

5D Sustainability Framework

Field Test Case Study: South African Game Meat

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Introduction

Sustainable use of wild species and biological resources is one of the pillars of the Convention on Biological Diversity (CBD), but there are no regulatory frameworks governing sustainable use of wild species that measure ecological, social, economic, animal welfare and human health outcomes collectively.

To start to address this shortcoming, a 5-dimensional sustainability assessment framework was developed that included the five abovementioned principles, including two previously unrecognised principles, animal welfare and human health, as well as cross-cutting principles relevant to all dimensions.

The framework, which can be viewed as a matrix of six (5+1) dimensions, each with seven distinct individual principles, was developed by an international consortium and verified by a group of selected experts from the fields of resource economics, animal welfare, human health, ecology and community development. Further testing of the validity and applicability of this framework was carried out by core team members of the development team in Indonesia, Tanzania and South Africa.

The intended outcome is a preliminary working model that can be used to assess the sustainability of a wildlife-based commercial enterprise in an objective and transparent way. For the field tests of the framework, the abovementioned consortium applied the model in different scenarios of wildlife use. Potential options for applying the framework are depicted in Figure 1.

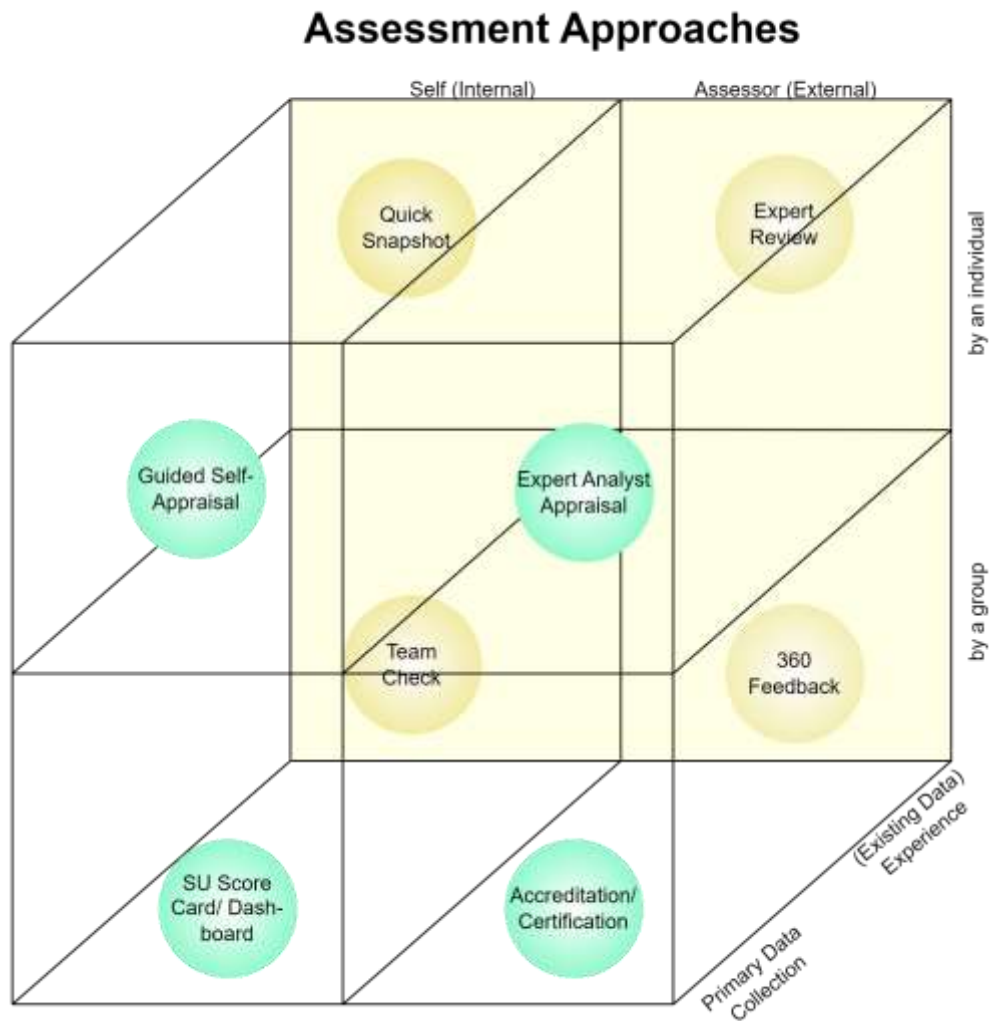


Figure 1: Application scenarios for the 5D framework considered by the international consortium along three dimensions. The framework is meant to be applicable as an internal self-assessment and by external assessors. Simultaneously, applying the framework individually and using it as part of a group discussion should be possible. Finally, both new and existing data are considered potentially valid information sources for the appraisal process.

Here, we describe a case study of wild game meat in South Africa’s wildlife ranching sector. This case study was conducted as an expert analyst appraisal according to the assessment approaches considered by the international consortium. As such, one member of the international consortium acted as an external assessor and collected primary data from individual wildlife ranches. The same expert analysed this data

subsequently to score the principles of the 5D framework. We describe the initial situation and scope of the case, the methodology for the framework appraisal and the results of the framework ratings. Furthermore, we discuss the findings in terms of scoring all principles for this scenario and a reflection on applying the framework from our test cases.

Case Study: Field Test for South African Game Meat

South Africa has a large and vibrant wildlife economy (Child, 2021; Taylor et al., 2016, 2020, 2021). Many individual wildlife economy enterprises can be classified as wildlife ranches, which are private land enterprises that use wildlife-based land uses (WBLU) to generate profits. These WBLUs may include extractive activities such as trophy hunting, meat hunting, and selling live animals, or non-extractive activities such as photographic ecotourism. The scale of the wildlife ranching sector in South Africa is not known precisely but is thought to encompass an area of more than 17 million hectares (Taylor et al., 2016), which equates to about 15% of the country's land surface area.

Wildlife ranches may be strictly wildlife-based or may keep both wildlife and domestic livestock (either in separate or overlapping areas), with the latter referred to as mixed farming (Figure 2). Many wildlife ranches offer wild meat hunting ('biltong hunting') as part of their portfolio, which is where local hunters pay to hunt wildlife and take the carcass for their own use. In contrast, far fewer wildlife ranches practice commercial wild meat production, generally referred to as 'game meat' in South Africa, although the more global term 'venison' can also be used. In the latter case, wildlife ranchers can develop a professional game meat production enterprise that culls, processes and sells the meat on a large scale. Amongst other factors, one reason for commercial game meat production being uncommon is a lack of suitable legislation to incentivise and control the practice among wildlife ranchers (Game Meat Strategy for South Africa, 2023). This, along with the complex requirements for establishing a legal commercial game meat producing enterprise make it an unattractive proposition to most wildlife ranchers.

