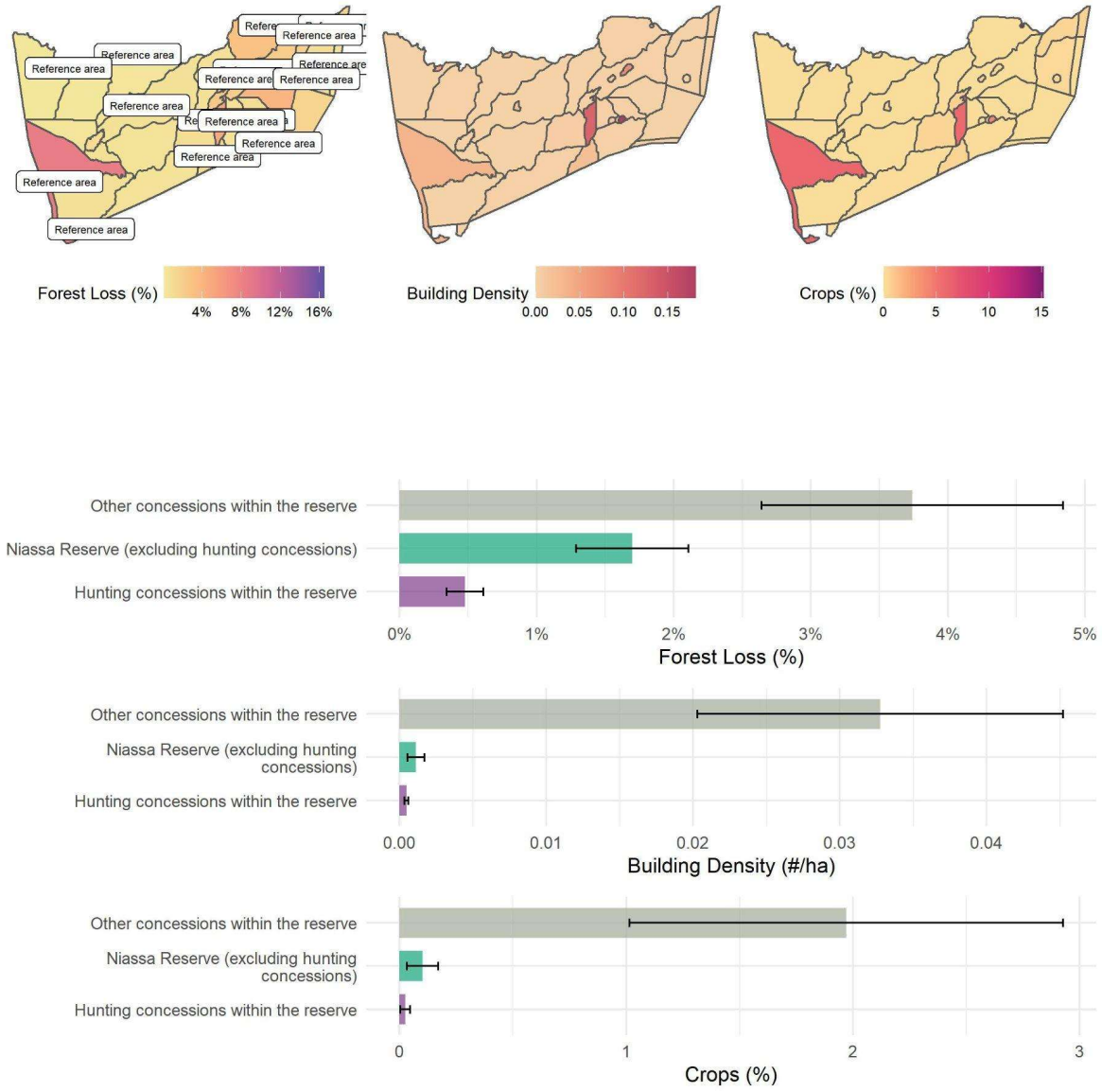


Fig. 4.38. Niassa breakdown of forest loss, building density and crop cover between different areas

5.3.1.3 Kruger National Park (South Africa)

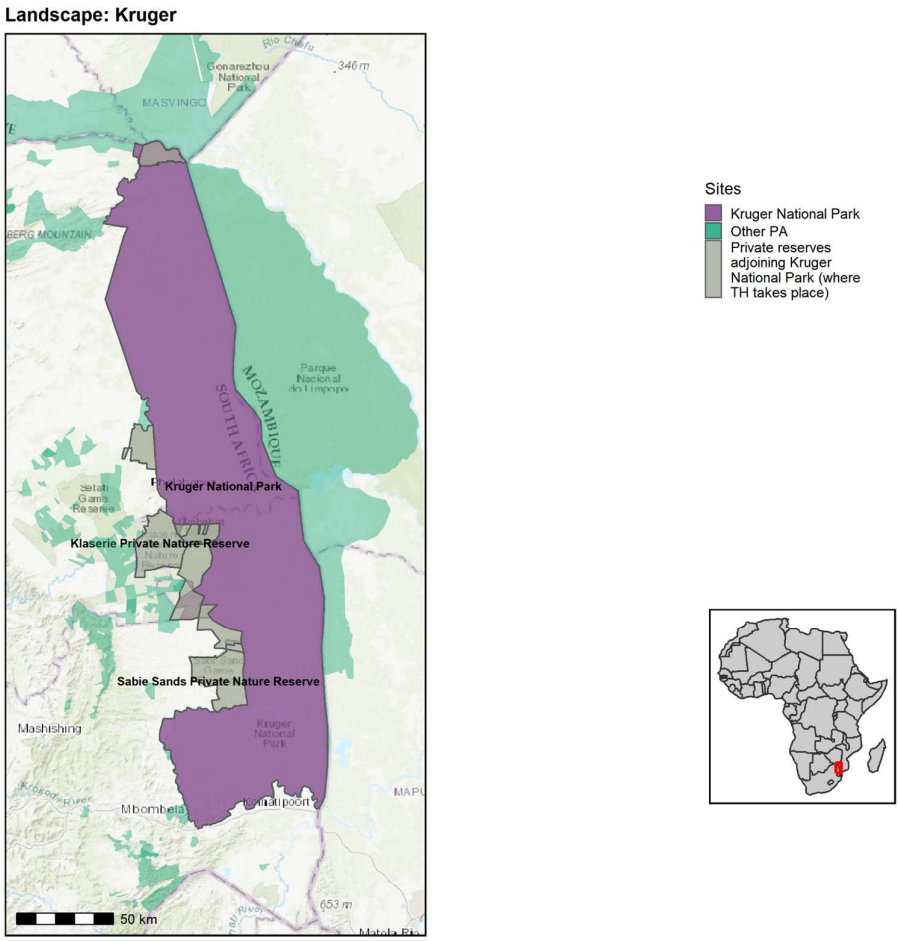


Fig. 4.35. Kruger National Park land use

Similar to other landscapes, the Kruger landscape in South Africa, highlights the strong conservation outcomes of core protected areas, including the Kruger National Park. Kruger National Park, exhibits minimal forest loss (0.65%), low crop coverage (0.12%), and very limited building density (0.008 buildings / ha).

Meanwhile, adjoining private reserves—used for either trophy hunting or photo tourism, a distinction that could not be fully determined from spatial data—show slightly higher impacts. Reserves such as Sabie Sands and Timbavati show low forest loss (0.49% and 0.55%, respectively) and minimal crop encroachment. Compared to other African landscapes, Kruger National Park performs exceptionally well, with forest loss and crop coverage rates similar to other well-managed protected areas like the Maasai Mara National Reserve and Luangwa National Parks. Pafuri seems to be an anomaly in the data, increasing the mean for crop coverage.

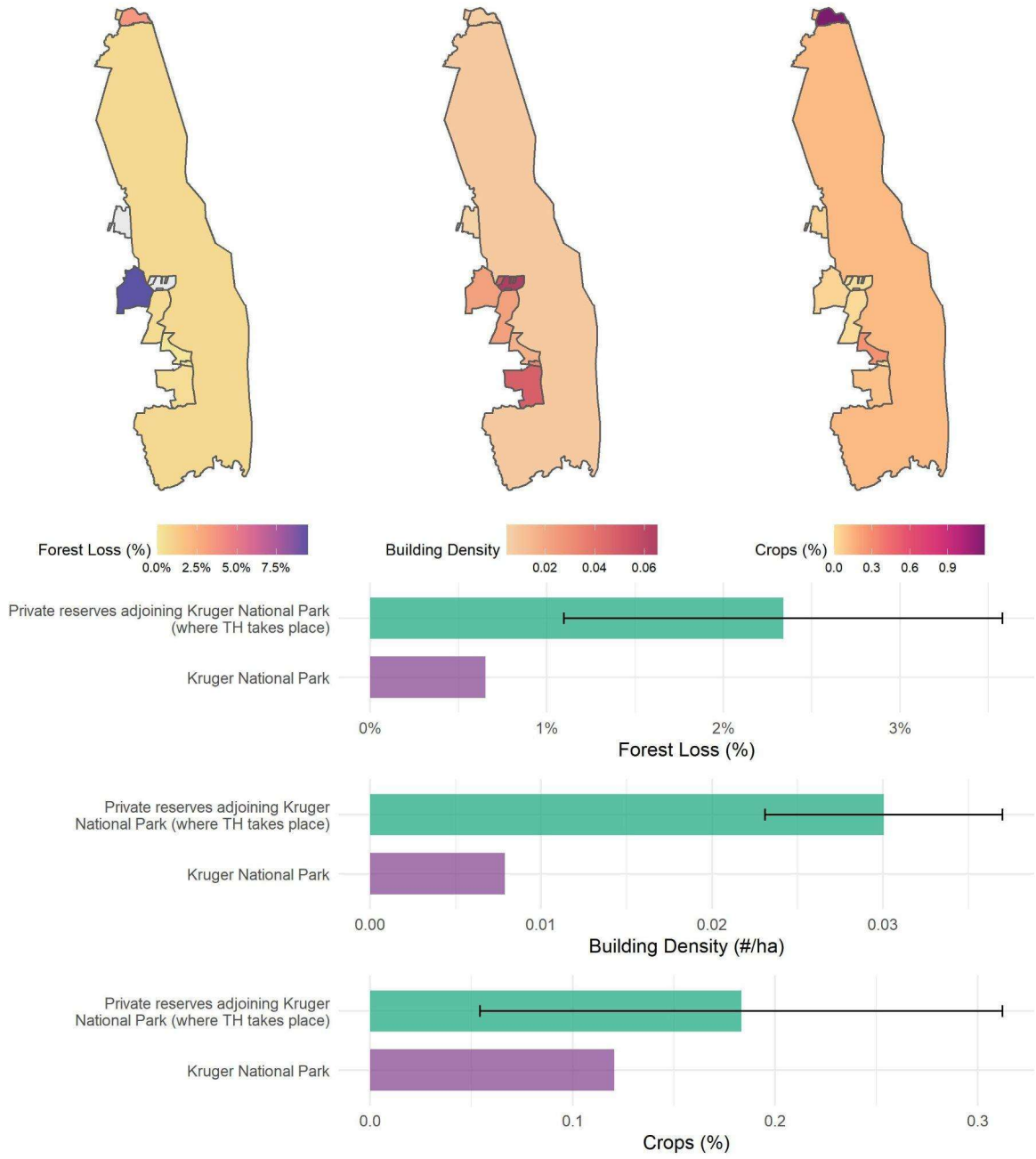


Fig. 4.36. Kruger National Park breakdown of forest loss, building density and crop cover between different areas

5.3.1.4 Luangwa landscape (Zambia)

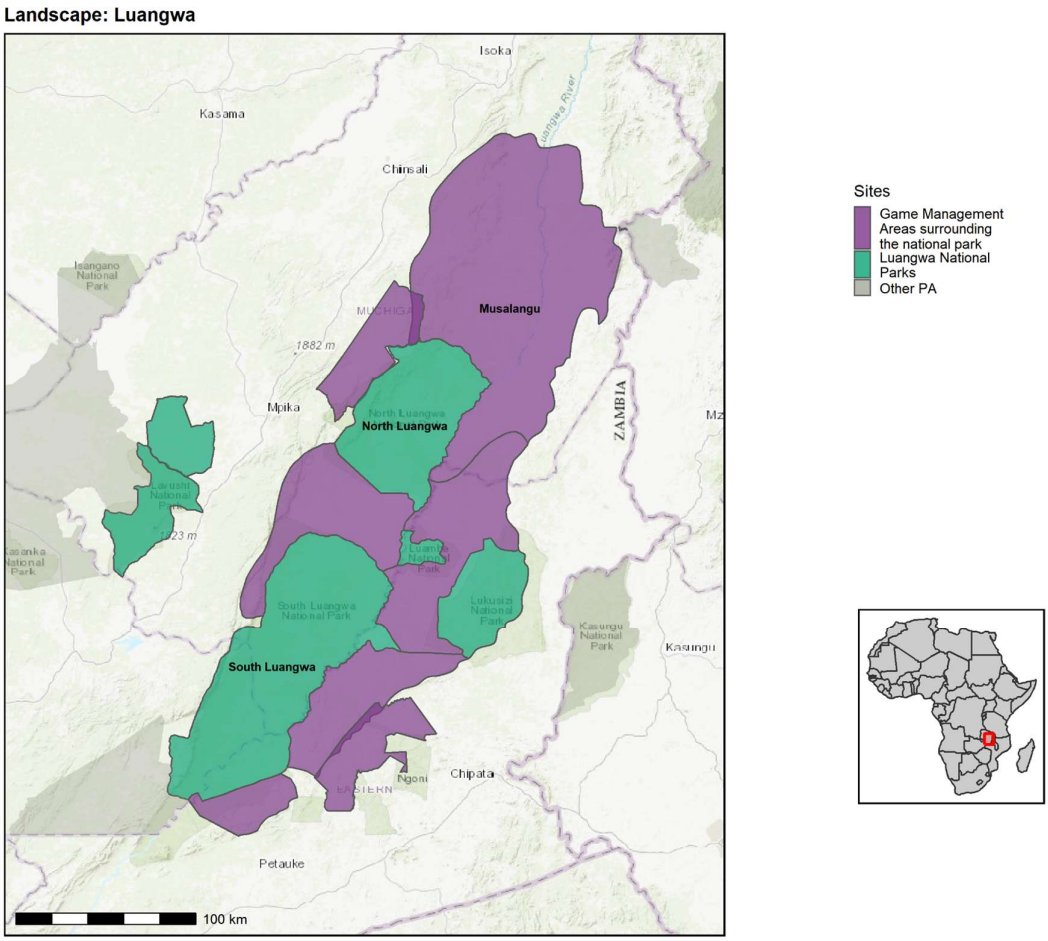


Fig. 4.41. Luangwa landscape land use

The Luangwa landscape in Zambia demonstrates medium to low levels of forest loss, building density, and crop coverage compared to many other landscapes across Africa. For example, mean forest loss across Luangwa National Parks (1.73%) is relatively low. Similarly, the Game Management Areas (GMAs) in Luangwa, despite being under anthropogenic pressure, show a mean forest loss rate of 3.88%, which is average when compared to other hunting concessions like Ruaha-Rungwa (3.05%) or Niassa (3.74%). Village lands surrounding the Luangwa parks exhibit higher impacts, with forest loss at 7.47%, yet this still compares favourably to other high-pressure areas such as the Maasai Mara's non-conserved lands.

Luangwa National Parks category (South and North Luangwa, Luambe, Lukuzuki, and Luitikila a Forest Reserve) report mean forest loss rates of 1.73%, among the lowest in the region. GMAs, while experiencing higher forest loss than national parks, still show moderate levels. For example, Musalangu GMA reports 2.13% forest loss, and Lupande GMA has a forest loss rate of 2.34%. These values are much lower than outside the PAs, with village lands exhibiting the highest levels of forest loss, in this case, a demarcated Reference Area, with 7.47% forest loss. This reflects greater human pressures in unprotected areas.

Crop coverage is minimal within Luangwa's national parks, such as 0.02% in South Luangwa National Park and 0.01% in North Luangwa National Park. Some GMA had high crop coverage, similar to village land around, with Musalangu GMA having the highest crop coverage at 2.02%, followed by Msoro GMA at 1.89%

Building density is negligible in the national parks, GMAs show slightly higher building densities, such as 0.077 buildings/ha in Msoro and 0.036 buildings/ha in Musalangu. The Luangwa Reference Area (village lands) reports the highest building density in the landscape at 0.022 buildings/ha, reflecting increased human settlement.

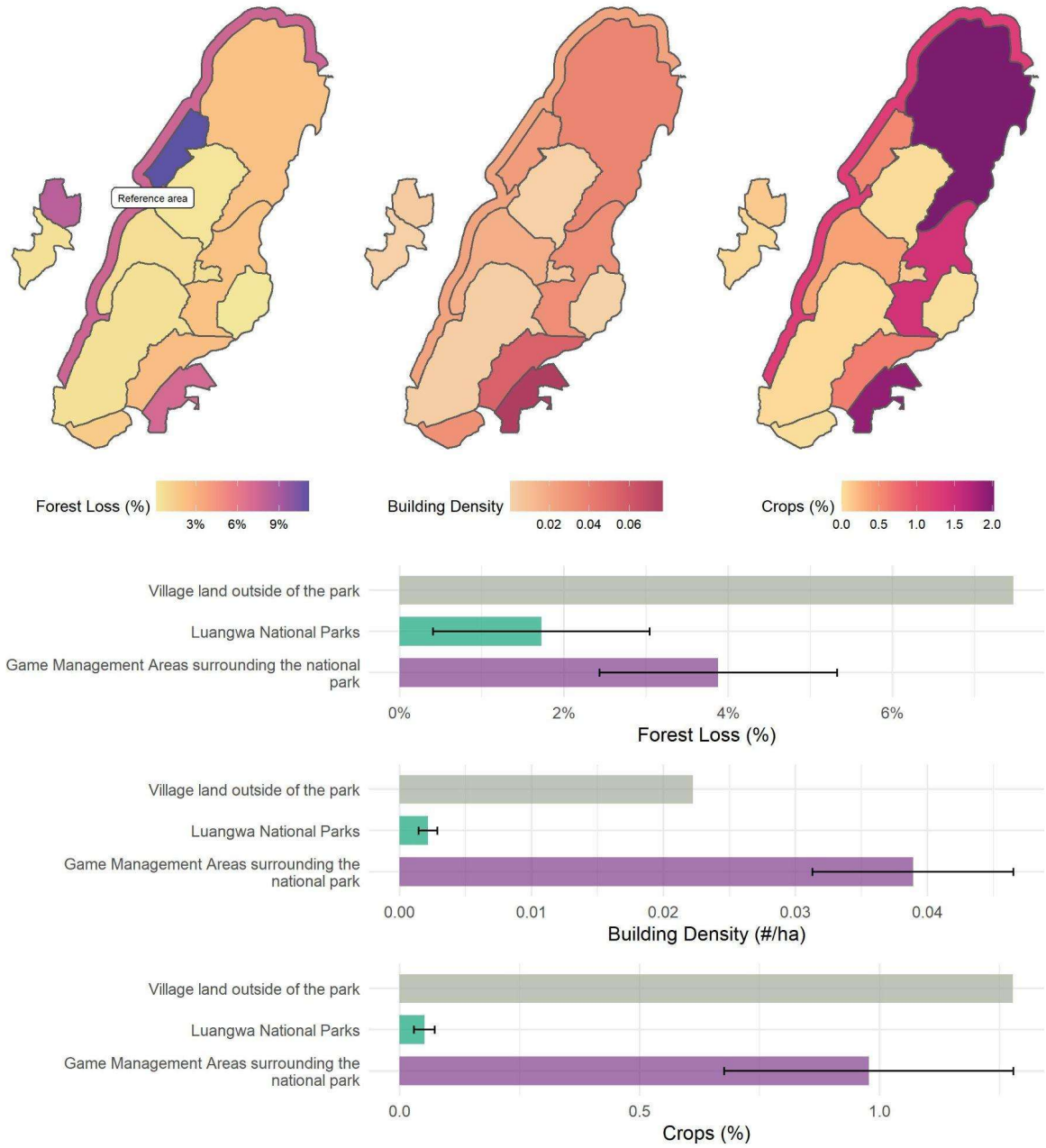


Fig. 4.42. Luangwa landscape break down

5.3.1.5 Hwange National Park (Zimbabwe)

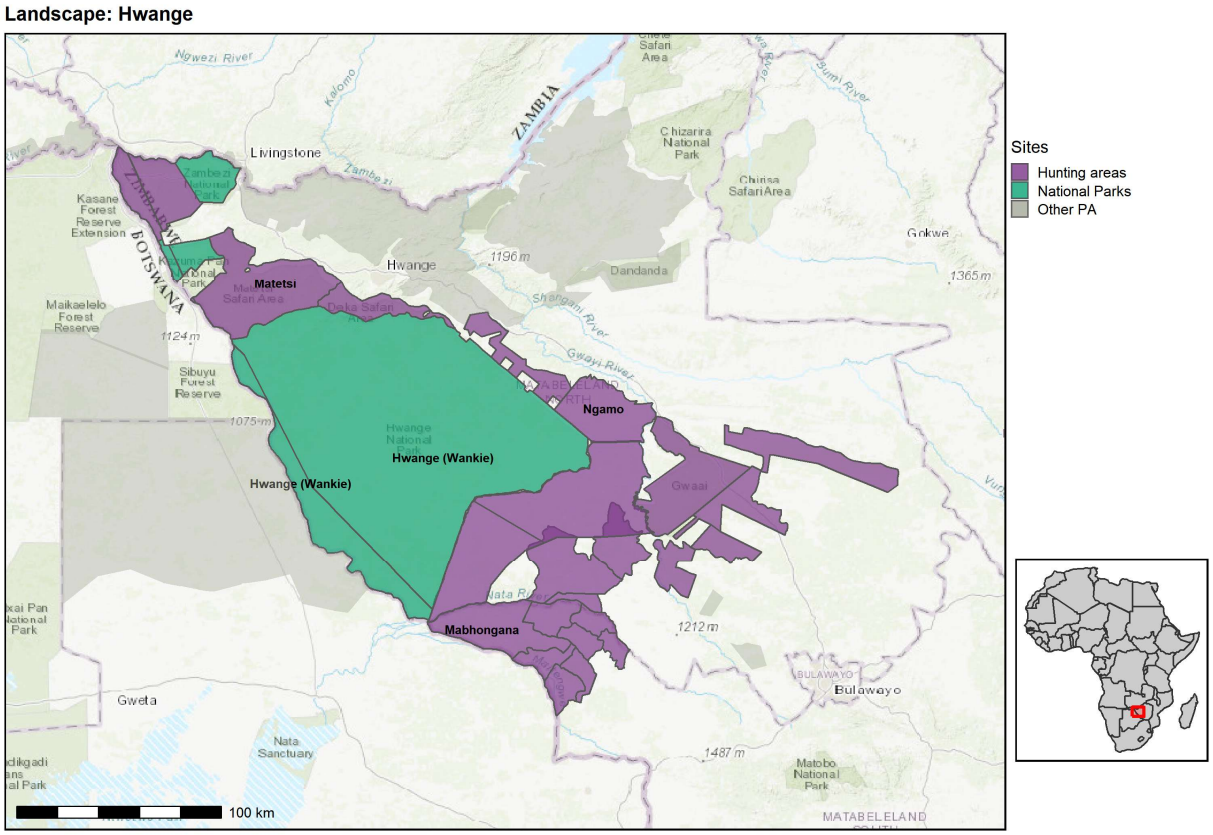


Fig. 4.39. Hwange land use

The Hwange landscape in Zimbabwe shows a distinction in conservation outcomes between the national parks, such as Hwange (Wankie) National Park and Kazuma Pan, and the surrounding hunting areas and unprotected community lands. Hwange National Park, the largest protected area in the landscape, shows strong conservation outcomes with minimal forest loss (0.14%), low crop coverage (0.02%), and very limited building density (0.007 buildings/ha), underscoring its effectiveness as a conservation stronghold. In contrast, the unprotected community lands surrounding the national park (Hwange reference area) suffer from higher crop coverage (10.61%) and building density (0.097 buildings/ha).

Surrounding hunting areas also show variable conservation outcomes. For example, areas like Mabhongana and Matetsi maintain relatively low forest loss at 0.12% and 0.80%, respectively, and minimal crop encroachment. However, some Campfire Areas, report much higher levels of forest loss (4.40%) and crop coverage (28.08%), demonstrating significant pressures from human activity and agricultural expansion. These patterns illustrate that trophy hunting blocks can have variable outcomes in terms of how well they support conservation goals.

