

“It is in my blood to conserve” – Indigenous knowledge related to human-wildlife coexistence

The interconnections between veld product-related livelihoods and solving human-wildlife
conflict in the Kalahari Desert

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Human-wildlife conflict (HWC) is one of the most significant conservation conflicts and sustainability challenges of our time, with one of its key causes being land use conflicts among people in areas where wildlife is present. Promoting coexistence through increased tolerance towards wildlife is currently seen as one of the most important solutions to the conflict. For coexistence to be successful, cultural dimensions of affected people must be considered. Livelihood diversification based on Indigenous knowledge offers long-term opportunities for this type of biocultural conservation, which emphasizes the interconnections between cultures and the protection of biodiversity. In this study I investigate how this type of culturally sensitive conservation is currently implemented from the perspective of Indigenous San veld product harvesters who are affected by the conflict, and how they hope the situation will change in the future. I achieve this by examining the harvesters' views on HWC, their veld product-related livelihood practices, and their pursuit for coexistence.

I conducted my research in the villages of Bere and New Xade, among the local, Indigenous San people. The villages are located in the Ghanzi District, Botswana. I collected the data for my thesis by organizing two future studies-oriented participatory backcasting workshops in both villages, and a participatory mapping workshop of veld products in Bere. I enriched the research data from the workshops with nine interviews involving 13 harvesters. I analyzed the results of the participatory backcasting workshops and interviews using a theory-guided content analysis and the mapping results using optimized hot spot analysis.

My thesis showed that HWC has intensified due to government restrictions on practicing traditional livelihoods and relocations of the San from protected areas. The partial abandonment of hunting and gathering and the transition to livestock farming poses threats to livestock animals and has resulted in significant financial losses among the communities. While communities largely support the peaceful management of human-wildlife conflict and coexistence with wildlife, indications of these attitudes weakening can be observed within the communities. The most important requirement for successful coexistence was found to be a reciprocal relationship with nature. The practice of traditional livelihoods has sustained such a relationship, in which people perceive themselves as part of their environment. In the future, the communities hope to maintain a close connection with nature by ensuring the viability of traditional livelihoods by improving processing opportunities of veld products and market access. Securing the availability of these plants as climate change alters growing conditions, and increasing local-level decision-making power, were also identified as important factors promoting livelihood diversification and supporting the realization of coexistence.

Keywords: human-wildlife conflict, human-wildlife coexistence, Indigenous knowledge, biocultural conservation, veld products, participatory methods

Tutkinto-ohjelma, oppiaine: Maantiede, Filosofian maisteri, Maantieteen linja

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Otsikko: *”Luonnonsuojelu on minulla verissä”* – Ihmisen ja villieläinten rinnakkaiseloon liittyvä alkuperäistieto: Keräilyelinkeinon harjoittamisen ja ihmisen ja villieläinten välisen konfliktin väliset yhteydet Kalaharin autiomaassa

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Ihmisen ja villieläinten väliset konfliktit ovat yksi aikamme merkittävimmistä luonnonsuojeluun liittyvistä kiistoista ja kestävyyshaasteista. Niitä kärjistävät erityisesti ihmisten väliset maankäyttöristiriidat alueilla, joilla villieläimiä esiintyy. Merkittävänä ratkaisuna ongelmaan nähdään ihmisen ja villieläimen välisen rinnakkaiselon edistäminen, mikä edellyttää paikallisten kulttuuristen ulottuvuuksien huomioimista. Alkuperäistietoon perustuva elinkeinojen monipuolistaminen tarjoaa mahdollisuuksia tämänkaltaiseen biokulttuuriseen luonnonsuojeluun, joka korostaa kulttuurien merkitystä luonnonympäristöjen monimuotoisuuden suojelussa. Tutkielmani tavoite on ymmärtää, kuinka paikalliset huomioiva luonnonsuojelu toteutuu San-alkuperäiskansaan kuuluvien hyötykasvikeräilijöiden näkökulmasta, ja miten he toivovat tilanteen muuttuvan tulevaisuudessa. Analysoin, millaisia näkemyksiä paikallisilla yhteisöillä on ihmisen ja villieläinten välisestä konfliktista, alkuperäistietoon perustuvan elinkeinon harjoittamisesta sekä rinnakkaiselon tavoittelusta keräilyelinkeinoja harjoittamalla.

Toteutin tutkimukseni Beren ja New Xaden kylissä paikallisen San-alkuperäiskansan keskuudessa. Kylät sijaitsevat Ghanzin maakunnassa Botswanassa. Keräsin tutkielmani aineiston järjestämällä molemmissa kylissä kaksi osallistavaa tulevaisuustyöpajaa sekä hyötykasvien kartoitustyöpajan Beressä. Täydensin työpajoista saatua tutkimusaineistoa yhdeksällä haastattelulla, joihin osallistui 13 kyläläistä. Analysoin osallistavien tulevaisuustyöpajojen ja haastattelujen tulokset teoriaohjaavalla sisällönanalysillä ja kartoitustulokset optimoidulla hot spot -analyysillä.

Tutkimukseni osoitti, että yhteisöjen ja villieläinten välinen konflikti on kärjistynyt Botswanan hallituksen asetettua rajoituksia perinteisten elinkeinojen harjoittamiselle, yhteisölähtöiselle luonnonvarojen hallinnalle sekä luonnonsuojelualueilla asumiselle. Siirtyminen metsästäjä-keräilijä elinkeinosta karjankasvatukseen, jossa villieläimet aiheuttavat vaaran kotieläimille, aiheuttaa huomattavia rahallisia menetyksiä kyläläisille. Vaikka yhteisöt suhtautuvat pääasiassa yhä myönteisesti rinnakkaiseloon villieläinten kanssa, merkkejä näiden asenteiden heikkenemisestä on havaittavissa. Tärkeimmäksi edellytykseksi ihmisen ja villieläinten välisen rinnakkaiselon toteutumiselle osoittautui luontosuhde, jossa ihminen näkee itsensä osana ympäristöään. Perinteisten elinkeinojen harjoittaminen on ylläpitänyt tällaista vastavuoroista luontosuhdetta. Yhteisöt toivovat voivansa säilyttää tiiviin luontosuhteen varmistamalla perinteisten elinkeinojen kannattavuuden kehittämällä hyötykasvituotteiden jalostusta ja parantamalla pääsyä markkinoille. Myös hyötykasvien saatavuuden turvaaminen ilmastonmuutoksen muuttaessa kasvuolosuhteita nähtiin tärkeänä elinkeinojen monipuolistamasta edistävänä tekijänä, joka voi tukea rinnakkaiselon toteutumista.

Avainsanat: ihmisen ja villieläinten välinen konflikti, ihmisen ja villieläinten yhteiselo, biokulttuurinen luonnonsuojelu, alkuperäistieto, hyötykasvit, osallistavat menetelmät

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1 Introduction

One of the consequences of humans' extensive modification of the Earth's surface is human–wildlife conflict (HWC) (Alba-Patino et al. 2025). It is among the most pressing sustainability challenges and conservation conflicts of our time (Brackowski et al. 2023). HWC refers to emerging socio-economic and environmental problems when people and wildlife struggle to share overlapping areas (Hill et al. 2017: 2; IUCN 2023; Kansky et al. 2024). HWC negatively impacts both the well-being of often impoverished rural communities and perceptions towards wildlife and their protection (Brackowski et al. 2023).

Since the late 1990s there has been a focus in HWC research on working towards coexistence between humans and wildlife instead of trying to separate them to avoid conflict (Jolly & Stronza 2025). HWC management methods have changed from wildlife damage control methods to finding long-term solutions to the conflict by addressing its complexity and human dimensions (Kansky 2022). This refers to addressing both the ways humans contribute to the creation of these conflicts, as well as how they can, through behavioral changes, help manage them.

HWC disproportionately affects Indigenous, vulnerable communities that have often coexisted with wildlife for generations due to their knowledge and intimacy with the natural world (Pyle 2003; Brackowski et al. 2023). Now, this coexistence has been disrupted by separating Indigenous people from their lands and wild animals, which has been reinforced by conservation efforts related to creating protected areas devoid of humans (Kabra 2009; Pettersson et al. 2022; Jolly et al. 2023). Recently, the importance of Indigenous ways of life in ensuring coexistence have been increasingly realized through community-based conservation (CBC) (Brooks et al. 2013; Galvin et al. 2018; Jolly & Stronza 2025). Community-focused initiatives realize that protecting biodiversity is not related only to ecological relationships, but ultimately to how people relate to nature through their cultures and identities (Jolly & Stronza 2025). One community-focused solution to enhance coexistence is livelihood diversification (Nyhus 2016). It has the potential to decrease dependence on a single income, such as livestock

management, which increases vulnerability to HWC (FAO 2004: iv; Habib et al. 2023). This may ultimately increase tolerance towards wildlife while protecting local practices and culture.

Coexistence has long been connected to Indigenous ways of being and related to their livelihoods (Jolly & Stronza 2025). Indigenous knowledge (IK) provides opportunities for realizing human and natural capital in communities affected by HWC (Upreti et al. 2016). IK refers to complex place-specific ways of knowing, acting and transmitting knowledge, which is guided by local Indigenous ideologies, beliefs and worldviews (Fernández-Llamazares et al. 2021; Mistry et al. 2021). IK is deeply connected to a specific place and has throughout centuries been used to cope with changes in the environment (Mistry et al. 2021). Since it is owned by Indigenous people, it is a way to enhance community development from the inside (Fernández-Llamazares et al. 2021). By using IK as the basis for livelihood diversification communities can simultaneously protect their incomes and heritage, while conserving wildlife.

HWC has become a prevalent issue in Ghanzi District, Botswana due to its geographical location between protected areas and competing land use between rural community settlements, livestock farming and wildlife habitats (Schiess-Meier et al. 2007; CI 2008; Klein 2013; Karunya Consulting et al. 2020: 83). The San communities living in the area have coexisted with wild animals through millennia by benefiting from them through their traditional livelihoods (Twyman 2000). However, due to displacements from ancestral lands and restrictions on practicing traditional livelihoods, the communities are slowly being assimilated into the modern economy, where humans and wild animals are seen as inherently separate.

Several CBC solutions to HWC have been explored in Botswana, mainly within the Community Based Natural Resource Management (CBNRM) framework, where the aim is to incentivize environmentally friendly behaviors through increasing communal benefits from nature (Gupta 2017; Mbaiwa 2018; Chitsove, E., & Madebwe 2024). However, these solutions often focus on only benefiting monetarily from wildlife (Cassidy 2021). Veld products remain largely unexplored within the context of CBNRM and coexistence, even though the products' ecological, economic and cultural value

has been recognized (Brinkhurst 2010; Cassidy 2021; Tshukudu 2024). Currently, the CBNRM framework is at cross-roads, which offers possibilities to improve it (Cassidy 2021). Livelihoods based on veld products could offer a useful way for communities to maintain their cultural connections to the land, while creating economic benefits that could decrease dependence on livestock farming as a conflict prone livelihood (Nyhus 2016; Carter & Linnell 2016; Pooley et al. 2021; SADC TFCA 2026:8).

My study contributes to increasing understanding of how San communities in the villages of Bere and New Xade perceive HWC as a conservation conflict and veld product-related livelihoods as a possible solution to it. My research primarily focuses on the present, while also examining these communities' desired futures for 2035. My study addresses these three research questions:

1. How is human–wildlife conflict (HWC) currently managed among San communities in Ghanzi District, Botswana, and how do the communities envision HWC management in the future?
2. What kinds of veld product–related livelihood activities are San communities currently practicing in Ghanzi District, Botswana, and how do they hope these activities will develop in the future?
3. How do veld product-related livelihoods support human-wildlife coexistence now and in the future?

To address these research questions, I combined participatory future studies methodology with interviews and participatory mapping in a novel way. I organized two participatory backcasting workshops in Bere and New Xade for veld product harvesters regarding HWC and veld products in February 2026. In Bere, I organized an additional participatory mapping workshop regarding the distribution of veld products. In addition, I organized five semi-structured thematic interviews for harvesters in Bere and four interviews for harvesters in New Xade. I analyzed the mapping results using optimized hot spot analysis and the workshop and interview results using a theory-guided qualitative content analysis. In conclusions, I highlight the most significant findings that emerged in the thesis in relation to my research questions.

2 Human-wildlife conflict, coexistence and Indigenous knowledge-based livelihoods

2.1 Human-wildlife conflict and management

HWC is a complex concept and has been defined in several ways, which mainly differ in who is seen as the perpetrator of the conflict and how the conflict is positioned on an anthropocentric-ecological axis. Woodroffe and their colleagues (2005; 1-2) and König and their colleagues (2020) refer to HWC as an interaction between people and wildlife, which includes crop raiding, livestock depredation and the killing of people, which must be resolved to conserve wildlife. Their definitions highlight especially the direct challenges human and wildlife co-occurrence causes for humans and see wildlife as perpetrators of negative interactions. Even though human losses are at the center of the definitions, they nevertheless point out the need to resolve the issue to protect wildlife, and don't therefore see HWC as merely a problem caused by wildlife negatively impacting humans, (Nyhus 2016). Definitions focusing primarily on the ecological impact of HWC also exist. HWC can be seen as a resource competition between humans and wildlife (Peterson et al. 2010), interactions leading primarily to wildlife decline (Treves & Santiago-Avila (2020) or as an evolutionary pressure influencing species survival (Schell et al. 2021).