Game meat hunting and game meat production on wildlife ranches in South Africa constitute an interesting case for testing the 5D framework, as the sector is well established. As such, the sector exists long enough to supply data and experiences. Furthermore, the newer developments towards more commercial production of game meat for the wider retail market in South Africa or even overseas provide an interesting scenario for applying the framework in a forward-looking, prospective manner.



Figure 2: Wildlife ranching models of the South African wildlife economy. The product and service portfolio of South African wildlife ranches consists of different proportions of biltong and trophy hunting, game meat production, ecotourism and agricultural activities including livestock and crop farming (Child, n.d.).

At the same time, it was necessary to be mindful of the test scope, due to the complexity of the wildlife economy sector across South Africa with its wide spectrum of different ranching models (Figure 2) and ranch sizes. It was, thus, decided to apply the 5D framework to three purposefully selected wildlife ranches, two in the Eastern Cape and one in Limpopo Province of South Africa:

(1) Facility 1: Limpopo property

The first property is in the Waterberg region of Limpopo Province and has an area of 1,050 ha. It is described by one of the owners as a wildlife reserve and is primarily a conservation and lifestyle investment. Before becoming a reserve, it was owned and run as a wildlife ranch by the same owner interviewed (before bringing in external investors to convert the property to the wildlife reserve), and before that it was a cattle farm. The current intention is to achieve a sustainable, self-funding, wildlife reserve that contributes to conservation as a whole and which provides the shareholders with the lifestyle they enjoy. This will be achieved by using a variety of sustainable sources of income that contribute to conservation, including breeding of rare species, tourism, hunting, meat production & beneficiation as well as producing other natural products such as honey and mutton from indigenous sheep.

The wildlife reserve has a game fence around the perimeter, with the main game species being a wide variety of herbivores appropriate for the region, including large species such as buffalo and rhino. There are also a wide variety of appropriate carnivores present, although lions and cheetahs are intentionally not kept. The financing model has changed in recent years with the development of the wildlife reserve and the involvement of external funders, who shy away from trophy hunting as a conservation tool. The enterprise has a professionally developed ecological management plan and practices limited interference with the wildlife.

Before changing to a wildlife reserve, the wildlife ranch had built two abattoirs, one of which is unused and will be closed due to insufficient throughput. Both abattoirs were built to a standard that would meet the current proposed national game meat scheme, which is not yet implemented (Game Meat Strategy for South Africa, 2023). Although the enterprise does not currently produce game meat for commercial production, it does take off game meat, and is an interesting case study for trialling the sustainability framework.

(2) Facility 2: *Eastern Cape property 1*

The second wildlife ranch is in the Eastern Cape Province and has an area of approximately 2,300 ha of mixed habitat types (including renosterveld, grassland and savannah). The ranch contains 1,700 ha of extensive (low interference) wildlife use and 600 ha of semi-intensive wildlife use, where higher levels of management are applied. It has a diverse set of herbivore species, which includes rare game species and colour variations, including Golden Wildebeest and various coloured Springboks.

The ranch has a game fence around the perimeter, with the main game species being a wide variety of herbivores mostly appropriate for the region, including large species such as buffalo and rhino. There are also a wide variety of appropriate carnivores present, although lions and cheetahs are intentionally excluded. The rancher does control two carnivore species through hunting to keep numbers down but considers himself relatively tolerant of carnivores. The enterprise has a professionally developed ecological management plan and practices limited interference with the wildlife, at least in the extensive area. The ranch also offers hunting experiences as part of a bigger (50,000 ha) private conservancy.

The enterprise has a registered and functional on-site abattoir for game meat production. All legislation has been complied with to make this work, but the rancher has stated that this process was onerous and took more than a year to complete.

(3) Facility 3: *Eastern Cape property 2*

The third wildlife ranch is a mixed farm in the Eastern Cape Province and has an area of approximately 50,000 ha of two main habitat types (thicket and fynbos). The ranch is entirely extensive and combines a diverse set of herbivore species alongside Angora goats, which are farmed for their mohair. The goats are rotated in camps, but the wildlife moves freely.

The ranch has a 'jackal-proof' game fence around the perimeter, which is intended to keep jackals out. There is a wide variety of herbivore species, mostly appropriate for the region (no exotic species, but some extralimital), including buffalo. There are also a wide variety of appropriate carnivores present, although lions and cheetahs are intentionally excluded. The rancher shoots three carnivore species to control numbers but considers himself more tolerant of carnivores than most neighbouring livestock farmers. The enterprise has a wildlife management plan that is built into a management plan designed primarily for the mohair enterprise.

Land uses include ecotourism, trophy hunting, biltong hunting, live sales, but limited game meat production. While the ranch has facilities to process game meat on site (a processing facility for goats that is also used by the local meat hunters), it does not have an abattoir and does not attempt to comply with national standards as these are confusing and onerous and not financially viable for the operation.

Methodology for the 5D framework field test

We tested the framework by interviewing the three abovementioned ranchers using a questionnaire designed to help us assign scores to each sustainability principle for each property (Appendix 1). Two of the three interviews were conducted in person on the relevant properties, while one was conducted virtually.

The two on-site meetings enabled us to make observations of the wildlife ranch enterprises, which helped verify some of the questionnaire responses. To support the process, we also asked the three ranchers to share any existing management plans and business plans for their game ranch with us.

Rather than asking ranchers to assign themselves a score for each principle, which would have required a detailed explanation of each principle to each rancher, we asked fact-based questions about their properties and management approaches that we then used to assign a score for each principle ('Expert Analyst Appraisal' according to Figure 1).

For example, the first principle under Animal Welfare, is: 'Animals are provided with (or can access) species-specific and appropriate nutrition, feed, and water which encourages natural behaviours and promotes health'. To assign a score to a ranch, we considered the size of the property, the management principles applied, species present and the species numbers to assess whether there would be sufficient appropriate nutrition provided.

A second example is for principle 9 under Human Health: ‘Facilities (including vehicles and equipment) handling wild species and/or their products (particularly food) have appropriate biosecurity, hygiene, food safety and sanitation measures in place to monitor, minimise and mitigate the risk of disease or hazards (pathogen, chemical, toxin, residue) and cross-contamination/transmission.’ To assign a score to a ranch, we considered the extent to which a game meat enterprise implemented national regulations regarding game meat production and had all the necessary meat hygiene measures in place.