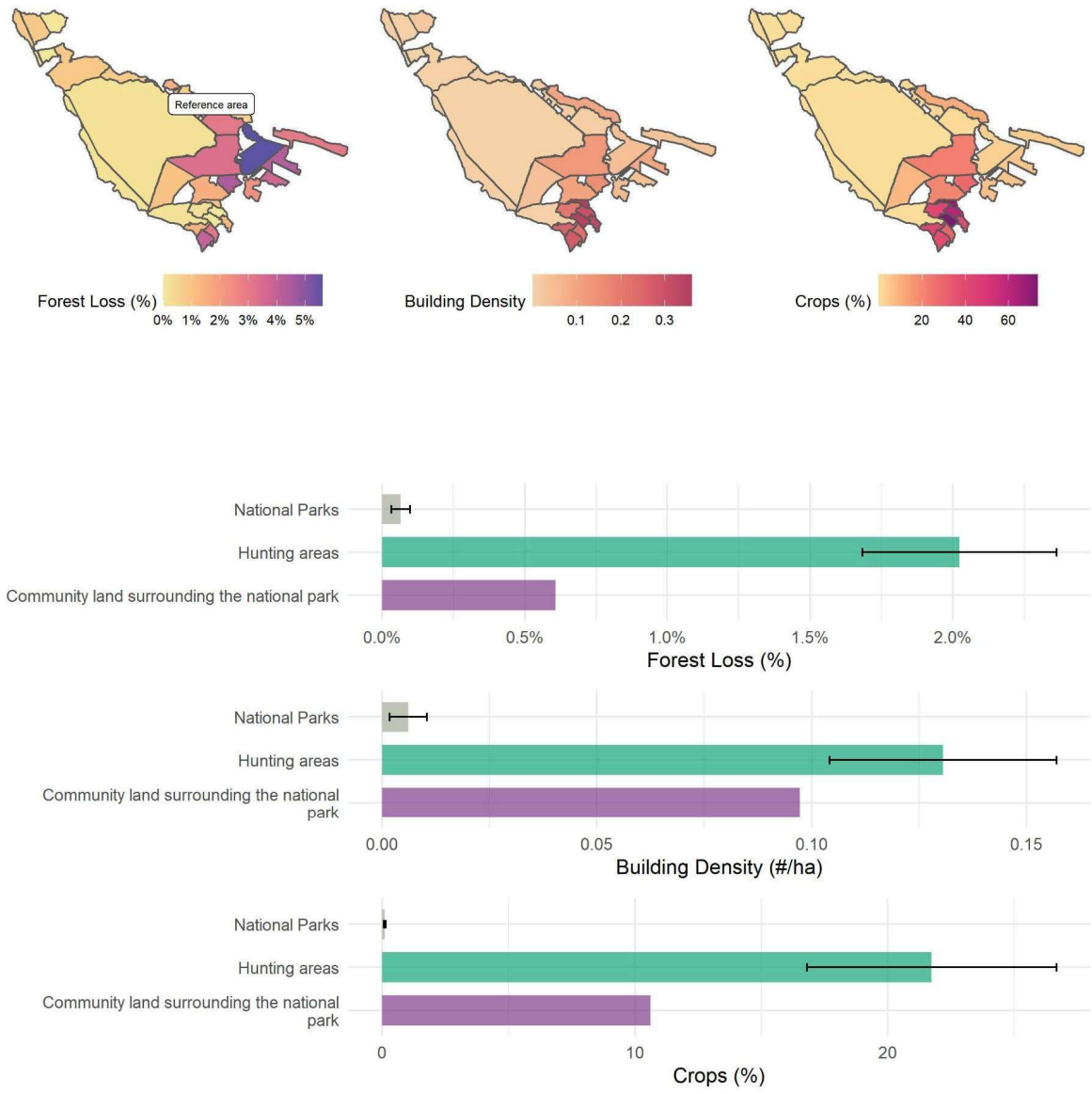


Fig. 4.40. Hwange breakdown of forest loss, building density and crop cover between different areas

5.3.1.6 Maasai Mara National Reserve (Kenya)

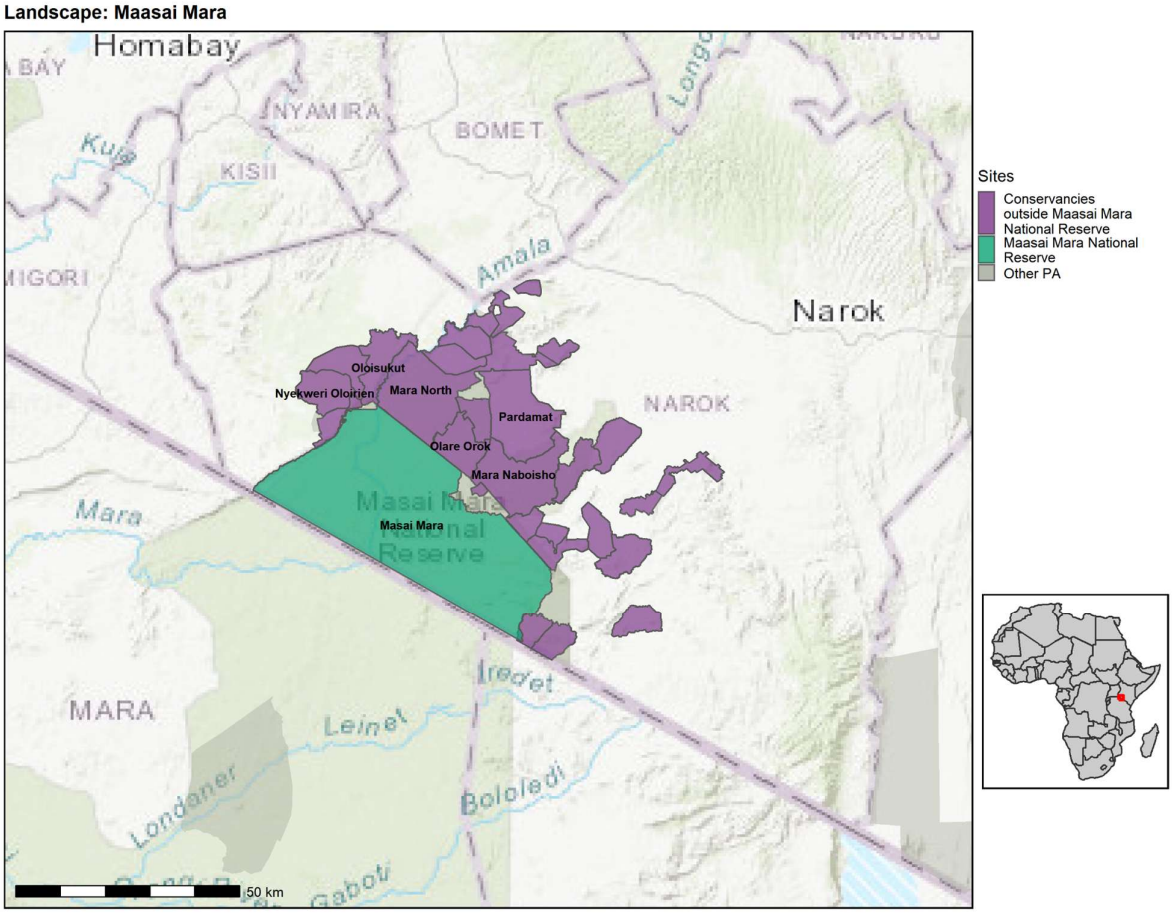


Fig. 4.43. Maasai Mara land use

Similar to other landscapes above, the Maasai Mara landscape in Kenya illustrates contrasts in conservation outcomes between the Maasai Mara National Reserve (MMNR) and the surrounding conservancies and unprotected lands, with the reference area here being the non-conserved land surrounding the national reserve. The Maasai Mara National Reserve performs well with low forest loss (0.39%), limited crop coverage (0.23%), and moderate building density (0.011 buildings/ha), making it a key conservation anchor for the region. In contrast, the non-conserved land surrounding the MMNR shows significantly higher human pressures, the highest in the region, with forest loss at 22.22%, crop coverage at 42.26%, and the highest building density in the region (0.57 buildings/ha). The conservancies surrounding the MMNR exhibit a wide range of performance, with some demonstrating strong conservation outcomes, while others face increasing anthropogenic pressures.

The surrounding conservancies exhibit varied conservation performance, acting as both ecological buffers and zones of anthropogenic impact. Conservancies like Loita Hills and Mara Naboisho demonstrate strong conservation outcomes with minimal forest loss (0.39% and 0.26%, respectively) and negligible crop coverage. Conversely, other conservancies, such as Nyekweri Oloirien and Mbokishi Mara, face significant challenges. Forest loss in Nyekweri Oloirien reaches 56.83%, with crop coverage of 17.49%, while Mbokishi Mara shows forest loss of 34.56% and crop coverage of 18.17%. These conservancies are trying to restore these landscapes.

The non-conserved land surrounding the MMNR presents an urgent challenge for conservation in the region. With high forest loss, crop coverage, and building density, this area has a high impact from intensive agricultural activity and expanding settlements. Compared to other landscapes, the non-conserved land around the Maasai Mara exhibits some of the highest levels of impact, surpassing other

high-pressure zones like village lands in Ruaha-Rungwa (15.73% forest loss).

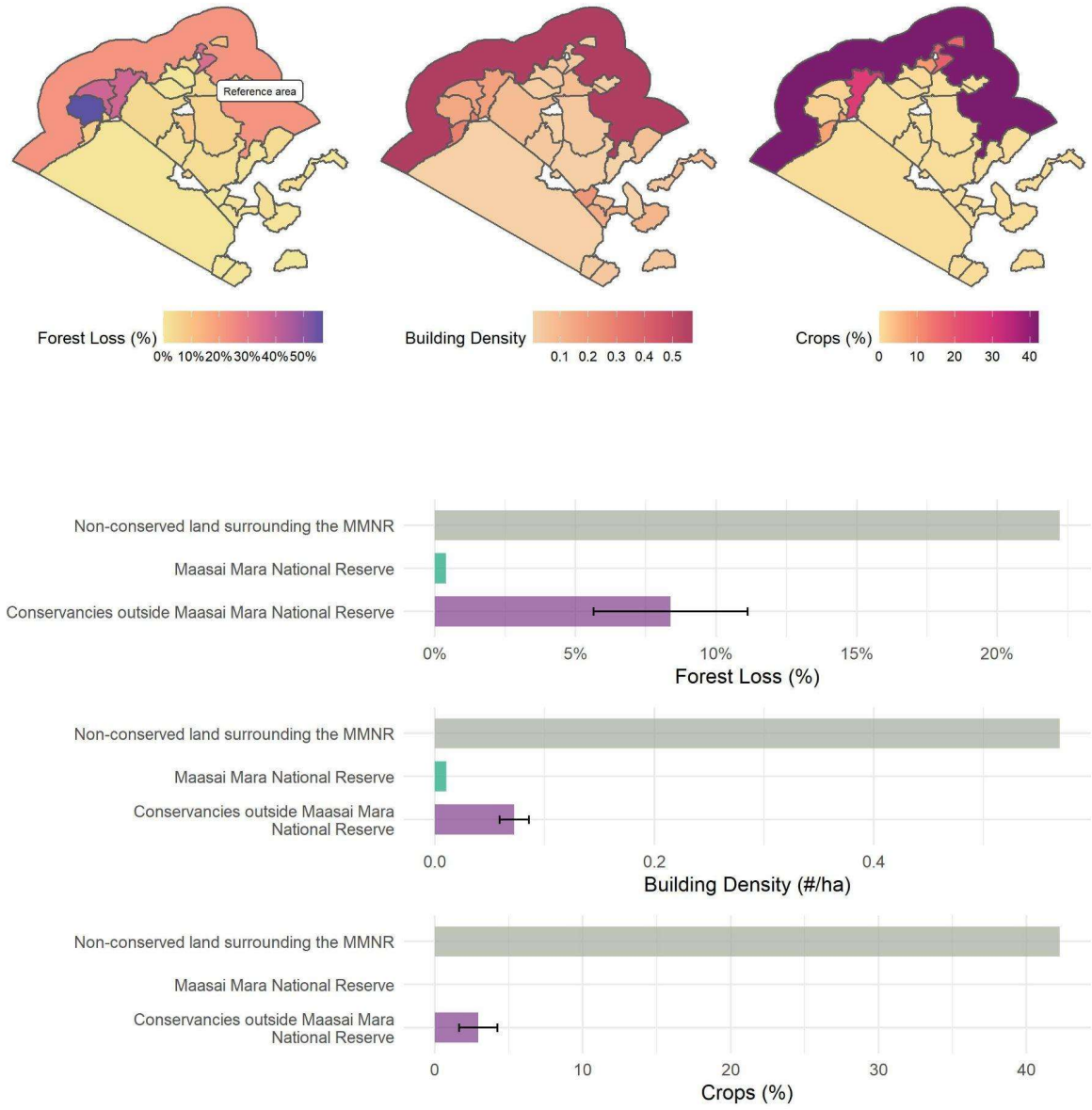


Fig. 4.44. Maasai Mara National Reserve breakdown

5.3.1.7 Ruaha-Rungwa landscape (Tanzania)

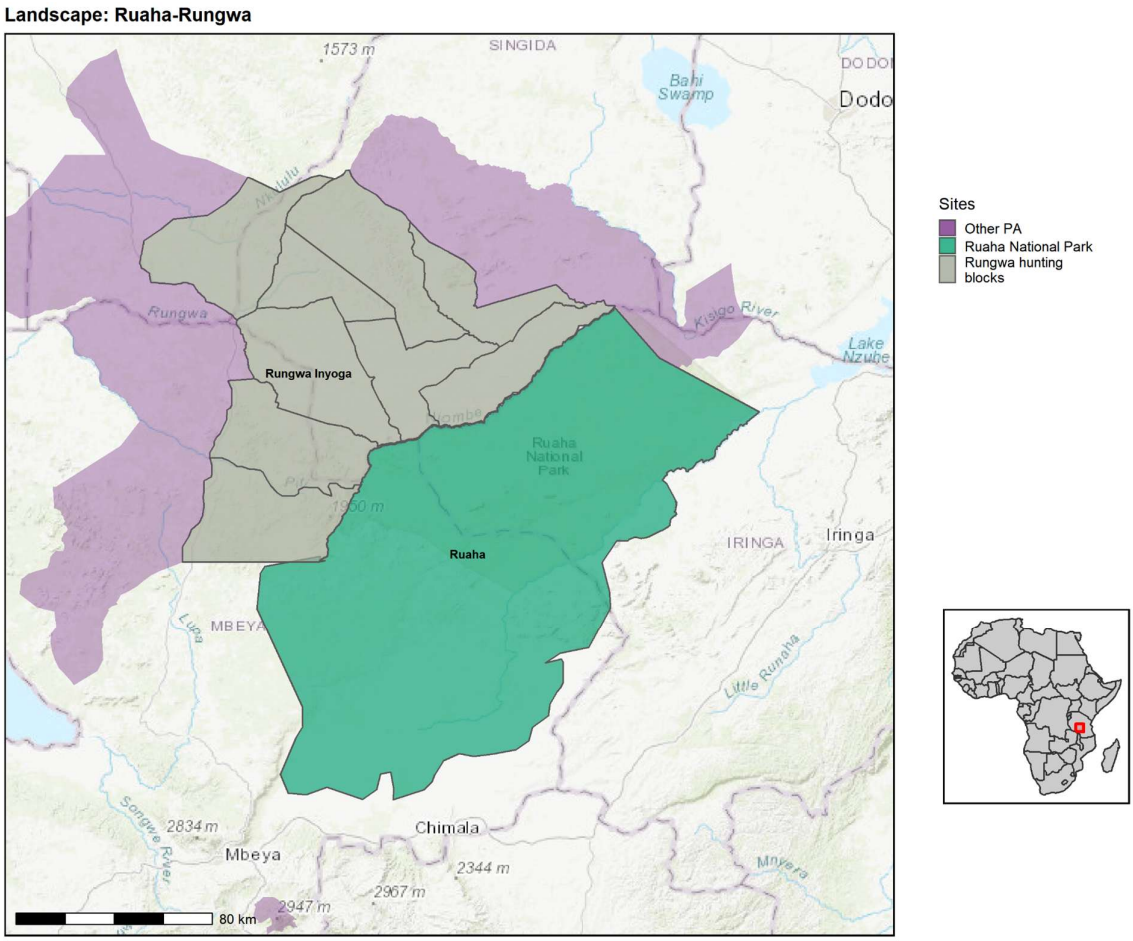


Fig. 4.45. Ruaha-Rungwa landscape land use

The Ruaha-Rungwa landscape in Tanzania highlights significant variability in conservation performance between Ruaha National Park and surrounding trophy hunting blocks and village lands. While Ruaha National Park performs well with low forest loss, crop coverage, and building density, the surrounding hunting blocks, and particularly the unprotected village lands, exhibit higher levels of human impact. Compared to other landscapes, such as Luangwa, Ruaha-Rungwa exhibits higher forest loss and anthropogenic pressures in its peripheral areas, signalling a need for more effective land-use management in buffer zones.

Ruaha National Park exhibits minimal forest loss (0.62%), low crop coverage (0.32%), and limited building density (0.015 buildings/ha), underscoring its role as a conservation anchor. In stark contrast, the unprotected reference area (village land) suffers from 15.73% forest loss, 21.23% crop coverage, and the highest building density in the landscape (0.182 buildings/ha), reflecting intense anthropogenic pressures. This is significantly higher crop coverage than into Luangwa village lands (1.28%) and is more comparable to the high-pressure zones of non-conserved land around Maasai Mara (42.26% crop coverage).

Similarly, several trophy hunting blocks, such as Rungwa N and Rungwa Mzombe[6], exhibit forest loss

[6] The United Republic of Tanzania indicated that these hunting blocks occur in open areas, not in protected areas, with other competing land uses and their status would be lower than the WMA, Game Reserves and National Park. Therefore, in comparing them with National Parks these areas will have lower percentages - a better comparison would be hunting blocks

of 15.08% and 7.35%, respectively, and significant crop coverage (3.93% and 3.75%), highlighting the challenges of balancing conservation and human activities in these buffer zones. While these values are lower than the surrounding reference areas, they are considerably higher than Ruaha National Park.

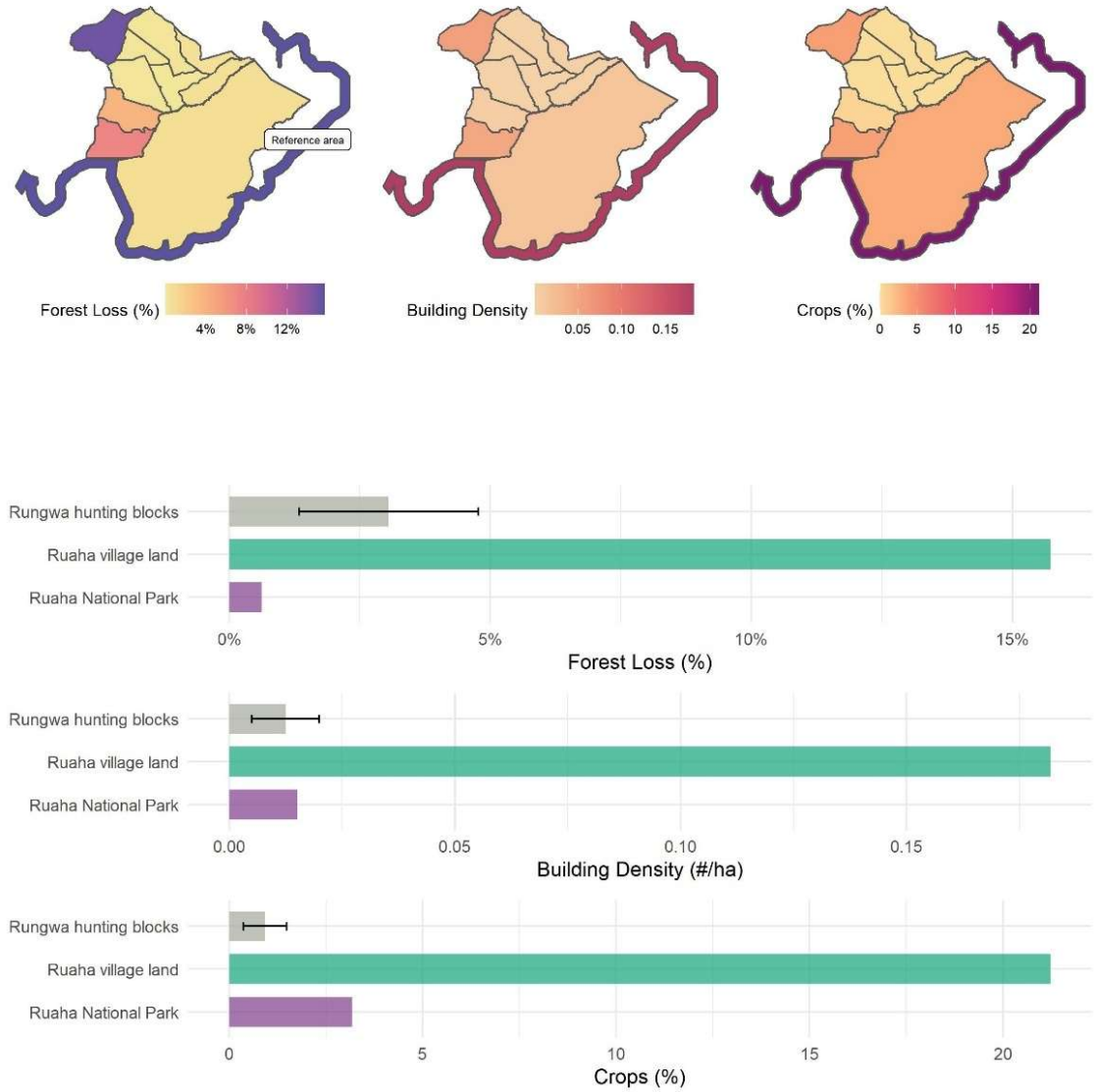


Fig. 4.46. Ruaha-Rungwa landscape break down

that are in Rungwa Game Reserve. This could as well be taken as a positive contribution in that hunting blocks that are located on the open areas have managed to secure habit despite the fact that those areas do not have any legal status.

5.3.1.8 W-Arly-Pendjari (WAP) Complex (Benin, Burkina Faso, Niger)

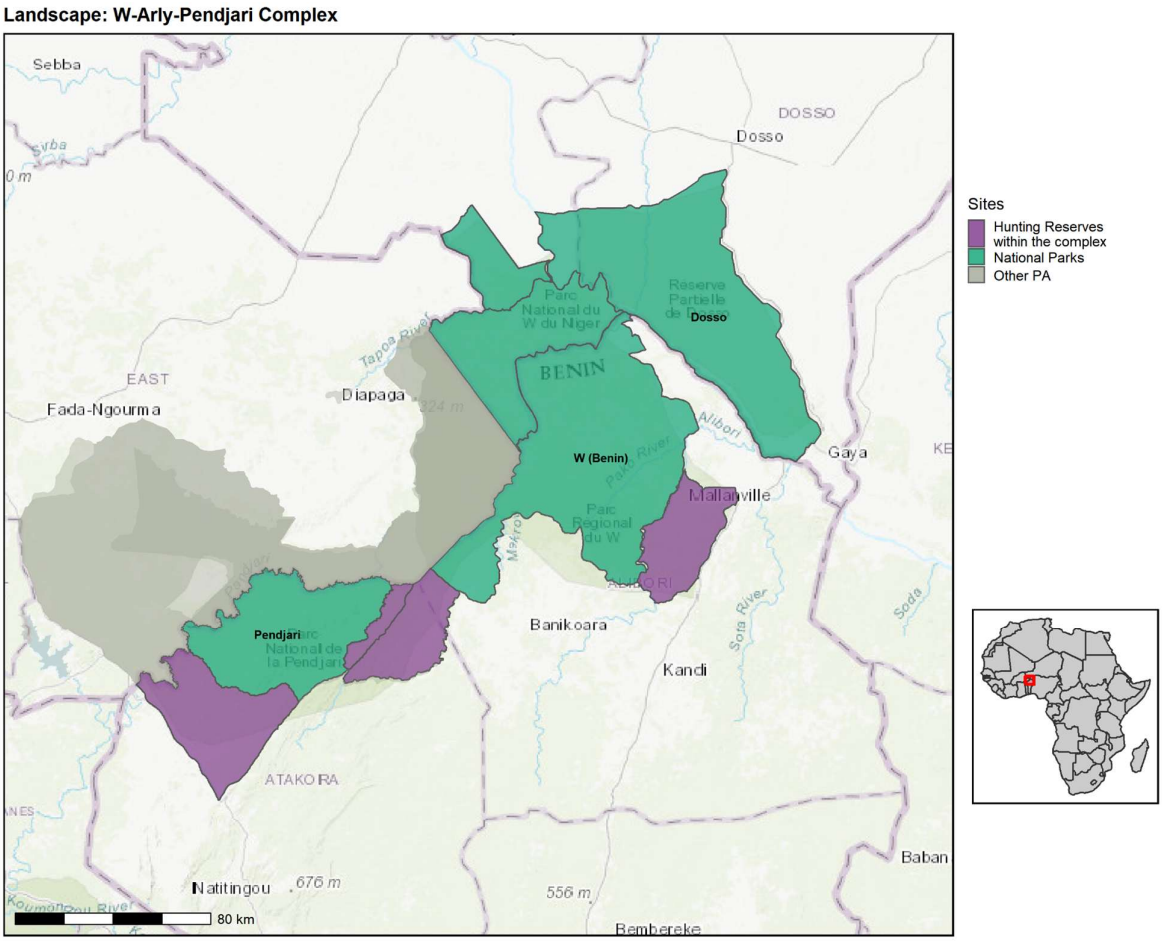


Fig. 4.31. WAP Complex land use

The W-Arly-Pendjari Complex, in this case focusing on Benin, includes hunting reserves (4 sites, 429,745 ha) and national parks (5 sites, 1,695,329 ha). However, the national parks category in this instance also included the less strictly protected Dosso Reserve and Tamou Reserve. The hunting reserves show moderate forest loss (0.85%) and crop cover (3.22%), while the national parks exhibit minimal forest loss (0.43%) and lower crop presence (1.14%), underscoring their role as biodiversity strongholds. Overall, the WAP complex demonstrates a relatively low level of disturbance compared to other landscapes.

"W (Benin)" National Park shows a forest loss of 100%, which is highly anomalous. This likely results from a misinterpretation of baseline forest cover because nearly all the areas had very low baseline forest cover based on the Hansen et al., 2013 dataset.

In Niger, Dosso Nature Reserve exhibits the highest crop coverage at 21.63%, highlighting significant agricultural pressures and Tamou GCA reports substantial crop coverage of 8.22%, suggesting that this area is also experiencing land-use competition between agriculture and conservation. Dosso Nature Reserve also has the highest building density at 0.30 buildings/ha, indicating notable human settlement and development.