The most recent definitions of HWC consider the complexity of HWC and connect it to a wider socio-ecological discourse. The definition by Braczkowski and their colleagues (2023) highlights the unequal burden of especially human-carnivore conflict. According to this definition, HWCs are spatially and socially distributed negative interactions between people and wildlife often co-occurring with vulnerable communities. This causes increased costs for already impoverished households. Alba-Patino and their colleagues (2025) define HWC as a complex issue arising due to the real or perceived threats of wildlife to humans, but not necessarily as caused by wildlife. Ma and their colleagues (2024) similarly discuss the complexity of HWC by pointing out how solutions to the issue need to consider simultaneously wildlife conservation, human development and be spatially explicit. These scholars therefore see HWC as a multi-

layered sustainability issue disproportionately affecting vulnerable humans and animals.

The concept of HWC has been challenged by suggesting that a human-human social conflict underlies HWCs (Nyhus 2016; Haage 2023). Here, animals are not seen as central agents in the conflict, but rather as victims of disagreements between different groups of people over how wildlife should be managed and ultimately, what the relationship between humans and nature is (Redpath et al. 2013; Hill et al. 2017: 3; Haage 2023). Therefore, HWC can be seen as a human-human conservation conflict, related to various understandings of how to use and relate to the land and its natural resources (Redpath et al. 2013; IUCN 2023: vi). Peterson and their colleagues (2010) and Hill (2015) also point out that calling the interaction between humans and wildlife a conflict, frames wildlife as conscious antagonists to humans (Peterson et al. 2010). There is also an increasing concern that the emphasis on conflict may obscure the varied and complex interactions between humans and wildlife and narrow the scope of research and management (Treves & Santiago-Avila 2020; Hill 2021; Pooley et al. 2021). Wildlife offers several benefits for humans, such as ecosystem services, and spiritual, recreational and educational values connected to them (Soulsbury & White 2015; Nyhus 2016; König et al. 2020). Additionally, conflict-oriented framing may strengthen the narrative of humans and nature being fundamentally separate (Pooley et al. 2021).

Based on these conceptualizations and how they have been challenged, I define HWC as a spatially and socially unevenly distributed sustainable development challenge, which is underpinned by conflicts between humans and impacts either humans, wildlife or both negatively. Since the focus is on challenges between humans and wildlife, and the role of humans as the perpetrators of the conflict is recognized, the use of the term conflict is justified. To find context specific and long-term solutions to HWC, it is necessary to consider what factors contribute to it.

Even though HWCs have existed through millennia, they are becoming more frequent and widespread due to various social and ecological factors, which lead to the overlap of wildlife and human populations (Nyhus 2016; Oliva-Vidal et al. 2022; Ma et al. 2024). On a global level, climate change, human population growth, and resulting

urbanization, increased transportation networks, energy production and agricultural expansion lead to interactions between humans and wildlife (Nyhus 2016; König et al. 2020; Pooley et al. 2021). Livestock systems already occupy 30 percent of the planet's ice-free terrestrial surface and are growing especially in the Global South (Nyhus 2016). This gradual loss and fragmentation of habitat have restricted wildlife into smaller pockets of suitable habitat and increased direct overlap with human populations (König et al. 2020; Galley et al. 2024).

The proximity of developed versus protected areas also influence conflict patterns (Nyhus 2016; Galley et al. 2024). Protected areas are the most common strategy globally for protecting biodiversity but can have the downside effect of increasing HWC in nearby areas (Pereira et al. 2024; Alba-Patino et al. 2025). For example, depredation on livestock tends to increase near protected areas (Woodroffe et al. 1998; Inskip & Zimmerman 2009).

As mentioned earlier, HWC is often a consequence of disputes between humans (Redpath et al. 2013; Nyhus 2016; Hill et al. 2017: 3; Haage 2023). It has been argued that social factors, like intolerant human attitudes and behavior may be even more important drivers of resulting persecution against wildlife than the actual wildlife damage (Dickman 2010; Jordan et al. 2020). There is often a difference between perceptions of risk, actual risks and the proportional response to risk (Dickman 2010). Diverse socio-psychological factors, such as beliefs, attitudes and human-human conflicts between authorities and local people on how to manage wildlife or plan land use may impact these perceptions and how people act consequently (Inskip et al. 2014).

Importantly, these beliefs and attitudes are shaped by the context which people live in (König et al. 2020). In areas where legal frameworks and policies such as stable land tenure and access to financial support in case of HWC have encouraged coexistence, perceptions towards wildlife may be positive (Chapron et al. 2014; Nyhus 2016; Jordan et al. 2020). Often these societal structures are stronger in the Global North than in the Global South (König et al. 2020). Stress and anxiety concerning wildlife, as well as marginalization, lack of compensation from conflicts and poverty may strengthen the

intolerance towards wildlife (Galley et al. 2024). Due to this as well as the overlap of rural populations and wildlife in the Global South, vulnerable communities living near protected areas end up bearing the unequal costs of HWC (König et al. 2020; Brackowski et al. 2023).

Due to these various factors contributing to HWCs, which vary in space and time, the range of different HWC types and their consequences is vast. Even though HWC affects a wide range of animal groups and diverse ecosystems (Nyhus 2016) conflicts between threatened, protected animals and humans tend to be more common. This is partly due to restrictions on killing the animals, which leads to negative attitudes towards them (IUCN 2023: 5). Indeed, much literature has focused on protected species of conservation concern, because a major challenge is to balance the protection of endangered species with the needs of local communities (Woodtrotte et al. 2005; Nyhus 2016). Most commonly conflicts occur near agricultural and other production landscapes, such as urban areas, as well as near protected areas (König et al. 2020). The diversity of species contributing to HWC broadens the spectrum of conflict types (Nyhus 2016). In my study, the focus is on human-carnivore conflict, which is significant in many parts of the world (Nyhus 2016). Especially felids and canids are at particular risk for conflict with people due to their large home ranges and physical size and diet, which pose real or perceived threats to humans (Macdonald & Sillero-Zubiri 2004: 108; Inskip & Zimmerman 2009). Consequently, now more than 75 percent of the world's felid species are affected by HWC (Nyhus 2016).

HWCs are associated with threats to wildlife and biodiversity as well as economic and social costs for humans. From an environmental perspective, HWC is related to the larger problem of biodiversity loss globally, because it threatens biodiversity in both terrestrial and marine environments and leads to the decline of species abundance and in most extreme cases, extinction (Nyhus 2016; Oliva-Vidal et al. 2022). HWC directly leads to persecution and killing of wildlife, which jeopardizes conservation efforts and contributes to declines in species and biodiversity loss (Nyhus 2016; Oliva-Vidal et al. 2022). Crop trampling, direct consumption of crops and livestock predation by wildlife have contributed to the significant population declines of large herbivores and carnivores due to human persecution (Ripple et al. 2015; Brackowski et al. 2023). This

loss of diversity has also been proven to have cascading effects on other species and ecosystem functions (Miller et al. 2014; Ripple 2015).

From the perspective of humans, HWC is associated with several social and economic costs, which may in turn challenge conservation management and lead to further HWCs (Lorand et al. 2022). These include economic costs and livelihood loss related to the depredation of livestock and crop-raiding destruction (Nyhus 2016; Galley et al. 2024). However, these costs of HWC are unequally carried often by vulnerable communities in the Global South already suffering from challenges like climate change (Jordan et al. 2020; Brackowski et al. 2023). Additionally, compensation policies of the losses may not be as strong in the global south, reducing tolerance towards wildlife and leading to their killing (Jordan et al. 2020).

Consequently, HWC is seen as an environmental justice issue and conservation conflict (Brackowski et al. 2023; Alba-Patiño et al. 2025). Environmental justice analysis emphasizes the unequal distribution of environmental costs, benefits and associated well-being outcomes and seeks to understand the drivers of this inequality (Martin et al. 2020). The disproportionate burdens vulnerable communities carry and the resulting reduced economic and health-related capabilities exemplify the connection between injustice and HWC. Additionally, the lack of consideration of the identity, values, knowledge, needs of local people suffering from HWC, and their participation in decision planning reflects recognition and procedural injustice (Alba-Patiño et al. 2025). In these cases, where HWC is exacerbated by conservation efforts, HWC can be seen as a conservation conflict, where the goals of different groups of people are not successfully coordinated and lead to unjust results. It is necessary to find ways to manage HWC in environmentally just ways, so that the vicious circle of human-caused problems leading to negative impacts on both wildlife and vulnerable communities can be stopped. Finding solutions to HWC contributes to the Sustainable Development Goals of protecting life on land and eliminating hunger and poverty (Brackowski et al. 2023).

2.2 Human-wildlife conflict management and coexistence

HWC management refers to efforts made to reduce the negative impacts of HWC (Dubois et al. 2017). The management methods range from directly reducing HWC damage by separating humans and wildlife to working towards coexisting in shared landscapes, depending on what the desired outcome is. When talking about HWC management, it is important to consider what the objectives of management are (Conover & Conover 2022: 10). Here, the question is whether HWC managed for the benefit of wildlife, mankind or for the benefit of both.

Roughly, HWC management strategies can be divided into wildlife damage control and managing human behavior (Nyhus 2016). Wildlife damage control methods can be categorized into lethal and non-lethal approaches, which both aim to prevent conflict or to reduce its frequency or severity. Lethal control has often proven to be unsuccessful, and it has led to declining wildlife populations. Non-lethal control approaches are preferable especially with species of conservation concern. These methods include translocation and methods to separate wild animals from people and livestock by using mechanical barriers, guarding animals or deterrents.

Declining wildlife populations, the lack of efficiency in wildlife damage control methods and the acknowledgement of HWCs as initially human-induced problems has shifted HWC management focus (Dubois et al. 2017). It has become clear that HWC is a complex problem which requires nuanced, holistic and transdisciplinary approaches to be solved (Kansky 2022). Addressing the human dimensions of the conflict may be a more effective way to reduce conflict than methods to reduce wildlife damage (Nyhus 2016). In the human-wildlife coexistence discourse the focus is on addressing the root causes of the problem and working on them, rather than only solving the problematic outcome (Dubois et al. 2017).

It is seen that developing a culture of coexistence is necessary, not only to manage HWC but also to succeed in long-term conservation (Dubois et al. 2017; Pooley et al. 2021). Coexistence refers to a sustainable and dynamic state, in which humans and wildlife adapt to live in shared landscapes through increased tolerance towards wildlife (Carter & Linnell 2016; König et al. 2020; Pooley et al. 2021). The concept reframes the

interactions between humans and wildlife by challenging the idea of humans and wildlife as antagonists to one another (Pooley et al. 2021). Since the concept of human-wildlife coexistence has arisen to challenge the concept of seeing interactions between humans and wildlife as conflicts per se, it may suggest that in a state of coexistence, there is no conflict (Hill 2021). However, according to Carter & Linnell (2016) tolerable risk levels are a part of coexistence.

Laws, policies and conservation programs influence people's decisions to coexist with wild animals (Woolaston et al. 2021). However, increased tolerance towards wildlife is shaped also by several community specific, interconnected factors, which remain rather unexplored (Bahetoleng & Stronza 2026). First, ensuring that community needs and benefits are balanced with conservation goals is essential (SADC TFCA 2026:8). In a state of coexistence, wildlife presence cannot pose significant threats to livelihoods, since economic vulnerability predicts negative attitudes towards wildlife (Carter & Linnell 2016; Nyhus 2016; SADC TFCA 2026:8). Here, it is important to note that coexistence is not a framework designed by mainstream conservation (Jolly & Stronza 2025). Indeed, several communities have coexisted with wild animals peacefully through millennia. In some cultures, animals are for instance perceived as knowledge holders and teachers of the environment (Álvares et al. 2011; Ghosal & Kjosavik 2015; Pettersson et al. 2022; Jolly et al. 2023). Benefits from wild animals have not therefore meant only monetary gains, but lessons of survival through nature.

Second, although not researched a lot in the context of coexistence and neglected in conservation research in general, nature connectedness and relational values to nature are essential for the development of pro-environmental behaviors (Barragan-Jason et al. 2023). A connection to nature is formed through physical and psychological connection to nature (Hatty et al. 2022; Barragan-Jason et al. 2023) and indeed also coexistence occurs where people share a history and reciprocity with wild animals (Salmón 2000; Jolly et al. 2023; Kimmerer 2013). This requirement for coexistence cannot be separated from the previous requirement related to benefits from living with wildlife. For instance, when wild animals are seen as teachers of the environment, the community does not only materially benefit from their knowledge but also builds a stronger, reciprocal relationship with the wild animals due to these benefits (Jolly & Stronza

2025). Currently, the loss of knowledge and intimacy with the natural contributes to HWC (Fiasco & Massarella 2022).

Third, coexistence depends on community involvement and adaptive strategies that respond to changing environmental and social conditions, including climate change (SADC TFCA 2026:8). Communal agency and context-specific problem solving are therefore important in fostering coexistence (Carter & Linnell 2016; Pooley et al. 2021). This includes involving communities in designing and implementing solutions to HWCs, which has been increasingly promoted in recent years (Kansky 2022).

2.3 Working towards coexistence through community development

The rise of participatory initiatives and grassroots movements in development, also referred to as ‘bottom-up approaches’, is related to the notion that to accomplish long-term development, programs detached from the communities cannot reach desired outcomes (Titz et al. 2018). This has reflected a major change in development work and increased the focus on local scale and context-specific solutions. Community development has remained a highly relevant topic when global inequalities have continued to rise and challenges to reach the Sustainable Development Goals have become apparent (Gilchrist & Taylor 2022: 4). Community development is carried out in multifaceted ways by both academics and practitioners leading to a conceptual and practical pluralism (Matarrita-Cascante et al. 2012).