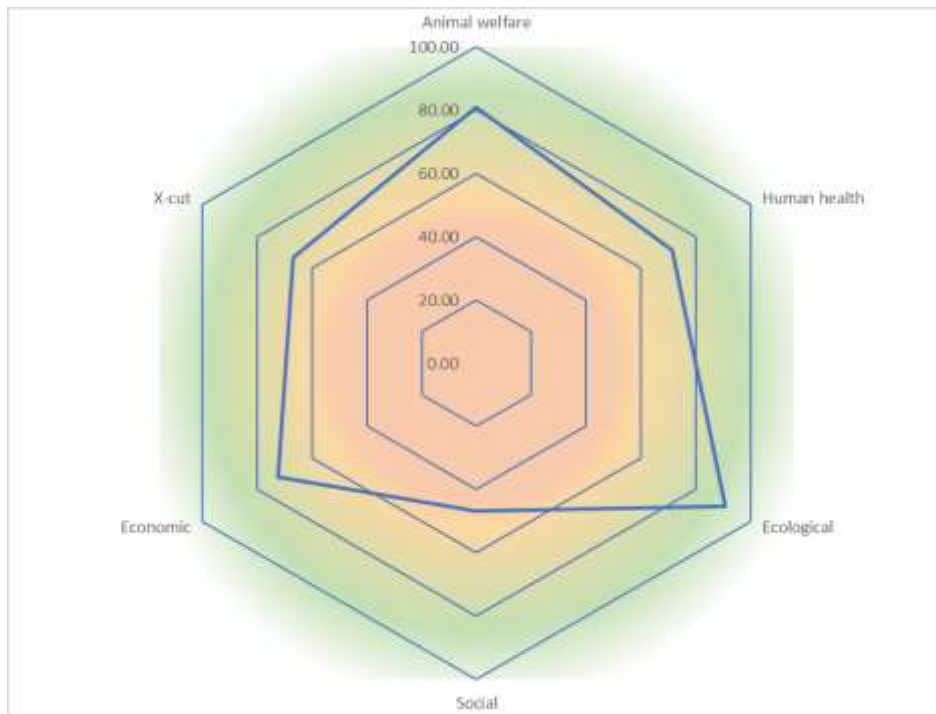
We scored all framework principles for each property in this manner based on the questionnaire response data and the shared management documents. As external scorers, we noted our rationale for each specific score as well as the evidence supporting our evaluation in the 5D framework tool. Simultaneously, we kept notes in a separate document about the applicability of each principle and the corresponding scoring scale. The results of both the appraisals and the review of the principles with their scores are summarised in the following Results section.

A final step for an application scenario in the form of an expert analyst appraisal (Figure 1), the appraisal outcomes ought to be shared and discussed with the facilities. As this field test aimed to verify the theoretical validity of the framework and due to capacity and time constraints, we could not include this step for our test case.

Field Test Results

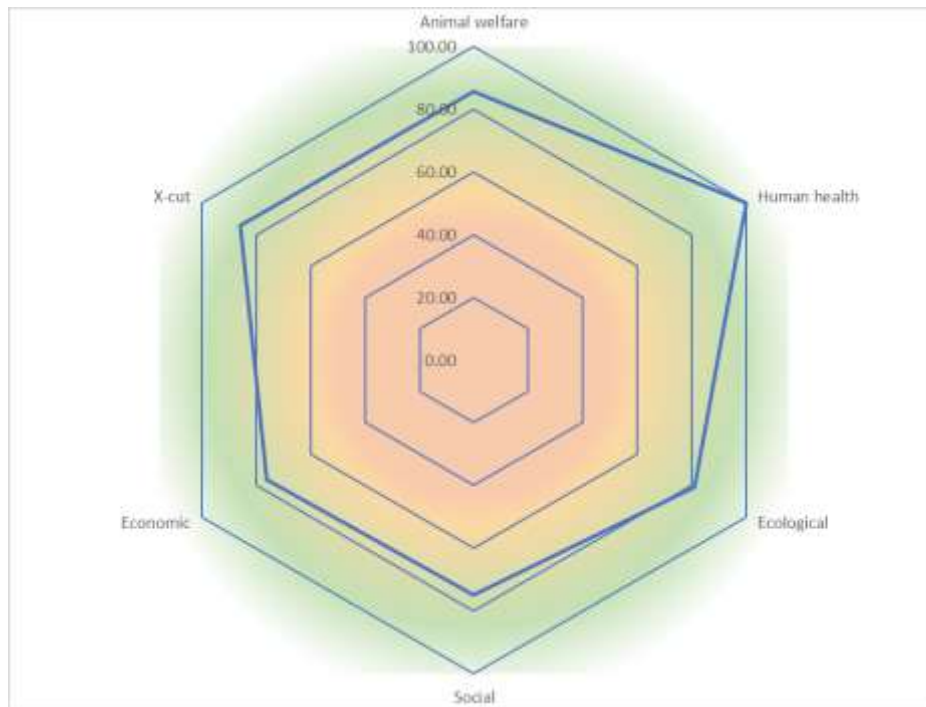
Framework Assessment Results for four Wildlife Ranches