National parks like Pendjari (0.007%) and W (Benin) (1.68%) maintain low crop coverage. National parks such as Pendjari (0.0004 buildings/ha) and W (Benin) (0.009 buildings/ha) demonstrate extremely low human infrastructure presence, aligning with their conservation goals. Hunting areas such as Pendjari and Djona show mixed performance, with moderate crop coverage (5.62% and

6.50%, respectively) and slightly higher building density, reflecting pressures from human activities.

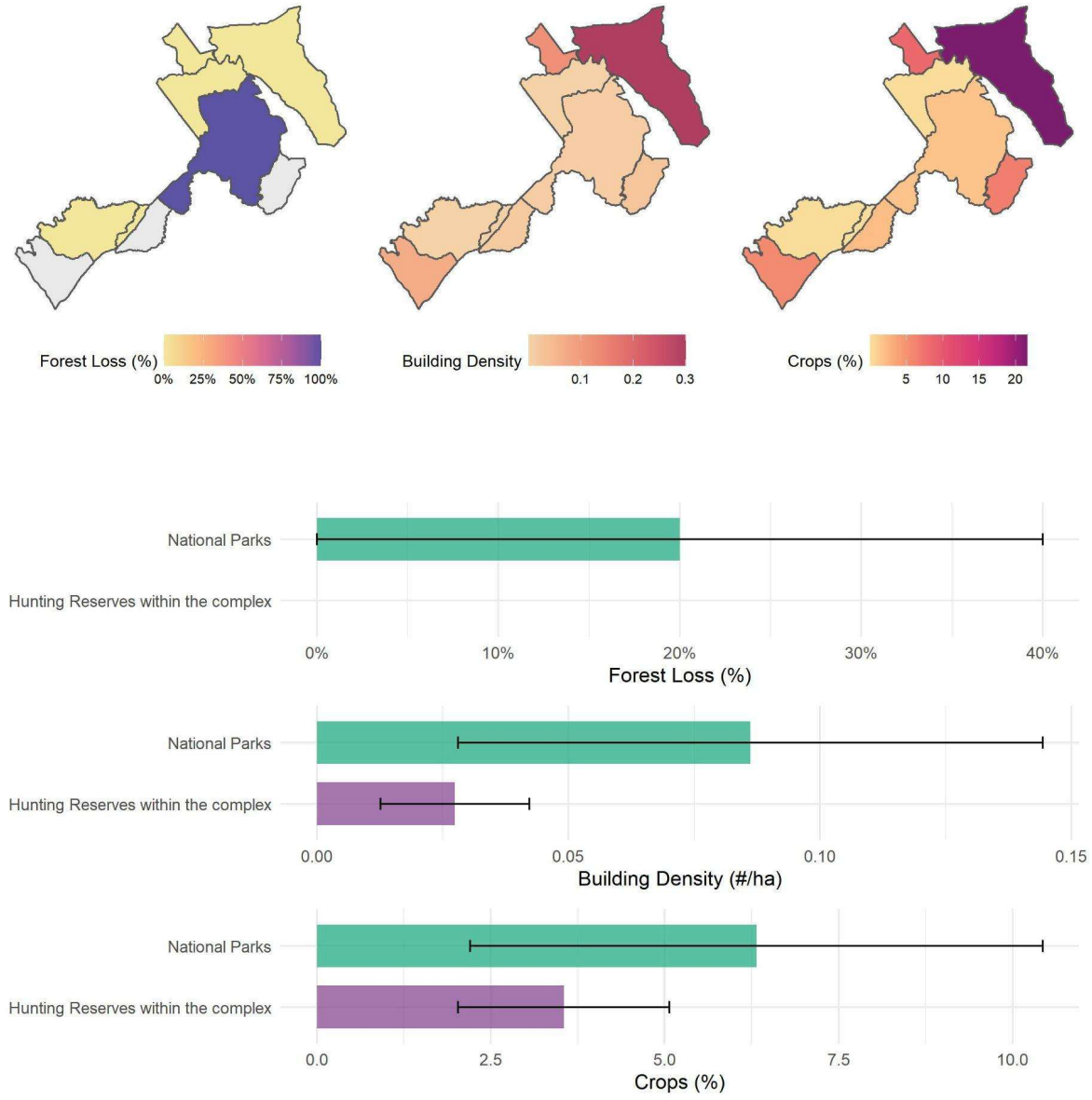


Fig. 4.32. WAP complex breakdown of forest loss, building density and crop cover between different areas

6. Range State responses for selected landscape and site analyses

Of the 24 African lion range States, eight (Cameroon, Kenya, Mozambique, Niger, South Africa, Tanzania, Zambia and Zimbabwe) agreed to participate in an assessment of selected landscapes with extant lion populations (Table 4.13). Each range State was requested to complete a questionnaire for one selected landscape within their country, so each State level response in the section below refers to that particular landscape in the country. These were The Benoue Complex for Cameroon, the Maasai Mara for Kenya, Niassa for Mozambique, the WAP complex for Niger, Kruger for South Africa, Ruaha-Rungwa for Tanzania, Luangwa for Zambia and Hwange for Zimbabwe. Each landscape was further broken down into three sites within the landscape, which generally differed from others in the landscape in terms of management and revenue streams, to allow for a site-level comparison. Landscape level questionnaires were completed by Cameroon, Kenya, Niger, South Africa, Tanzania and Zambia. The results presented within this section are based on responses from the questionnaires shared with the relevant range State experts, unless otherwise stated.

6.1 A comparison of threats to lions across the selected landscapes

The questionnaire sought to determine the severity of key threats to lions in each particular selected landscape (Table 4.13). Range State respondents were requested to categorize threats as major, minor, or non-threats.

Human-lion conflict was identified as a major threat in their selected landscape by four out of countries: Kenya, Niger, Tanzania and Zambia, representing 57% of the surveyed countries (four out of seven). Bushmeat poaching was listed as a major threat in the landscapes in Cameroon, Mozambique, Niger and Zimbabwe, accounting for 57% of the landscapes surveyed. Livestock expansion was identified as a major threat in the landscapes for four countries (Cameroon, Kenya, Niger and Tanzania), accounting for 57% of the countries (four out of seven), and as a minor threat in the landscape in Zambia. Cropland expansion was the next most significant, identified as a major threat for landscapes in two countries (Cameroon and Kenya), accounting for 29% of the countries (two out of seven), and as a minor threat in the landscapes in five countries (Mozambique, Niger, South Africa, Tanzania and Zambia). Resource extraction and illegal lion body part trade were each identified as major threats in the selected landscapes in two countries (Mozambique and Niger), representing 29% of respondents (two out of seven).

Small population size was identified as a major threat in the landscape by one country (Cameroon) (14%), a minor threat in the landscape by one country (Niger) (14%), and not a threat in their landscape by remaining five countries (Kenya, Mozambique, Tanzania, Zambia, and South Africa) (71%). Trophy hunting (if it occurs) was considered a minor threat in the selected landscape in two countries (Cameroon and Mozambique; 29%), while the majority, five countries (Kenya, Niger, South Africa, Tanzania and Zambia) (71%), deemed it not a threat in their selected landscape – though in Kenya it does not occur at all, and in Niger it does not occur in that landscape.

These findings indicate that human-lion conflict, bushmeat poaching, and livestock expansion are perceived as the most common major threats to lion populations in the selected landscapes (each being identified as major threats in 57% of the surveyed countries (four out of seven), underscoring the need for targeted interventions to address these challenges. These findings underscore the critical need to address human-wildlife interactions and habitat pressures in efforts to conserve lion populations.

Table 4.13. Range States were asked how much of a threat are each of these factors to the lion population in their selected landscape

	Major threat	Minor threat	Not a threat	Don't know
Small population size	Cameroon (Benoue)	Niger (WAP)	Kenya (Maasai Mara), Mozambique (Niassa), South Africa (Kruger), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	

	Major threat	Minor threat	Not a threat	Don't know
Human-lion conflict	Kenya (Maasai Mara), Niger (WAP), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	Cameroon (Benoue), Mozambique (Niassa)	South Africa (Kruger)	
Bushmeat poaching	Cameroon (Benoue), Mozambique (Niassa), Niger (WAP), Zambia (Luangwa)	Kenya (Maasai Mara), South Africa (Kruger), Tanzania (Ruaha-Rungwa)		
Livestock expansion	Cameroon (Benoue), Kenya (Maasai Mara), Niger (WAP), Tanzania (Ruaha-Rungwa)	Zambia (Luangwa)	Mozambique (Niassa), South Africa (Kruger)	
Cropland expansion	Cameroon (Benoue), Kenya (Maasai Mara)	Mozambique (Niassa), Niger (WAP), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	South Africa (Kruger)	
Trophy hunting (if occurs)		Cameroon (Benoue), Mozambique (Niassa)	Kenya* (Maasai Mara), Niger (WAP), South Africa (Kruger), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	
Resource extraction	Mozambique (Niassa), Niger (WAP)	Cameroon (Benoue), Kenya (Maasai Mara), South Africa (Kruger), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)		
Illegal lion body part trade	Mozambique (Niassa), Niger (WAP)	Cameroon (Benoue), South Africa (Kruger)	Kenya (Maasai Mara), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	

*Trophy hunting does not happen in Kenya

6.1.1 Importance of photo tourism within the landscapes

Parties were requested to provide insights on the importance of different wildlife-related revenue streams within each landscape for various uses, such maintaining wildlife areas and generating funds

for tackling poaching.

Regarding photo-tourism, seven countries provided insights on their selected landscape (Table 4.14). Revenue generation for maintaining wildlife areas emerged as the most important aspect of photo-tourism: it was identified as "very important" for the landscape by four countries (Kenya, Niger, South Africa and Tanzania; 57%), and "moderately important" by one country (Cameroon; 14%). One country (Zambia) regarded it as "neither important nor unimportant" (14%), while Mozambique regarded it as "not at all important" (14%). Revenue generation for tackling threats such as poaching was also seen as a key concern, considered "very important" for the landscape in three countries (Kenya, South Africa and Zambia; 43%) and "moderately important" in three countries (Cameroon, Niger and Tanzania; 43%), while one country (Mozambique) regarded it as "not at all important" (14%). Income generation for local government and state wildlife agencies was deemed "very important" for landscapes in four countries (Kenya, Niger, South Africa, and Tanzania; 57%), "moderately important" in two countries (Cameroon and Zambia; 29%), and "not at all important" in one country (Mozambique; 14%).

Income generation for local communities followed a similar pattern, rated as very important for the selected landscape in three countries (Kenya, Niger, and South Africa; 43%), moderately important in two countries (Cameroon and Tanzania; 29%), and "neither important nor unimportant" and "not at all important" in Zambia (14%) and Mozambique (14%) respectively. Helping fund and manage problem animal control was considered "very important" by three countries (Kenya, South Africa, and Tanzania; 43%), "moderately important" in two countries (Cameroon and Niger; 29%), and "not at all important" in the remaining two countries (Mozambique and Zambia; 29%). These findings indicate that revenue generation for maintaining wildlife areas and income generation for government and wildlife agencies are perceived as the most critical benefits from photo-tourism activities.

Table 4.14. Parties were asked how important photo tourism was to various income streams and revenue generation, regarding their selected landscape

	Very important	Moderately important	Neither important or unimportant	Moderately unimportant	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	Kenya (Maasai Mara), Niger (WAP), South Africa (Kruger), Tanzania (Rungwa-Ruaha)	Cameroon (Benoue)	Zambia (Luangwa)		Mozambique (Niassa)	
Revenue generation for tackling threats such as poaching	Kenya (Maasai Mara), South Africa (Kruger)	Cameroon (Benoue), Niger (WAP), Tanzania (Ruaha-Rungwa)	Zambia (Luangwa)		Mozambique (Niassa)	
Income generation for local government and state wildlife agencies	Kenya (Maasai Mara), Niger (WAP) South Africa (Kruger), Tanzania (Ruaha-Rungwa)	Cameroon (Benoue), Zambia			Mozambique (Niassa)	
Income generation for local communities within this landscape	Kenya (Maasai Mara), Niger (WAP), South Africa (Kruger)	Cameroon (Benoue), Tanzania (Ruaha-Rungwa)	Zambia (Luangwa)		Mozambique (Niassa)	

	Very important	Moderately important	Neither important or unimportant	Moderately unimportant	Not at all important	Don't know
Helping fund and manage problem animal control	Kenya (Maasai Mara), South Africa (Kruger), Tanzania (Ruaha-Rungwa)	Cameroon (Benoue), Niger (WAP)			Mozambique (Niassa), Zambia (Luangwa)	
Other						

6.1.2 Importance of trophy hunting within the landscapes

As with photo-tourism, Parties were requested to indicate how important trophy hunting is to each of a variety of factors within the landscape, with six countries responding (Table 4.15).

Revenue generation for tackling threats such as poaching emerged as the most important outcome from trophy hunting funds, rated as "very important" for the selected landscape by two countries (Tanzania and Zambia; 29%), "moderately important" by two countries (Cameroon, South Africa; 29%) and "moderately unimportant" by Mozambique (14%). Similarly, revenue generation for maintaining wildlife areas was identified as "very important" for the landscape in one country (Zambia; 14%), "moderately important" in three countries (Cameroon, South Africa, and Tanzania; 43%) and "moderately unimportant" in Mozambique (14%).

Income generation for local government and state wildlife agencies was deemed "very important" for the landscape concerned in two countries (Mozambique and Tanzania; 29%), "moderately important" in two countries (Cameroon and South Africa; 29%), and "neither important nor unimportant" in one country (Zambia; 14%). Income generation for local communities was considered "very important" for the selected landscape in one country (Zambia; 14%) and "moderately important" in three countries (Cameroon, South Africa, Tanzania; 43%) and "moderately unimportant" in Mozambique (14%). Helping fund and manage problem animal control was viewed as "very important" in one country (Tanzania; 14%), "moderately important" in two countries (Cameroon and South Africa; 29%), and "not at all important" in one country (Mozambique; 14%).

Responses from Niger frequently indicated "Don't know" across all categories, underscoring a lack of clarity about the impact of these factors in this region. Kenya has banned trophy hunting, and therefore did not submit responses to this section. Overall, revenue generation for tackling poaching and maintaining wildlife areas were identified as the most important outcomes from having trophy hunting.

Table 4.15. Parties were asked how important trophy hunting was to various income streams and revenue generation.

	Very important	Moderately important	Neither important or unimpor-tant	Moderately unimportant	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	Zambia (Luangwa)	Tanzania (Ruaha-Rungwa), Cameroon (Benoue), South Africa (Kruger)		Mozambique (Niassa)		Niger (WAP)
Revenue generation for tackling threats such as poaching	Zambia (Luangwa), Tanzania (Ruaha-Rungwa)	Cameroon (Benoue), South Africa (Kruger)		Mozambique (Niassa)		Niger (WAP)
Income generation for local government and state wildlife agencies	Tanzania (Ruaha-Rungwa), Mozambique	Cameroon (Benoue), South Africa (Kruger)	Zambia (Luangwa)			Niger (WAP)
Income generation for local communities within this landscape	Zambia (Luangwa)	Cameroon (Benoue), South Africa (Kruger) Tanzania (Ruaha-Rungwa)		Mozambique (Niassa)		Niger (WAP)
Helping fund and manage problem animal control	Tanzania (Ruaha-Rungwa)	Cameroon (Benoue), South Africa (Kruger)	Zambia (Luangwa)		Mozambiq ue (Niassa)	Niger (WAP)
Other						

6.1.3 Potential impacts of stopping trophy hunting on lion conservation, biodiversity conservation and local communities in the selected landscapes

The results of the questionnaire reveal diverse perspectives across seven countries regarding the impact of ceasing trophy hunting on lion conservation, biodiversity conservation, and local communities within their selected landscapes (Table 4.16). For lion conservation, four countries (57%; Cameroon, South Africa, Tanzania and Zambia) indicated that it would have a "strongly negative" impact for the landscape concerned, while two countries (28.6%; Kenya and Niger) reported that trophy hunting does not occur in their landscapes. Therefore, all the range States which used trophy hunting of lions thought that its cessation would be strongly negative for lion conservation within the selected landscape.

In terms of biodiversity conservation, two countries (29%; Cameroon and South Africa) identified the impact of stopping trophy hunting as "strongly negative" for the landscape concerned, while Mozambique and Tanzania (29%) noted a "slightly negative" effect. Zambia (14.3%) considered the effect "slightly positive," and the remaining two countries (29%; Kenya and Niger) reported no trophy hunting in their landscapes. For local communities within the selected landscapes, four countries (57%; Mozambique, South Africa, Tanzania, and Zambia) expressed a "strongly negative" impact of a ban, while Cameroon (14.3%) noted a "slightly positive" impact. Similarly, Kenya and Niger (29%) indicated no trophy hunting in their landscapes.

The leaning towards the belief that bans would have negative impact was striking: amongst countries which had trophy hunting, 100% thought stopping trophy hunting would be strongly negative for lion conservation in the selected landscape, 80% thought it would be negative (either slightly or strongly) for biodiversity conservation in the landscape, and 80% thought it would be negative (either slightly or strongly) for local communities in the landscape (Table 4.16).

Table 4.16. Parties were asked whether stopping trophy hunting in the landscape would be positive or negative for lion conservation, biodiversity conservation and for local communities in that landscape.

Impact on	Strongly positive	Slightly positive	Neither positive nor negative	Slightly negative	Strongly negative	No hunting in this landscape
Lion conservation					Cameroon (Benoue), South Africa (Kruger), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	Kenya (Maasai Mara), Niger (WAP)
Biodiversity conservation		Zambia (Luangwa)		Mozambique (Niassa), Tanzania (Ruaha-Rungwa)	Cameroon (Benoue), South Africa (Kruger)	Kenya (Maasai Mara), Niger (WAP)
Local communities		Cameroon (Benoue)			Mozambique, (Niassa), South Africa (Kruger), Tanzania (Ruaha-Rungwa), Zambia (Luangwa)	Kenya (Maasai Mara), Niger (WAP)

More details on the threats and trends for lion populations, revenue streams and the potential impact of bans, as reported by the Range States, are detailed below for each of the landscapes.

6.1.3.1 Cameroon's Bénoué landscape

Cameroon agreed to an external expert providing input for the Bénoué Complex.

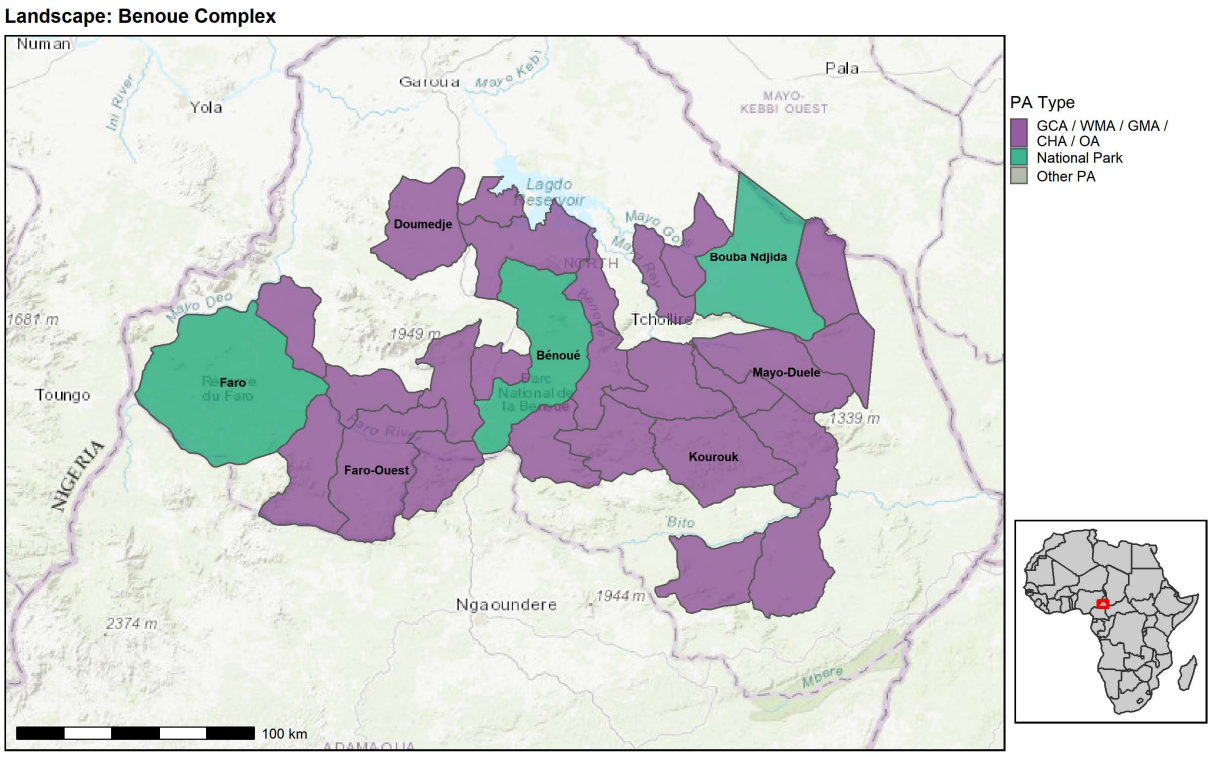


Fig. 4.48. Land use of the Bénoué landscape

a) Lion population trends and threats in the landscape

The trend in the African lion population in the Bénoué landscape is unknown according to Cameroon, but it is assumed that over the last five years, the population has declined. Key ecological pressures include habitat loss and degradation driven by agricultural expansion, human settlement, and infrastructure development.

The three greatest perceived threats to lions identified by an external expert for this landscape include: i) Habitat loss and degradation (due to expansion of agricultural activities, human settlements, and infrastructure development, along with unchecked grazing of livestock within protected areas); ii) poaching and insecurity; and iii) a lack of perceived conservation value [of lions]. A wide range of threats exist within the Bénoué Landscape with small population size, bushmeat poaching, livestock expansion and cropland expansion being identified as major threats to the local lion population. Other threats such as human-lion conflict, trophy hunting, resource extraction and the illegal trade lion body part trade were identified as minor threats.

To improve lion conservation across the landscape, identified by an external expert, suggested that enhancing law enforcement in hunting concessions, implement land-use planning, and developing sustainable, income-generating activities tied to lion conservation are identified as the top three actions which are most needed.

b) Revenue streams within the landscape

Local communities in the landscape rely on livelihoods such as growing crops, livestock keeping, and alternative income streams such as wild meat and tourism, though these vary in importance. Growing crops and livestock keeping were identified as very important income streams for local people while photo tourism, trophy hunting and wild meat were considered as somewhat important.

Photo tourism occurs within the landscape and was considered as moderately important for revenue generation for maintaining wildlife areas, for tackling threats (such as poaching), for local government

and state wildlife agencies, for local communities with the landscape and to help fund and manage problem animal control.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting of lions within the Bénoué landscape has occurred within the last three years. This activity was regarded as "moderately important" for revenue generation for maintaining wildlife areas, for tackling threats (such as poaching), for local government and state wildlife agencies, for local communities with the landscape and to help fund and manage problem animal control. If trophy hunting within the landscape was stopped, it was assumed that there would be a strongly negative impact on lion conservation. Cameroon stated that the hunting concessions will remain vacant/abandoned unless the hunting concessions were transitioned into other conservation related purposes, however no economically advantageous plan currently exists for such a scenario. The consequence would be loss of substantial habitat. The land would likely no longer be protected for wildlife and used for other purposes, hence the buffer areas around the park would be reduced.

More broadly, if trophy hunting were stopped, then the impact on biodiversity conservation would be strongly negative as, according to Cameroon a large portion of habitat would be lost to human encroachment. The potential loss of trophy hunting would be slightly positive for local communities as, according to Cameroon, the land would likely use the land for livestock, agriculture and mining which directly benefit the communities.

Both trophy hunting and photo-tourism are not used to their full potential within this landscape. Quotas are not economically competitive (compared to other countries), and the tourism offer (and demand) is very low. As a result, conservation efforts in this region are largely reliant on bilateral funding from international conservation programmes, which underscores the need for diversifying and optimizing sustainable financing mechanisms.

6.1.3.2 Mozambique's Niassa landscape

Mozambique agreed to the Niassa Carnivore Project providing input on responses.