The concept of community is used widely in development research to refer to people connected by social relations, space, identity or resources (Titz et al. 2018). Although there are differences between definitions of community, most of them acknowledge interactions and interdependence between community members (UNHCR 2008; Matarrita-Cascante et al. 2012; Titz et al. 2018). Generally, development refers to processes and outcomes of social change which can be seen as economic progress, increased social well-being or improved political or environmental conditions (Sumner 2022). Community development is seen as a process in which communities establish ways to promote their economic opportunities, participation, human rights and equality (Matarrita-Cascante & Brennan 2022). What is common to recent definitions of community development is the desire to increase community engagement and capacity

to work towards collective resilience (Gilchrist & Taylor 2022: 4 & 15). There is also a focus on place-based solutions instead of general development theories (Matarrita-Cascante & Brennan 2012). Community development should also recognize communities as heterogeneous, since power dimensions and divisions exist within a community due to the diversity of its members (Gilchrist & Taylor 2022). A romanticized portrayal of communities as harmonious and homogenous entities may lead to the wrongful interpretations of communities and their challenges (Titz et al. 2018).

In the context of managing HWC, community development can take the form of community-based conservation (CBC). Overall, it is seen as a context specific conservation method based on the idea that long-term conservation success requires not only successful biodiversity conservation but also engaging with and providing benefits for communities (Brooks et al. 2013; Galvin et al. 2018). Therefore, CBC requires seeing the environment as a socio-ecological system, in which ecological and social components are interconnected and -dependent (Kansky et al. 2022). Communal approaches in the context of conservation are also supported by the argument that strategies to protect biodiversity must be place-based and context sensitive (Armitage et al. 2020). Context specific approaches, like CBC can consider local tolerance towards certain species affected by for instance history and political dynamics better than generic strategies (König et al. 2020; Kansky et al. 2020).

The human-wildlife coexistence discourse can be seen as a subtype of CBC, since they have the same goal of ensuring both human and wildlife well-being (Galvin et al. 2018). Integral parts of coexistence and CBC are community engagement, capacity building through increased resilience and place-based adaptation to a changing environment (Brooks et al. 2013; König et al. 2020). In Sub-Saharan Africa, especially the ecological outcomes of CBC have often been positive (Galvin et al. 2018). These include positive impacts on wildlife, improved biodiversity metrics and better ecosystem conditions. However, the impacts on communities have been more varied.

In Sub-Saharan Africa, CBC efforts typically fall under the framework of community based natural resource management (CBNRM) (Kansky et al. 2020). CBNRM is an economic approach practiced since the 1980s, where the assumption is that monetary

compensation can be used to buy the tolerance of affected communities to foster positive attitudes towards the environment (Kansky et al. 2020; Adeyanju et al. 2021). In practice, this means that, for instance, the government gives local communities lease rights to wildlife, which they can sell to tourism operators in the area (Stone 2017: 81; Cassidy et al. 2023: 3). CBNRM aims to empower communities to sustainably manage natural resources and protect their environment through participation and decentralization (Adeyanju et al. 2021).

CBNRM initiatives have had mixed results (Mbaiwa et al. 2014). Some of them have successfully reached the goals of improving rural livelihoods and biodiversity conservation. However, if locals have not had the skills to carry out CBNRM practices or there has been a lack of long-term capacity building and social cohesion, projects have collapsed. The initiatives have often been externally driven, disconnected, and designed with little community involvement (Cassidy 2021). Additionally, the benefits of participating in wildlife management have not always outweighed the costs of the negative impacts of wildlife (Kansky 2022). To reduce inequalities and increase tolerance towards wildlife in the long run, the behaviors, attitudes and practices must be modified to increase tolerance, but in ways that acknowledge context-specific socio-ecological factors, such as local culture, community needs and knowledge (Jordan et al. 2020). Depending on only one income, such as livestock management reduces the tolerance to HWC, which may further deepen the problem (Yeshey et al. 2023; Pereira et al. 2024).

A coexistence-focused and community-oriented method to reduce this intolerance is livelihood diversification (Nyhus 2016). Livelihood includes income, social and institutional factors and networks such as social relations as well as access to public services, which make livelihood activities possible (Ellis 1998). Ellis (1998) defines livelihood diversification as a process in which “*rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standard of living*”. Still in the 2020s research focusing on livelihood diversification often refers to this definition (Achiba 2018; Sun et al. 2023). Widening options by diversifying livelihoods can be considered a safety net for communities (Sun et al. 2023). It can contribute to improving household income, strengthening skills and

ultimately reducing inequality by increasing resilience, adaptive capacity and tolerance in crisis situations (FAO 2004: iv; Habib et al. 2023).

Two broad perspectives have been developed to explain why rural households diversify their livelihoods (Achiba 2018). The first suggests that economic diversification is an adaptation to risks. This perspective suggests that there are push drivers to diversify livelihoods. The risks are a combination of natural or human-induced challenges combined with a vulnerability to them. Indeed, livelihood diversification can be response to livelihood vulnerability, which Pereira and their colleagues (2024) define as *“the degree to which livelihoods are susceptible and unable to cope with adverse pressures”*. Factors influencing livelihood vulnerability include the exposure to stressor-driven change, the sensitivity to change and the ability to implement effective responses to changes by minimizing, coping with or recovering from the impacts of the stressor (Pereira et al. 2024). Livelihood diversification is especially related to the latter, since it increases the adaptive capacity of communities without compromising from conservation efforts (Sun et al. 2023). An alternative perspective suggests that livelihood diversification is driven by pull-factors, instead of a response to risks to livelihoods (Achiba 2018). In this case, often non-farm or livelihood-related are seen as compelling, because they offer more stable returns. In many cases, livelihood diversification is a result of the combination of both push and pull factors.

Livelihood diversification as a coexistence method can be examined within the Sustainable Livelihood Framework (SLF) (Morse 2025). The Department for International Development (1999) proposed the framework as a comprehensive theory to present the factors influencing people’s livelihood choices. According to this framework, households use five assets, which are human, natural, financial, physical and social capitals, to obtain positive livelihood outcomes (Sun et al. 2023). Human capital consists of factors such as the number of laborers, their education level and health. Natural capital relates to the area of land operated by a household. Financial capital is indicated by the access to inclusive finance and physical capital refers to the access to equipment and infrastructure, such as agricultural production tools. Finally, social capital relates to social connections. In addition to these assets local push factors, such as regulations on resource use and crisis situations like HWC, or pull factors, such

as good access to markets may influence which livelihood strategy is chosen (Achiba 2018).

In general, a higher capital in all five assets supports livelihood diversification (Habib et al. 2023). A systematic review on livelihood strategies, however, revealed that human and natural capitals are significant factors influencing livelihood diversification. An example of human and social capital is IK, which can provide necessary skills for livelihood diversification and guide the use of natural capital, as well as be strengthened when these various livelihoods are practiced (Uprety et al. 2016). IK is owned by Indigenous people, which form one of the most vulnerable groups in the world (Spoon 2014). Therefore, applying IK in livelihood diversification may also reduce the inequalities these groups of people suffer from.

2.4 Indigenous knowledge in livelihood diversification

Globally, there are over 476 million Indigenous people that form over 5000 distinct groups in 90 different countries (United Nations 2025a). The International Labor Organization, Article 1 (1989) defines Indigenous People as

“tribal peoples in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations.”

Even though there is significant heterogeneity between these groups of people, they have in common a historical continuity with a given region and a strong link to the land they inhabit. Indigenous Peoples also have distinct social, economic, and political systems which they maintain and develop as well as their own languages, cultures, beliefs and knowledge systems (United Nations 2025a).

Indigenous peoples also have challenges in common (United Nations 2025b). In the colonial past Indigenous peoples have been excluded, marginalized or discriminated against by outside hegemonic forces (Spoon 2014). Colonialism reduced Indigenous populations and removed people from their ancestral lands. Since the social structures of these people are connected to the land, decreasing the access to it striped

Indigenous peoples also of their cultures and knowledge. To this day, Indigenous people suffer from inequality and are one of the most disadvantaged and vulnerable groups of people in the world fighting for their identities, rights to land and resources (United Nations 2025b).

Generally, IK refers to complex place-specific ways of knowing, acting and transmitting knowledge, which is guided by local Indigenous ideologies, beliefs and worldviews (Fernández-Llamazares et al. 2021; Mistry et al. 2021). IK is a broad and heterogeneous concept, but still different IK bases around the world have similar characteristics. It has developed through social learning and cultural evolution (Berkes 2017: 272-273). IK exists within a knowledge-practice-belief complex, in which beliefs and ideologies, such as responsibility and reciprocity guide practices and learning, through which knowledge accumulates (Berkes 2017: 18). It is held collectively and transmitted generally from generation to generation orally or through learning by doing (Spoon 2014; Mistry et al. 2021; Fernández-Llamazares et al. 2021). IK is relational by nature, meaning that it often includes all living things, non-living things and supernatural beings that interact in space and time (Mistry et al. 2021). Indeed, central to IK is often a strong emphasis on fostering reciprocal and responsible relationships between humans and non-humans (Fernández-Llamazares et al. 2021).

IK practices are dynamic by nature, because they have had to adapt to changes in the natural, social and cultural environment through time to ensure the survival of Indigenous peoples (Mistry et al. 2021). Consequently, the concept Indigenous is often used instead of traditional, because the latter can be associated with stagnation (Berkes 2017: 4). However, long roots have made IK time-tested and wise. Indeed, crisis learning is an important part of the development of IK (Berkes 2017: 273). Therefore, when researching IK, it is also important to consider its change over time and what influences this change (Mistry et al. 2021).

IK has often been contrasted with modern, scientific knowledge (Cassidy et al. 2011: 77). Scientific knowledge is often abstract and analytical, whereas IK represents a way of knowing that closely relates to a certain context and practical ways to manage it (Fernández-Llamazares et al. 2021). IK is based on a thorough understanding of the land

and relationships within it (Fernández-Llamazares et al. 2021). Consequently, the alienation of many non-Indigenous people from nature has contributed to environmental problems, when the connection to the environment has been lost (Berkes 2017: 2).

Recently, efforts to improve the well-being of Indigenous peoples have been carried out to both protect their cultures and rights and to enhance sustainability (Muzah 2016: 69–70; Mistry et al. 2021; Fernández-Llamazares et al. 2021; United Nations 2025b). IK plays a critical role in protecting the biological and cultural diversity on our planet (Fernández-Llamazares et al. 2021). According to the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES 2019) over a quarter of the global land area is traditionally owned, managed or used by Indigenous peoples. In these areas, nature is declining less rapidly compared to other lands indicating that Indigenous ways of living enhance sustainability.

By looking at the characteristics of IK, it is possible to understand why it is such a powerful tool for working towards biocultural conservation and sustainability. Since Indigenous cultures and ways of knowing are related to using land sustainably to survive, protecting Indigenous peoples also protects the land they inhabit (Fernández-Llamazares et al. 2021). On the other hand, ensuring the land is protected and that Indigenous people have access to it protects their knowledge and identities. Indigenous peoples have also lived through several changes in their environment and found ways to adapt their knowledge to the current environment (Spoon 2014). Now there is an increasing understanding of how this adaptive capacity can be beneficial in dealing with changes in the environment, such as HWC (Mistry et al. 2021).

However, the use of IK should not be seen as a miracle solution to sustainability problems without examining its limitations. Despite ideologies that often support sustainable management practices and living in harmony with nature, Indigenous peoples do not always follow their ideologies, or the ideologies may be forgotten for some time (Berkes 2017: 251). Considering this prevents exoticizing Indigenous peoples and their ways of living and emphasizes the dynamic characteristic of IK (Sinthumule 2025). Similarly to Western science IK may be incomplete, proven wrong or

misinterpreted (Berkes 2017: 251). Yet, this does not mean that IK should not be applied but rather that it requires critical examination like scientific knowledge.

Even though international policy increasingly realizes the importance of including various value systems and knowledges in policy development and decision making the pace and scale of modern pressures severely threaten it (Fernández-Llamazares et al. 2021). IK is decreasing globally due to suppression, misinterpretation and appropriation of Indigenous cultures, land and resources, assimilation, disconnection from territories and the destruction of heritage and ecosystems. These are consequences of the centuries-long discrimination against Indigenous peoples, contributing to, for instance, lacking land tenure rights, or recent megatrends such as economic and cultural globalization and urbanization (Berkes 2017: 247; Fernández-Llamazares et al. 2021). Also decreasing biodiversity and ecosystems threaten the availability of resources to which IK is related to (Mbelebele et al. 2024).

A biocultural diversity framework has been suggested as an effective and culturally appropriate approach to protect Indigenous peoples, IK and simultaneously ensure sustainable development (Nemoga et al. 2022). The framework is based on the idea that by validating the worldviews on Indigenous peoples and protecting the integrity of their knowledge it is possible to ensure long-term protection of both the environment and the people apart of it. Through the concept of biocultural diversity, the understanding of biodiversity and its conservation may also slowly change. Mainstream conservation, deeply rooted in colonialism, capitalism and white supremacy, has often been based on the idea of culture versus nature (Berkes 2017: 259). These conservation practices, such as the creation of protected areas to conserve ‘wilderness’ devoid of humans have often required the violent and forced removal of Indigenous people (Layden et al. 2025). Even today, Indigenous people suffer from conservation violence, when access to important resource or sacred sites is denied (Luoma 2023). Layden and their colleagues (2025) have suggested a fundamental transformation away from the colonial roots of conservation. This includes critically reflecting on who benefits from conservation, treating IK as valid, as well as shifting the power of conservation to Indigenous people.