(1) *Facility 1: Limpopo property - spider graph and comments*



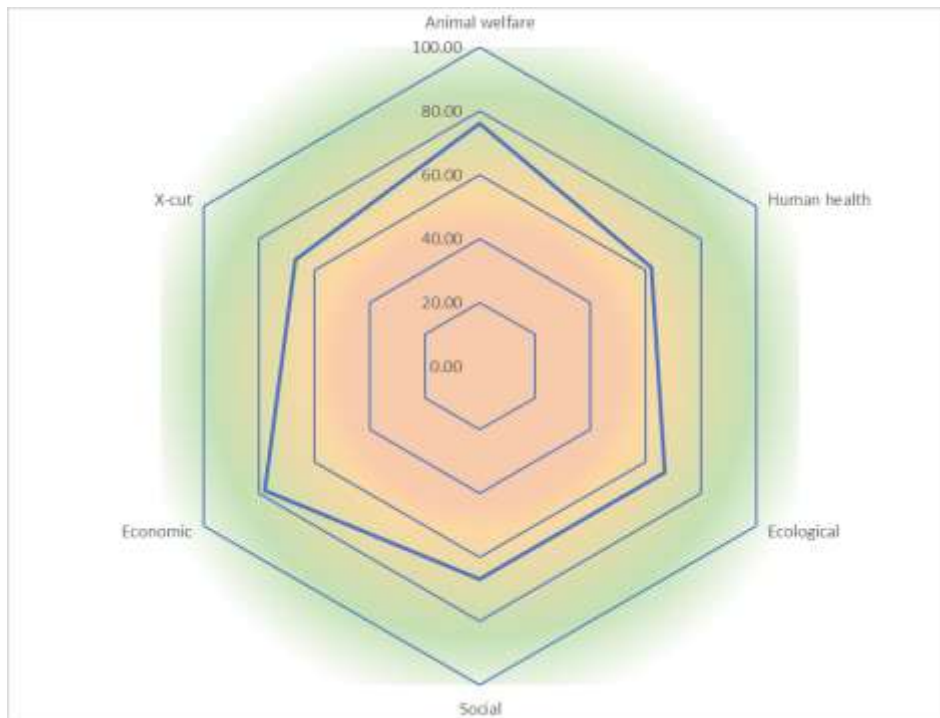
Facility 1 scored very highly on the ecological and animal welfare principles. This outcome aligns with the management approach of the property, which is to be a sustainable wildlife reserve. It scored well on the human health and economic principles, attaining 70% for each, but less well relative to Facility 2. This makes sense because Facility 1 is not a commercial game meat producer and does not need to comply with the highest national standards. The low score for the social principle reflects the fact that the facility is privately owned with no land claims or community requirements that necessitate inclusion of communities (other than employees) in management processes.

(2) Facility 2: Eastern Cape property 2 - spider graph and comments



Facility 2 scored highly on all principles, especially human health, which received a perfect score. This outcome aligns with the management approach of the property, which is to be both a sustainable wildlife ranch, but also a commercial producer of game meat. The owner went to considerable trouble to meet national standards for meat production, and this was apparent during the site visit. The property also aspires to have sound ecological management, which shows in the high ecological score.

(3) Facility 2: Eastern Cape property 2 - spider graph and comments



Facility 3 scored highly on the animal welfare and economic principles. This outcome aligns with the management approach of the property, which does not interfere with the wildlife but ensures that animal numbers are suitable for the habitat. It also reflects the economic focus of the property. It scored reasonably well on the other principles as well. Like Facility 1, the lower human health score relative to Facility 2 reflects the fact that Facility 3 is not a commercial game meat producer and does not need to comply with the highest national standards.

Feedback on 5D Framework Principle and Scoring from South Africa’s Game Meat Sector Field Test

We found that the overarching dimensions and their principles of the framework were relevant for the cases we tested. They provide insightful findings and potential to reflect on sustainability-related improvements. Nevertheless, the rating scale/scoring for some principles was inapplicable or inappropriate for our test ranches and we believe that different rating scales might be required in some circumstances. Our test results suggest that it might be useful to review the rating scales of the principles from the perspective of:

- Entire sector vs. individual facility
- Large organisation/institution vs. sole proprietor (family business) vs. informal/customary use (commercial vs. non-commercial/subsistence)
- Intensive vs. extensive systems

We scored the principles and their rating scales according to the applicability to our test case of game meat production in South Africa (Figure 3). The principle and its rating scale proved fully applicable to the test case for green cells ('Y' for yes), while principles in red ('N' for no) were not relevant for the test case. Yellow cells ('R' for review) indicate a proposed need for customising the principle's rating scale. Cells in light green ('D' for discuss) should be discussed to review the scoring that result from the way the rating scales are worded. We provide specific comments on the principles marked for discussion, review or inapplicability.

Principle	Framework Dimension					
	Animal Welfare	Human Health	Ecological	Social	Economic	Cross-Cutting
1	D	D	R	D	Y	R
2	D	D	R	R	D	D
3	D	Y	Y	N	D	D
4	D	Y	D	N	D	D
5	Y	R	Y	D	R	Y
6	D	Y	Y	R	N	D
7	D	Y	D	R	Y	D

Figure 3: Applicability of the respective principle's scoring/rating scale to the test case of game meat production on South African wildlife ranches as per the evaluation of the external assessors. Principles in green proved fully applicable to the case study while red cells indicate that the principle was not applicable to the case. For yellow cells a revision of the rating scale might be required.

Notes on Sustainability Framework Tool. For principles that worked well and where no additional comments were needed, no points are made below.

(1) Animal welfare dimension

Principle 1: 'Animals are provided with (or can access) species-specific and appropriate nutrition, feed, and water which encourages natural behaviours and promotes health.'

In a wild/extensive/natural system, animals cannot be given supplemental food, so the land manager must manage the vegetation and stocking densities. It is also not possible to monitor every animal and it should not be expected that every animal be in good health in a natural environment.

Principle 2: 'The physical environment allows for species-specific comfortable resting places, free and normal movement, thermal regulation, and adequate shelter.'

A score of 2 here is the best an extensive system can expect to score, but it would be unfair to mark down an extensive property for this reason. Also, a score of three might be over-managing and this would be a negative (the spider diagram could register this as red).

Principle 3: 'The catching, maintaining, breeding, raising, transporting, handling (and, where relevant, killing) of wild species is carried out in a way that promotes positive physical and psychological welfare and minimises the risk of pain, injury, stress and suffering. Killing is carried out in a humane way that minimises pain and suffering.'

A score of 3 requires: Interactions with animals are designed in accordance with best available science-based guidelines such that pain and suffering are minimised and physical and psychological welfare is actively promoted. It is not clear how this would be achieved in an extensive system.

Principle 4: 'Stocking densities and group composition ensure (most) normal behaviours, and positive species-specific social interactions.'

An extensive system can only be managed so far before it becomes overmanaged. In an extensive system the animals should be left to sort themselves out to some extent.

Principle 6: 'Animals with physical or psychological health issues are isolated (where appropriate) and treated/addressed promptly or killed humanely if treatment is not feasible or recovery is unlikely.'

For an extensive system where animals are left to fend for themselves, a score of 3 would be irrelevant. For extensive systems, a maximum score of 2 might be needed here.

Principle 7: 'People working with animals have sufficient knowledge and understanding of animal behaviour and physiology to ensure good care practices and welfare standards are applied.'

On a wild ranch with an extensive system, and with the limitations on available resources to train staff, and the natural limitations of staff abilities, a score of 3 here would be unachievable. For extensive systems, a maximum score of 2 might be needed here.

(2) Human health dimension

Principle 1: 'People coming into contact with / working with wild species and their products (including in production facilities, markets, slaughterhouses etc) understand and practice good personal health hygiene and biosecurity measures.'