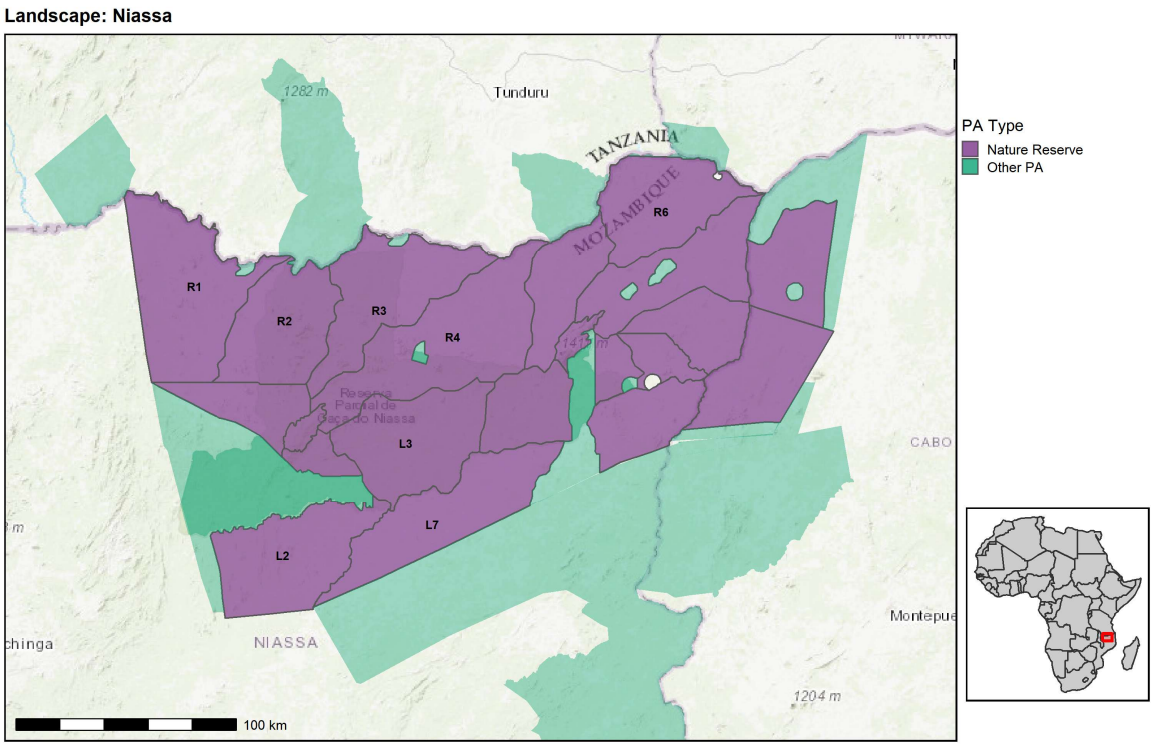


fig. 4.50. land use of the niassa landscape

a) Lion population trends and threats in the landscape

The Niassa Special Reserve (NSR) is a vast and ecologically diverse landscape in Mozambique, covering approximately 42,000 km². Lion populations in Niassa, thought to be decreasing according to the Niassa Carnivore Project, are distributed patchily across the landscape, primarily influenced by human population densities, anti-poaching efforts, and the quality of community engagement.

The ecological stability of the Niassa landscape is threatened by significant illegal activities, including poaching for bushmeat and the illicit trade in lion body parts. While sport hunting areas show variable outcomes for lion and leopard densities, the overarching determinant of population health is the extent and effectiveness of protected area management rather than the type of business conducted within the landscape.

The three greatest perceived threats to lions in the landscape include: i) illegal poaching of lions for teeth and claws and some skins for regional and international wildlife trade using poison, firearms and snares, ii) inadvertent snaring of lions as bycatch in bushmeat snares and iii) bushmeat snaring and reduced prey.

Bushmeat poaching, resource extraction and the illegal trade in lion parts were identified as major threats while human-lion conflict, cropland expansion and trophy hunting were identified as minor threats.

To improve lion conservation within the landscape, it was recommended to include collaboration between stakeholders and the setting of sport hunting quotas which are linked to both protected area management and community engagement metrics.

b) Revenue streams within the landscape

> The most important income streams for local people within this landscape include growing crops and harvesting wild meat. Photo tourism and trophy hunting are considered as somewhat important.

Mozambique is a poor country with limited access to education and challenging soil conditions for agriculture. Many people live in extreme poverty, and alternative livelihood opportunities are scarce. As a result, some individuals turn to poaching as a means of survival, with lion body parts, such as teeth and claws, being sold for significant amounts—up to US$1500. This is a major threat to lions in Mozambique.

Niassa Carnivore Project commented that: Fishing for food and income is a critical component of the “green economy” within the NSR, particularly for those with access to the Lugenda River, although fishing has collapsed along the Ruvuma. Illegal gold and ruby mining provide significant income in some key areas but are not widespread across the entire region. Crop cultivation is predominantly for subsistence, playing a critical role in food security, with sesame being the primary cash crop in some villages. Alternative livelihoods, such as beekeeping and community camera trapping, are making significant economic impacts in the Mecula Corridor, generating US$30,000 annually from beekeeping in seven villages and US$60,000 annually from camera trapping across 10 villages, thanks to conservation NGO initiatives. Trophy hunting contributes income through licensing and concession fees, with 16% of revenues allocated to the 70,000 residents of the NSR, though the distribution process remains unclear. The region’s sole operational tourism camp operates within a community tourism concession, directing 20% of bed-night fees to a community fund and surplus revenue to initiatives like a school lunch programme and community scouts, benefitting one village significantly. Efforts to establish community-led models, such as CBNRM-based sport hunting in the L7 concession and a joint-venture community concession (L4E) for 10 communities, are underway, with the latter expected to generate substantial income upon becoming operational.

Only one photo-tourism concession currently has operational tourism at a low level within the landscape. This concession is only 560 km² out of 42,000 km². As such photo-tourism is not regarded as important for revenue or income generation for the whole landscape.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting remains a significant yet contentious element within NSR. It occupies over 70% of the reserve's land and is tightly regulated, with quotas set according to a points system and external audits. Trophy hunting generates revenue through concession fees, a portion of which is redistributed to local communities. While well-managed concessions can contribute positively to anti-poaching and community engagement, poorly managed ones may exacerbate threats to wildlife. The overall impact of trophy hunting on lion and leopard populations depends on the quality of concession operators rather than the nature of the business. Although trophy hunting offers financial support for reserve management, it is often supplemented by philanthropic and donor funding, as the profits alone are insufficient to sustain comprehensive conservation efforts. Stopping lion trophy hunting specifically, without ceasing other forms of hunting, has been suggested as a potential strategy during periods of heightened poaching and illegal trade.

Trophy hunting operators are a critical partner in protected area management in Niassa Reserve, but this depends on the operator on whether this is a positive or negative. NSR is a major sport hunting destination with more than 70% of NSR dedicated to sport hunting (> 27,000 km^2). The sport hunting operators have management leases so are not only responsible for paying trophy license fees that are retained by the ANAC at national level except for the 20% sent to the communities in NSR and concession fees that are retained at NSR level, but are also responsible for protected area management of the concessions (infrastructure, roads, communities, antipoaching, fire management). This is not done by the NSR management authority but is largely devolved to concession level. As a result, the operators are critically important for the day to day protected area management of NSR. This role is not on the list. When it is done well sport hunting operators are a critically important part of the conservation management of NSR. Surveys of leopard and lion, as well as maps of illegal mortality and bushmeat consumption show that blocks that are open have the lowest densities and highest illegal offtake, however there are large differences in density and impact between sport hunting operators dependent on the level of antipoaching efforts and quality of community engagement.

Trophy hunting is considered as a very important for income generation for local government and wildlife agencies and moderately important for maintaining wildlife areas. Trophy hunting is moderately important for revenue generation for maintaining wildlife areas, for tackling threats such as poaching, helping to fund and manage problem animal control, as well as revenue generation for local communities within the landscape.

Table 4.18 provides some additional information given by the representative for Mozambique in response to this questionnaire.

Table 4.18. Additional information on African lion populations provided by the representative for Mozambique (Niassa Carnivore Project)

Range State	Additional information provided by Mozambique
Mozambique - Niassa Carnivore Project	Collaboration among various NGOs is essential to develop a comprehensive program addressing illegal wildlife trade (IWT) in lion parts, poisoning, and bushmeat snaring, leveraging the unique skills and expertise of each organization to support the NSR warden and ANAC. This challenge cannot be tackled by a single organization, as it requires support from district and provincial governments; increased detection rates and effective coverage by antipoaching teams, currently estimated at just 30%; and enhanced professionalism and accountability in antipoaching efforts, including tourism operators, through tools like SMART, training, and performance indicators. High-quality, performance-based community programs must address real needs such as employment, income, education, and health, while incorporating indigenous knowledge and community decision-making in conservation strategies. Intelligence-driven activities targeting buyers are critical to reducing demand, increasing prosecutions, and raising the opportunity costs for those involved in the trade. Leadership at NSR must be inclusive and collaborative to unite partners effectively, while funding must be strategic, outcome-focused,

Range State	Additional information provided by Mozambique
	and transparent to ensure maximum return on investment. National-level support is also vital, as Mozambique is a hotspot for IWT, necessitating coordinated responses to address this pressing issue.
Mozambique – Niassa Carnivore Project	Lion sport hunting in the NSR could be halted without ending all trophy hunting, similar to the moratorium on elephant hunting during the peak of poaching in the area. Currently, only 5–10 lions are taken annually due to stringent lion regulations, import bans, poor marketing, and travel advisories linked to the insurgency. Given the severe threats from poisoning and the illegal trade in lion parts, suspending lion hunting is feasible and could address the mixed messaging surrounding legal sport hunting amidst ongoing declines in lion populations. Trophy hunting is not a reliable indicator of lion or leopard densities, as data show no consistent pattern between areas with sport hunting and those under tourism management. Instead, predator densities correlate with the quality of protected area management—antipoaching coverage, professional scouts, and community engagement—not the type of business model. In areas with low antipoaching coverage, lion and leopard densities are critically low, regardless of whether they are sport hunting or tourism zones, while stable or increasing populations are found in areas with effective management. Open concessions, with no operators, have the lowest predator densities, demonstrating that NSR management alone cannot adequately protect these areas. Trophy hunting, while a business that generates income, only supports conservation under certain conditions, with the operator's quality being key. Most effective operators, whether in ecotourism, conservation, or trophy hunting, rely on philanthropy and donor grants rather than trophy profits for antipoaching and community engagement. Additionally, in areas with poor operators, predator densities are similar to those in open concessions, underscoring the importance of meeting minimum standards in protected area management to ensure lion conservation.

6.1.3.3 South Africa's Greater Kruger landscape

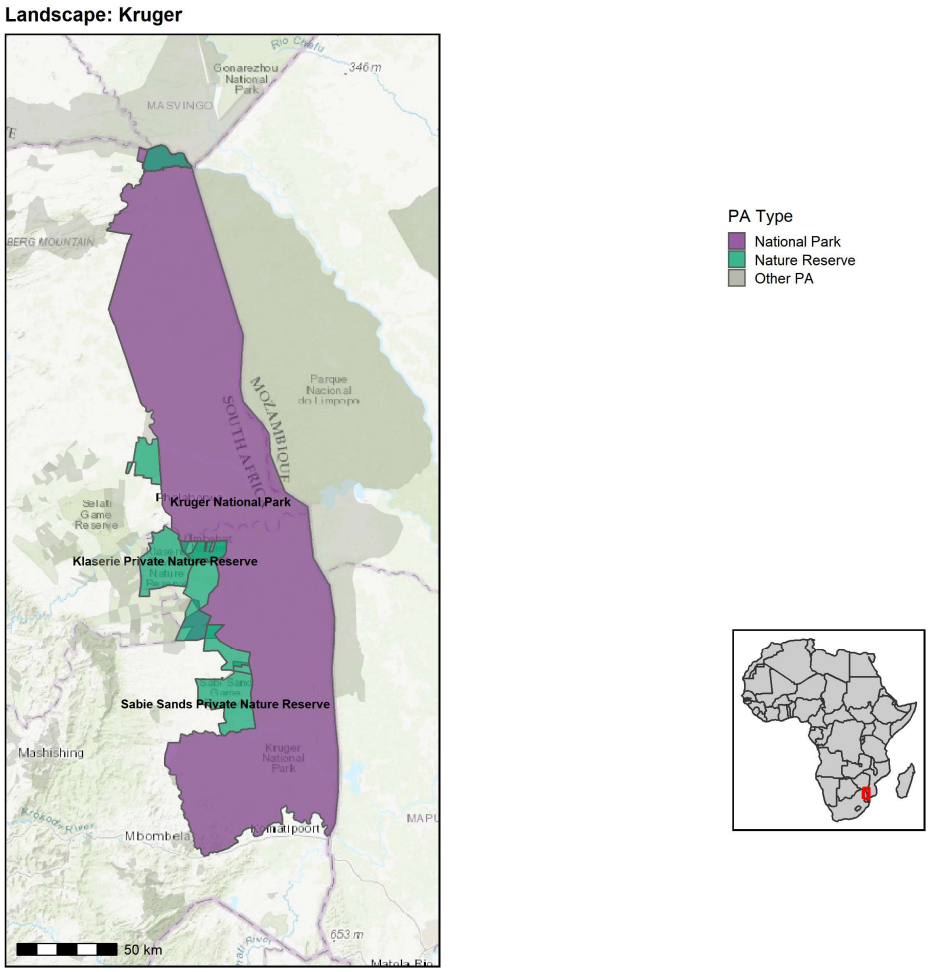


Fig. 4.49. Land use of the Greater Kruger landscape

a) Lion population trends and threats in the landscape

The Greater Kruger landscape in South Africa encompasses the Kruger National Park (KNP) and adjacent private reserves. According to South Africa, the lion population in the landscape has remained stable over the past five years. The landscape is also impacted by adjacent industries, including mining, which adds complexity to conservation efforts (see link). According to South Africa, the three greatest perceived threats to lions within this landscape include: i) localized by-catch from snares intended for bushmeat, ii) localized by-kill of poisoning other species, particularly carcasses poisoned for vultures, and iii) targeted poisoning of lions for their body parts. While there are no major threats to lions in the landscape, according to South Africa, bushmeat poaching, resource extraction and the illegal lion body part trade are considered as minor threats. Small lion population size, human-lion conflict, livestock expansion, crop expansion and trophy hunting are not considered as threats in the landscape.

According to South Africa, the top three actions that are most needed to improve lion conservation in the landscape include, firstly, addressing the social drivers through engagement with local people and co-designing responses to reduce and eliminate the public health risks of using potentially compromised meat from snares, or poisons are the key elements. Secondly, co-designing and co-implementing responses with local people that are principally affected are a key requirement for when dispersing lions leave the Greater Kruger landscape. And lastly, there is a need to continue to provide the opportunities for ecological processes to play out but integrate the greater Kruger into a national

lion meta-population management framework.

b) Revenue streams within the landscape

Local communities in the Greater Kruger landscape rely on diverse income streams, including photo tourism, trophy hunting, livestock keeping, and crop farming. Photo-tourism was identified as highly important for generating revenue, while trophy hunting was noted as moderately important for supporting local economies and wildlife management. Other activities, such as livestock keeping and crop farming, are crucial for local livelihoods.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting in the Greater Kruger landscape is a regulated activity, although according to South Africa, no lion hunts have occurred since 2019. According to South Africa, trophy hunting is moderately important for revenue generation for maintaining wildlife areas, for tackling threats such as poaching, for income generation for local government and state wildlife agencies, for local communities within the landscape and for helping fund and manage problem animal control. Trophy hunting was suppressed due to public sentiment against it, but it has the potential to increase benefits if the public were more supportive. Photo tourism, on the hand, was considered by South Africa to be very important for these factors.

If trophy hunting were stopped, the impact on lion conservation was believed to be strongly negative. According to South Africa, trophy hunting can incentivize the retention of large, connected habitats essential for sustaining lion populations, as exceptional specimens are more common in larger, intact ecosystems. However, external pressures, such as social media activism, often hinder the sustainable use of this resource, impacting both conservation strategies and the viability of photographic tourism.

The impact on biodiversity more generally after a ban on trophy hunting would also be strongly negative. South Africa state that responsible trophy hunting requires large, intact habitats and can generate crucial income for reserves, enhancing conservation efforts and sustainability programmes. Evidence from elsewhere in Africa shows that halting hunting often leads to biodiversity loss, with many areas subsequently returning to hunting models to support ecological and financial stability.

Lastly, local communities would also be “strongly negatively” impacted by a ban in trophy hunting. According to South Africa, currently, low levels of trophy hunting limit its potential to contribute to conservation and community benefits, despite its capacity to sustain large lion populations and preserve their cultural and ecological values. Hunting revenues support conservation, wildlife security, and community upliftment, including job creation and significant food donations, providing tangible benefits unmatched in some areas by photographic tourism.

Table 4.17 provides some additional information given by South Africa in response to this questionnaire.

Table 4.17. Additional information on lion populations provided by South Africa.

Range State	Additional information provided by South Africa
South Africa	Continue to provide the opportunities for ecological processes to play out but integrate the greater Kruger into a national lion meta-population management framework. See Selier, J., Miller, S.M., Coverdale, B., Ferreira, S., Kruger, J. and Parker, D.M., 2024. Wild lions in small, fenced reserves in South Africa conform to a meta- population. Ecological Solutions and Evidence, 5(3), p.e12341. See also the Draft National Guidelines for Lion Metapopulation Management available from Jeanetta Sellier J.Selier@sanbi.org.za
South Africa	Trophies are by definition exceptional specimens which are relatively rare in a population. One thus has higher numbers of trophy specimens the larger the population. For that one needs large areas with intact ecological processes. NOTE: That a highly photogenic lion is also a trophy animal category. A key element is not whether trophy hunting takes place or not, but whether there is always an option to use trophy hunting when conditions require or allow. For instance, it is unrealistic to expect that every locality will allow similar opportunities for ecotourism, trophy hunting or any use and appreciation of all the other values that lions may have. Having a trophy hunting option now or in the future incentivize aspiration for retaining larger and connected areas. We have a highly valuable sustainable resource (lions) that is not being utilised due to external pressures such as social media. Therefore, this species is excluded from our quota in an effort to preserve our respective brands. Social media "outcries" severely impact the photographic tourism on the reserve if there are hunting issues exploited by the activists in mainstream media and social media.
South Africa	Inadvertent requirements of large intact areas within responsible trophy hunting framings. In addition, the complete stop of trophy hunting of any kind would reduce the available income for reserves, and although we are currently making do without lion hunts the funds a lion hunt would bring in will in some reserve's cases definitely boost their ability to conserve the area and run programs. Our hunting quotas are determined by the strictest scientific methods, and we have a dedicated hunting protocol that dictates the classes of animals harvested. This ensures sustainability and genetic preservation. Africa has many case studies where the biodiversity of areas was severely impacted when hunting was stopped. The majority have returned to the hunting model.
South Africa	Regarding the impact of stopping trophy hunting on local communities: because at present low levels of trophy hunting takes place. The potential is thus not unlocked. Note the mechanisms of the inadvertent requirements of large intact areas within responsible trophy hunting framings. A key principle is that robust large populations provide opportunities for recognizing all the values of lions and use them sustainably, with respect and thankfulness. Retaining and enhancing the potential to recognize and use all values have enormous consequences for enhancing benefits equitably for all indigenous people and local communities. These values include an array of cultural and national cohesion values. Our hunting quotas generate real tangible benefits for the local communities. Besides job creation and maintenance, we currently donate over 20 tons of healthy meat per year to local communities. In terms of the co-operative agreement hunting revenues earned by us can only spent on: Conservation, wildlife security and community upliftment. No other activity (photographic tourism) does this.

6.1.3.4 Zambia's Luangwa landscape

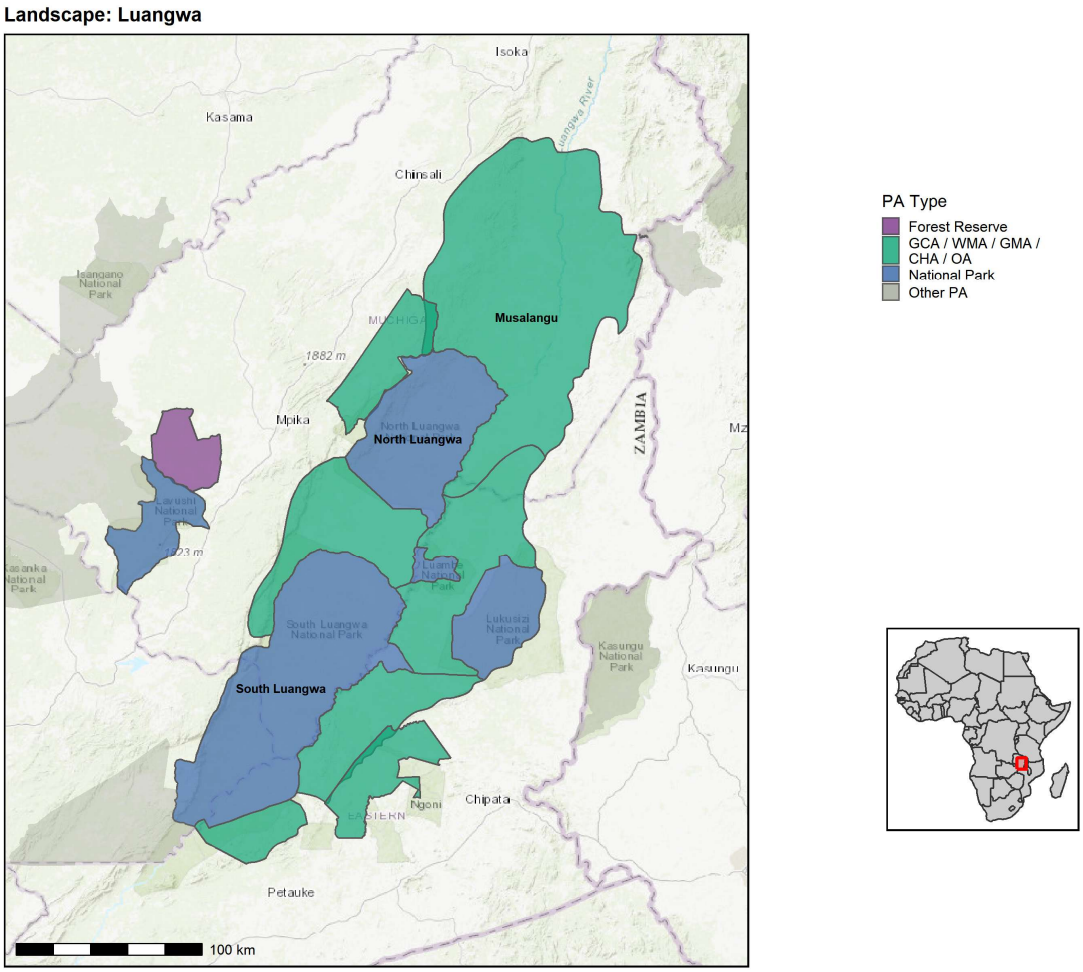


Fig. 4.52. Land use of the Luangwa landscape

a) Lion population trends and threats in the landscape

The African lion population within the Luangwa landscape is reported to have been stable over the past five years, reflecting effective conservation measures and long-term monitoring efforts according to Zambia.

The three greatest perceived threats to lions in the landscape include: i) habitat loss (due to encroachment of protected areas), ii) human-lion conflict and iii) snaring. Lions are rarely targeted directly by poachers; however, they often become unintended victims of snares set for antelopes. This issue is compounded by a shortage of wildlife veterinary staff, resulting in delayed or limited responses to treat injured lions. Additionally, the use of snares contributes to a decline in prey populations, which has a cascading negative impact on lion survival. Additionally, while Zambia implements age- and sex-based trophy hunting regulations, concerns have emerged about the consistent offtake of prime-aged male lions (5–6 years old), which could potentially reduce reproductive capacity and impact population dynamics. The landscape also benefits from the most comprehensive lion monitoring in Zambia, spanning over two decades, but further research is required to understand the nuanced effects of current conservation practices.

Major threats to lions in the landscape include human-lion conflict and bushmeat poaching. Minor threats include livestock and cropland expansion and resource extraction. Small lion population sizes, trophy hunting and the illegal trade in lion body parts are not considered as threats to lions in the

landscape.

To address these threats, three urgent conservation actions to improve lion conservation in the landscape include the promotion of human-lion coexistence models, review and update of the General Management Plans for the landscape protected areas and the continuation of research including the intensive lion population dynamics research and monitoring by the local government agencies and partners.

b) Revenue streams within the landscape

Photo tourism, trophy hunting and wild meat are considered as very important income streams for local people within this landscape. Livestock keeping is "not important" within this region due to the presence of tsetse flies, which render livestock farming non-viable. Limited alternative livelihoods exist, with beekeeping identified as a supplementary activity for local communities. Growing crops and resource extraction are rated as somewhat important, though these activities are secondary to wildlife-based income streams. Growing crops and beekeeping are somewhat important.

Photo-tourism is somewhat important within this landscape, albeit not as important as trophy hunting. This activity is only moderately important for income generation for local government and state wildlife agencies.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting, practiced in the landscape over the past three years, is central to conservation and local livelihoods. It generates critical revenue for maintaining protected areas and tackling poaching while providing communities with income and employment opportunities. The socio-economic structure of this landscape is heavily dependent on wildlife-based revenue, with trophy hunting serving as a vital economic activity. Trophy hunting is considered "very important" for generating revenue to maintain wildlife areas, tackle poaching, and support local communities.

However, concerns have been raised about the ecological impact of removing prime-aged male lions, which could affect reproduction rates. Zambia suggested that stopping trophy hunting would negatively impact local livelihoods but could slightly benefit biodiversity conservation by reducing pressure on the lion population. Banning trophy hunting could be strongly negative for lion conservation. According to Zambia, the landscape is infested with tsetse flies this makes livestock non-viable and thus it is not a major social economic activity for the district and local communities. The sure source of revenue for both the government and local communities is trophy hunting and if it does not happen, the livelihoods of the local communities within the landscape would be very negative. The ban would be strongly negative for local communities. According to Zambia, this is due to a majority of the local communities in this landscape depending on trophy hunting for their livelihood, including employment and protein supplements through wild meat given to them during hunting activity. Not having trophy hunting was thought to negatively impact them. Zambia also state that a ban could result in a rise in human-wildlife conflict from crop damage.

6.1.3.5 Zimbabwe's Hwange landscape

Zimbabwe did not complete a landscape questionnaire but did complete site-specific questionnaires, which are covered in sections below.