In many Indigenous worldviews the duality of mind and matter is foreign, since culture and identity are deeply interconnected with nature (Berkes 2017: 259). Consequently, these relationships have supported the sustainable management of nature. Indeed, environments sustainably managed by humans can be even more biodiverse than untouched landscapes (Angoletti & Rotherdam 2015). A strong connection to nature positively impacts both individual well-being and pro-environmental behaviors (Sollis et al. 2025). The biocultural framework can help pursue decolonial conservation strategies, which respect and learn from Indigenous worldviews while promoting environmental and social justice. If done in a community-based manner, this type of conservation can be especially effective (Layden et al. 2025).

It is worth considering how IK can be used ethically in sustainable development work. Indigenous people suffer from cross-pressures caused by climate change and environmental changes resulting from colonialism, racism and inequality (Reyes-García et al. 2024). Given the history of marginalization and suppression Indigenous people have globally faced, it seems unfair that these people should share their knowledge of how to ensure biocultural conservation that benefits their suppressors (Fernández-Llamazares et al. 2021; Layden et al. 2025). Shifting power to Indigenous people means making it possible for them to use IK in ways they see as appropriate.

Livelihood diversification based on IK may be one example of this type of community respecting conservation practice (Berkes 2017: 274; Layden et al. 2025). In many cases IK has evolved to enable Indigenous people to make a living (Berkes 2017: 266). For instance, ecotourism, agroforestry and the harvest of veld products can be guided by IK (Berkes 2017; Pereira et al. 2024). The development of these livelihoods is both a consequence of social learning and cultural evolution over centuries as well as faster learning has often been a consequence of some sort of crisis (Berkes 2017: 267 & 273).

Importantly, several environmental, economic and cultural factors influence whether IK based livelihood diversification occurs in HWC situations. For instance, the severity and nature of HWC influences whether people decide to allocate their resources to alternative livelihoods (Togoch 2020). If HWC doesn't pose significant threats for existing livelihoods it may be better to allocate resources to existing livelihoods.

Livelihood diversification is also more challenging if the resources required in livelihood practices are negatively impacted, for instance, by climate change (Mipun et al. 2019). Access to markets and value chains is also crucial as well as the condition of IK and its transmission. Recently, social media has been used as a platform by Indigenous people to reach markets for their products and find ways to benefit monetarily from traditional livelihoods in a modern economy (Noor & Maha 2025).

The benefit of IK based livelihoods is their ability to simultaneously sustain biodiversity, culture and economic development in a place-specific way (Berkes 2017: 268; Mbelebele et al. 2024). Indigenous guidelines in resource management, such as focusing on both quality and quantity, the diversification of livelihoods and an idea of resources being borrowed from future generations support conserving biodiversity and diverse income bases (Berkes 2017: 269-270). These guidelines can promote policies and incentives that provide well-being for the community as well as the environment.

Indeed, from an economic, social and cultural perspective, IK -based livelihoods offer multiple benefits for communities. These include increased self-determination, employment, reduced poverty and sensitivity and responsiveness to conflicts, capacity building and cultural conservation of the heritage (Berkes 2017: 270-271). Since IK is based on heritage and practical experiences, it can be held by people who have not had access to formal education or extensive resources (Sinthumule 2025). It can also be used as a comparative advantage, because the skills a certain Indigenous background offers are unique (Berkes 2017: 271). The use of IK in livelihoods is also an important way to connect Indigenous peoples to the global economy and avoid the separation between Indigenous and non-indigenous peoples (Berkes 2018: 269).

All in all, IK based livelihood diversification addresses some of the key root causes of HWC. IK based livelihood diversification reduces the reliance on a single income base and upkeep a connection to nature, thus promoting tolerance towards wildlife. Additionally, it responds to the issue of inequality by offering solutions to rural communities near protected areas, which disproportionately suffer from HWC (Brackowski et al. 2023). Berkes (2017: 274) notes that economic development based on IK and biodiversity may be the best bet for an environmentally sustainable future.

3 Human-wildlife conflict, coexistence and veld product-related livelihoods in Ghanzi District

3.1 Ghanzi District

My empirical research was conducted in two villages located in Ghanzi District, Botswana (Figure 1). Botswana is a landlocked country in Sub-Saharan Africa, between Zimbabwe, Zambia, Namibia and South-Africa (World Bank Group 2026). The country has a population of approximately 2,6 million people and an area of 581 730 km² (Government of Botswana 2022; World Population Review 2026). Thus, Botswana is sparsely populated, with a population density of about 4,6 people per km² (County Meters 2026; World Population Review 2026).

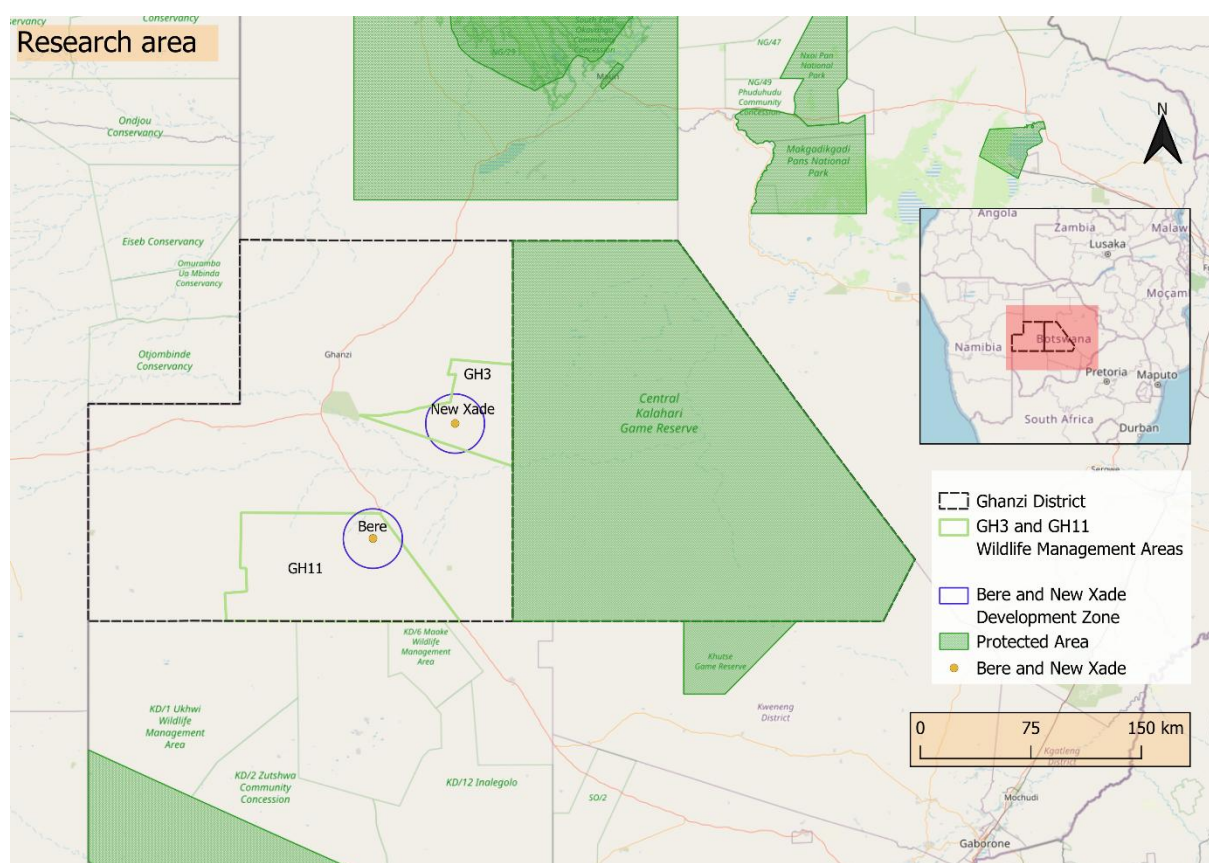


Figure 1. Broad research area. (Ghanzi District © UN OCHA 2025; GH3 & GH11 WMAs © Ngami Data Services 2017; Bere and New Xade Development Zone © Ministry of Local Government 2009; Protected Area © UNDP-WCMC & IUCN 2025; Bere and New Xade © Botswana National Spatial Plan database 2017).

From 1885 to 1966 Botswana was a British protectorate, which meant that the United Kingdom largely controlled the country (Holm 2013). Since the country's independence in 1966, it has progressed significantly in terms of democracy, education and economic development and is Africa's longest-standing multiparty democracy (Dowie 2011: 102). Botswana's economy started to grow soon after independence due to newly discovered diamonds and is classified as an upper-middle income country (Parsons 2026; World Bank Group 2026). However, higher poverty and inequality persist within the country compared to many middle-income countries. It has become apparent that the extractives-driven and unilateral economic model is insufficient in sustaining poverty reduction or maintaining inclusive growth.

Two-thirds of the country's area is covered by the Kalahari Desert (Department of Environmental Affairs 2016). Despite its name, Kalahari Desert is not a desert, since the annual rainfall exceeds 250 mm in several parts of the region (Tshukudu 2024: 16). Therefore, I refer to the Kalahari Desert also as Kalahari. Rainfall is spatially and temporally unpredictable and droughts are common (Karunya Consulting et al. 2020:69). Following Gielen (2025: 4), I define Kalahari as the area covered by xeric savanna and acacia-baikiaea woodland. These ecoregions are characterized by a semi-arid climate and the lack of permanent surface water. Temperatures range from below zero temperatures in winter nights to 40 degrees Celsius during summer (Gielen 2025: 4). The terrain is covered by sand, grasses, shrubs and scattered trees, which form an open savannah. The Kalahari Desert covers Ghanzi District, where my empirical research was conducted.

Ghanzi District is located in the western part of Botswana, and shares part of its border with Namibia (Tshukudu 2024: 4). Almost half of the district is covered by the Central Kalahari Game Reserve (CKGR), which is the second largest game reserve in Africa (Ramsay 2023: 2). Wildlife Management Areas (WMAs) cover large parts of the district (Tshukudu 2024: 32). WMAs aim is to ensure the existence of wildlife and integrate them in the rural economy, since villages exist within these WMAs (Gielen 2025: 11). According to the 2022 population census, there are 56 067 people in Ghanzi District that belong to several cultural communities and ethnic groups.

This research focuses on two villages, Bere (Figure 2) and New Xade (Figure 3). Bere exists in the GH11 WMA and New Xade in the GH3 WMA. In both villages the population has been growing significantly in recent years (Tshukudu 2024: 50). According to the 2022 housing census, the population of Bere is 874 and in New Xade it is 1614. The growing population size has led to an increased demand for boreholes, grazing areas and settlement growth.

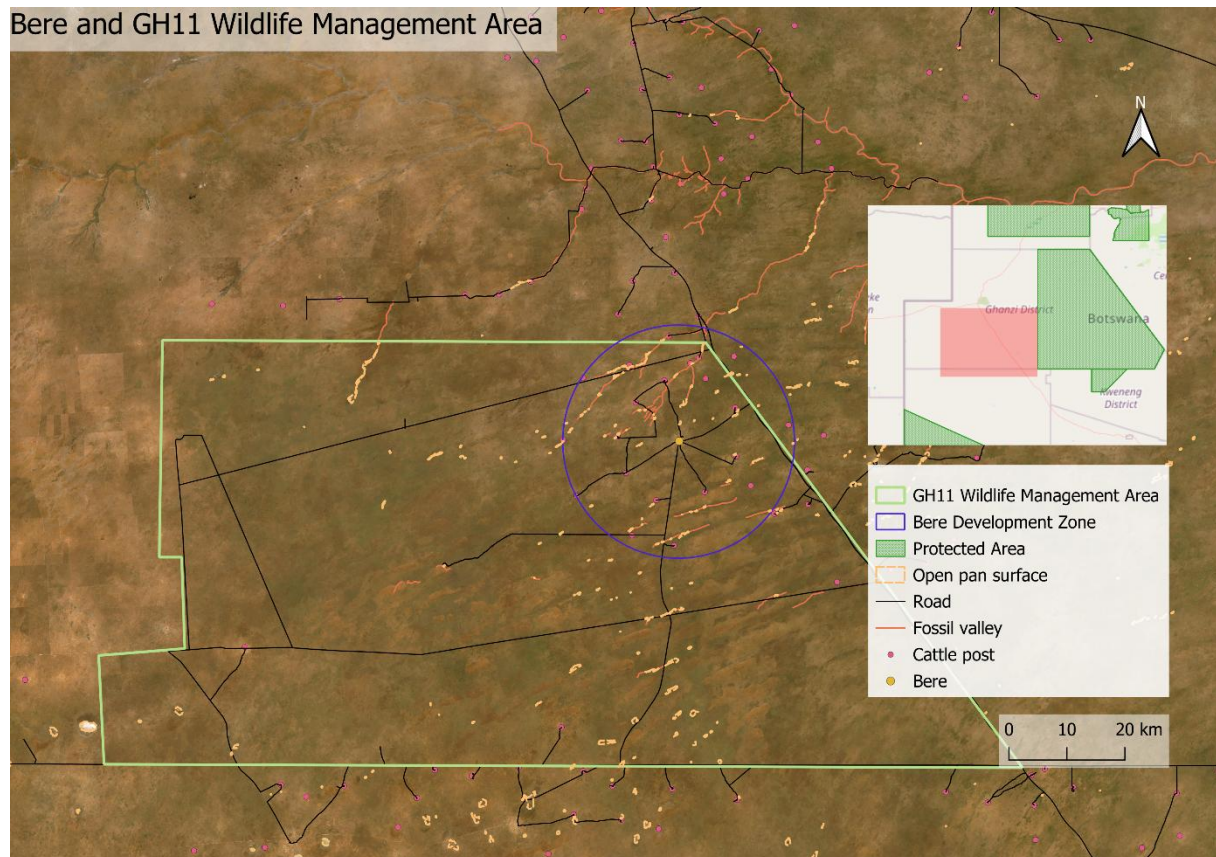


Figure 2. Bere and GH11 WMA. (GH11 WMA © Ngami Data Services 2017; Bere Development Zone © Ministry of Local Government 2009; Protected Area © UNDP-WCMC & IUCN 2025; Open pan surface © Gielen, M. & Albertson, A. 2024b; Road © Gielen, M. 2019-2021 & CCB 2022-2025; Fossil valley © Gielen, M. & Albertson, A. 2024a; Cattle post © Gielen, M. & CCB 2019-2021; Bere © Botswana National Spatial Plan database 2017).