This would be particularly important for ranches producing game meat commercially but less so for ranches doing local hunting. This principle is clear and works for an extensive system.

Principle 2: 'Facilities (including vehicles and equipment) handling wild species and/or their products (particularly food) have appropriate biosecurity, hygiene, food safety and sanitation measures in place to monitor, minimise and mitigate the risk of disease or hazards (pathogen, chemical, toxin, residue) and cross-contamination/transmission.'

Same as above. This principle is relevant for commercial meat production in an extensive system.

Principle 5: 'Trade chains are as short and simple as possible to reduce the number of interfaces at which there could be cross-contamination and transmission of hazards/pathogens and to facilitate traceability.'

This principle would be difficult to measure, even for a commercial enterprise because some aspects of the supply chain are not within the control of the rancher. But it is relevant for commercial meat production in an extensive system.

(3) Ecological dimension

Principle 1: 'There is a current formal / informal system (e.g., management plan) in place which considers and governs the scale and rate of use of the target species, in its harvest range taking into account its life history strategy and tailored to the local social and ecological context.'

Level 3 requires the management plan to be endorsed by multiple stakeholders, which would be hard to attain, and most ranchers will not have their plans endorsed in this way. Should consider an alternative endorsement approach.

Principle 2: 'The species use is aligned with international, national, regional, and/or local/customary plans for sustainable management, conservation, or restoration/regeneration of biodiversity.'

Level 3 requires the species use to exceed national requirements. It is not clear what this would mean for a wildlife ranch.

Principle 4: 'The species use does not adversely affect the conservation or restoration of non-target elements of biodiversity (eg non-target species, ecosystems, ecological processes, natural habitats, soil and water condition and quality).'

Level 3 would be hard to measure and documenting the effects may be beyond the capabilities of needs of ranchers.

Principle 7: 'Practices, processes and facilities associated with the species use do not have a negative impact on areas important for biodiversity including e.g., High Conservation Value areas, Protected Areas, Key Biodiversity Areas, ICCAs, OECMs.'

For level 3 to apply, a property would need to occur in an area of important biodiversity.

(4) Social dimension

Principle 1: 'The use (harvesting, processing, sale etc) of the species does not involve any harmful discrimination (e.g., gender-based, race-based or any other barriers) to effective participation and leadership.'

Level three requires the owner to actively encourage access to effective participation and leadership by disadvantaged groups with regards to species use. This is very unlikely to be implemented in most private enterprises in South Africa.

Principle 2: 'Local communities and indigenous people with legal or customary access and /or use rights are able to maintain control over the species use to the extent necessary to protect their rights, traditional knowledge and customary institutions and uses.'

Levels 2 and 3 in this case are naïve for private land in South Africa. Few countries with private landownership rights would expect landowners to attain level 2 status. This principle might need revision.

Principle 3: 'Agreements with local communities and indigenous people are based on Free Prior and Informed Consent (FPIC), appropriate and adequate knowledge of customary tenure and access rights.'

This is not relevant for most private property in RSA.

Principle 4: 'Where the species use occurs on sacred sites or other lands and waters traditionally occupied or used by IPs and/or LCs, a protocol or code of conduct is in place to regulate the behaviour of personnel and visitors.'

This is not relevant for most private property in RSA.

Principle 5: 'Fair employment conditions, and labour rights, which maintain or enhance social and economic wellbeing, are provided for all workers including no use of forced labour including child labour.'

Levels 2 and 3 require monitoring along the value chain. Is this in the power of the landowner? Should it be?

Principle 6: 'The use of the species does not result in the undermining or physical or economic displacement of local communities/segments within a community (eg traditional women harvesters displaced by commercial collectors).'

Displacement is unlikely to be an issue in current RSA, but it may have been in the past. This may require more thought regarding how it would be measured.

Principle 7: 'The use of the species makes a positive contribution to the wellbeing of local communities in the area where the wild species is harvested.'

This can be easily measured with interview questions, but more thought should be given to how private landowners should be assessed. Is it reasonable to expect a wildlife rancher to provide substantial benefits to communities? If yes, then should this standard not be applied to all landowners, including farmers and mining companies?

(5) Economic dimension

Principle 2: 'There is an appropriate enabling environment (policy, legislation, incentives etc) supporting the species use and no external factors (eg, community challenges, conflict, political insecurity, global pandemics) undermining its financial viability.'

This is relevant, but a score of three seems to require policy support from government, which is not within the control of the rancher.

Principle 3: 'There is a competitive market for the outputs/products of the species use.'

RSA has a strong competitive market for local hunters but does not yet have a strong competitive market for game meat, so level 3 cannot be attained currently. This is a major point of contention among the wildlife ranching sector, and they have been pushing the government for more support for more than a decade.

Principle 4: 'The type of use of the species (eg hunting, tourism, ranching) and/or product (eg skins, resin, meat) is competitive with other available alternatives.'

Wildlife ranching is competitive, but game meat production is only so currently when combined with other enterprises. Government policy is not sufficiently supportive for a score of three.

Principle 5: 'The species use makes a positive contribution to local economic development and potentially also to sub-national or national economies.'

It is not clear how this would be applied at the business level. Is this referring to the species use in general or the specific use of the species by the landowner?

Principle 6: 'Economic relations (prices, rates of pay, payment schedules etc) in the supply chain are understood and acceptable to those involved.'

This is not relevant for most private property in RSA.

(6) Cross-cutting dimension

Principle 1: 'Wild species use operations and practices are compliant with applicable local, regional, national, and international law.'

National laws are well known, but international laws are not relevant for local game meat production, unless it was for the export market, which is currently limited due to FMD restrictions. This principle might need different laws for different practices.

Principle 2: 'Wild species use operations and practices take note of, and apply, existing authoritative best practice guidance where relevant.'

This is an example where the principle could be well applied to commercial game meat production but would not be as necessary for non-commercial production.

Principle 3: 'Wild species use operations and practices are subject to regular monitoring (of the disease/health, species population, social context and of the impacts of any processes involved in the use) to facilitate adaptive management.'

To score 3 here, the property must have advanced monitoring systems in place. It is not clear what advanced means here, so this needs to be clarified.

Principle 4: 'Wild species use operations and practices adopt a precautionary approach ensuring risks are anticipated, assessed and addressed in ways as to mitigate or minimise adverse conservation and social consequences.'

It will be necessary to define the kinds of risks applicable here, which might vary between enterprise types.

Principle 6: 'Wild species supply chains are traceable from the point of off-take and systems in place for monitoring.'