Landscape: Hwange

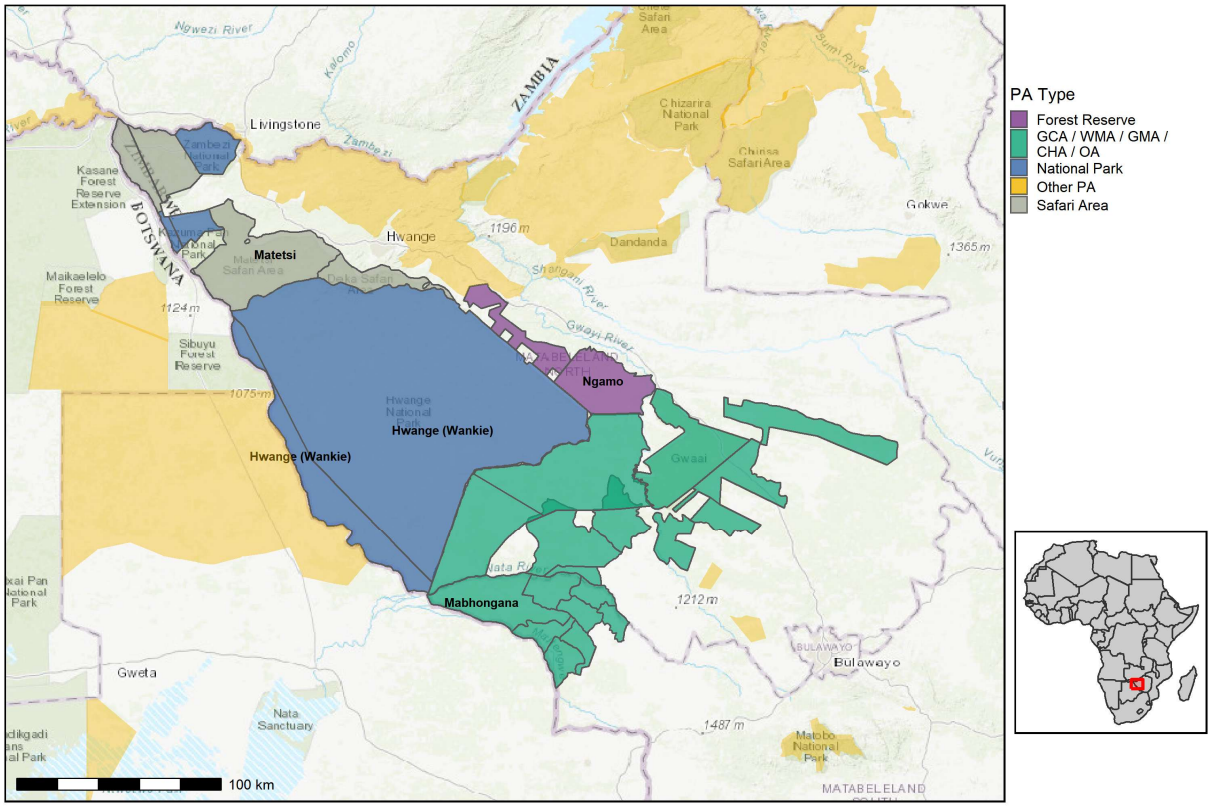


Fig.4.51. Land use of the Hwange landscape

6.1.3.6 Kenya's Maasai Mara landscape

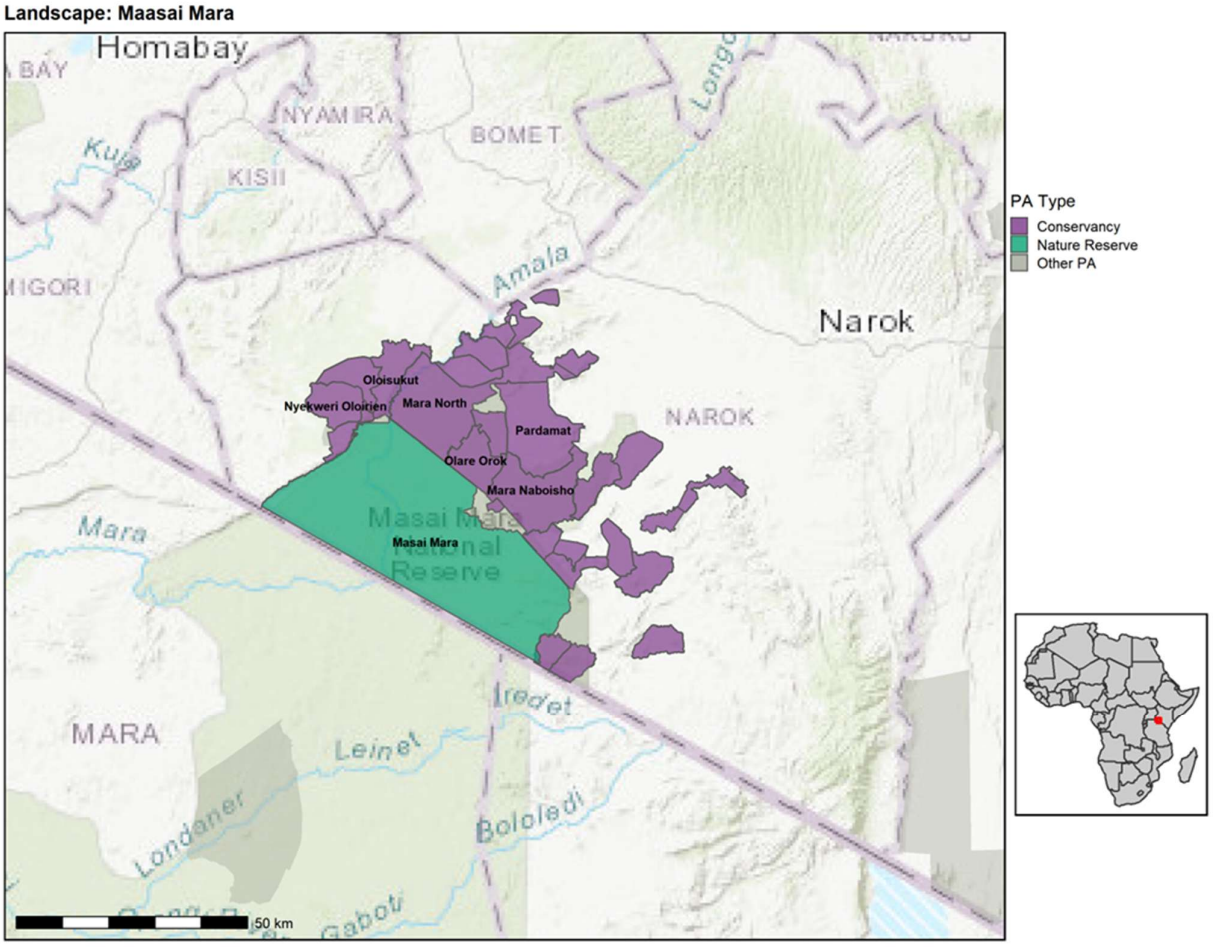


Fig. 4.53. Land use of the Maasai Mara landscape

a) Lion population trends and threats in the landscape

Based on the information provided by Kenya, the Greater Maasai Mara Landscape lion population has been stable over the past five years. The three greatest perceived threats to lions within the landscape are: i) habitat loss and land use changes, ii) human-lion conflict (from pastoralists) and iii) reduced prey base (due to settlement and habitat degradation. Other major threats to the species included human-lion conflict, livestock and cropland expansion. Bushmeat poaching and resource extraction were considered as minor threats to the local lion population.

The conservation priorities for improving lion populations include understanding the drivers behind increased livestock predation, researching the movement patterns of dispersing male lions, and addressing human-lion conflicts. In addition, there should be a focus on improving livestock management through measures like predator-proof bomas and better grazing practices to reduce conflict and improve coexistence between humans and lions.

b) Revenue streams within the landscape

From a socio-economic perspective, photo tourism is considerably important to local communities within the Greater Maasai Mara Landscape. It is regarded as a vital source of revenue for maintaining wildlife areas, combating poaching, supporting both local government, state wildlife agencies and local communities, and to help fund and manage problem animal control.

Livestock keeping is also highlighted as a very important livelihood activity. Trophy hunting does not occur in the landscape, and wild meat gathering and crop farming are relatively less significant sources of income for the local population. The reliance on photo tourism points to the value of wildlife conservation in driving local economic activity, especially in the absence of other forms of hunting-based income.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting does not occur within this landscape or within Kenya at all, so would not affect this landscape.

6.1.3.7 Tanzania's Ruaha-Rungwa landscape

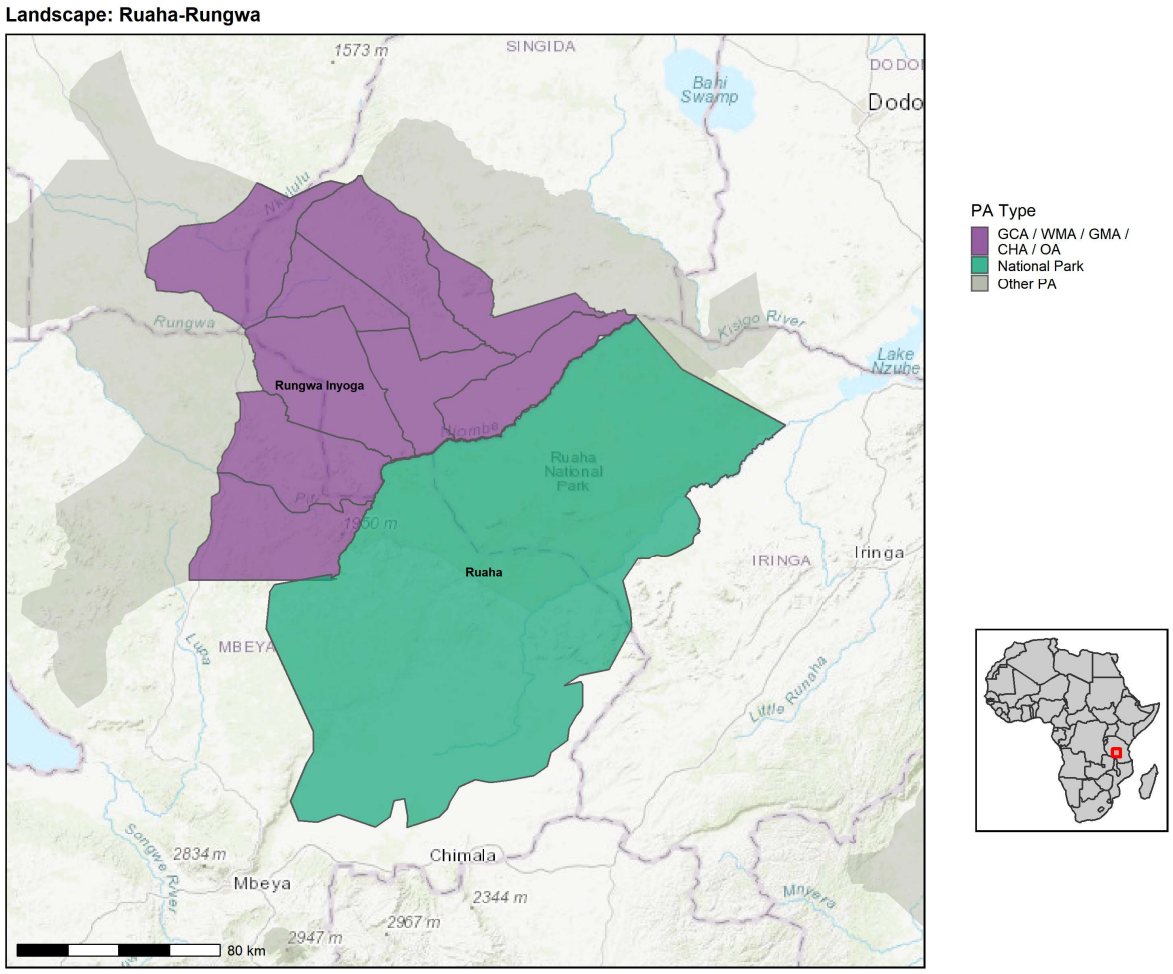


Fig. 4.54. Land use of the Ruaha-Rungwa landscape

a) Lion population trends and threats in the landscape

The lion population trend in the Ruaha-Rungwa landscape was considered by Tanzania to be stable over the past five years. The environment includes protected areas, buffer zones, and dispersal corridors that are crucial for lion conservation.

The three greatest perceived threats to lions include: i) human lion conflict along the population edges, ii) livestock encroachment and illegal grazing and iii) lethal control of dispersing lions. The top three actions most needed to improve lion conservation in the landscape include: i) mitigating human-lion conflict, ii) promoting the development and implementation of village land-use plans to accommodate

both biodiversity conservation and livestock husbandry as land use practices to benefit lions and other wildlife in the buffer zones and dispersal areas and lastly, iii) building capacity for rangers and wildlife scouts on alternative (non-lethal) approaches to problem animal control using innovations and technologies to enhance lion conservation.

The major threats identified for the lion population in the landscape include human-lion conflict and livestock expansion while bushmeat poaching, cropland expansion and resource extraction are considered as minor threats.

a) Revenue streams within the landscape

Photo tourism, trophy hunting and growing crops are perceived to be "very important" income streams for local people. Livestock keeping is only considered to be "somewhat important", while wild meat harvesting is "not important at all".

Photo tourism is an important land use across the Ruaha-Rungwa landscape. It is considered very important for revenue generation for maintaining wildlife areas, income generation for local government and state wildlife agencies and income generation for local communities within this landscape.

b) The potential impact of trophy hunting bans for this landscape

Trophy hunting plays a pivotal role in the management and conservation of this landscape. It is considered as very important for revenue generation for tackling threats (such as poaching), income generation for local government and state wildlife agencies and helping fund and manage problem animal control. Trophy hunting is moderately important for revenue generation for maintaining wildlife areas and income generation for local communities within this landscape.

Trophy hunting under the current practice regime in Tanzania (area and quota) is under sustainable management, benefiting both conservation and livelihoods of surrounding communities. Controlling direct impacts such as Problem Animal Control (PAC) and human-wildlife conflict provide greater prospects for lion conservation in the landscape especially through enhanced community tolerance for extra-territorial lions.

If trophy hunting were to stop in the landscape, then, according to Tanzania, it would be "strongly negative" for lion conservation in the landscape. This is because, as stated by Tanzania, trophy hunting is the main revenue generation that supports Protected Areas management, enhances local government provisions of public services to surrounding villages and direct financial benefits to communities living with lions, particularly where there is lack of photo-tourism income generation. Tanzania states that the ban would be "slightly negative" for biodiversity conservation as "there are multiple Protected Areas management regimes, including Game Reserves in which trophy hunting provides support for conservation. Stopping trophy hunting would particularly affect the areas designated and are under direct support of hunting revenues". However, a ban would be "strongly negative" for local communities living within the landscape. Tanzania stated that communities along hunting areas benefit from trophy hunting through taxes/fees paid to the local government which support education, roads and other infrastructure, water and health public services. Furthermore, hunting companies also provide community support through Cooperate Social Responsibility (CSR) which complement local government provisions on public services. Stopping trophy hunting would affect community income through loss of the double funding streams.

6.1.3.8 Niger's WAP landscape

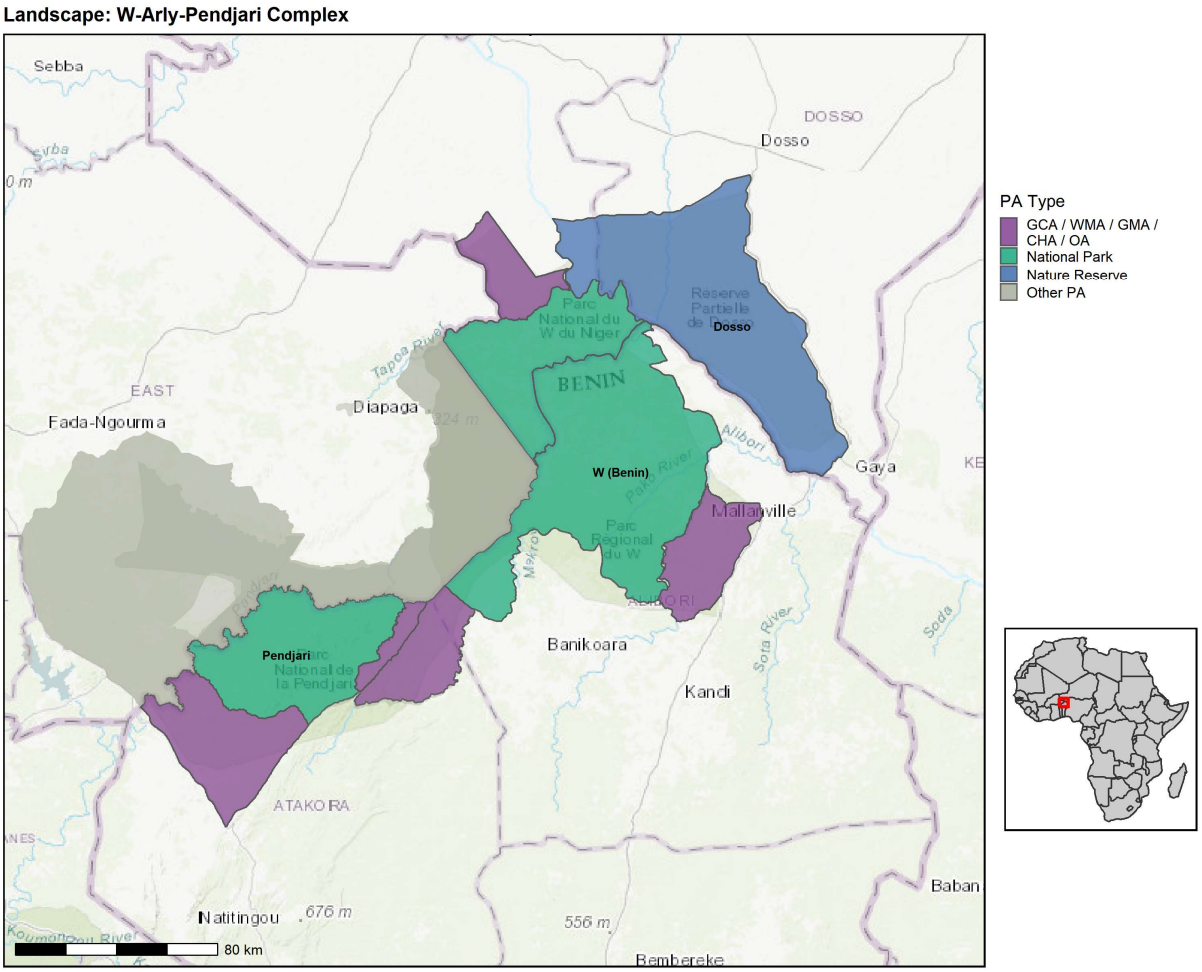


Fig. 4.47. Land use of the WAP complex

a) Lion population trends and threats in the landscape

The W Niger National Park, is an IUCN Category II protected area, indicating its primary purpose as the conservation of ecosystems and natural habitats. The African lion population in this area is not well-documented, with its recent trend reported by Niger as unknown. The illegal trade in lion body parts, poaching and habitat destruction are perceived as the three greatest threats to lions in the landscape.

Major threats to lions within the landscape included human-lion conflict, bushmeat poaching, livestock expansion, resource extraction and the illegal trade of lion body parts. Small population size and cropland expansion were identified as minor threats.

b) Revenue streams within the landscape

Local communities within this landscape rely heavily on practices such as growing crops, livestock keeping, and beekeeping for the production and marketing of honey. Photo tourism plays a critical role in generating revenue and providing income for local governance and conservation efforts. Activities such as trophy hunting and wild meat harvesting are deemed not important for local people within the landscape, with the former not occurring in this area.

Photo tourism was regarded as very important in this landscape. Specifically, it was considered very important for revenue generation for maintaining wildlife areas, for income generation for local and

government and state wildlife agencies as well as for local communities. This activity was considered moderately important for revenue generation for tackling threats (such as poaching) and for helping fund and manage problem animal control.

c) The potential impact of trophy hunting bans for this landscape

Trophy hunting is prohibited in the W Niger National Park, and this restriction aligns with the park's classification as a strict conservation area. Niger emphasized that no trophy hunting has occurred in the past three years and that such activities are not authorized. While its absence ensures that the landscape remains focused on non-consumptive conservation practices like photo-tourism, Niger noted that if trophy hunting were hypothetically stopped, it would have no impact on lion conservation but could negatively affect local community dynamics.

6.2 A comparison of study sites within lion landscapes

Of the 24 African lion range States, eight agreed to participate in an assessment of landscapes with lion populations, as detailed above. These included Cameroon, Kenya, Mozambique, Niger, South Africa, Tanzania, Zambia and Zimbabwe. Each range State was also requested to complete a site questionnaire for the multiple sites within each landscape. The results presented within this chapter are based on responses from the questionnaires shared with the relevant range State experts, unless otherwise stated.

6.2.1 Cameroon's Bénoué landscape

For this body of work, Cameroon completed one landscape questionnaire to represent all sites within the landscape. As such a site comparison for the landscape cannot be completed.

6.2.2 Mozambique's Niassa landscape

For this body of work, the Niassa Carnivore Project completed one landscape questionnaire to represent all sites. As such a site comparison for the landscape cannot be completed.

6.2.3 South Africa's Greater Kruger landscape

South Africa completed site questionnaires for the following sites: the Adjoining Private Nature Reserves' photographic lodges (APNRs; including: Sabi Sand Nature Reserve (SSNR), Sabie Game Reserve (SGR), Manyeleti Game Reserve (MGR), MalaMala Game Reserve (MMGR), Kruger National Park and the APNR hunting areas (Fig. 4.49).

a) Lion population trends and threats across different sites in the landscape

Lion population trends in the Kruger National Park and the APNR Photographic Lodges report stable lion populations, whereas the APNR Hunting Areas indicate an increasing trend, potentially reflecting differences in management practices or ecological pressures. Income streams deemed "very important" also highlight contrasting priorities.

Threats to lion populations also vary among the sites, driven by localized human-lion interactions and ecological dynamics (Table 4.19). In Kruger National Park, the primary threats include bushmeat snaring and poisoning, both localized and targeted, reflecting illegal activities impacting predator species. Conversely, in APNR Photographic Lodges, disease, human-lion conflict resulting from escape events, and snaring emerge as the most critical concerns. This is potentially influenced by the proximity of lions to human settlements and the risk of disease transmission. Interestingly, in APNR Hunting Areas, overpopulation of lions, alongside poisoning and snaring, ranks as the most pressing issue, with disease also a notable concern. This focus on overpopulation highlights the unique challenges faced within this site.

The strategies proposed to improve conservation of lions at the sites emphasize site-specific responses tailored to the challenges faced. In Kruger, community engagement and co-designed

conservation actions are prioritized, indicating the importance of aligning ecological objectives with local socio-economic realities, particularly regarding lion dispersal from protected areas. Similarly, integrating Kruger into a national meta-population management framework underscores the importance of connectivity in lion conservation. In contrast, the APNR Photographic Lodges recommend that ongoing monitoring, research, and enhanced security measures, reflecting a focus on strengthening scientific and enforcement capabilities within existing protected area boundaries will improve conservation of the species. The APNR Hunting Areas, meanwhile, emphasize population monitoring, conservation education, and maintaining boundary fencing, indicating a dual need for ecological oversight and minimizing human-lion conflict.

Furthermore, differences in the classification of threats reinforce the importance of localized conservation priorities. Kruger identifies bushmeat poaching, resource extraction and illegal trade as "minor threats", unlike the APNR Hunting Areas, where resource extraction is a "major threat". Photographic Lodges identify neither resource extraction nor illegal trade as significant threats, reflecting the distinct land use patterns in these areas. Commonalities across all sites, however, include a lack of concern regarding small population size, a testament to the relative abundance of lions across the surveyed regions.

Certain themes, such as the importance of photo tourism and challenges like snaring, are shared across the sites, the distinct socio-ecological contexts necessitate tailored conservation strategies. Collaborative, inclusive measures dominate in Kruger, while APNR areas focus on strengthening internal systems and boundary management, collectively addressing the multifaceted pressures on lion populations.

Table 4.19. Survey responses by South Africa for lion specific questions for each of the three sites in the Greater Kruger landscape.

	Site		
	Kruger National Park	**APNR Photographic Lodges**	**APNR hunting areas**
Lion population trend at the site in the last 5 years	Stable	Stable	Increasing
The three greatest perceived threats to African lion populations overall in this site	1.Localized snaring for bushmeat 2.Localized poisoning of other species 3.Targeted poisoning of lions	1.Disease 2.Escape from protected areas resulting in human-lion conflict 3.Snaring	1.Overpopulation of lions 2. Poisoning and snaring (targeted and non-targeted) 3.Disease
Top three actions needed to improve lion conservation at the site	1. Addressing the social drivers through engagement with local people 2. Co-designing and co-implementing responses with local people that are principally affected are a key requirement for when dispersing lions leave the Greater Kruger of which the Kruger National Park is part off 3. Continue to provide the opportunities for ecological processes to play out but integrate the greater Kruger into a national lion meta-population management framework	1.Continued monitoring 2.Continued research 3.Contined and improved security within the protected area network	1.Population monitoring 2.Conservation education on the borders of the reserves 3. Maintain western boundary perimeter fencing

	Site		
	Kruger National Park	**APNR Photographic Lodges**	**APNR hunting areas**
Major threats to the lion population at this site	None	None	Resource extraction
Minor threats to the lion population at this site	Bushmeat poaching, resource extraction, illegal lion body part trade	Human-lion conflict, bushmeat poaching	Human-lion conflict, bushmeat poaching, livestock expansion, cropland expansion, illegal body part trade
Not identified as a threat to lions at the site	Small population size, human-lion conflict, livestock expansion, cropland expansion, trophy hunting	Small population size, livestock expansion, cropland expansion, trophy hunting, resource extraction	Small population size, trophy hunting

b) Revenue streams across different sites in the landscape

In Kruger National Park, photo tourism is integral not only to the park's revenue generation but also to broader conservation objectives, including the maintenance of wildlife areas and tackling threats such as poaching. The park's diverse income streams include photo tourism, crop cultivation, livestock keeping, and other industries (Table 4.20). This diversification helps to mitigate the reliance on any single revenue source, ensuring resilience against market fluctuations. In contrast, the APNR Photographic Lodges site highlights a more focused approach, where photo tourism and livestock keeping are prioritized. However, the livestock keeping likely occurs outside of the APNR, adjacent to the site. Photo tourism, as indicated, plays a significant role (listed as “very important”) in revenue generation for wildlife area maintenance, tackling threats (e.g. poaching) and income generation for local communities. However, it is rated as “somewhat important” for income generation for local government and state wildlife agencies, which may reflect a more targeted and possibly smaller-scale impact compared to Kruger’s broader reach. The APNR Hunting Areas, while also recognizing photo tourism as a “very important” land use for revenue generation and conservation efforts, notably emphasizes trophy hunting as a primary income stream. This distinction underscores the divergent economic models within the same broader region.