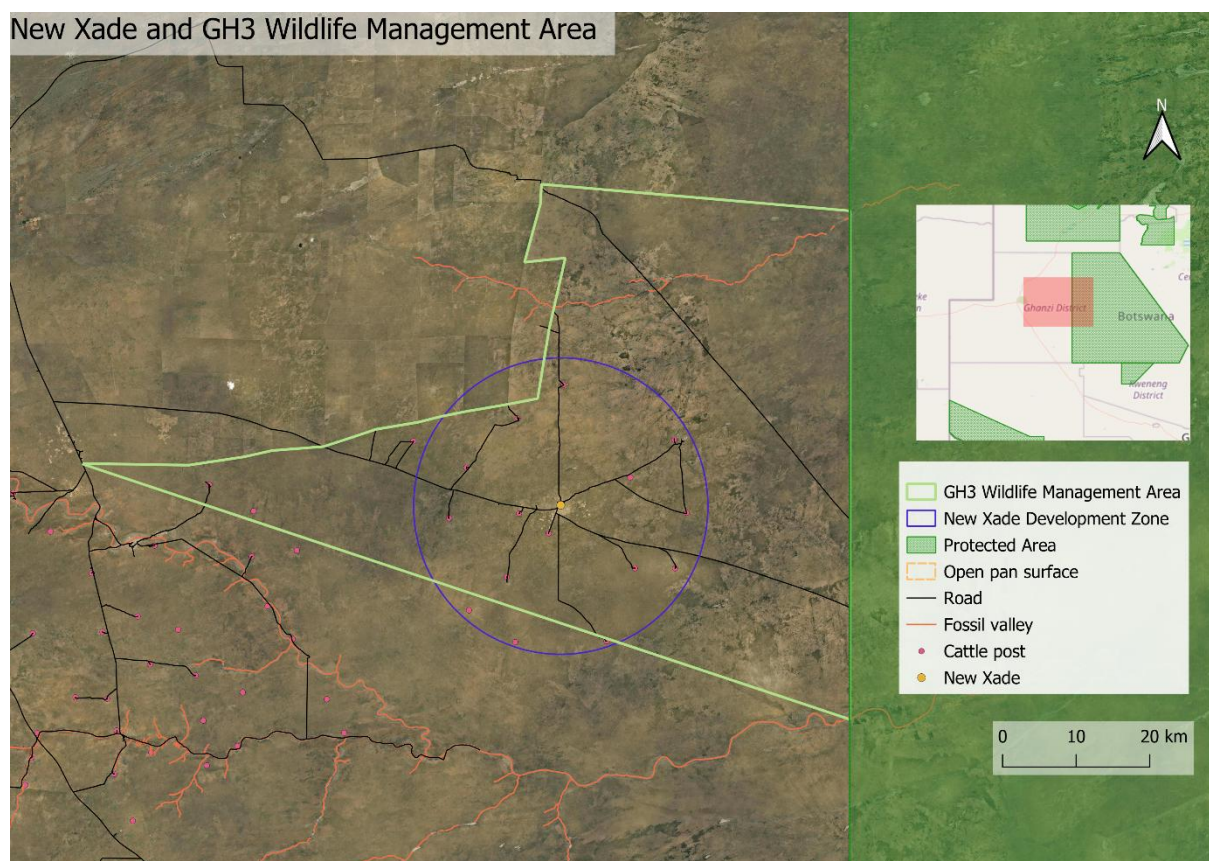


Figure 3. New Xade and GH3. (GH3 WMA © Ngami Data Services 2017; New Xade Development Zone © Ministry of Local Government 2009; Protected Area © UNDP-WCMC & IUCN 2025; Open pan surface © Gielen, M. & Albertson, A. 2024b; Road © Gielen, M. 2019-2021 & CCB 2022-2025; Fossil valley © Gielen, M. & Albertson, A. 2024a; Cattle post © Gielen, M. & CCB 2019-2021; Bere © Botswana National Spatial Plan database 2017).

Traditional leadership is followed in the villages (Karunya Consulting et al. 2020: 88). In practice, this means that village chiefs, DiKgosis', exercise their power through a village council called the Kgotla. To ensure grassroot development, a Village Development Committee (VDC) selected by the community at the Kgotla, is in power and supports the local governance. Community Trusts also play a part in managing the WMAs (Karunya Consulting et al. 2020: 89). Trusts were established as a part of the CBNRM Program to manage the natural resources of the WMAs. The Trusts are offered hunting quotas by the government, which allows communities to sell subleases to wild animals for tourism operators, or hunt wildlife for subsistence purposes (Tshukudu 2024: 32).

3.2 The San People

In Botswana, there are around 73 500 who identify themselves as San, who are the Indigenous people of the Kalahari Desert (Hitchcock 2024: 35). The San are direct

descendants of the oldest human lineage found in the world and originate from the Kalahari (Gielen 2025: 12). The San used to be nomadic hunter-gatherers, who lived sustainably within their environment and migrated seasonally (Bieseke et al. 1989). Since the late 19th century colonial-era land policies prioritized allocations for European settlers and Tswana cattle farmers (Bieseke et al. 1989). This restricted the San access to hunting grounds and water sources. Since being excluded from formal land ownership, the San were forced to labor on farms and to some extent leave their Indigenous lifestyles behind. The San are among the most under privileged people living in Botswana (Hitchcock 2024: 35).

The Central Kalahari Game Reserve (CKGR) was established in the 1960s as an area where the San could continue their Indigenous way of life while wildlife and ecological features of the landscape were preserved (Campbell 2004; Hitchcock 2002). In the late 1990s the San living in CKGR started to be relocated outside the protected area, for instance to New Xade, which caused disputes between the residents and the government (Dowie 2011: 105). The government stated this was done to ensure wildlife conservation in CKGR by preventing the San from hunting animals and to ensure human development of the San by assimilating them to the modern culture (Dowie 2011: 102). Essentially, the residents in New Xade are conservation refugees. In December 2006, the San were allowed to return to their homelands, but disagreements remained between the San and the government about rights to natural resources (Dowie 2011: 106). Today, a few hundred residents live in the area (Hitchcock et al. 2020).

In the 1960s the Bere village was established by a white ex-professor of parasitology, when the mobility of the San was increasingly curtailed (Bieseke et al. 1989). Despite good intentions of encouraging the San to sell their crafts and make an income through livestock keeping, the development of the village was attempted to be done for the community instead of with the community. Essentially, this led to difficulties, since the development was not community-led.

3.3 Human-wildlife conflict, management and coexistence in Kalahari

The ecosystems of Botswana are home to abundant flora and fauna, including globally threatened species (Department of Environment 2016: 13). When Botswana was a

British Protectorate, wildlife was prolific but declining (Gielen et al. 2025: 8). Since independence, about 40 percent of the country has been dedicated to protecting wildlife (Gielen 2025: 1). One of the largest remaining populations of the African wild dog (*Lycaon pictus*) lives in the country, as well as the largest global population of the African elephant (*Loxodonta Africana*). Large mammals living in the Ghanzi region include eland (*Taurotragus oryx*), gemsbok (*Oryx gazella*), red hartebeest (*Alcelaphus buselaphus caama*), lion (*Panthera leo*), leopard (*Panthera pardus*), cheetah (*Acinonyx jubatus*), African wild dog, spotted hyena (*Crocuta Crocuta*) and brown hyena (*Hyena brunnea*) (Tshukudu 2024: 35). The role of these species is essential in keeping ecosystems functional. (Gielen 2025: 21). Other large mammals living in the area include blue wildebeest (*Connochaetes taurinus*), greater kudu (*Tragelaphus strepsiceros*) and ostrich (*Struthio camelus*) (Tshukudu 2024: 35). Wild animals move across the WMAs in Ghanzi District between the Kgalagadi Transfrontier Park (KTP) and the CKGR (Gielen 2025: 9). This area is called the Western Kgalagadi Conservation Corridor (WKGC). The WKGC is one of the largest unprotected areas in Sub-Saharan Africa supporting free-ranging wildlife movements (Gielen 2025: 7). The WMAs in WKGC are especially important for species like African wild dogs and cheetahs, which are outcompeted in protected areas by larger species (IUCN/SCC 2015; Durant et al. 2017; Tshukudu 2024: 32&35).

Despite WMAs namely being corridors for wildlife between protected areas, the wildlife biodiversity in Kalahari has been threatened due to several causes (Department of Environmental Affairs 2016). Long-scale changes in the climate have influenced the environmental conditions of the Kalahari leading to changes in the fauna from more water-dependent species to those of today (Nash 2017). In addition to long-scale changes, shorter-scale drought cycles exist, which cause temporary population declines (Gielen 2025: 24). However, in the latter half of the 20th century populations did not seem to recover after droughts like they used to before, due to human-induced factors (CI 2010; Gielen 2025: 24).

One of these factors has been hunting, which has caused significant debates over the last century (Gielen 2025: 19). During the Protectorate era, seemingly plentiful wildlife was hunted for sport and commercial reasons (Campbell 1997). It is important to

differentiate hunting as a traditional lifestyle from sport or commercial hunting (Campbell 1997). Subsistence hunting has been practiced by the San and other Indigenous communities for times immemorial (Liebenberg 2006). Hitchcock (1996) defines subsistence hunting as “*the customary and traditional use of wild animals for food, raw material, social, and ceremonial purposes*”. From the independence of the country until 1990s, these local communities were allowed to continue their hunting practices under Special Game Licenses, despite hunting regulations in place for others (Hitchcock 1996; LaRocco 2020). However, concerns about the risks of hunting for biodiversity grew, and from 2014 to 2019 hunting was totally banned (Hitchcock et al. 2020). Since 2019, commercial hunting has again been legal under licenses, which are however often monetarily out of reach for rural communities (LaRocco 2020). This has caused outrage among those who think subsistence hunting by rural communities is sustainable. Wildlife offtakes were generally below replacement rates when the San lived in CKGR, suggesting that hunting itself was not necessarily incompatible with wildlife conservation (Hitchcock 1996).

Competition over different land uses is one of the key reasons for increasing wildlife impacts on communities leading to wildlife habitat fragmentation and essentially wildlife declines (SADC TFCA 2026: 9). The Kalahari was opened to the cattle industry during the Protectorate era in the 1930s, when water became available for cattle and humans all year round due to borehole technology development (Campbell 1981; Cooke 1985). Bere and New Xade are surrounded by a development zone, with a radius of 20 kilometers, which are used to develop cattle posts (Ministry of Local Government 2009). Cattle post livestock management refers to a common management style in Botswana, where livestock can range freely around a water access point (Gielen 2025: 18).

The overlap of cattle and other livestock, like sheep, goats, horses and donkeys together with wildlife has brought communities and wildlife into closer contact with each other (CI 2008; Klein 2013; Schiess-Meier et al. 2007; Karunya Consulting et al. 2020: 83). This has led to HWC, manifested in the lethal control of wildlife after livestock predation events. In 2022, 11 938 cases of wildlife impacts were reported in Botswana, which does not include all incidents (SADC TFCA 2026: 13). This can be seen as a conflict

between conservation objectives and local livelihoods, which are not Indigenous to the San (Tshukudu 2024: 90&138). HWC in WMAs is an issue for wildlife survival, since the survival of most of the species is dependent on their ability to exist outside protected areas (Klein 2013; Gross et al. 2021).

Wild animals that the communities in Ghanzi come into conflict with are primarily lions, leopards, African wild dogs, cheetahs, spotted and brown hyaenas, black-backed jackals, African elephants and porcupines (Karunya Consulting et al. 2020: 113). Lions, leopards, cheetahs and African elephants are vulnerable species, and African wild dogs are endangered (Karunya Consulting et al. 2020: 82). Land use type greatly influences wildlife occupancy (Van der Weyde et al. 2018). Lion occurrence is highest close to protected areas, leopards and brown hyenas occur closer to commercial farms and black-backed jackals near both commercial farms and protected areas. The occurrence of black-backed jackals has also been associated with the proximity to livestock. Species like cheetahs and African wild dogs in general exist outside protected areas, because they avoid larger predators (Durant 2000; Durant 2002). Conflicts are especially common near the protected areas and conflicts have been increasing in recent years (Tshukudu 2024: 91; SADC TRCA 2026: 5). Lethal control is legal in cases of HWC, if it is reported to the Department of Wildlife and National Parks (DWNP), since according to the Wildlife Conservation and National Parks Act of 1992:

“ – the owner or occupier of land, or any agent of such owner or occupier may, subject to the provisions of this Act, kill any animal which caused, is causing or threatens to cause damage to any livestock, crops, water installation or fence on such land” (Government of Botswana 1992: 30).

However, in all cases lethal control is not reported. Reporting can be seen as useless or challenging (LeFlore et al. 2019; Karunya Consulting et al. 2020). Compensation is not received if the livestock damage is discovered too late and the evidence has been distorted. Distances to reporting offices also decrease willingness to report.