This makes sense for commercial game meat production, but a score of 3 would not be necessary for a non-commercial enterprise.

Principle 7: 'People working with wild species are provided with sufficient training and awareness to ensure compliance with relevant best practices and regulations.'

Same as P6.

Self-Reflection of the External Framework Assessors

In this section, we summarise our experience of using the framework as external assessors of individual game meat facilities.

The decision to run the test case of the South African game meat sector as an external analyst appraisal (Figure 1) made it necessary to collect primary data from each of the facilities to be able to score the framework principles. As described in the Methodology, we decided to develop a questionnaire for this purpose. The efforts of questionnaire development in correspondence with the principles and their rating scales were significantly higher than those of self-assessment test scenarios using the framework based on one's experiences. Hence, the data collection and appraisal of the South African test case happened later than other field tests in the core team of the international consortium.

The questionnaire proved to be a valuable tool to collect data in a standardised fashion. By comparison, we also asked the test facilities to provide us with their management and business plans. In addition to the fact that not all ranches have or are willing to share these plans, their structure and quality differ. While a time-consuming qualitative analysis would be required to discern the relevant data from such documents for scoring purposes, relevant data could potentially be missing altogether.

The test cases confirmed that a review of the questionnaire would be necessary to enhance its applicability for scoring the framework principles. Based on our experience, this review would entail excluding unnecessary questions, adding questions for areas that were challenging to score based on the available data and rephrasing some questions that our participants found difficult to answer.

Conclusion

We used the South African Game meat sector to test the framework dimensions, its principles and the rating scales as an external analyst appraisal (Figure 1). Our conclusions are reflective of this application perspective where primary data is collected from individual facilities and scored by an external expert.

We found that the 5+1 dimensions were valid and relevant to our test facilities. The assessment results provide meaningful findings for reflecting and discussing improvement areas for each facility in terms of them managing their game meat activities more sustainably. All except three principles of the framework were applicable to the game meat sector. However, the rating scale / scoring system for some principles was debateable or inappropriate for our test ranches, and we believe that further improvements should be discussed to verify which scoring items might be further improved.

In particular, our test results suggest that it might be useful to review the rating scales of some principles highlighted in Figure 3 from the perspective of assessing:

- an entire sector vs. an individual facility
- a large organisation/institution vs. a sole proprietor (family business) vs. an informal/customary use case
- a commercial vs. a non-commercial/subsistence scenario
- an intensive vs an extensive wildlife utilisation system.

Based on these outcomes, it could be sensible to consider a standardised step allowing to customise the framework to a specific application scenario.

Our test case scenario in the form of an external analyst appraisal also afforded us the opportunity to experience and reflect on steps involved to collect primary data relevant to the framework principles. The comprehensiveness and specificity of the principles and their rating scales calls for a well-designed and prepared data collection process. The collected information ought to cover all principles and align clearly and transparently to the rating scales.

For our test case, we developed a questionnaire with 83 questions with the aim to cover all principles with relevant data to evaluate them according to the scoring items. To reduce the time required to complete the questionnaire-based interview, we highlighted questions for which we could find the answer in stipulated documents for wildlife ranches such as a game management plans or business plans. Nevertheless, the effort to collect relevant data proved considerable for both the game ranchers as well as the external assessor. Due to capacity constraints, the final step to discuss the assessment outcomes with the test facilities could not be carried out.

Based on these experiences, it could be sensible to develop guidance material for external evaluation scenarios allowing external experts to align their efforts and share their practices.

References

- Child, M. (2021). *SANBI Sustainable wildlife economies project*. South African Biodiversity Institute. https://prezi.com/p/886lo4_kjiqx/sanbi-sustainable-wildlife-economies-project/
- Government Gazette REPUBLIC OF SOUTH AFRICA: Game Meat Strategy for South Africa, Pub. L. No. 49620, Government Gazette (2023). www.gpwonline.co.za
- Taylor, W. A., Child, M. F., Lindsey, P. A., Nicholson, S. K., Relton, C., & Davies-Mostert, H. T. (2021). South Africa's private wildlife ranches protect globally significant populations of wild ungulates. *Biodiversity and Conservation*, 30(13), 4111–4135. <https://doi.org/10.1007/s10531-021-02294-5>
- Taylor, W. A., Lindsey, P. A., Nicholson, S. K., Relton, C., & Davies-Mostert, H. T. (2020). Jobs, game meat and profits: The benefits of wildlife ranching on marginal lands in South Africa. *Biological Conservation*, 245. <https://doi.org/10.1016/j.biocon.2020.108561>
- Taylor, W. A., Lindsey, P., & Davies-Mostert, H. (2016). *An assessment of the economic, social and conservation value of the wildlife ranching industry and its potential to support the green economy in South Africa*. <https://doi.org/10.13140/RG.2.1.1211.1128>

Appendix 1: Wildlife Rancher Questionnaire for assessing the 5D sustainable use framework

1	Name	
2	Contact Number	
3	Email	
4	Farm name (commercial name)	
5	Cadastral name(s) and number(s)	
	a.	a
	b.	b
	c.	c
	d.	d
	e.	e
6	Province	
7	GPS coordinates	
8	What is the total farm size in hectares?	
9	What area is under extensive wildlife (ha)?	
10	What area is under intensive wildlife?	
11	What area has been classified as high value for biodiversity (ha)?	
	ha:	<input type="checkbox"/> Has not been assessed
	Type:	
12	Do you have a management plan? (only ask if not already provided)	
13	Who developed the plan? (only ask if no copy is provided)	
14	How old is the mgt plan (in years)? (only ask if no copy is provided)	