Across all three sites, photo tourism is regarded as "very important" for multiple factors of conservation and local development, including funding wildlife area maintenance, combating threats, supporting local communities, and managing problem animals. This consistent valuation of photo tourism's importance highlights its critical role in integrating conservation with community benefits. However, the economic models differ significantly between the sites. Kruger National Park’s broader income mix, which also includes crop growing (albeit adjacent to the site) and micro-enterprises, suggests a more diversified approach to regional economic development. APNR Photographic Lodges and APNR Hunting Areas, on the other hand, rely more heavily on photo tourism and either trophy hunting or livestock keeping, reflecting a more specialized focus on these activities.

The comparison between these sites also underscores the different levels of government and wildlife agency involvement. In Kruger, photo tourism is seen as essential for generating income for local government and state wildlife agencies, which likely benefits from the park’s larger scale and international reputation. In contrast, APNR Photographic Lodges and APNR Hunting Areas rate photo tourism as “moderately important” for governmental income, suggesting that while it plays a role, other sources of income, such as hunting or livestock keeping, may be more directly impactful for local governance and conservation funding at these sites.

While photo tourism is universally acknowledged as a key driver for both conservation and local economic benefits across the three sites, the relative importance of supplementary income streams such as trophy hunting, livestock keeping, and crop growing varies. The sites' varying economic models reflect both the ecological diversity of the regions and the differing priorities of local stakeholders in balancing conservation with community development.

Table 4.20. Survey responses by South Africa for site specific questions for each of the three sites in the Greater Kruger landscape

	Site		
	Kruger National Park	**APNR Photographic Lodges**	**APNR hunting areas**
Income streams rated as "very important" in or adjacent to the site	Photo tourism, growing crops, livestock keeping, other industries	Photo tourism, livestock keeping	Photo tourism, trophy hunting
Income streams rated as "somewhat important" in or adjacent to the site	Trophy hunting, wild meat	Growing crops, wild meat, small to medium micro-enterprises	Wild meat, livestock keeping
How important do you think photo tourism is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Very important	Very important	Very important
○ **Revenue generation for tackling threats such as poaching**	Very important	Very important	Very important
○ **Income generation for local government and state wildlife agencies**	Very important	Moderately important	Very important
○ **Income generation for local communities within this landscape**	Very important	Very important	Very important
○ **Helping fund and manage problem animal control**	Very important	Very important	Very important

c) The potential impact of trophy hunting bans for different sites across this landscape

The responses provided for the three sites by South Africa offer a valuable comparison of how trophy hunting is perceived as well as its impact on various factors related to lion conservation and local communities in South Africa. While all three sites report no trophy hunting occurring in the last three years, the perceived importance of trophy hunting for revenue generation, conservation efforts, and local communities varies considerably between them.

Kruger National Park, a globally recognized conservation area, emphasizes a moderately important role for trophy hunting in generating revenue for wildlife areas and combating threats (such as poaching). However, it rates both the importance of hunting for local government income and for local communities as relatively less important, showing a more neutral stance on its direct economic benefits. The impact of stopping trophy hunting is seen as highly negative for lion and biodiversity conservation, underlining the potential implications of removing an established funding source that supports these conservation efforts. Furthermore, stopping trophy hunting is perceived as having a slightly negative effect on local communities, largely due to the low levels of hunting in the park and the limited direct benefits that currently accrue to local populations from this activity.

In contrast, the APNR Photographic Lodges site indicate that trophy hunting is potentially more important, particularly for revenue generation. The participants indicate that trophy hunting is "very important" for revenue generation, tackling threats, and for income generation for local government or state agencies. This suggests a more integrated relationship between hunting revenues and conservation goals.

APNR Hunting Areas, while similarly reporting no current hunting activity, presents a mixed outlook on the role of trophy hunting (Table 4.21). The Party here states that trophy hunting is "moderately important" for revenue generation and tackling poaching, but its importance for local government

income and funding problem animal control is less important. The responses from this site suggest that the direct benefits of trophy hunting are less pronounced compared to the Photographic Lodges, where hunting is perceived as a key funding mechanism for conservation and local economies. Notably, APNR Hunting Areas site view the cessation of trophy hunting as highly negative for lion conservation and biodiversity. This suggests that despite the absence of current hunting activities, there remains a strong belief in the long-term benefits of a well-regulated hunting regime in terms of sustaining larger lion populations and ensuring conservation funding. Moreover, local communities in the APNR Hunting Areas are thought to be more negatively impacted by the cessation of trophy hunting compared to the other two sites, reflecting concerns over the potential loss of livelihood opportunities tied to hunting tourism and related infrastructure. Additional information from South Africa is presented in Table 4.22.

Table 4.21. Survey responses by South Africa for trophy hunting specific questions for each of the three sites in the Greater Kruger landscape

	Site		
	Kruger National Park	**APNR Photographic Lodges**	**APNR hunting areas**
Has lion trophy hunting occurred in the last three years at this site?	No	No	No
How important do you think trophy hunting is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Moderately important	Very important	Moderately important
○ **Revenue generation for tackling threats such as poaching**	Moderately important	Very important	Moderately important
○ **Income generation for local government and state wildlife agencies**	Neither important or unimportant	Moderately important	Neither important or unimportant
○ **Income generation for local communities within this landscape**	Neither important or unimportant	Very important	Moderately important
○ **Helping fund and manage problem animal control**	Moderately important	Very important	Neither important or unimportant
If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for the following in this site			
○ **Lion Conservation**	Strongly negative	NA – no hunting in this site	Strongly negative
○ **Biodiversity conservation**	Strongly negative	NA – no hunting in this site	Strongly negative
○ **Local communities**	Slightly negative	NA – no hunting in this site	Strongly negative

Table 4.22. Additional information provided by South Africa when responding to the potential impacts of stopping lion trophy hunting.

Site	Impact On	Additional Information
Kruger National Park	Lion conservation	Trophies are by definition exceptional specimens which is relatively rare in a population. One thus has higher numbers of trophy specimens the larger the population. For that one needs large areas with intact ecological processes. NOTE: That a highly photogenic lion is also a trophy animal category. E key element is not whether trophy hunting takes place or not, but whether there is always an option to use trophy hunting when conditions require or allow. For instance, it is unrealistic to expect that every locality will allow similar opportunities for ecotourism, trophy hunting or any use and appreciation of all the other values that lions may have. Having a trophy hunting option now or in the future incentivize aspiration for retaining larger and connected areas.
	Biodiversity conservation	See the comment above about the inadvertent requirements of large intact areas within responsible trophy hunting framings.
	Local communities	This is largely because at present low levels of trophy hunting takes place. The potential is thus not unlocked. Note the mechanisms of the inadvertent requirements of large intact areas within responsible trophy hunting framings. A key principle is that robust large populations provide opportunities for recognizing all the values of lions and use them sustainably, with respect and thankfulness. Retaining and enhancing the potential to recognize and use all values have enormous consequences for enhancing benefits equitably for all indigenous people and local communities. These values include an array of cultural and national cohesion values.
APNR hunting areas	Lion conservation	We have a highly valuable sustainable resource (lions) that is not being utilised due to external pressures such as social media. Therefore, this specie is excluded from our quota in an effort to preserve our respective brands. Social media "outcries" severely impact the photographic tourism on the reserve if there are hunting issues exploited by the activists in mainstream media and social media.
	Biodiversity conservation	The complete stop of trophy hunting of any kind would reduce the available income for reserves, and although we are currently making do without lion hunts the funds a lion hunt would bring in will in some reserve's cases definitely boost their ability to conserve the area and run programs. Our hunting quotas are determined by the strictest scientific methods, and we have a dedicated hunting protocol that dictates the classes of animals harvested. This ensures sustainability and genetic preservation. Africa has many case studies where the biodiversity of areas was severely impacted when hunting was stopped. The majority have returned to the hunting model.
	Local communities	Our hunting quotas generate real tangible benefits for the local communities. Besides job creation and maintenance, we currently donate over 20 tons of healthy meat per year to local communities. In terms of the co-operative agreement hunting revenues earned by us can only spent on: Conservation, wildlife security and community upliftment. No other activity (photographic tourism) does this.
APNR Photographic lodges	Lion conservation	Photographic Ecotourism, underpinned by high end commercial lodges is an extremely strong economic driver for this landscape and alternative revenue sources have not been needed.

6.2.4 Zambia's Luangwa landscape

Zambia completed site questionnaires for the following sites: National Parks in south Luangwa (including: South Luangwa, North Luangwa, Nyika, Luambe, Lukusuzi, Lavushi Manda and Nsumbu), Game Management Areas (GMAs; including: Musalangu, Lupande, Lumimba, Munyamadzi,

Mukungule, Chisomo, West Petauke, Luano and Sandwe Game Management Areas) and Trophy Hunting Areas (including: Nyakolwe Game ranch, Nyamvu game ranch, Munyamdazi game ranch, Nkalamu game ranch, Kazumba game ranch, Mbizi and Mwangazi game ranch) (Fig. 4.52).

a) Lion population trends and threats across different sites in the landscape

According to Zambia, lion populations are reported as stable across all three sites over the last five years, suggesting that conservation efforts are having some success, though the relative stability masks varying pressures faced by each site type. For instance, the National Parks, particularly South Luangwa, are considered strongholds for lion populations, benefiting from enhanced protection measures. In contrast, GMAs and Trophy Hunting Areas, where human activity is may be more prevalent, may face greater challenges that necessitate more nuanced conservation strategies to mitigate threats and ensure population stability.

A major threat across all sites is human-lion conflict, particularly due to lions straying into buffer zones and conflict with livestock (Table 4.26). This is most pronounced in GMAs and Trophy Hunting Areas, where the encroachment of human settlements and the fragmentation of lion habitats exacerbate conflict situations. Snaring for bushmeat also emerged as a "major threat" in all sites, with snaring particularly affecting lions across all areas. However, Trophy Hunting Areas and GMAs face additional challenges, such as expanding human settlements and land-use changes that disrupt lion corridors and reduce available habitat. This is likely due to less strict laws and regulations that are enforced for National Parks.

The recommended conservation actions to improve lion conservation share some commonalities but also reflect the unique needs of each site. Across all areas, improved management of human-lion conflicts is recommended, with a focus on promoting coexistence through community-based approaches like citizen science and participatory management practices. However, the actions differ in their specifics: for National Parks, the emphasis is on increasing protection, enhancing research, and developing land use mapping. In GMAs, managing human-lion conflict and promoting sustainable livelihoods, including alternative income sources are important. Trophy Hunting Areas, while emphasizing similar conservation measures, also advocate for increased local community participation in game ranching activities and improving economic benefits beyond trophy hunting fees. Small lion population sizes, livestock expansion, and trophy hunting are considered as minor threats in GMAs and Trophy Hunting Areas, reflecting the pressures these regions face from both human development and hunting activities.

Overall, while National Parks are relatively stable due to stronger protection measures, GMAs and Trophy Hunting Areas require tailored conservation strategies that balance human development with wildlife protection. Effective lion conservation in these areas will require a combination of habitat protection, community engagement, and sustainable livelihoods to reduce human-lion conflict and safeguard lion populations.

Table 4.26. Survey responses by Zambia for lion specific questions for each of the three sites in the South Luangwa landscape

	Site		
	National Parks	**GMAs**	**Trophy hunting areas**
Lion population trend at the site in the last 5 years	Stable	Stable	Stable
The three greatest perceived threats to African lion populations overall in this site	1.Snaring 2.Human-lion conflicts of lions straying from National parks to buffer zones called GMAs, conflicting with local people's livestock; 3.Poaching of prey, leading	1.Snaring 2.Human-lion conflicts 3.Expanding human settlements, that are fragmenting the lion natural corridor/habitat	

	Site		
	National Parks	**GMAs**	**Trophy hunting areas**
	to prey depletion for the lions that has been found to affect their survival		
Top three actions needed to improve lion conservation at the site	1.Increased protection of the national park for its added benefit to the lion reproductive success rates 2.Land use mapping for the national parks particularly South Luangwa which is considered a stronghold of lion populations in the lower Luangwa system; and 3.Increased research and monitoring of lions in small clusters to understand the population dynamics of the small but important lion populations there	1.Management of the prevailing human-lion conflicts and promoting lion – human coexistence through a combination of citizen science and CBNRM principles 2.Provision of alternative viable and sustainable livelihood activities from mainstream trophy hunting 3.Land use mapping in GMAs whose general management plans have expired or not developed	1. Improved local community participation in game ranching activities and beneficiation aside from trophy animal fees 2. Management of the prevailing human-lion conflicts and promoting lion – human coexistence through a combination of citizen science and CBNRM principles 3. Provision of alternative viable and sustainable livelihood activities from mainstream trophy hunting
Major threats to the lion population at this site	Human-lion conflict, bushmeat poaching	Human-lion conflict, bushmeat poaching	Human-lion conflict, bushmeat poaching
Minor threats to the lion population at this site	Small population size, livestock expansion, cropland expansion	Small population size, livestock expansion, cropland expansion, trophy hunting, resource extraction	Small population size, livestock expansion, cropland expansion, trophy hunting, resource extraction
Not identified as a threat to lions at the site	Trophy hunting, resource extraction, illegal body part trade	Illegal lion body part trade	

b) Revenue streams across different sites in the landscape

Zambia indicates significant differences and some similarities in income streams, their importance to local economies, and the perceived role of photo tourism across the three types of sites in Luangwa. Income streams such as photo tourism, trophy hunting, and wild meat are vital across all sites, however, their relative importance varies, reflecting the distinct economic and conservation priorities of each area.

Photo tourism is recognized as an important income stream across all three sites, but its role varies considerably between them. In National Parks, photo tourism is rated as “very important,” particularly for revenue generation aimed at maintaining wildlife areas. However, it is perceived as less important for addressing other conservation needs, such as tackling threats or funding problem animal control. In contrast, the GMAs view photo tourism as “very important” for revenue generation but emphasize a more diversified economic model, where income from crops, livestock keeping, and beekeeping potentially play a significant role. This indicates that communities in the GMAs may rely more on agricultural activities alongside wildlife-based incomes. Trophy hunting areas, while acknowledging

photo tourism as an income source, primarily indicate that trophy hunting and wild meat are the dominant income streams, suggesting that these areas are more heavily reliant on hunting-related revenues.

The importance of various income streams for local communities and conservation efforts is a critical theme across the three sites. National Parks, with their focus on photo tourism, place a high value on maintaining the landscape for long-term revenue generation but show a lower value for the role of tourism in local community development and threat mitigation. This may indicate a gap between conservation priorities and community engagement in these areas. In GMAs, the recognition of multiple income sources, including agriculture and beekeeping, suggests a more integrated approach to community livelihoods, where wildlife-based income is balanced with agricultural practices. This approach may provide a buffer against over-reliance on any single sector, enhancing sustainability. Trophy Hunting Areas, meanwhile, emphasize the importance of hunting and wild meat, reflecting a more traditional conservation model where wildlife management is often intertwined with hunting revenues.

The role of photo tourism in combating threats and supporting local government agencies is less emphasized across the sites, with respondents indicating that this income stream is only moderately or not particularly important in these areas (Table 4.27). This suggests that while tourism contributes significantly to park and wildlife area funding, it may not be the primary tool for addressing the complex threats facing wildlife, such as threat mitigation. On the other hand, GMAs and trophy hunting areas seem to view their income streams more holistically, indicating that a diversified economic base might help support broader conservation efforts, including tackling poaching and funding local governance.

While there is a shared understanding of the value of photo tourism, its role and importance are clearly shaped by the specific context of each site. National Parks emphasize photo-tourism's contribution to conservation and landscape maintenance, the GMAs integrate diverse economic activities, and Trophy Hunting Areas rely heavily on hunting and wild meat.

Table 4.27. Survey responses by Zambia for site specific questions for each of the three sites in the South Luangwa landscape

	Site		
	National Parks	**GMAs**	**Trophy hunting areas**
Income streams rated as "very important" in or adjacent to the site	Photo tourism	Photo tourism, trophy hunting, wild meat	Trophy hunting, wild meat
Income streams rated as "somewhat important" in or adjacent to the site	Trophy hunting, growing crops, wild meat, livestock keeping	Growing crops, livestock keeping, bee keeping	Photo tourism, growing crops
How important do you think photo tourism is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Very important	Moderately important	Neither important or unimportant
○ **Revenue generation for tackling threats such as poaching**	Moderately important	Neither important or unimportant	Neither important or unimportant
○ **Income generation for local government and state wildlife agencies**	Moderately important	Neither important or unimportant	Neither important or unimportant
○ **Income generation for local communities within this landscape**	Not at all important	Moderately important	Moderately important
○ **Helping fund and manage problem animal control**	Not at all important	Neither important or unimportant	Neither important or unimportant
○ **Other**	Moderately important:	Moderately	NA

	Site		
	National Parks	**GMAs**	**Trophy hunting areas**
	Donor investment in national parks and other national parks are under collaborative partnership agreements in managing national parks (e.g., North Luangwa and Nsumbu National Parks, then Transfrontier conservation areas treaties for parks like Lukusuzi and Nyika)	important: Carbon trading	

c) The potential impact of trophy hunting bans for different sites across this landscape

Zambia revealed significant contrasts and similarities in the role of trophy hunting, its economic impact, and its perceived effects on conservation across different site types in Luangwa (Table 4.28).

Trophy hunting occurs in both GMAs and Trophy Hunting Areas but not National Parks. Unsurprisingly, therefore, Zambia expressed varying levels of importance for trophy hunting in generating revenue for wildlife management according to different sites, with GMAs and Trophy Hunting Areas considering it "very important" for maintaining wildlife areas, while National Parks view it as "not at all important". These differences reflect the underlying objectives and management strategies of each site type. National Parks do not rely on consumptive use such as trophy hunting, while GMAs and Trophy Hunting Areas depend on trophy hunting as a key revenue stream to support conservation efforts and address threats like poaching.

The perceived role of trophy hunting in addressing local economic needs also varies between the sites. In GMAs and Trophy Hunting Areas, trophy hunting is important for local communities and generating income for local governments and wildlife agencies, whereas National Parks generally consider it unimportant for these factors. The disparity in responses may stem from the different funding mechanisms in place at these sites, with National Parks potentially relying more on government support and tourism revenue, while GMAs and Trophy Hunting Areas are more dependent on hunting-related income, particularly those private properties/management areas. The economic reliance on trophy hunting in the latter two sites is evident, as it is seen as "very important" for local community income generation, which further underscores the contrasting economic frameworks at play.

The GMAs and Trophy Hunting Areas perceive the cessation of trophy hunting as "slightly positive" for lion conservation but "strongly negative" for local communities. This contrast reveals a significant concern about the economic disruption that would follow the removal of trophy hunting as a source of income in these areas. The fact that respondents in GMAs and Trophy Hunting Areas recognize a slight benefit for lion conservation from halting hunting suggests a belief that reducing hunting pressure could improve the long-term viability of lion populations, yet they still emphasize the social and economic drawbacks for local communities who rely on hunting-related revenues.

While National Parks prioritize non-hunting-based conservation strategies, GMAs and Trophy Hunting Areas demonstrate a more pragmatic approach, where hunting plays a key role in both conservation funding and local livelihoods.

Table 4.28. Survey responses by Zambia for trophy hunting specific questions for each of the three sites in the South Luangwa landscape

	Site

	National Parks	GMAs	Trophy hunting areas
Has lion trophy hunting occurred in the last three years at this site?	No	Yes	Yes
How important do you think trophy hunting is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Not important at all	Very important	Very important
○ **Revenue generation for tackling threats such as poaching**	Not important at all	Very important	Neither important or unimportant
○ **Income generation for local government and state wildlife agencies**	Not important at all	Neither important or unimportant	Moderately important
○ **Income generation for local communities within this landscape**	Not important at all	Very important	Very important
○ **Helping fund and manage problem animal control**	Not important at all	Neither important or unimportant	Neither important or unimportant
If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for the following in this site			
○ **Lion Conservation**	No hunting in this site or adjacent areas	Slightly positive	Slightly positive
○ **Biodiversity conservation**	No hunting in this site or adjacent areas	Slightly negative	Slightly negative
○ **Local communities**	No hunting in this site or adjacent areas	Strongly negative	Strongly negative

6.2.5 Zimbabwe's Hwange landscape

Zimbabwe completed site questionnaires for the following sites: Hwange National Park (including Kazuma and Zambezi), hunting areas and the community areas (Fig. 4.51).

a) Lion population trends and threats across different sites in the landscape

According to Zimbabwe, in all three sites, lion populations are reported as stable to increasing for the past five years, suggesting that conservation efforts, to some extent, have been successful in maintaining or improving lion numbers. However, the diversity of threats and conservation priorities across these sites points to the need for approaches tailored to the specific challenges faced by each site (Table 4.23).

A major commonality across the sites is the recognition of interactions between humans and lions as a threat. In Hwange National Park, hunting areas, and community areas, the impacts of human-lion interactions, such as livestock depredation and retaliatory killings, are cited as major threats. However, each site also faces unique pressures. Hwange National Park and hunting areas identify poaching, disease, and encroachment as the greatest perceived threats, while community areas emphasize human-lion conflict, lion depredation, and poisoning of problem lions. These variations highlight the differing dynamics at each site, with community areas particularly focused on direct conflicts between people and lions. Notably, in hunting areas, poaching and disease are major concerns, suggesting more anthropogenic pressures in these areas.

When it comes to the perceived actions needed to improve lion conservation, there is an alignment in recognizing the importance of funding for research, monitoring, and law enforcement. These actions are seen by Zimbabwe as necessary across all sites, although the specifics of these measures vary. In Hwange National Park, the emphasis is placed on land use planning to improve connectivity, while in hunting areas, the focus is on ensuring that trophy hunting benefits local communities, which may help

reduce human-lion conflicts. Community areas, on the other hand, prioritize education, awareness campaigns, and improving livestock husbandry as crucial actions to mitigate the ongoing issues surrounding human-lion conflict. These varying priorities underline the need for targeted conservation efforts that consider the specific socio-economic and ecological contexts of each site.

The identified threats and recommended actions also reflect the broader land-use pressures each site faces. In Hwange National Park and hunting areas, livestock and cropland expansion are seen as major threats, highlighting the tension between agricultural development and lion conservation. Conversely, community areas report a broader array of threats, including bushmeat poaching and resource extraction, in addition to land-use changes. Interestingly, small population sizes and the role of trophy hunting as a potential threat are highlighted in community areas, but not in the other two sites, pointing to a greater reliance on conservation incentives tied to tourism and hunting in more formally protected areas.

Table 4.23. Survey responses by Zimbabwe for lion specific questions for each of the three sites in the Hwange landscape

	Site		
	Hwange National Park	**Hunting areas**	**Community areas**
Lion population trend at the site in the last 5 years	Stable to increasing	Stable to increasing	Stable to increasing
The three greatest perceived threats to African lion populations overall in this site	1. Reduced connectivity 2.Retaliatory killing 3.Commercial and traditional use poaching	1.Poaching 2.Disease 3.Encroachment	1.Human lion conflict 2.Lion depredation 3.Poisoning of problem lions
Top three actions needed to improve lion conservation at the site	1.Land use planning improve connectivity 2.Funding for habitat protection and law enforcement 3.Funding for research and monitoring	1.Funding for research and monitoring 2.Funding for law enforcement and habitat protection 3.Ensure meaningful benefits from trophy hunting to reduce human lion conflicts	1.Education and awareness on wildlife 2.Improved livestock husbandry 3.Alternative livelihoods
Major threats to the lion population at this site	Livestock expansion, cropland expansion	Livestock expansion, cropland expansion	Human-lion conflict, bushmeat poaching, livestock expansion, cropland expansion
Minor threats to the lion population at this site	Human-lion conflict, bushmeat poaching, resource extraction, illegal lion body part trade	Human-lion conflict, bushmeat poaching, resource extraction, illegal lion body part trade	Small population size, trophy hunting, resource extraction, illegal lion body part trade
Not identified as a threat to lions at the site	Small population size, trophy hunting	Small population size, trophy hunting	NA

b) Revenue streams across different sites in the landscape

Zimbabwe's questionnaire responses provide valuable insights into the varying roles of income streams and the significance of photo tourism in three distinct sites in Zimbabwe, namely Hwange National Park, hunting areas, and community areas (Table 4.24). These sites share commonalities in their reliance on wildlife-based income sources, yet they also demonstrate notable differences in the diversity of income streams and the importance placed on photo tourism for various conservation and economic factors.

Across all three sites, photo tourism is consistently rated as a crucial income stream, with respondents identifying it as "very important" for revenue generation aimed at maintaining wildlife areas and tackling threats to lions. This suggests a strong alignment in the recognition of photo tourism's role in supporting conservation efforts, particularly through the financial resources it generates. However, the significance of photo tourism in the broader landscape of income generation varies. In Hwange National Park, photo tourism is the sole income stream rated as "very important," indicating that the park's conservation model may rely more heavily on tourism as a primary economic driver. In contrast, hunting areas and community areas demonstrate more diverse income streams. Hunting areas combine photo tourism with trophy hunting and livestock keeping, while community areas also incorporate growing crops, wild meat, and livestock keeping. These areas, therefore, present a more integrated approach to land use and resource management, where multiple income streams contribute to local economies and conservation outcomes.