Findings of coexistence willingness in the Kalahari differ (Tshukudu 2024: 9; Gielen 2025: 21-22; Bahetoleng & Stronza 2026). Despite livestock losses, some people in Kalahari are choosing to coexist with wildlife (Bahetoleng & Stronza 2026). However,

some farmers' tolerance levels for wildlife are low, because wildlife threatens their livelihoods and they may not feel like they receive enough benefits from wild animals (Tshukudu 2024: 91; Gielen 2025: 21-22). Human-wildlife interactions are associated with significant economic losses for the local communities (SADC TFCA 2019: 13). The non-consumptive tourism industry is rather underdeveloped in the area, so wildlife does not bring direct extensive monetary benefits for the locals though tourism operators buying subleases to the wildlife. The locals are also poorly compensated for livestock loss, even though herding livestock was a livelihood imposed by the government on the San when they were relocated to settlements (Hitchcock et al. 2011; LeFlore et al. 2019). Local communities may also feel like they are not in charge of managing the conflict, since responsibilities of managing the animals are allocated to the government instead of the communities (Tshukudu 2024: 91). Indeed, even though it may seem like the communities have low tolerance towards wildlife, they are in fact mainly dissatisfied with the structures of coexistence instead of the animals (Serenari 2024).

In the past, communities have historically lived side by side with wild animals for thousands of years, but the population increase, rise of livestock farming and permanent settlements has altered this sustainable state when humans and wildlife have been separated (SADC TFCA...2026: 2). Now efficient management of HWC is necessary to ensure coexistence (Tshukudu 2024: 119-120; SADC TFCA...2026: 2). International, regional and national policies regulate how HWC is managed in Botswana (SADC TFCA 2026:17-20). However, despite efforts to increase environmentally friendly behaviors through CBNRM, the scheme has largely failed to secure effective, community-based management of natural resources consistently within Botswana (Chitsove & Madebwe 2024). CBNRM has been externally imposed and driven by conservationists, who see conservation as the goal, in contrast to local communities hoping for increased development (Agrawal & Gibson 1999; Swatuk 2005). The focus has also been mainly on initiatives related to community trusts benefiting from wildlife tourism despite other natural resources like veld products being an integral part of community members' livelihoods (Cassidy 2021). A recent major advancement has been the CBNRM Act from 2025 which legally empowers communities through better

rights to access and benefit from natural resources aiming to strengthen local stewardship (SADC TFCA...2026: 19).

To reach long-term change by ensuring benefits or tolerable losses of livestock, building a nature connectedness and creating adaptive, community-based strategies, HWC management methods beyond physical protection measures or wildlife damage control are needed (SADC TFCA 2026:8). Stronger fencing, drones and early warning systems to prevent wildlife attacks on livestock can be used, but they must be coupled with solutions related to human behaviors (Tshukudu 2024: 94&139: SADC TFCA 2026:29).

Ensuring that the presence of wild animals does not cause too much monetary losses is necessary to ensure people benefit from wildlife and communities want to promote coexistence. Communities, where the residents feel like they benefit from wild animals through the Community Trust understand the importance of wild animals better (Tshukudu 2024: 117). On the other hand, Cassidy (2021) has proposed that focusing on monetary 'small wins' at the household level related to benefiting from natural resources, may be a better way of increasing environmentally friendly behaviors than creating large sums at the community level through Trusts. Better compensation schemes, which combine compensation with conflict prevention, may also reduce retaliatory killing (SADC TFCA 2026:27).

Supporting coexistence through increasing nature connectedness could be achieved through understanding the importance of relational values between humans and wild animals (Pédarros et al. 2025). This involves learning about nature conservation through traditional livelihoods from older generations (Agrawal&Gibson 1999; Swatuk 2005). There are also ideas for developing a public education program on Kalahari biodiversity to increase knowledge about the importance of wild animals (Tshukudu 2024: 116). The requirement of following adaptive, community involving strategies may be realized in Kalahari through the Botho ethic (Bahetoleng & Stronza 2026). This African relational ethic based on the idea of authentic humanity being dependent on interdependence between individuals, has been realized as a characteristic influencing coexistence willingness. This supports the notion of the importance of communal level discussions within the kgotla, which values making decisions together through mutual

respect (Kololo and Kari 2021). Top-down ways of approaching communities that are used to relational systems may leave little room for negotiations and may ignore communities as managers of the conflict (Bahetoleng & Stronza 2026). This may lead to unwillingness to conserve the animals and increase human-human conflict. When bringing together these requirements for coexistence it seems like veld product-related livelihoods based on IK may offer solutions for supporting coexistence mindsets among San communities.

3.4 Veld product-related livelihoods

Solutions to promote coexistence with wildlife while ensuring socio-economic sustainability are needed in the Kalahari. One opportunity may be offered through veld product use, because the San are willing to utilize their ecological knowledge (Gielen 2025: 179). IK of the San is deeply connected to wild plants, referred to in my research as veld products (Brinkhurst 2010). Veld products form an important part of rural livelihoods in Kalahari WMAs (Favretto et al. 2014: 3; Department of Environmental Affairs 2016: 28). Veld products refer to non-timber forest products (NTFPs) that provide raw materials and food. Edible veld products in Kalahari include, for example, Kalahari truffles (*Kalaaharituber pfeili*) and Morama bean (*Tylosema escelentum*). In this research, those are referred to by their Indigenous names: mahupu (Kalahari truffle) and morama (Morama bean) (Favretto et al. 2014: 18). Medical veld products include devil's claw (*Harpagophytum procumbens*), which is used as an analgesic, sedative and anti-inflammatory medicine. Devil's claw is referred to in this research as sengaparile, by its local name. I use the local names to emphasize that the knowledge related to the plants is deeply rooted in the local culture of the San.

The distribution areas of the plants has not been previously precisely mapped. As part of the Kgalagadi-Ghanzi Drylands Ecosystem Project a local NGO Cheetah Conservation Botswana (CCB) investigated which plants are most found in the village areas in the districts and how far they are from the village center (Cheetah Conservation Botswana 2024). In Bere, among many other plants, the presence of mahupu, morama and sengaparile was identified. Mahupu and morama were found 7 km from the village center, and sengaparile is said to be found “*along an old dumping site*”.

The knowledge of veld plants is culturally significant and connects the San to their lands and past (Brinkhurst 2010). The veld products have made it possible for the San to survive in the Kalahari and maintain their cultural identity. Lost access to land through forced relocations, privatization and ranching threatens the preservation of knowledge about veld plants. The San have had to adapt to the modern culture, and commonly work on cattle posts as livestock herders, or depend on a social work program called Ipelegeng. Ipelegeng is a government program that offers short term employment for unemployed people (Government of Botswana 2026). According to climate change scenarios, Botswana will become hotter and dryer in the future, which may also influence veld product availability (Perkins 2019). However, the plants have also been adapted to the climatic conditions of the Kalahari and provide livelihood even during droughts and may help in adapting to climate change (Favretto et al. 2014: 22; Mugari et al. 2024).

In recent decades modern markets have shown an interest in wild foods, and the importance of promoting veld products commercially has been realized (Brinkhurst 2010; Tshukudu 2024: 96). The Botswana government has estimated that the value of the NTFP market could be 26 million USD exceeding the value of conventional forest exports (Brinkhurst 2010). Especially abroad there is a growing demand for specialty veld products and the value of sengaparile has been internationally realized (UNDP 2017: 7). However, the ones possessing knowledge of veld products rarely capture most of the value of veld plants when they are sold. The ones often benefitting from the veld product market are the middlemen, to whom the veld product harvesters are selling the products to.

Other challenges related to economic possibilities of veld products in Bere are the transport costs to marketing areas, lack of entrepreneurial and financial skills and lack of information of markets (Cheetah Conservation Botswana 2024). In New Xade, low prices of products, the lack of markets, high competition within the village, and expensive harvesting permits are issues related to the economic possibilities of veld products. In the future, the appeal to veld product-related livelihoods may however grow, since there is willingness to increase the commercialization of the products and shift management more to the communal level (Cheetah Conservation Botswana 2024;

Mugari et al. 2024). In Bere, an Exatheni veld product processing center was built in 2025 in cooperation with CCB to promote rural livelihoods (Exatheni Veld...2025).

To ensure that veld products could sustain rural lives, harvesting them should be conducted sustainably (Brinkhurst 2010; Tshukudu 2024: 127). Increasing harvests and cattle grazing may challenge the ecological systems veld products are dependent on, and result in the scarcity of them (Brinkhurst 2010; Favretto et al. 2014: 19). Careful participatory planning of veld product harvesting is required to ensure that the resources benefit those with knowledge of the products, and that the resource base is not overexploited (Tshukudu 2024: 160). In natural resource management, the tragedy of the commons is often an issue, referring to a situation where the lack of property rights regime leads to overutilization of a product (Brinkhurst 2010). Before the demand for the products was smaller, there were cultural rules for harvesting. Therefore, for veld product use to be sustainable today, the rules of veld product harvesting should be carefully reconsidered. In nearby districts, it has been suggested that there should be a new hierarchy of natural resource protocols, where communities are themselves also part of coordinating natural resource licensing, harvesting and trading (Tshukudu 2024: 129; Mugari et al. 2024). If veld product gatherers have permits to harvest and sell the products outside their villages themselves, they are also more likely to sustainably manage the resources they benefit from (Brinkhurst 2010).

One suggested way to promote the sustainable use of veld products is the cultivation of these wild plants (Brinkhurst 2010). However, when cultivating veld plants, it may be difficult to replicate the ecosystem functions veld products depend on, such as microclimates and soil moisture. Additionally, cultivation may threaten the unique features of the soil and its nutrients. Another challenging factor is that the San communities do not necessarily have access to the land and the rights to cultivate it.

4 Data and methods

4.1 Methodological framework

My study is driven by a critical and emancipatory interest of knowledge, which refers to the research's stance-taking nature and the desire to change the current situation (Graham 1997: 22). The epistemology of the research and the methods used are based on the idea of dismantling colonialist structures in both science and society (Shepherd 2018: 9). This is grounded in the ontological notion that colonialist structures, in this context within mainstream conservation, still exist. Typical methodological choices made in anti-colonial studies include the use of participatory methods and the emphasis on marginalized voices, which I do in this thesis (Smith 2021: 239). According to anti-colonialism, knowledge is not limited to western scientific and peer-reviewed knowledge, but also includes, for example, IK.

I use a multi-method approach to ensure that the voices of the locals are heard and I gain in-depth understanding of my research topic. The method also aims to challenge outdated ways of researching the Global South in an extractivist manner, where the study does not benefit the communities (Brito Salas & Avento 2023). My research methods consist of triangulation of participatory backcasting workshops, semi-structured thematic interviews and participatory mapping. Backcasting workshops and interviews were conducted in both Bere and New Xade, but the participatory mapping workshop was organized only in Bere (Figure 4).

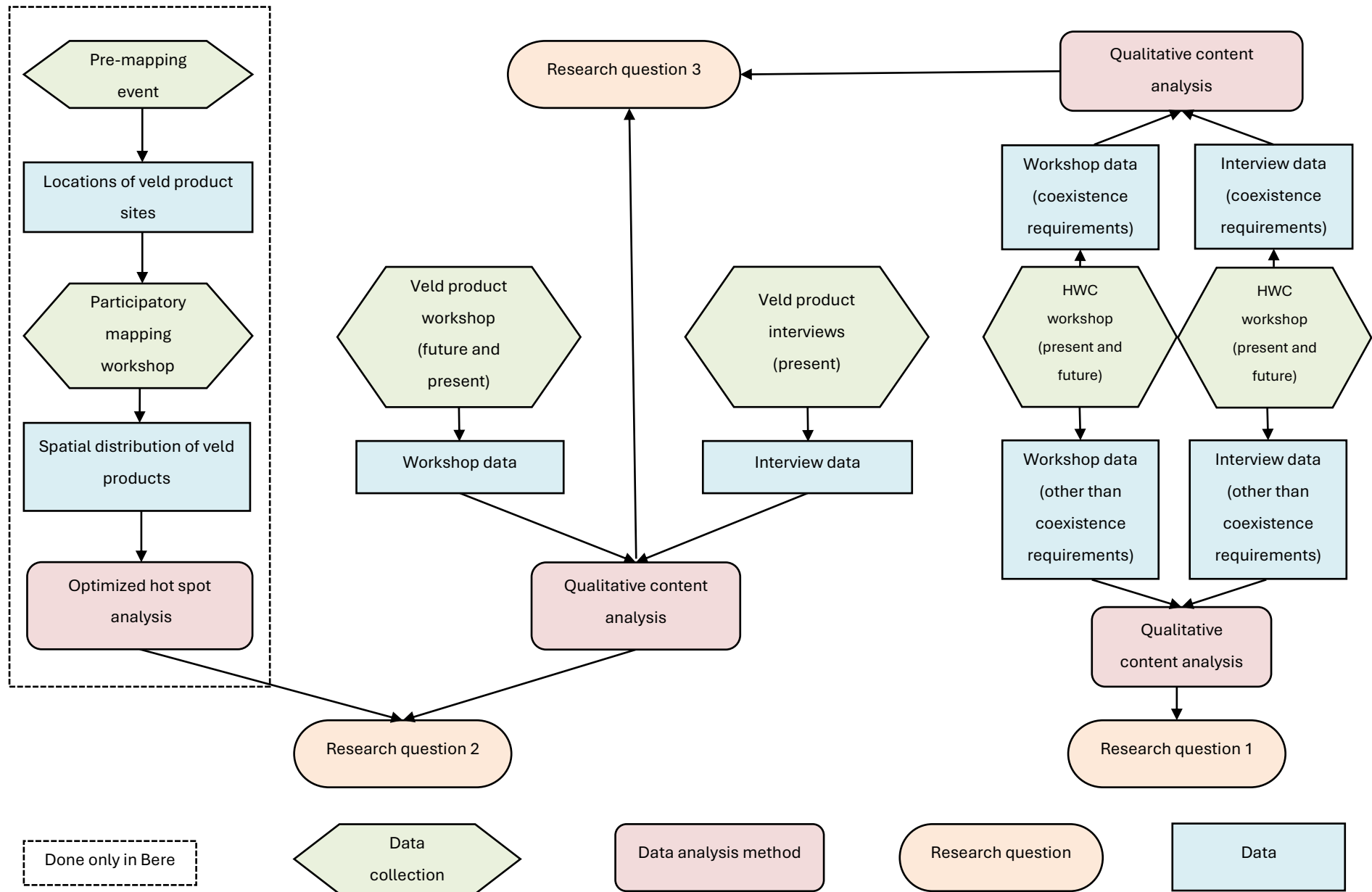


Figure 4. The methodological framework of the study. The figure presents the research design linking data collection methods to data types, analysis methods, and research questions. The abbreviation HWC refers to human-wildlife conflict.