21 Do you have a health & safety policy / biosecurity protocol? (only ask if no copy is provided)	
<input type="checkbox"/> Yes <input type="checkbox"/> No	Comment:
22 How old is the health & safety policy / biosecurity protocol (in years)? (only ask if no copy is provided)	
23 Are meat processing facilities, equipment and practices audited? (only ask if not in biosecurity protocol)	
<input type="checkbox"/> Yes, regularly <input type="checkbox"/> Yes, on demand <input type="checkbox"/> No <input type="checkbox"/> N/A (not necessary)	If yes, by whom and how often If no N/A: comment
24 How often do you conduct a health and safety risk assessment? (only ask if not in biosecurity protocol)	
<input type="checkbox"/> Always as part of strictly enforced rules (SOPs) <input type="checkbox"/> Regularly, but not always <input type="checkbox"/> On demand (after an incident) <input type="checkbox"/> Never / not a priority	Comment:
25 Personal health hygiene and biosecurity for people coming into contact with wildlife (products) are: (incl. handwashing and other appropriate personal health and hygiene equipment and facilities)	
<input type="checkbox"/> Challenging / difficult to enforce <input type="checkbox"/> A matter of personal responsibility of every person <input type="checkbox"/> Provided for with regular reminders as part of work <input type="checkbox"/> Part of strictly enforced rules (e.g., standard operating procedures)	
Other: Specify	
26 What do you do with animal carcasses?	
<input type="checkbox"/> Leave in the veld (only extensive systems) <input type="checkbox"/> Bury <input type="checkbox"/> Burn/Cremate <input type="checkbox"/> Sell/give away with vet inspection <input type="checkbox"/> Sell/give away w/o vet inspection	Where: Where: To whom: To whom:
Other: Specify	
27 Do you count your wildlife species?	
<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, how often? <input type="checkbox"/> Every year <input type="checkbox"/> Every 2 years <input type="checkbox"/> Every 3 years or more
What method(s) do you use?	
<input type="checkbox"/> Walking <input type="checkbox"/> Driving <input type="checkbox"/> Aerial <input type="checkbox"/> Waterhole <input type="checkbox"/> Other	
28 Please indicate which species occur on your property and estimate the approximate population sizes (if possible). If game count data is available, get copy of this and add later.	
Click here to go to Q28	

29 Do you provide any supplementary food for your general wildlife? (Excluding intensive breeding.)

<input type="checkbox"/> Supplementary food <input type="checkbox"/> Licks <input type="checkbox"/> Nothing	If yes, please describe:
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30 How many permanent water points do you have?

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31 Are any of the permanent water points man-made?

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Comment:
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32 If you conduct any intensive breeding, do you control which animals mate?

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Comment:
------------------------------	-----------------------------	----------

Do you keep a stud book?

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Comment:
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33 Do you use genetic testing for operational purposes (e.g. breeding decisions)?

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Comment:
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34 Do you have any species that are not indigenous to South Africa? (e.g. deer)

<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, which species?
---	------------------------

35 Are the following predators present on your property?

	Resident	Occasion. sighted	Never sighted	Don't know
Lion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leopard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cheetah	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Serval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Caracal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
African Wildcat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Black-footed cat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spotted Hyaena	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brown Hyaena	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aardwolf	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jackal sp.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wild Dog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bat-eared Fox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cape Fox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Civet sp.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Genet sp.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mongoose sp.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Honey Badger/Ratel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otter sp.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weasel/Polecat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Any other predator species?

36 Do you practice any measures to control predator numbers?

- Nothing
- Live capture & translocation
- Contraception
- Lethal, Selective (e.g. shooting known problem animals)
- Lethal, Selective (hunting or culling)
- Lethal, Non-selective (e.g. poisoning/gin traps)

Please describe which species:

37 In comparison to the other ranchers|farmers in the area, how tolerant of predators are you?

On our farm/ranch, we are:
 1=much less tolerant 2=a bit less tolerant 3=about as tolerant 4=a bit more tolerant 5=a lot more tolerant

38 Do you intervene in case of sick or injured wildlife or for prevention?

Extensive Systems	Intensive Systems	Comment:
<input type="checkbox"/> Duncan Applicator <input type="checkbox"/> Livestock dip <input type="checkbox"/> Vet Care <input type="checkbox"/> Antimicrobials <input type="checkbox"/> Other Health Products <input type="checkbox"/> Own offtake <input type="checkbox"/> Other <input type="checkbox"/> Nothing	<input type="checkbox"/> Duncan Applicator <input type="checkbox"/> Livestock dip <input type="checkbox"/> Vet Care <input type="checkbox"/> Antimicrobials <input type="checkbox"/> Other Health Products <input type="checkbox"/> Own offtake <input type="checkbox"/> Other <input type="checkbox"/> Nothing	

39 Which diseases (viral, bacterial, fungal) or insect, worm and other parasite infestations were treated on your farm/ranch since 2015 and why?

40 If you use animal health products, do you make an effort to use environmentally compatible products? Please explain.

- Yes
- No
- Don't know

41 Are you a member of a Fire Protection Association? (Check management plan)

- Yes
- No

42 How frequently do you perform controlled burns and what methods do you use? (Check management plan)

- | | |
|---|---|
| <input type="checkbox"/> Every year
<input type="checkbox"/> Every 2 years
<input type="checkbox"/> Every 3 or more years
<input type="checkbox"/> Never | <input type="checkbox"/> Block burning
<input type="checkbox"/> Mosaic burning
<input type="checkbox"/> Other |
|---|---|

43 Do you perform any bush clearing? (Check management plan)

- Yes
 - No
- If yes, please describe briefly:

44 Do you do any erosion control? (Check management plan)

	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, please describe briefly: <div style="border: 1px solid black; height: 40px; width: 100%;"></div>
--	---	---

45 Are you aware of any alien invasive plant species on your farm (or did you have them previously)?

	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, what species and do you attempt to clear them? (Check management plan) <div style="border: 1px solid black; height: 40px; width: 100%;"></div>
--	---	--

46 Do you have an exemption?

	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, what permits do you have? <div style="border: 1px solid black; height: 40px; width: 100%;"></div>
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47 What are your guiding principles for breeding, catching, transporting, handling and killing animals?

Breeding and raising (in extensive systems) Breeding and raising (in intensive systems) Catching (e.g., for live sales) Transporting (e.g., for live sales or game meat production) Offtakes (hunting or culling) Other:	
---	--

48 How do you decide on off-take numbers?

<input type="checkbox"/> Based on customer demand <input type="checkbox"/> Conduct external stocking density assessment <input type="checkbox"/> Conduct internal/own stocking density assessment <input type="checkbox"/> Personal experience <input type="checkbox"/> Other	Specify: <div style="border: 1px solid black; width: 100%; height: 20px;"></div>
---	--

49 What were the off-takes for each species over the last year (or during 2023 if that is easier to calculate) for the methods listed below? For live sales, please provide averages. If you have this in a spreadsheet, would you mind supplying that?