While photo tourism is considered “very important” for income generation for local communities and state wildlife agencies, the importance of this income source varies across the sites. For example, in community areas, photo tourism is considered critical for local revenue, yet it is also ranked as "somewhat important" for income generation at the government level, which may reflect a more complex distribution of economic benefits in these regions. The varying roles of photo tourism across sites highlight the different conservation and development priorities of each area, with community areas potentially benefiting from a wider range of income-generating activities tied to land use and resource extraction, in addition to tourism.

A common thread in the responses is the emphasis on photo tourism’s role in supporting problem animal control and addressing threats like poaching (Table 4.24). Across all three sites, respondents rated photo tourism as "very important" for funding and managing wildlife management interventions, underscoring its centrality to conservation efforts. Despite the broader importance of photo tourism, the survey also points to the fact that other income streams, such as livestock keeping and wild meat hunting, are more prominent in hunting and community areas, reflecting the socio-economic realities faced by these regions, where livelihoods often depend on a mix of traditional agricultural practices and wildlife use.

While all three sites recognize the importance of photo tourism, the diversity of income streams and the varying roles of tourism-related revenues suggest that tailored conservation strategies are necessary for each area (Table 4.24). For Hwange National Park, continued focus on photo tourism is essential, while hunting and community areas may require integrated approaches that balance tourism with sustainable resource management practices.

Table 4.24. Survey responses by Zimbabwe for site specific questions for each of the three sites in the Hwange landscape

	Site		
	Hwange National Park	**Hunting areas**	**Community areas**
Income streams rated as “very important” in or adjacent to the site	Photo tourism	Photo tourism, trophy hunting, livestock keeping	Photo tourism, trophy hunting, growing crops, wild meat, livestock keeping
Income streams rated as “somewhat important” in or adjacent to the site	None	Wild meat	None
How important do you think photo tourism is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Very important	Very important	Very important
○ **Revenue generation for tackling threats such as poaching**	Very important	Very important	Very important

	Site		
	Hwange National Park	**Hunting areas**	**Community areas**
○ **Income generation for local government and state wildlife agencies**	Very important	Very important	Neither important or uimportant
○ **Income generation for local communities within this landscape**	Very important	Very important	Very important
○ **Helping fund and manage problem animal control**	Very important	Very important	Very important

c) The potential impact of trophy hunting bans for different sites across this landscape

The survey responses highlight both convergences and divergences in the perceived role and importance of trophy hunting and photo tourism across Hwange National Park, hunting areas, and community areas in Zimbabwe (Table 4.25). Trophy hunting does not occur in Hwange National Park, reflecting its protected status and the prioritization of non-extractive conservation efforts (within Zimbabwe, no utilization can occur within National Parks). In contrast, hunting areas and community areas reported ongoing lion trophy hunting, underscoring the economic and wildlife management roles these landscapes play within the broader conservation framework. These distinctions offer differing perceptions regarding the significance of trophy hunting and its potential cessation.

The importance of trophy hunting as a revenue stream varies by site type. In Hwange National Park and hunting areas, respondents consistently rated trophy hunting as “very important” for revenue generation to maintain wildlife areas, combat poaching, and fund problem animal control. However, community areas presented a mixed perspective, with trophy hunting deemed “very important” for community income but “neither important nor unimportant” for maintaining wildlife areas and supporting government and wildlife agencies. This variation suggests that community areas may experience fewer direct conservation benefits from trophy hunting compared to hunting areas, where such activities are more integrated with wildlife management frameworks.

Potential impacts of discontinuing trophy hunting further illuminate the differences among the sites (Table 4.25). For Hwange National Park, halting trophy hunting in adjacent areas was perceived as strongly negative for both lion and biodiversity conservation, reflecting concerns about the broader implications for conservation funding and management efficacy. A similar sentiment was expressed regarding hunting areas, where cessation was viewed as “strongly negative” for lion and biodiversity conservation, as well as for local communities. However, the perspective in community areas was less uniform, with the cessation of hunting rated as having a more neutral impact on lion conservation and biodiversity, but negative for local communities. This disparity highlights the differential reliance on trophy hunting as a livelihood and conservation strategy across these landscapes.

Despite these differences, some commonalities emerge. Across all sites, respondents acknowledged the importance of trophy hunting in generating revenue to tackle threats and support local communities, underscoring its perceived utility as a conservation tool and economic driver. Additionally, the alignment in recognizing its role in funding problem animal control suggests a shared reliance on hunting revenues to address human-wildlife conflict and associated risks.

Table 4.25. Survey responses by Zimbabwe for trophy hunting specific questions for each of the three sites in the Hwange landscape

	Site		
	Hwange National Park	**Hunting areas**	**Community areas**
Has lion trophy hunting occurred in the last three years at this site?	No	Yes	Yes
How important do you think trophy hunting is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Very important	Very important	Neither important or unimportant
○ **Revenue generation for tackling threats such as poaching**	Very important	Very important	Very important
○ **Income generation for local government and state wildlife agencies**	Very important	Very important	Neither important or unimportant
○ **Income generation for local communities within this landscape**	Very important	Very important	Very important
○ **Helping fund and manage problem animal control**	Very important	Very important	Very important
If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for the following in this site			
○ **Lion Conservation**	Strongly negative	Neither positive nor negative	Strongly negative
○ **Biodiversity conservation**	Strongly negative	Neither positive nor negative	Strongly negative
○ **Local communities**	Slightly negative	Neither positive nor negative	Strongly negative

6.2.6 Kenya's Maasai Mara landscape

Kenya completed site questionnaires for the following sites: the Maasai Mara National Reserve, surrounding conservancies and the dispersal pastoral areas (Fig. 4.53).

a) Lion population trends and threats across different sites in the landscape

The survey responses reveal notable differences and similarities in lion population dynamics, income streams, threats, and conservation needs across the landscape (Table 4.29). Lion populations are indicated by the participants, as stable in both the Maasai Mara and the conservancies, underscoring the relative effectiveness of existing conservation measures in these regions. However, the population in dispersal pastoral areas has been declining over the past five years, indicating that these areas face greater pressures and require targeted interventions to address the unique challenges present.

The threats to lion populations demonstrate both shared concerns and site-specific variations. Human-wildlife conflict is identified as a major threat across all sites, particularly in the form of livestock predation and retaliatory killings. Loss of habitat connectivity and expansion of settlements, fences, and markets are universally recognized threats but are potentially more acute in dispersal pastoral areas, where unregulated land use changes exacerbate challenges. While resource extraction is a threat in both the conservancies and dispersal areas, cropland expansion features prominently only in dispersal pastoral zones, indicating a distinct shift towards agricultural activities in these regions. Small population size is seen as a minor threat in the dispersing pastoral areas.

Proposed conservation actions align broadly across sites but also reveal localized priorities. Securing habitat connectivity is a unifying recommendation, with specific emphasis on linking the Maasai Mara with adjacent conservancies and the broader dispersal landscape. In the Maasai Mara, efforts focus on maintaining corridors and mitigating human activities such as fencing and land subdivision. In dispersal pastoral areas, strategies expand to encompass the establishment of community conservancies and the monitoring of wildlife corridor use. Predator-proof bomas and improved livestock husbandry are popular measures, highlighting the centrality of reducing human-lion conflict to conservation success. Control of human expansion and land-use changes, including the removal of fences, is also emphasized across sites, reflecting widespread concern about the encroachment on lion habitats.

Generally, while the Maasai Mara and conservancies demonstrate greater stability in lion populations and stronger reliance on tourism-based economies, dispersal pastoral areas face declining lion numbers. The need for tailored strategies that integrate economic development with lion conservation is evident, particularly in pastoral areas where challenges are more pronounced. Collaborative, site-specific approaches, coupled with community involvement and sustainable land-use planning, are crucial for securing the long-term viability of lion populations across all regions.

Table 4.29. Survey responses by Kenya for lion population specific questions for each of the three sites in the Maasai Mara landscape

	Site		
	Maasai Mara National Reserve	**Conservancies**	**Dispersal pastoral areas**
Lion population trend at the site in the last 5 years	Stable	Stable	Decreasing
The three greatest perceived threats to African lion populations overall in this site	1.Human wildlife conflicts 2.Loss of habitat connectivity and corridors 3.Expansion of fences, market centres and settlement		1.Human wildlife Conflicts-Livestock predation and retaliatory killings 2. Loss of habitat connectivity and corridors 3.Expansion of Human settlement and crop farming, fences and land subdivision
Top three actions needed to improve lion conservation at the site	1.Secure habitat connectivity between the conservancies and MMNR 2.Predator proof bomas, livestock husbandry and grazing plans 3.Control human activities - Pulling down fences as well as monitor wildlife use of the wildlife corridors		1.Secure lion corridors and connectivity between the Mara and Magadi Mosiro ecosystems through establishment of community conservancies. 2.Predator proof bomas, livestock husbandry and grazing plans 3.Control human expansion and land use changes including pulling down fences as well as monitor wildlife use of the dispersal area.
Major threats to the lion population at this site	Human-wildlife conflict, Livestock expansion		Human-lion conflict, livestock expansion, cropland expansion, resource extraction
Minor threats to the lion population at this site	Resource extraction		Small population size,
Not identified as a threat to lions at the site	Small population size, bushmeat poaching, cropland expansion, resource extraction		Bushmeat poaching, trophy hunting

b) Revenue streams across different sites in the landscape

The responses by the participants for the three sites in the Maasai Mara landscape reveal significant contrasts and similarities across the sites regarding economic activities and the perceived importance

of photo tourism. Photo tourism and livestock keeping were both regarded as “very important” income streams in both the MMNR and conservancies. This likely highlights the dual reliance on both tourism and pastoralism, which likely reflects the infrastructural and ecological capacities of these sites to accommodate both activities. By contrast, growing crops and livestock keeping were identified as "very important" within the Dispersal Pastoral Areas, reflecting a divergence in economic focus. This difference suggests that agricultural livelihoods dominate in dispersal areas, likely driven by factors such as lower tourism accessibility or infrastructure compared to MMNR and Conservancies. Furthermore, while wild meat was considered "somewhat important" across Conservancies and Dispersal Pastoral Areas, Dispersal Pastoral Areas uniquely included photo tourism in this category, potentially indicating its emerging but limited role in these areas compared to its established importance in MMNR and Conservancies.

These findings also highlight the contextual differences in livelihood strategies. While MMNR and Conservancies rely on photo tourism, its absence as a critical income stream in Dispersal Pastoral Areas points to a lack of integration or feasibility of tourism in these regions. Instead, the reliance on agriculture and livestock keeping emphasizes the role of subsistence-based economies in areas with fewer tourism opportunities. This contrast may reflect differences in infrastructure, accessibility, or land-use policies across the sites. However, the shared perception of photo tourism’s limited role in conservation and community welfare suggests a need for broader reforms. Policies that enhance revenue-sharing mechanisms, promote equitable benefits, and address community priorities could help align photo tourism’s economic contributions with broader socio-ecological objectives.

c) The potential impact of trophy hunting bans for different sites across this landscape

Trophy hunting does not occur across Kenya.

6.2.7 Tanzania’s Ruaha-Rungwa landscape

Tanzania completed site questionnaires for the following sites: Ruaha National Park, Rungwa Game Reserve and the adjacent community land (Fig. 4.54).

a) Lion population trends and threats across different sites in the landscape

The survey responses highlight both commonalities and unique challenges in lion conservation across three key sites in Tanzania: Ruaha National Park, Rungwa Game Reserve, and the adjacent community land (Table 4.30). Lion populations at all three sites are reported as stable over the past five years, suggesting that current conservation efforts have managed to maintain population abundance. However, despite this overall stability, each site faces distinct pressures that require site-specific interventions to address local challenges more effectively.

The threats to lion populations across these sites reflect both shared concerns and site-specific differences. Human-lion conflict is identified as a major threat at all three locations, particularly through livestock predation and retaliatory killings. Additionally, the loss of habitat connectivity is a common issue, highlighting the need for improved corridors to facilitate lion movement. However, the specific drivers of these threats vary. In the National Park, the primary concern is the shrinking of wildlife corridors due to human encroachment, while Rungwa Game Rerserve faces additional challenges from habitat destruction caused by wildfires and water scarcity during the dry season. The adjacent community land highlights another critical threat, persecution and retaliatory killings, directly linked to local perceptions of lions as a danger to livelihoods. Furthermore, while resource extraction is a threat across the three sites, the expansion of croplands and livestock operations is particularly pronounced in the adjacent community land, which faces significant habitat fragmentation and loss.

The proposed conservation actions also reflect both shared priorities and localized strategies. Securing and restoring habitat connectivity is a central recommendation across all sites, with particular emphasis on opening wildlife corridors in Ruaha and protecting key habitats in the community land. Ruaha National Park’s focus on improving human-lion coexistence strategies, alongside corridor restoration, highlights the importance of community-based conservation efforts. In Rungwa, more infrastructure-based solutions are proposed, including fire management plans, the construction of

water ponds or dams, and the implementation of land use plans to engage surrounding communities. The community land, on the other hand, underscores the need for robust lion monitoring programs, securing wildlife corridors, and raising awareness about the ecological importance of lions, reflecting a more community-engaged and educational approach to conservation.

Although the overall threats are similar across the sites (human-lion conflict, habitat loss, and poaching), although the degree to which they occur may vary, indicating the need for region-specific strategies. Ruaha National Park focuses on corridor restoration and coexistence, Rungwa emphasizes resource management and ecological restoration, and the adjacent community land calls for stronger monitoring and community involvement. These nuanced differences underline the importance of context-sensitive conservation approaches that not only address ecological factors but also integrate community needs and local economic realities.

Table 4.30. Survey responses by Tanzania for lion specific questions for each of the three sites in the Ruaha-Rungwa landscape

	Site		
	Ruaha National Park	**Rungwa Game Reserve**	**Adjacent community land**
Lion population trend at the site in the last 5 years	Stable	Stable	Stable
The three greatest perceived threats to African lion populations overall in this site	1. Human-lion conflict 2.Shrinking of wildlife corridor 3.Not provided	1.Habitat destruction and biodiversity loss due to wildfires 2.Water scarcity during the dry season because of high surface run off 3.Blockage of wildlife corridors and migratory routes	1.Persecution/retaliatory killings 2.Decline in prey base 3.Habitat fragmentation and loss
Top three actions needed to improve lion conservation at the site	1.Improve human-lion coexistence strategies 2.Open up historical wildlife corridors	1.Development and implementation of fire management plan 2.Construction of water ponds or dams 3.Prepare and implement land use plan to surrounding communities	1.Establishment of robust monitoring programme for lion conservation 2.Support securing of wildlife corridors to protect the key lion habitat 3.Awareness creation on the importance of lion in the ecosystem as an apex predator
Major threats to the lion population at this site	Human-lion conflict, bushmeat poaching, livestock expansion, cropland expansion	Bushmeat poaching, cropland expansion, resource extraction	Human-lion conflict, livestock expansion
Minor threats to the lion population at this site	None	Human-lion conflict, livestock expansion	Bushmeat poaching, cropland expansion
Not identified as a threat to lions at the site	Small population size, resource extraction, illegal lion body part trade	Small population size, trophy hunting, illegal lion body part trade	Small population size, trophy hunting, resource extraction, illegal lion body part trade

b) Revenue streams across different sites in the landscape

Tanzania reveal key differences and similarities in income streams, the role of photo tourism, and the varying importance of specific factors for wildlife conservation across three sites: Ruaha National Park, Rungwa Game Reserve, and adjacent community land (Table 4.31). Each site demonstrates its unique set of economic drivers, with Ruaha National Park and the adjacent community land heavily reliant on income from livestock keeping and crop growing, alongside trophy hunting. Trophy hunting and mining

are more important in Rungwa Game Reserve compared to other land uses. These income sources reflect the broader socio-economic contexts within which the sites operate, with the adjacent community land showing the most diverse set of income streams, incorporating fishing and beekeeping, which may provide supplementary livelihoods for local populations.

The perceived importance of photo tourism varies across the sites. In Ruaha National Park, photo tourism is rated as "very important" for several factors, including revenue generation for wildlife conservation, tackling poaching, and supporting local government and communities. This indicates a strong recognition of the role photo tourism plays in both conservation and community welfare. Similarly, Rungwa Game Reserve acknowledges the importance of photo tourism, though it is rated as "moderately important" in most categories, suggesting that the economic focus may depend more on trophy hunting and resource extraction. In contrast, the adjacent community land assigns only moderate importance to photo tourism in relation to most factors, reflecting a potential gap in tourism development or infrastructure that could elevate its economic contribution.

The varying importance of photo tourism for addressing threats such as poaching also highlights a disparity in conservation priorities across the sites. In Ruaha National Park, photo tourism is considered “very important” in combating threats, potentially underlining the park's reliance on tourism-driven conservation funding. Rungwa Game Reserve, however, views photo tourism as neither particularly important nor unimportant for this issue, possibly reflecting a stronger emphasis on other conservation strategies or a differing view on the role of tourism in reducing threats such as poaching. The adjacent community land rates photo tourism as “moderately important” for tackling threats, which might suggest that while tourism plays a role in conservation efforts, other challenges such as land-use pressures and resource extraction may be more pressing concerns.

Local community engagement and the financial benefits derived from tourism also exhibit variation. In Ruaha National Park, photo tourism is considered “very important” for generating income for local communities, while in Rungwa Game Reserve, its role is seen as “moderately important”. The adjacent community land shows a similar trend, where photo tourism is seen as less integral to local income generation, likely reflecting its more diversified economic base and the additional livelihood options available, such as agriculture and fishing. This suggests that while tourism is a key element in some sites, in areas with more diversified income streams, it may not be perceived as the sole or primary driver of community welfare.

The survey findings suggest that while photo tourism plays a crucial role in the conservation economies of Ruaha National Park and, to a lesser extent, Rungwa Game Reserve[7], the adjacent community land demonstrates a more complex socio-economic structure with a broader range of income-generating activities.

Table 4.31. Survey responses by Tanzania for site specific questions for each of the three sites in the Ruaha Rungwa landscape

	Site		
	Ruaha National Park	**Rungwa Game Reserve**	**Adjacent community land**
Income streams rated as “very important” in or adjacent to the site	Trophy hunting (adjacent to the site), growing crops, livestock keeping	Trophy hunting, mining	Trophy hunting, growing crops, livestock keeping, fishing and beekeeping
Income streams rated as “somewhat important” in or adjacent to the site	Photo tourism, wild meat	Photo tourism, growing crops, wild meat, livestock keeping	Photo tourism

[7] The United Republic of Tanzania noted that by law "photographic tourism" is the only use of resources allowed in national parks in Tanzania while both trophy hunting and photographic tourism is allowed in game reserves - as is the case for Rungwa, Kizigo and Muhesi Game Reserves. Therefore, the rating of 'Very important VS moderate' reflects this institution arrangements and legal provisions

	Site		
	Ruaha National Park	**Rungwa Game Reserve**	**Adjacent community land**
How important do you think photo tourism is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	Very important	Moderately important	Moderately important
○ **Revenue generation for tackling threats such as poaching**	Very important	Neither important or unimportant	Moderately important
○ **Income generation for local government and state wildlife agencies**	Very important	Moderately important	Neither important or unimportant
○ **Income generation for local communities within this landscape**	Very important	Moderately important	Neither important or unimportant
○ **Helping fund and manage problem animal control**	Very important	Neither important or unimportant	Moderately important

c) The potential impact of trophy hunting bans for different sites across this landscape

Important differences and similarities exist in the role of trophy hunting, its economic importances, and its impact on conservation across the three sites in Tanzania: Ruaha National Park, Rungwa Game Reserve, and adjacent community land (Table 4.32). Trophy hunting does not occur in Ruaha National Park as it is not permitted in any of Tanzania's National Parks, contrasting with its presence in both Rungwa Game Reserve and adjacent community land. This distinction highlights the divergent management approaches and regulatory environments between national parks and the surrounding lands, where hunting may be permitted as part of broader wildlife management strategies. In both Rungwa and adjacent community land, trophy hunting is seen as "very important" for generating revenue, particularly for managing wildlife areas, tackling threats (such as poaching), and supporting local government and state wildlife agencies. Conversely, the absence of trophy hunting in Ruaha National Park does not allow for such economic benefits, pointing to the site's reliance on other sources of funding and management strategies. Despite the differences in hunting practices, all three sites share concerns regarding the importance of generating income for local communities, with respondents indicating that trophy hunting plays a vital role in enhancing livelihoods, especially in the adjacent community land, where it is viewed as particularly important for community development.

The survey also reflects significant concerns about the potential consequences of halting trophy hunting. Across all sites, respondents believe that stopping trophy hunting would have negative impacts on lion conservation, biodiversity conservation, and local communities. This widespread concern suggests that trophy hunting, despite its controversial nature, is currently seen as a vital tool for sustaining conservation efforts and ensuring the economic stability of local populations. In particular, the responses concerning Rungwa and adjacent community land emphasize the critical role of trophy hunting in managing problem animal control and mitigating human-wildlife conflict.

Furthermore, the varying perspectives on the importance of trophy hunting for local communities underline the complex relationship between conservation and economic development (Table 4.34). While trophy hunting is seen as moderately important in Rungwa Game Reserve for local community income generation, it is deemed very important in the adjacent community land. This suggests that in areas where communities are directly involved in conservation efforts, such as community lands, trophy hunting may be more integrated into local economic activities. The negative views on the cessation of trophy hunting in these sites underscore the dependence on hunting revenue for community support, making any changes to hunting policies potentially disruptive.

Table 4.33. Survey responses by Tanzania for trophy hunting specific questions for each of the three sites in the Ruaha-Rungwa landscape

	Site		
	Ruaha National Park	**Rungwa Game Reserve**	**Adjacent community land**
Has lion trophy hunting occurred in the last three years at this site?	No	Yes	Yes
How important do you think trophy hunting is to each of the following factors at this site?			
○ **Revenue generation for maintaining wildlife areas**	NA – no trophy hunting	Very important	Very important
○ **Revenue generation for tackling threats such as poaching**	NA – no trophy hunting	Very important	Moderately important
○ **Income generation for local government and state wildlife agencies**	NA – no trophy hunting	Very important	Very important
○ **Income generation for local communities within this landscape**	NA – no trophy hunting	Moderately important	Very important
○ **Helping fund and manage problem animal control**	NA – no trophy hunting	Very important	Moderately important
If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for the following in this site			
○ **Lion Conservation**	Unknown	Strongly negative	Strongly negative
○ **Biodiversity conservation**	Unknown	Strongly negative	Slightly negative
○ **Local communities**	Strongly negative	Strongly negative	Strongly negative

Table 4.34. Additional information provided by Tanzania when responding to the potential impacts of stopping lion trophy hunting or any further comments

Site	**Impact On**	**Additional Information**
Ruaha National Park	Lion conservation	Trophy hunting is conducted in areas (hunting blocks) adjacent to the park, but we don't have sufficient data to justify the impact of hunting. However, the same lion from the NPs are the ones hunted on hunting blocks.
	Biodiversity conservation	Trophy hunting is conducted in areas (hunting blocks) adjacent to the park, but we don't have sufficient data to justify the impact of hunting. However, the same lion from the NPs are the ones hunted on hunting blocks.
	Local communities	NA
	Additional comments	To improve the research of lion database to support their conservation.
Rungwa Game Reserve	Lion conservation	Rungwa GR landscape is not suitable for many other land uses apart from trophy hunting. Its landscape is dominated with interspersed miombo woodland and granite rocky outcrops. Trophy hunting not only generate income which in turns support conservation and community development but also provide this landscape with value of which it would not be there if trophy hunting not conducted. Existence of trophy hunting operations prevent a large existent of encroachment hence protect wildlife habitat and resources. It is obvious that, if trophy hunting is not being practiced, this prestigious landscape will perish and the wildlife habitat and resources will disappear.
	Biodiversity conservation	Conservation initiatives carried on Rungwa landscape are mainly supported due to existence of nine (9) hunting blocks occupied by hunting companies. Government through TAWA who supervised and

		managed wildlife resources in Rungwa landscape spend about TZS 668,464,792 each year to ensure conservation and protection of wildlife resources. This fund is mainly generated from hunting. Further, tour companies leased hunting block within Rungwa landscape conditioned to ensure areas within block jurisdiction is well protected, conserved and sustainable operationalized. Existence of TAWA and tour companies give Rungwa landscape ecological defence and to some extent hampered human activities as well as reduced human pressure within this landscape.
	Local communities	Tanzania considers community engagement policy in conservation and protection of wildlife resources as it is started in its Wildlife Conservation Policy of 2007. This policy clearly states that local community has to be engaged in protection and conservation initiatives and also benefiting from wildlife resources. Through trophy hunting within Rungwa landscape community has been engaged and benefitted from both Government/TAWA and Investors (Hunting Companies). Tanzania has a policy of distributing 25% of revenue generated from trophy hunting activities to local government so as to support different social development activities within their districts (Manyoni and Chunya districts). Nevertheless, each investor in six hunting blocks legally required to pay a sum of 5000 USD each year to support social development activities in village surrounding these blocks (Kintanula, Mwamagembe, Kambikatoto and Rungwa).
Adjacent community land	Lion conservation	Lion hunting generates revenue that is ploughed back to conservation of lion in the land scape. Further, it helps in mitigating the human – lion conflicts, improve gene flow as it allows younger males to reproduce
	Biodiversity conservation	Hunting is a prime source of revenue in this land scape which is dominated by miombo woodland. The difficult terrain, insufficient accessibility due to infrastructure makes the area not suitable for photographic tourism. Therefore, hunting of lion creates an incentive for lion conservation because when lions are hunted under the premium safari package generates the very needed resources for biodiversity conservation. Also, the government has been able to maintain the vast areas outside the co-protected areas within this ecosystem because they are primarily used for hunting.
	Local communities	Local communities living adjacent to the protected areas will have no incentives of living with wildlife because contributions from hunting is crucial to support community-initiated projects. Community gets 25% of the revenue generated from game fees to support conservation and community development projects. Further, hunting operators are paying USD 5000 annually to community as community conservation fee to support community-initiated project. If there will be no hunting, all these benefits will be lost forever. Also, lion is used a key animal species in marketing hunting industry, if it will be removed from the package, the majority of hunting operators will move to other countries where lion hunting is allowed, communities will lose employment opportunities, poaching especially for bushmeat will increase, retaliatory killing of lion will increase because of lack of incentive for lion conservation. Additionally, areas that is currently used as hunting blocks outside the Coe protected areas, will be converted into farms which will result into loss of Biodiversity
	Additional comments	Ruaha Rungwa is the lion strong hold in Tanzania and the success of lion conservation in this ecosystem is supported by government and development partners. As part of the initiatives to open this important tourism circuit, Tanzania through REGROW Project, a world bank funded project, has invested a lot in terms of infrastructure and species monitoring, community development, habitat restoration especially at Ruaha River. It is envisaged that the outcome of this project will support lion conservation, reduce pressure over natural resources. Further, combating poaching and illegal wildlife trade through an integrated approach project implemented by UNDP and

		the Ministry of Natural Resources and Tourism targets lion and elephant conservation by strengthening capacity of law enforcement agencies to fighting poaching, support community livelihood, strengthening interagency collaboration and improve species (Lion and elephant) monitoring. Ruaha-Rungwa ecosystem and its adjacent communities is the project focus area at the landscape level.