4.2 Data collection methods and research data

4.2.1 Participatory backcasting workshops

I conducted participatory workshops in Bere and New Xade to understand the current and future state of HWC and veld product use, and how they may be interlinked. In Bere, three workshops were organized, including the participatory mapping event described in chapter 4.2.2. The two other workshops focused on veld product-related livelihoods and HWC. In New Xade, these two workshops were held. A participatory backcasting method was applied in the workshops, since it includes elements of both reflecting the current situation and the future that are the interest of my research.

Backcasting is a scenario analysis method used to build future scenarios and plan sustainability transitions (Nikolakis 2020; Petrontino et al. 2025). Rather than defining likely futures, in backcasting participants imagine preferred outcomes, and plan pathways to reach them (Carlsson- Kanyama et al. 2008). The visions of future provide both orientation and guidance by suggesting participants where to go and what to do (Quist et al. 2011). Backcasting supports system thinking, which helps understand complex socio-ecological challenges. It is especially useful when dominant trends are part of the problem. Previous studies have applied participatory backcasting separately to livelihood development (Andreotti et al. 2020; Nikolakis 2020) and HWC (Jiren et al. 2021; Petrontino et al. 2025), but little research has examined the relationship between the two.

Participatory backcasting is a form of backcasting, where communities are part of imagining a desired future (Carlsson-Kanyama et al. 2008). Scenario planning can be seen as a form of decolonization, because locals get the opportunity to plan the future themselves (Nikolakis 2020). Participatory backcasting can strengthen communal agency, learning, and adaptive management by enabling participants to collectively envision desirable futures and identify locally relevant pathways towards them (Nikolakis 2020; Jiren et al. 2021; Lundsgaard-Hansen et al. 2024). Building scenarios can be seen as a way of creating stories about the future, which is a legitimate and

accessible way of sharing IK and values (Ogilvy 2002:26; Drawson et al. 2017; Spanio & Rowland 2019; Nikolakis 2020).

Participatory backcasting in this research aimed to reflect on the current veld product-related livelihoods and HWC and envision desirable livelihood and HWC management futures for the year 2035 (Appendix 1 & 2). The workshops also explored whether livelihood diversification could support human-wildlife coexistence. By discussing desirable futures, the workshops aimed to support visionary thinking and communal agency.

In both villages, the Community Trust and Village Development Committee representatives participated in the workshops with relevant knowledge. This was necessary, since it was my first time working with these communities. In Bere 32-44 and in New Xade 25-31 community members took part in the workshops. The number of people varied between workshops. In Bere the age range was from 17 to 69 and in New Xade from 24 to 72 years. Workshops were conducted in English with translation to Setswana to ensure equal participation of all participants regardless of their English skills. Before participation, all participants filled in a consent form, which included information about the purpose of the research, anonymity of participants and sharing the results.

In both villages, participants worked in five focus groups of 6-9 people led by local facilitators hired from the community. Even though there was also a translator, the facilitators also helped with translation. Each workshop consisted of these four phases applied from Carlsson-Kanyama and their colleagues (2008) and Petrontino and their colleagues (2025) frameworks: 1) Framing the workshop and its objectives, 2) Reflecting on the current state of HWC/veld product-related livelihoods, 3) Imagining a desired future for HWC management/veld product-related livelihoods, 4) Designing pathways to these futures 5) Evaluation.

Phases 2-4 involved focus group discussions through a list of questions. The discussions were documented on Post-it notes by a facilitator in each group. Workshop questions were relatively similar between villages but were revised a bit after the workshops in Bere to improve their clarity and avoid repetition. The HWC workshop

lasted for about five hours, and the veld product workshop for six hours, including breaks. Finally, each workshop was evaluated by the participants, inspired by Carlsson-Kanyama and their colleagues (2008).

However, there are also several challenges related to the participatory backcasting method. Power dynamics may challenge the creation of scenarios, if certain groups of people are overrepresented in the participation phase (Nikolakis 2020). Even if a diverse group of people attended the workshops there may be power imbalances among the participants. However, it doesn't make sense to exclude especially powerful stakeholders either, because they may later oppose and effectively undermine the results of the workshops (Lundsgaard-Hansen et al. 2024: 42). Therefore, it is important for the facilitators of the workshops to be aware of existing power structures, culture and norms and that different types of community members can safely join the workshops (Lundsgaard-Hansen et al. 2024: 41).

Language and concepts related to future planning may also create difficulties, when participants are unfamiliar with the method (Lundsgaard-Hansen et al. 2024: 40-41). Therefore, it is helpful if the facilitator of the workshop designs the questions presented in the workshop in collaboration with local facilitators. For some participants it may also be challenging to formulate thoughts by writing them down. Therefore, it is important that participants also the chance to draw, alternatively illustrate visually or orally explain their thoughts. This can also enhance creative thinking, which is important when imagining the future (Lundsgaard-Hansen et al. 2024: 42-43).

To ensure participation, participants must see the benefits of the visioning process (Lundsgaard-Hansen et al. 2024). This can mean establishing new contacts, tangible documentation of the participants' visions, or the creation of outputs that can be used in the day-to-day life of the participants. To support building a sense of ownership of the vision creation process, it may be beneficial to include a participant in leading or facilitating the workshop. Also, it is important that the participants are somehow compensated for joining the workshops, because they may not otherwise be able to afford to miss work. Validation of the results after the workshops is important to ensure there are not any misunderstandings.

4.2.2 Participatory mapping workshops

A participatory mapping workshop was held in Bere to map the distribution of sengaparile, mahupu, morama and other plants, which were grouped into one category. The mapping was done in this village instead of New Xade, because CCB, assisting me in the workshop facilitation, has a more established relationship with the Community Trust. The Community Trust supported the facilitation of the event, since it was tested for the first time. More than just understanding the distribution of veld products, the goal was to increase communication between the community members about their natural resources and livelihoods.

Participatory mapping refers to map-making processes where participants communicate their spatial knowledge, often facilitated by supporting organizations (Brown & Kyttä 2018; Denwood et al. 2022). Even though participatory mapping can produce accurate maps, the aim of this type of mapping is not to follow rigid cartographic principles but rather to empower communities to foster long-term, transformative change (Laituri et al. 2023). Participatory mapping can help place knowledge, which could not be known by authorities, on maps, and thus give visibility to communal spatial understanding.

In this research, participatory mapping was done using the Sketch Map Tool (SMT) (<https://sketch-map-tool.heigit.org/>). It is a free, open-source participatory mapping tool created by the Heidelberg Institute for Geoinformation Technology (HeiGIT) (Klonner & Norze 2023: 161). SMT combines analogue data collection with digital data processing to help visualize local knowledge and communicate it to relevant stakeholders (Klonner et al. 2021; Klonner & Norze 2023: 149&165). The idea of sketch mapping originates from critical GIS research, which challenges the positivist view of seeing only scientific knowledge as relevant. Technological barriers, which are common in often primarily digitally conducted participatory mapping, can be overcome when using sketched maps (Boschmann & Cubbon 2014).

Sketching maps is a beneficial mapping practice both during the sketching process but also later when visualizing and analyzing the sketched results. The sketching process is straightforward and does not require previous experience in mapping (Klonner & Norze 2023: 149). Since sketching is done in person instead of digitally, it may reach people who may be incapable of using digital platforms or may find using them challenging. Working in person does not require internet access, which makes mapping possible also in remote areas. Additionally, several people working around a map can guide meaningful conversations between participants and researchers (Klonner & Norze 2023: 152). The Sketch Map Tool makes it possible for communities to be part of design and development processes, which enhances empowerment and ownership of the environment (Klonner & Norze 2023: 152). Thus, sketching breaks down positionality in research and gives a voice to the communities (Boschmann & Cubbon 2014).

During the visualizing and analysing Sketch Map -data can be combined with other geographical data, which may enrich the results (Klonner & Norze 2023). Additionally, since all the sketches are drawn on the same basemap and scale, issues related to them do not occur (Klonner et al. 2021). When making the final map of sketched features, working digitally makes it possible to add map elements, such as a title, legend, north arrow, and scale, that make it easier to interpret the results and make the map more visually appealing (Klonner & Fagerholm 2025). The automatic marking detection makes visualising the sketches easy and fast on GIS (Klonner & Norze 2023: 154).

Since the Sketch Map Tool is an open-source and cost-free platform, it is theoretically possible for communities to independently use the platform for their own needs (Klonner & Norze 2023: 152-153). However, this may require additional training. Also, even though sketching requires only the basemaps and pens, the whole mapping process requires internet access to the basemaps, printers and access and knowledge to use a GIS software to visualize the results (Klonner & Norze 2023: 161). Additionally, some participants may not have map literacy skills (Klonner & Norze 2023: 155).

When conducting participatory mapping it is important to follow ethical guidelines to ensure that vulnerable communities are not harmed (Brown & Kytä 2018). It must be

carefully considered who selects participants and who participates in a mapping event. When the mapping is done, the information gathered must not be shared against the participants' will (Klonner & Norze 2023: 152). Professionals who use the Sketch Map Tool must be honest and transparent throughout the mapping process about the purpose, benefits and risks of mapping as well as how the information will be used (Klonner & Norze 2023: 151). After mapping is done it is important to share the results with the participants to allow them to comment on the results, privacy-related factors, as well as show the influence of their contribution (Klonner & Norze 2023: 157).

In my thesis, creating a sketch map began with choosing the area of interest and basemap on the SMT website (Klonner et al. 2021). Relevant areas were chosen based on a pre-mapping event facilitated by a CCB staff member. The idea of the pre-mapping was to identify general areas within the Bere development zone and in the GH11 area, where veld products exist. By doing this it was possible to create more detailed and small-scale basemaps for the sketch mapping event of these specified areas. In practice the pre-mapping was done using QGIS, which is an open-source GIS software application. To make the identification of veld product sites easier for the locals, relevant vector layers of the Bere development zone, roads, fossil valleys, open pan surfaces and cattle posts were added to the QGIS project. The facilitator populated the veld product site layer with points marked together with four community members locals in the 20-minute pre-mapping event. All together 33 veld product sites were identified.

I created ten PDF sketch maps of these focus areas using the SMT website (Figure 5). To make mapping easier for the participants, the same layers that were used in the pre-mapping event were included in the physical sketch maps. This required converting the PDF sketch maps into PNG images and georeferencing them on QGIS. After this, I made a map layout of each of the ten sketch map sites including the development zone, road, fossil valley, open pan surface and cattle post layers.