[Click here to go to question 49](#)

50 What do you do with the game meat you produce from both culling and trophy hunting?

	Rank Top Three	
	Small/medium spp: Impala or smaller	Large spp: Larger than Impala
Personal consumption		
Use at own guesthouse		
Give to farm workers		
Sell to farm workers		
Sell through own butchery		
Sell domestically		
Export		

51 If you sell game meat, what % is sold in the following forms, and what prices do you get for each?

	Domestic		Export	
	%	Price/kg	%	Price/kg
Fresh/frozen, Whole carcass				
Fresh/frozen, Select cuts				
Processed (e.g. biltong)				

52 Do you find game meat production to be profitable?

- Yes
- No
- Don't know

Please explain:

53 If you produce meat from both livestock and wildlife, which is more profitable?

- Wildlife
- Livestock

54 What are the difficulties or barriers with selling game meat? (e.g. becoming compliant with meat handling act, rules for selling commercial meat)

55 What type of fencing do you have?

Perimeter		Internal	Breeding camps
<input type="checkbox"/> No fencing <input type="checkbox"/> Cattle <input type="checkbox"/> Game, Bonox/veldspan <input type="checkbox"/> Game, Stranded <input type="checkbox"/> Electrified <input type="checkbox"/> Trip wire	Length	<input type="checkbox"/> No fencing <input type="checkbox"/> Cattle <input type="checkbox"/> Game, Bonox/veldspan <input type="checkbox"/> Game - Stranded <input type="checkbox"/> Electrified <input type="checkbox"/> Trip wire	<input type="checkbox"/> Cattle <input type="checkbox"/> Game, Bonox/veldspan <input type="checkbox"/> Game - Stranded <input type="checkbox"/> Electrified <input type="checkbox"/> Trip wire

What is the total perimeter length?

If you have breeding camps, what size are they?

56 If you use trip wires, what height are they from the ground?

Is the fence predator proof? Please describe:

57 How long has your farm been used for wildlife ranching? Did you convert from another form of farming?

58 If you converted, in what way have the veld conditions improved and how do you verify that improvement?

59 How many positions to run your farm are skilled/unskilled?					
		Permanent		Temp.	Total
		Male	Female		
	Unskilled Labourers / Staff				
	Skilled Labourers / Admin Staff				
	Management Staff				
60 Number of previously disadvantaged persons and women in highly skilled (paid) and management jobs					
61 What is the minimum you pay your unskilled staff members?					
	Daily Rate		Monthly wage		
62 Please tick all non-obligatory benefits at least 75% of the people who work for you receive?					
	<input type="checkbox"/> At least more than 10% over minimum wage				
	<input type="checkbox"/> Medical aid Medical care				
	<input type="checkbox"/> Pension Fund				
	<input type="checkbox"/> Funeral cost insurance coverage				
	<input type="checkbox"/> Housing on facility: with family Housing benefits				
	<input type="checkbox"/> Housing on facility: w/o family (no housing benefits)				
	<input type="checkbox"/> Transport (money)				
	Other: Specify				
63 On average, what is the number of formal training/skills development days per staff member per year?					
64 Is there any explicit skills development and other capacity building for staff members working with wildlife? E.g. training for game scouts; anti-poaching; hunting; skinning; butchering; etc.					
	<input type="checkbox"/> Yes	If yes, briefly describe:			
	<input type="checkbox"/> No	What are specific measures for health & safety training?			
65 What is the legal entity / governance structure of your farm/ranch? (if in no other document)					
	<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Private Company (Pty Ltd) <input type="checkbox"/> Public Company (Stock Exch) <input type="checkbox"/> Partnership <input type="checkbox"/> Personal Liability (Inc) <input type="checkbox"/> Non-Profit Company (NPC) <input type="checkbox"/> Not Incorporated <input type="checkbox"/> Do not know			Comment (e.g., partners, board/governance institutions,...):	
	Other: Specify				
66 Do you have a business plan? (only ask if no copy is provided)					
67 How old is the business plan (in years)? (only ask if no copy is provided)					

68 Is this facility your primary source of income?		
<input type="checkbox"/> Yes <input type="checkbox"/> No	If no, what is your primary income source?	
	How much does the ranch/farm earn in comparison (in %)?	
69 What was your gross income/turnover for the entire operation and for the wildlife based operations over the last year, or during 2013?		
the entire enterprise:		
the wildlife based operations of the enterprise:		
carbon sequestration or other new nature-based income streams:		
70 On average, what % of your gross wildlife income/turnover are reinvested into the game farm; i.e., the maintenance and restoration of the ecosystem functioning (e.g. soil erosion, invasive species mgt., ...)?		
71 What is currently more profitable, wildlife ranching (ALL forms of wildlife use), livestock ranching, or exclusive photographic tourism? Why?		
<input type="checkbox"/> Extractive Wildlife <input type="checkbox"/> Livestock <input type="checkbox"/> Phototourism	Please explain:	
72 Please rate the financial health (profitability) of the wildlife sections of your enterprise?		
1=Looming Bankruptcy 2=Short-term Losses 3=Breaking Even 4=Profitable 5=Very Profitable		
73 For your game meat production, please outline the supply chain (from your ranch/farm to the final consumer)		
74 How do the profit margins of game meat compare to other wildlife use options?		
Please, list up to three products/services with the highest profit margins on your ranch/farm:		
1		If game meat is not among the top three why are you producing and selling game meat?
2		
3		
75 Except the wage bill, what were your 3-5 highest types of expenses (in % of total expenses) in the past five years?		
	Rank	Expense Type (e.g. diesel, supplements, etc.)
	1	
	2	
	3	
	4	
	5	
76 What are the top supplies you source from local businesses (max 5)?		
	Rank	Expense Type (e.g. diesel, supplements, etc.)
	1	
	2	
	3	
	4	
	5	

77	What is the area of the property that allows communities access/use/benefit-sharing (ha)?	
78	What arrangements exist with communities to allow access/use/benefit-sharing?	
79	Do you engage with your neighbouring communities regularly or are you involved in the LED planning (local economic development)	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, briefly describe:
80	What percentage of the ranch/farm is under PDI ownership? (previously disadvantaged)	
81	What is your current BBBEE status?	
	<input type="checkbox"/> Unrated <input type="checkbox"/> Exempted Rated - Level:	
82	Are there any land claims or are you aware of any cultural heritage sites on the property?	
83	Please rate the engagement of your ranch/farm in the following activities since 2015	
	0=None 1=Once off 2=Irregular (occasionally) 3=Regular(conscious planning)	
	Implementation or sponsorship for skills development opportunities and family-related programmes (e.g., family planning, HIV-/AIDS, ...)	
	Mentorship of new entrants to the Wildlife Economy Sector	
	Active part in the delivery of basic services & infrastructure in the community (expenditure or effort)	
	Active part in enhancing the social and economic welfare in neighbouring communities (e.g., poverty alleviation, education, health care, safety & security,...)	
	Other - Specify:	