6.2.8 Niger's WAP landscape

For this body of work, Niger completed one landscape questionnaire to represent all sites within the landscape. As such a site comparison for the landscape cannot be completed.

7. Brief discussion of some key findings

This report – which was a relatively rapid overview of the reported situation - provides insights into the status and management of African lion populations, focusing on the interplay between hunting, conservation efforts, and habitat quality across different lion range States in Africa. The document is based on a questionnaire filled out by 19 of the 24 African lion range States, capturing a diverse range of perspectives regarding lion conservation, different revenue streams, the impacts of trophy hunting, and the potential impacts of removing trophy hunting for conservation and for livelihoods.

7.1 Reported lion population trends and threats

Lion populations were reported as showing varying trends in different countries. While populations are reportedly decreasing in Ethiopia, Gabon, Somalia, and Uganda, they were reportedly increasing in Cameroon, Kenya, Malawi, and Zambia. In several countries (including the Democratic Republic of the Congo, Namibia, Sudan, Tanzania, and Zimbabwe), lion populations appear to be stable, while in countries such as Botswana, Chad, Niger, Senegal, and Nigeria, trends are unclear or unknown. It is notable that many countries highlighted poor data on lion population numbers and trends as a key gap, so it is important to build the technical and financial capacity to conduct sufficient surveys to assess whether these reported trends are correct, and how they change over time.

The most frequently cited threat to lion populations across these range states is human-lion conflict, particularly retaliatory killings. Human-lion conflict, bushmeat poaching, and livestock expansion are consistently cited as major threats to lion populations across the surveyed landscapes, with most countries indicating that bushmeat poaching is a significant concern. These threats often lead to direct lion mortality and contribute to the overall decline in lion numbers. Notably, trophy hunting was not identified as a major threat to lions by any range state, and most states that permit legal hunting reported that it does not negatively impact lion populations. In contrast, Nigeria raised concerns about hunting abroad, although it does not engage in lion hunting itself.

The survey results reveal several challenges to effective lion conservation. The most significant challenge is the lack of technical expertise and capacity to carry out accurate population surveys. Limited financial resources, equipment, and training also hamper effective lion management and monitoring.

7.2 Trophy hunting occurrence and reported offtake in the range States

Nine of the range States permit legal lion hunting for trophies, including countries like Namibia, South Africa, Tanzania, and Zambia. Trophy hunting is primarily conducted on private lands, community conservancies, and other protected areas, including game reserves and wildlife management areas. Over the past five years (2019-2023), more than 1,500 lions were legally hunted for trophies, with South Africa accounting for the largest number (1,371 lions). Of these, a substantial proportion were captive-bred lions (1,308 lions, or 95%).

Countries that allow lion trophy hunting generally report that the revenue generated from these activities is used for conservation efforts, with a significant portion (50-85%) shared with local communities or regions where the lions originated. The revenue helps fund conservation initiatives and infrastructure in these areas. The primary aim of trophy hunting in these countries is often seen as revenue generation for conservation.

In contrast, 10 countries disallow trophy hunting, citing reasons such as the species' declining populations and ethical concerns about the practice. Some countries, including Kenya, are considering reintroducing culling and consumptive use of wildlife as part of their future conservation strategies.

Among the 9 countries that allow legal lion hunting, 7 manage hunting through quotas, including age, sex, and area-based quotas. The use of these quotas is aimed at ensuring sustainable hunting practices. However, there is a significant data gap regarding lion populations, with many countries lacking reliable population estimates and trends.

7.3 The importance of photo-tourism and trophy hunting in local revenue

Photo-tourism and trophy hunting are identified as important sources of revenue for lion conservation, with photo-tourism being particularly valuable in countries like Kenya and South Africa. Trophy hunting is generally seen as moderately important for revenue generation, though some countries, like Mozambique, report that photo-tourism plays a lesser role in local economies.

7.4 The perceived impacts of trophy hunting bans

There have been growing international calls, particularly in the Global North, for bans on trophy hunting and/or the importation of hunting trophies, particularly from iconic and threatened African species such as lions. Countries that allow trophy hunting generally oppose such bans, believing they would negatively affect conservation efforts and local economies. In contrast, countries that do not permit lion hunting are more likely to support these bans.

The idea of banning trophy hunting, or the imports of such hunts to places such as the European Union, raises concerns amongst multiple range States regarding a perceived negative impact on both lion conservation and local economies. Range states where trophy hunting is permitted report that hunting revenues are important for managing protected areas and supporting community infrastructure. A majority of the surveyed countries express concern that such a ban would result in negative impact on local communities and lion conservation efforts, as such revenues would decline.

7.5 Habitat quality in different land uses

A geospatial analysis of habitat quality in selected landscapes reveals that core protected areas, such as national parks, show the least degradation. These areas experience minimal forest loss, agricultural encroachment, and building density, which are crucial for maintaining lion populations. Conversely, lands outside protected areas tend to experience the highest levels of degradation, with higher rates of forest loss, cropland expansion, and human settlement. For instance, the Maasai Mara in Kenya and Kruger National Park in South Africa show significantly better habitat quality compared to non-conserved areas surrounding these parks.

Hunting areas, while generally maintaining low levels of degradation, are more susceptible to deforestation, agricultural expansion, and settlement, especially in areas with high economic pressure and favorable climatic conditions. Open areas adjacent to national parks and reserves where hunting takes place, like areas around Ruaha-Rungwa in Tanzania and Luangwa in Zambia show varying levels of degradation within hunting areas, suggesting that habitat management within these areas needs to be more consistent and tailored to local conditions.

7.6 Conclusion

The conservation of African lion populations remains a complex, diverse and multi-faceted issue. Threats vary between and even within landscapes, but issues such as human-lion conflict and habitat loss pose major risks and urgently require action. Though much of the international public and policy focus, has been on the issue of trophy hunting, it was notable that not one range State felt that such hunting was a key threat, and it was seen as an important source of revenue for conservation and local communities in many countries. This suggests that rather than having such a strong focus on trophy hunting that the perspectives and priorities of range States should be put first, with international pressure and policy better used to focus on major threats such as human-wildlife conflict and habitat degradation. The results here highlight the need to consider the varying conservation threats and realities across different countries, landscapes and sites, and to listen to and acknowledge the diverse perspectives of the countries and communities who maintain lions as a top priority for long-term conservation.

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6.1. Questionnaire for African lion range States

SECTION ONE: Contact details

1.1. Name

1.2. Country

1.3. Organisation

1.4. Position

1.5. Number of years in current role

1.6. Number of years of experience in professional conservation work

1.7. Email address

SECTION TWO: African lion populations

2.1. Based on the best information you have available, what was the population trend for African lion in your country over the last five years? [please tick one from the following]

- Increasing
- Decreasing
- Stable
- Unknown

2.2. What are the three greatest perceived threats to African lion populations overall in your country? [3 free text boxes. Please provide as much detail as possible]

2.3. How important do you think the following factors are to your government in conserving and managing African lions? [Please rank from 1-5 in order of importance, with 1 being the most important and 5 the least important]

- The intrinsic value of African lion
- The ecosystem services African lion provide
- Revenue generated (e.g., from tourism and/or hunting)
- Delivering benefits to local communities from wildlife presence
- Problem animal control

If there are important reasons not mentioned here, please explain [free text box]

2.4. How important do you think African lion conservation is to citizens of your country? [please select one option]

- Very important
- Somewhat important
- Neither important nor unimportant
- Somewhat unimportant

- Very unimportant

2.5. How important do you think African lion conservation is amongst citizens of countries beyond Africa? [please select one option]

- Very important
- Somewhat important
- Neither important nor unimportant
- Somewhat unimportant
- Very unimportant

2.6. Is maintaining African lion populations net positive (i.e., beneficial) or negative (i.e., a cost) to your country? [please select one option]

- Strongly positive
- Positive
- Neutral
- Negative
- Strongly negative

2.7. Is there anything further you would like to add regarding African lions in your country? (e.g., historical distribution, threats etc.) [free text]

SECTION THREE: Use and trade

3.1. Does your country allow legal hunting of African lions for trophies? [yes/no]

3.2. How many African lions were legally hunted for trophies in each of the last 5 years in your country? [free text box for 2019, 2020, 2021, 2022, 2023; Please provide the best estimate possible].

3.3. If your country does not allow legal hunting of African lions for trophies, when was this policy introduced? [free text]

3.4. If your country does not allow legal hunting of African lions for trophies, what are the reasons behind the adoption of this policy? Please provide as much detail as possible. [free text]

3.5. On which land designation is the legal hunting of trophies allowed in your country? [for each land designation please indicate which type of trophy hunting is allowed]

	TH not allowed	TH allowed	TH but not lions
● National parks	☐	☐	☐
● Game reserves	☐	☐	☐
● Forest reserves	☐	☐	☐
● Wildlife Management Areas	☐	☐	☐
● Community-owned land (incl. conservancies)	☐	☐	☐

- Private land ☐ ☐ ☐
- Sanctuary ☐ ☐ ☐
- Other (please state…) ☐ ☐ ☐

SECTION FOUR: Hunting and management

4.1. What do you think the **primary** aim is of legal hunting of African lions for trophies in your country? [free text]

4.2. How important do you think African lion trophy hunting is to each of the following factors? [For each factor, please indicate level of importance]

- Revenue generation for hunting site management (e.g., anti-poaching measures) [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]
- Revenue generation for non-hunting site management (e.g., anti-poaching measures and protection of non-hunting Parks) [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]
- Income generation for the Government and state wildlife agencies [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]
- Income generation for local communities [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]
- Problem animal control [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]
- Other [please state] [very important, moderately important, neither important nor unimportant, moderately unimportant, not at all important, don't know]

4.3. How many African lions were legally killed through problem animal control in each of the last 5 years in your country? [free text box for 2019, 2020, 2021, 2022, 2023; Please provide the best estimate possible].

4.4. How many African lions were killed by unnatural causes in each of the last 5 years in your country? Unnatural causes include mortalities through poaching and roadkill but not disease. [free text box for 2019, 2020, 2021, 2022, 2023; Please provide the best estimate possible].

4.5. How many hunting concessions (i.e., areas where hunting is allowed) are there in your country? Note, this is **not** limited to hunting concessions with African lions. If possible, please provide a map of these areas at the end of the survey.

4.6. Of the hunting concessions (i.e., areas where hunting is allowed) in your country, how many are currently actively managed by hunting operators? If possible, please provide a map of these areas at the end of the survey.

4.7. How many hunting concessions (i.e., areas where hunting is allowed) in your country allow hunting of African lions for trophies? [free text]

4.8. Of the hunting concessions (i.e., areas where hunting is allowed) in your country which allow hunting of African lions for trophies, how many are currently actively managed by hunting operators?

4.9. In the last five years, have hunting concessions that allow trophy hunting of African lions in your country been returned by operators to the government or abandoned? [yes/no]

4.9.1. If yes, how many [free text]

4.9.2. If yes, please explain why

4.10. Has your country found it easier, harder or the same over the past five years, in terms of the willingness of hunting operators to take on the management of hunting areas? [Easier than in the past, no difference, harder than in the past, don't know, not applicable]

4.11. Has your country seen a noticeable change in the nationality of hunting operators and/or clients over the past five years? If yes, please explain. [free text box]

4.12. If you have transboundary populations of African lion in your country are there unique challenges to managing and conserving these populations [yes/no]

4.12.1. If yes, please elaborate [free text].

[if no, go to 4.13.]

4.13. Does legal hunting of African lions for trophies in your country threaten your lion populations? [yes/no]

4.13.1 If yes, please elaborate [free text].

4.14. Does legal hunting of African lions for trophies in any neighbouring countries threaten your lion populations? [yes/no]

4.14.1. If yes, which country? [free text]

4.14.2. If yes, please elaborate [free text]

4.15. Have there been any significant policy changes in your country regarding the hunting and/or trade in African lions and their habitats in the last 5 years?

4.15.1. If yes, please elaborate [free text]

4.16. Are there any anticipated policy changes in your country regarding the hunting and/or trade in African lions and their habitats in the next 5 years

4.16.1. If yes, please elaborate [free text]

4.17. Is government allocated funding for the management of areas with African lions sufficient to achieve conservation objectives?

- Sufficient
- Insufficient
- Don't know

4.17.1. If insufficient, please elaborate [free text]

SECTION FIVE: Impact of import restrictions

5.1. Do you think import bans on African lion hunting trophies (e.g., by European countries) would overall be positive, negative or have no effect on the lion conservation efforts of your country? [please select one option]

- Positive
- Negative

- Have no effect

    5.1.1. Please elaborate [free text]

5.2. Do you think import bans on African lion hunting trophies (e.g., by European countries) would reduce the number of lions trophy hunted in your country? [yes/no]

    5.2.1. Please elaborate [free text]

5.3. Do you think import bans on African lion hunting trophies (e.g., by European countries) would reduce the number of lion trophies exported from your country? [yes/no]

    5.3.1. Please elaborate [free text]

5.4. Based on the best available information, do you think import bans on hunting trophies (e.g., by European countries), including but not limited to African lions, would likely increase or decrease the number of African lions killed overall (e.g., through changes in conflict, habitat loss etc.)?

- Increase
- Decrease
- Stay the same
- Don't know

5.5. How supportive would your country be of import bans on hunting trophies (e.g., by European countries), including but not limited to African lions, if they:

- Positively affected lion populations [strongly support, slightly support, neither support nor oppose, slightly oppose, strongly oppose, don't know]
- Negatively affected lion populations [strongly support, slightly support, neither support nor oppose, slightly oppose, strongly oppose, don't know]
- Positively affected Indigenous peoples/local communities [strongly support, slightly support, neither support nor oppose, slightly oppose, strongly oppose, don't know]
- Negatively affected Indigenous peoples/local communities [strongly support, slightly support, neither support nor oppose, slightly oppose, strongly oppose, don't know]

5.6. Based on the best available information, what proportion of African lion trophy hunters in your country are domestic hunters or international hunters?

- Domestic [please state proportion]
- International [please state proportion]

5.7. Is there a national policy on allocating revenue from African lion trophy hunts to stakeholders beyond the government and hunting operators? [yes/no]

    5.7.1. If yes, please explain this policy providing as much detail as possible [free text]

5.8. What do you think would happen to hunting trophy areas if one or more import bans on hunting trophies were enacted (e.g. by European countries)? [For each potential outcome, please indicate the likelihood]

- There would be no change [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

- Hunting areas would change to photo-tourism [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

- Hunting areas would change to crop farming [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

- Hunting areas would change to livestock keeping or other agriculture [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

- Hunting areas would be degazetted (i.e. have legal status such as Game Reserve removed) [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

- Hunting area would be returned to the government [very likely, likely, neither likely or unlikely, unlikely, very unlikely, don't know]

5.8.1. If you would like to elaborate on your answers, please do so here [free text].

SECTION SIX: Quotas

6.1. Does your country use quotas to manage trophy hunting offtake from African lion populations? [yes/no]

6.1.1. If no, please provide reasoning [free text]

6.2. If your country uses hunting quotas to manage offtake from African lion populations, what types of hunting quota(s) are used? [please tick all that apply]

- Age-based quotas (e.g. restrictions around the hunting of individuals below a certain age). Please summarise what these are [free text box]

- Sex-based quotas (e.g. restrictions around which sex may or may not be hunted). Please summarise what these are [free text box]

- Area-based quotas (e.g. restrictions based on the area or land use and whether hunting is allowed or not) Please summarise what these are. [free text box]

- Adaptive quotas (by operator). Please summarise what these are [free text box]

- Other. Please summarise. [free text box]

6.3. If your country uses hunting quotas to manage offtake from lion populations, how are the quotas set? Please provide as much detail as possible. [free text]

6.4. If your country uses hunting quotas to manage offtake from lion populations, how frequently are the quotas updated? Please provide as much detail as possible. [free text]

6.5. If your country uses hunting quotas to manage offtake from lion populations, how are the quotas monitored? Please provide as much detail as possible. [free text]

SECTION SEVEN: Data, data gaps and challenges

7.1. What are the **three** greatest challenges to implementing African lion population surveys in your country? [free text]

7.2. What are the top three data gaps for African lion conservation and management that need filling in your country? [free text]

SECTION EIGHT: Additional supporting documents

Please share any relevant documents, reports, academic papers and/or supporting information here that provide support for the answers you have provided or that would be helpful for this study.

For example:

- Maps of active hunting concessions (jpeg/kml/shapefile)
- Population surveys or reports
- Details of trophy hunts (e.g., locations, dates)

Please upload **here:**

Alternatively, please email relevant documents to **dan.challender@biology.ox.ac.uk** and/or **samanthan@ewt.org.za**

6.2. Questions for countries with chosen landscapes

1. Name:

2. Country:

3. Organisation:

4. Position:

5. Email address:

6. Based on the best information you have available, what was the population trend for African lion **in this landscape** over the last five years? [please tick one from the following]

- Increasing ☐
- Decreasing ☐
- Stable ☐
- Unknown ☐

7. Please state how important each of the following income streams are for local people **within this landscape** [please tick an answer for each row]

	Does not occur here	Very important	Somewhat important	Not important
Photo tourism	☐	☐	☐	☐
Trophy hunting	☐	☐	☐	☐
Growing crops	☐	☐	☐	☐
Wild meat	☐	☐	☐	☐
Livestock keeping	☐	☐	☐	☐
Other	☐	☐	☐	☐

If other, please state:

8. What are the three greatest perceived threats to African lion populations overall in this landscape? [Please provide as much detail as possible]

i.

ii.

iii.

9. What top 3 actions do you think are most needed to improve lion conservation in this landscape? [Please provide as much detail as possible]

i.

ii.

iii.

10. Does lion trophy hunting happen in this landscape (i.e., has happened within the past 3 years)?

Yes ☐

No ☐

11. How much of a threat are each of these factors to the lion population in this landscape? [please tick an answer for each threat]

	Major threat	Minor threat	Not a threat	Don't know
Small population size	☐	☐	☐	☐
Human-lion conflict	☐	☐	☐	☐
Bushmeat poaching	☐	☐	☐	☐
Livestock expansion	☐	☐	☐	☐
Cropland expansion	☐	☐	☐	☐
Trophy hunting (if occurs)	☐	☐	☐	☐
Resource extraction	☐	☐	☐	☐
Illegal lion body part trade	☐	☐	☐	☐

12. How important do you think trophy hunting is to each of the following factors in this landscape? [Please tick one box per row]

	Very Important	Moderately important	Neither important or unimportnant	Moderately important	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	☐	☐	☐	☐	☐	☐
Revenue generation for tackling threats such as poaching	☐	☐	☐	☐	☐	☐

Income generation for local government and state wildlife agencies	☐	☐	☐	☐	☐	☐
Income generation for local communities within this landscape	☐	☐	☐	☐	☐	☐
Helping fund and manage problem animal control	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

If other, please state:

13. How important do you think photo tourism is to each of the following factors in this landscape? [Please tick one box per row]

	Very Important	Moderately important	Neither important or unimportnant	Moderately important	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	☐	☐	☐	☐	☐	☐
Revenue generation for tackling threats such as poaching	☐	☐	☐	☐	☐	☐
Income generation for local government and state wildlife agencies	☐	☐	☐	☐	☐	☐
Income generation for local communities within this landscape	☐	☐	☐	☐	☐	☐
Helping fund and manage problem animal control	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

If other, please state:

14. If trophy hunting occurs in this landscape and was stopped, do you think that would be positive or negative for lion conservation in the landscape? If trophy hunting doesn't occur in this landscape, please tick 'no trophy hunting in this landscape.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No hunting in this landscape ☐

Why? _____

15. If trophy hunting occurs in this landscape and was stopped, do you think that would be positive or negative for biodiversity conservation more generally in this landscape? If trophy hunting doesn't occur in this landscape, please tick 'no trophy hunting in this landscape.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No trophy hunting in this landscape ☐

Why? _____

16. If trophy hunting occurs in this landscape and was stopped, do you think that would be positive or negative for local communities living in the landscape? If trophy hunting doesn't occur in this landscape, please tick 'no trophy hunting in this landscape.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No trophy hunting in this landscape ☐

Why? _____

17. Is there anything further you would like to add regarding African lions and their conservation in this landscape?

6.3. Questions for countries with chosen sites

1. Name:

2. Country:

3. Organisation:

4. Position:

5. Email address:

6. Based on the best information you have available, what was the population trend for African lion **in this site** over the last five years? [please tick one from the following]

- Increasing ☐
- Decreasing ☐
- Stable ☐
- Unknown ☐

7. Please state how important each of the following income streams are for local people **in or adjacent to this site** [please tick an answer for each row]

	Does not occur here	Very important	Somewhat important	Not important
Photo tourism	☐	☐	☐	☐
Trophy hunting	☐	☐	☐	☐
Growing crops	☐	☐	☐	☐
Wild meat	☐	☐	☐	☐
Livestock keeping	☐	☐	☐	☐
Other	☐	☐	☐	☐

If other, please state:

8. What are the three greatest perceived threats to African lion populations overall in this site? [Please provide as much detail as possible]

iv.

v.

vi.

9. What top 3 actions do you think are most needed to improve lion conservation in this site? [Please provide as much detail as possible]

iv.

v.

vi.

10. Does lion trophy hunting happen in this site (i.e., has happened within the past 3 years)?

Yes ☐

No ☐

11. How much of a threat are each of these factors to the lion population in this site? [please tick an answer for each threat]

	Major threat	Minor threat	Not a threat	Don't know
Small population size	☐	☐	☐	☐
Human-lion conflict	☐	☐	☐	☐
Bushmeat poaching	☐	☐	☐	☐
Livestock expansion	☐	☐	☐	☐
Cropland expansion	☐	☐	☐	☐
Trophy hunting (if occurs)	☐	☐	☐	☐
Resource extraction	☐	☐	☐	☐
Illegal lion body part trade	☐	☐	☐	☐

12. How important do you think trophy hunting is to each of the following factors at this site? [Please tick one box per row]

	Very Important	Moderately important	Neither important or unimportnant	Moderately important	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	☐	☐	☐	☐	☐	☐
Revenue generation for tackling threats such as poaching	☐	☐	☐	☐	☐	☐
Income generation for local government and state wildlife agencies	☐	☐	☐	☐	☐	☐

Income generation for local communities within this landscape	☐	☐	☐	☐	☐	☐
Helping fund and manage problem animal control	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

If other, please state:

13. How important do you think photo tourism is to each of the following factors at this site? [Please tick one box per row]

	Very Important	Moderately important	Neither important or unimportnant	Moderately important	Not at all important	Don't know
Revenue generation for maintaining wildlife areas	☐	☐	☐	☐	☐	☐
Revenue generation for tackling threats such as poaching	☐	☐	☐	☐	☐	☐
Income generation for local government and state wildlife agencies	☐	☐	☐	☐	☐	☐
Income generation for local communities within this landscape	☐	☐	☐	☐	☐	☐
Helping fund and manage problem animal control	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

If other, please state:

14. If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for lion conservation in this site? If trophy hunting doesn't occur, please tick

'no trophy hunting in this site or adjacent areas.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No hunting in this site or adjacent areas ☐

Why? _____

15. If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for biodiversity conservation more generally in this site? If trophy hunting doesn't occur, please tick 'no trophy hunting in this site or adjacent areas.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No trophy hunting in this site or adjacent areas ☐

Why? _____

16. If trophy hunting occurs in this site or adjacent areas and was stopped, do you think that would be positive or negative for local communities living in or around this site? If trophy hunting doesn't occur, please tick 'no trophy hunting in this site or adjacent areas.'

Strongly positive ☐

Slightly positive ☐

Neither positive nor negative ☐

Slightly negative ☐

Strongly negative ☐

No trophy hunting in this site or adjacent areas ☐

Why? _____

17. Is there anything further you would like to add regarding African lions and their conservation in this site?