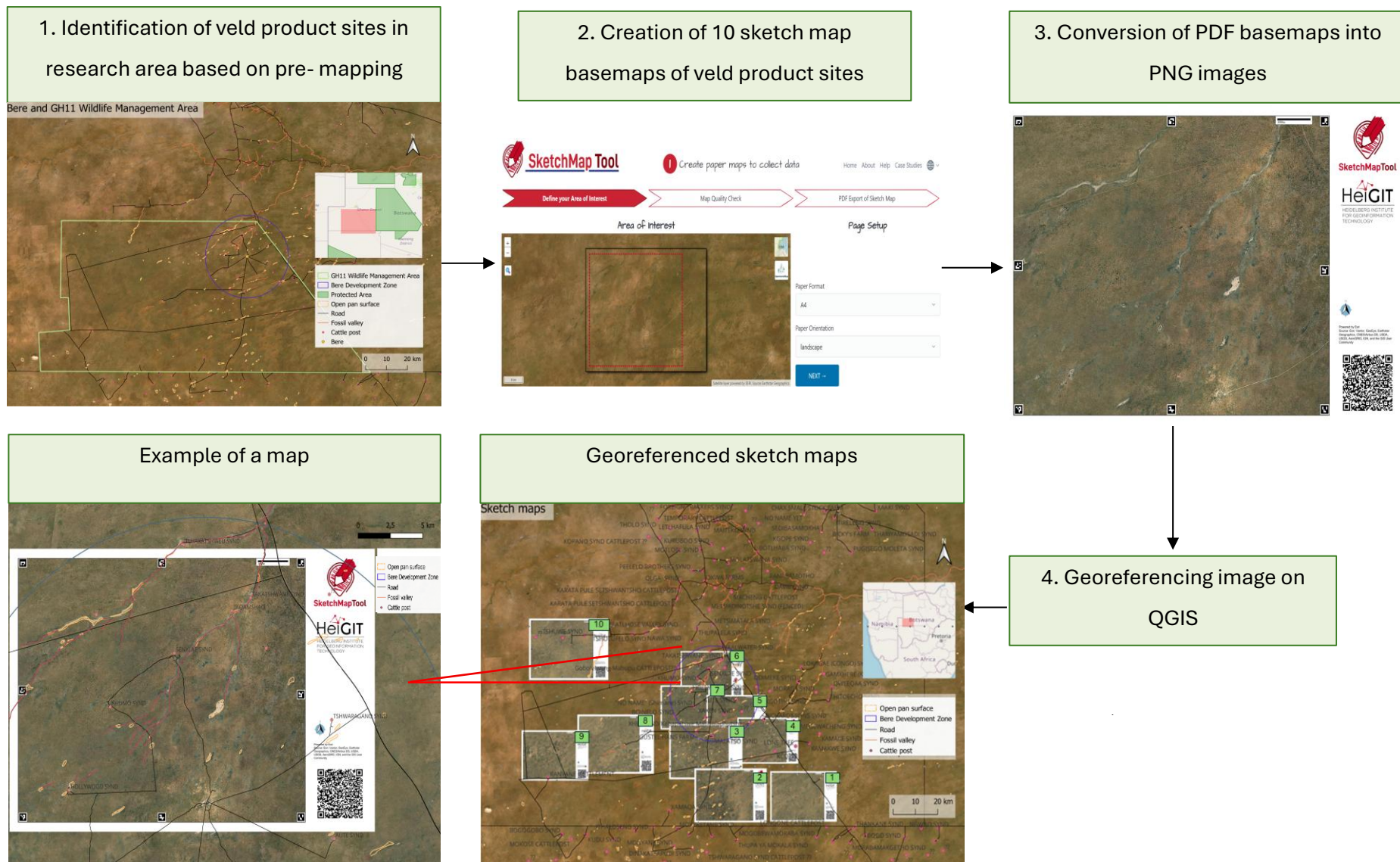


Figure 5. Creation process from pre-mapping to printable sketch maps. Ten sketch maps were created using Sketch Map Tool, converted to images, georeferenced on QGIS and combined with additional layers. The veld product sites from the pre-mapping event are not shown on the maps to protect the information from being misused.

In practice, the participatory mapping event consisted of five parts: 1) Framing the workshop 2) Practicing sketch mapping 3) The official mapping 4) Group discussion about environmental factors 5) Evaluation. The workshop was about five hours long, including breakfast and lunch break.

During the *first* phase 44 participants were introduced to the SMT and learned about the purpose of mapping. Participants also consented to the research and were divided into five focus groups during this phase. In the *second phase* the participants practiced marking areas on test maps using different colors and symbols. Time was also allocated to make sure participants could locate themselves on the maps. During official mapping the groups worked with six sketch maps representing different areas. They circled sengaparile, mahupu, morama and other plant sites with different colored markers, and drew legends on the side of the sketch map to explain their markings (Appendix 3). After mapping groups discussed environmental factors influencing veld product availability. These discussions resembled those of the other two workshops, but focused only on the current situation, since there was not time to introduce futures thinking as a part of this workshop. Facilitators documented results on Post it-notes. *Finally*, the workshops were evaluated by all participants.

4.2.3 Thematic interviews

To deepen my understanding of veld product use and HWC, I interviewed harvesters in both villages. Interviews enable researched individuals to explain their experiences in their own words, which helps build a deeper understanding of their understandings (Anyan 2013). In Bere, I conducted five interviews, one of which involved two harvesters. The rest of the interviews involved one interviewee. In New Xade, I conducted four interviews, including one with three harvesters, one with two harvesters and two individual interviews. Therefore, altogether thirteen people participated in my interviews.

The interviewees were chosen in both villages from the workshop participants, since they had relevant knowledge related to the themes of the research. The local translators in both villages suggested potential interviewees to me based on their knowledge of who would be willing to participate and have relevant knowledge. Based on these

suggestions I selected interviewees who represented different genders and age groups. This way I ensured that the interviewees share diverse perspectives and thereby broaden my understanding of the research subject.

The interviews conducted were semi-structured thematic interviews. In this type of interview method, the topics and therefore the theme of the interview are known in advance (Eskola & Suoranta 2014: 87). The interview questions are planned based on the themes the researcher is interested in (Hirsjärvi & Hurme 1988: 41). However, the method lacks the precise wording and order of questions, which is characteristic of a structured interview (Hirsjärvi & Hurme 1988: 36). Therefore, the order and depth of questions may vary between interviews (Eskola & Suoranta 2014: 87).

Based on this interview method, I determined a set of questions that were similar between interviews. However, during the interviews, if the interviewee had a lot of knowledge about a certain subject, I asked additional questions on the spot to deepen my understanding. I also changed the order of questions if the interviewee started referring to a certain theme in a different part of the interview than I had initially planned. Questions were relatively similar between villages but were revised a bit after the workshops in Bere to improve their clarity and avoid repetition.

The first half of the interview focused on themes related to HWC, and the second half to veld product livelihoods. The responses to the HWC questions contributed to answering research question one. The responses to the veld product questions contributed to answering research question two. When responding to research question three, I used responses from both parts of the interview. The interviews were only focused on the current state of HWC and livelihoods, unlike the workshops. In Bere, the interviews' length varied from 1.5 to 2 hours, while in New Xade they ranged from 1.5 to 2 hours and 45 minutes. The duration varied depending on how many harvesters participated in each interview. I recorded the interviews using a smartphone and took notes during them. I transcribed the interviews manually, primarily documenting the interpreter's translations of the interviewees' responses. At times, the interviewees also spoke English, in which case I transcribed their responses as well.

There are certain challenges related to interviews as a research method. One of these challenges is related to the power imbalances between the interviewer and the interviewee (Kvale 2006: 480). The interviewer has a lot of control over the situation and interpretation, simply because they have chosen the questions and analysis methods (Kvale 2006: 483; Anyan 2013). Power can also be further built up by differences in socioeconomic statuses, educational backgrounds, ethnic identities and genders between the interviewer and interviewee (Anyan 2013). Based on the interviewer's own knowledge of the subject the interviewer may also steer the conversation in a certain direction.

Another challenge, related specifically to situations, where there is a need for a translator between the interviewee and interviewer, is the 'lost in translation' -issue. In qualitative research the aim is to understand subjective experiences, which are shared through language (van Nes et al. 2010). Therefore, language plays a crucial role in both data collection and analysis. However, when the researcher and the participants speak different languages, meaning may get lost in the process. Additionally, both the participants and the researcher's understanding of the subject is also tied to the interpretations made by the translator (Hirsjärvi & Hurme 1988: 47; Squires 2009). The researcher, interviewee and translator all have also their own preconceptions, expectations, motives and behavioral factors which influence the results of the interview (Hirsjärvi & Hurme 1988: 47). These are related to the demographic characteristics, personality, experiences and skills of all parties. This may be an issue not only in interviews but also in the workshops.

4.2.4 Ethical considerations

To tackle potential ethical issues related to biased participation, language barriers or unequal benefits from the research, I planned and implemented the research by following ethical guidelines for research on Indigenous people (Brito Salas & Avento 2023; Heikkilä et al. 2024; Lundsgaard-Hansen et al. 2024). Participant selection for both participatory backcasting and workshops was assisted by CCB and conducted in collaboration with the local Trust and Village Development Committee to ensure a heterogeneous group chosen by the community itself. To address language barriers,

workshop materials were reviewed and adapted by CCB staff, further simplified during the research process based on learnings in the field, and supported by facilitators and translators to enable discussion in participants' own languages. Small group formats were used in workshops to ensure that all participants could express their views.

Consent forms were provided to all participants, including information on how results will be shared with both the community and the public. Participants were offered meals and refreshments during workshops as compensation, and cooks, facilitators, and translators were financially compensated for their contributions. Validation workshops were conducted in both villages, where preliminary findings were presented and discussed with participants to identify and correct possible misinterpretations.

Concerning participatory mapping, questions of data ownership were particularly relevant in this study, as the mapping involved veld product sites known primarily to local Indigenous communities (Klonner & Norze 2023: 151). During the validation workshops, the potential risks associated with publicly sharing the maps as part of my thesis were discussed with participants. Community members expressed concern that external actors could misuse the spatial information for harvesting veld products. As the knowledge of these sites is collectively held by the Bere community, the specific mapped locations are not published in this thesis and are shared only with the community. However, non-sensitive, generalized descriptions that do not enable the identification of exact locations are included in the thesis.

To enhance my understanding of topics discussed in the workshops, it was necessary to interview harvesters with thorough knowledge of veld products and HWC. Translators in both villages assisted in choosing interviewees of different ages and genders who had in-depth knowledge. The semi-structured interview indeed offered possibilities for the interviewees to guide the direction of the conversation and have power over the results (Hirsjärvi & Hurme 1988: 36; Anyan 2013). To obtain meaningful results, it was essential to be able to adapt the interview framework as the interview progressed, as some interviewees, for example, had more comprehensive knowledge of life in the CKGR area than I had anticipated. This knowledge helped build an understanding of factors contributing to coexistence and difficulties in modern lifestyles. However, the

interviewees within a village were relatively homogeneous, as all were veld product harvesters residing in the same small village. I acknowledge that the small sample size (thirteen interviewees) does not allow for a comprehensive representation of veld product use and HWC in the area.

4.3 Analysis methods

4.3.1 Processing mapping data

After mapping the distribution of sengaparile, mahupu, morama and other plants in the ten areas surrounding Bere in the GH11 district, these results were digitalized. Each map was photographed, and the images were uploaded on the SMT website. The tool automatically georeferenced the collected data and digitalized the markings. I downloaded the geodata in vector and raster format and transferred the vectorized mapping results in geojson format and the rasterized results in geotiff format to QGIS. I manually verified and corrected the data, since the tool had not identified all markings on the maps and had, on the other hand, misidentified some map layer features as markings.

I first categorized the mapped areas according to the plant species they represented by separating polygons based on their assigned color codes. For each mapped area, I therefore created three focal plant species layers for sengaparile, mahupu and morama, and an additional layer containing all other mapped plant sites. After doing this to the ten mapped focus areas, I combined polygons representing the same plant species from different focus areas into unified layers. I merged overlapping polygons for each species-specific layer to create continuous distribution areas. Finally, I visualized the resulting layers using intuitive symbology.

Next, I created a plant specific distribution map for each of the 10 sketch mapped areas. There were no morama sites in areas 1,4 and 5, so for the plant I created only 7 maps. For sengaparile and mahupu I created 10 maps, as well as for the 'others' layer. In addition to creating maps, I conducted an optimized hotspot analysis for each plant species to find statistically significant clusters.

4.3.2 Optimized Hot Spot Analysis

Optimized hot spot analysis was used to explain both visually and statistically the distribution of veld product sites. The tool identifies statistically significant spatial clusters of high values and low values (Esri 2026a). The spatial analyst tool identifies statistically significant high and low values by automatically determining suitable analysis settings by aggregating data, identifying an appropriate scale and correcting for multiple testing and autocorrelation. The advantage of the method is that it provides objective, statistically rigorous information of spatial clusters, moving beyond subjective visual interpretation (Mapular 2026). In an optimized hot spot analysis, there is not an issue of choosing parameters that do not suit the data, since the tool does this automatically (Esri 2026a). However, small sample size and sparse data can produce unreliable results (Mapular 2026).

First, I used the optimized hot spot analysis to identify areas where veld product markings are statistically significantly close to one another. In other words, this meant searching for clusters of the center points of the marked veld product site polygons. I did this for each mapped plant species separately. In practice, I first converted the veld product polygon data into center points. Then, the tool automatically identified an optimal neighborhood size for the points, which meant detecting which points are analyzed together to assess local clustering (Esri 2026a). The calculated neighborhood values varied between layers. The fixed distances for the sengaparile-, mahupu-, morama- and other plants -layer were 10080 meters, 7601 meters, 7007 meters and 12971 meters, respectfully. The results were displayed in 1 kilometer x 1 kilometer grid cells, which all got a value of either being a statistically significant hot spot or not.

I used a query to filter only hot spot areas with a confidence rate of 95 % (figure 6). The `GipValue_Fixed` in the definition query refers to the p-value, which was set to $<0,05$ to ensure statistical significance (Esri 2026b). The `giZScore_Fixed` refers to the z-score, which refers to standard deviations. If the standard deviation is high, it is unlikely that the observed spatial pattern is random. For the definition query I indicated that the Z-score should be greater than 1,96, because this indicates that the p-value is $<0,05$. Finally, the `Gi_Bin_Fixed` value indicates the confidence level of the hotspot. For the

definition query I indicated that the value should be greater than 1 to filter out points, where the confidence level is below 95 %.

I also used optimized hot spot analysis to identify two other types of veld product site clusters. By conducting the analysis on the veld product site polygons, using their area as the determining variable, I was able to identify clusters of spatially large and small veld product sites (Figure 6). The results can help harvesters plan where to go when staying for a long period of time harvesting large quantities, or when seeking specific locations for smaller scale harvesting. On the other hand, the results may reveal spatial patterns that help gain understanding of factors, such as overharvesting or grazing, influencing the distribution. The fixed neighborhood distances for the sengaparile-, mahupu-, morama- and other plants-layer were 9945 meters, 9610 meters, 18403 meters and 9459 meters, respectfully. To filter only values, where the observed spatial pattern is not random and the confidence level of the hotspot is over 95 %, I used a definition query (Figure 7). The query was otherwise the same as before, but it included also values related to cold spots.

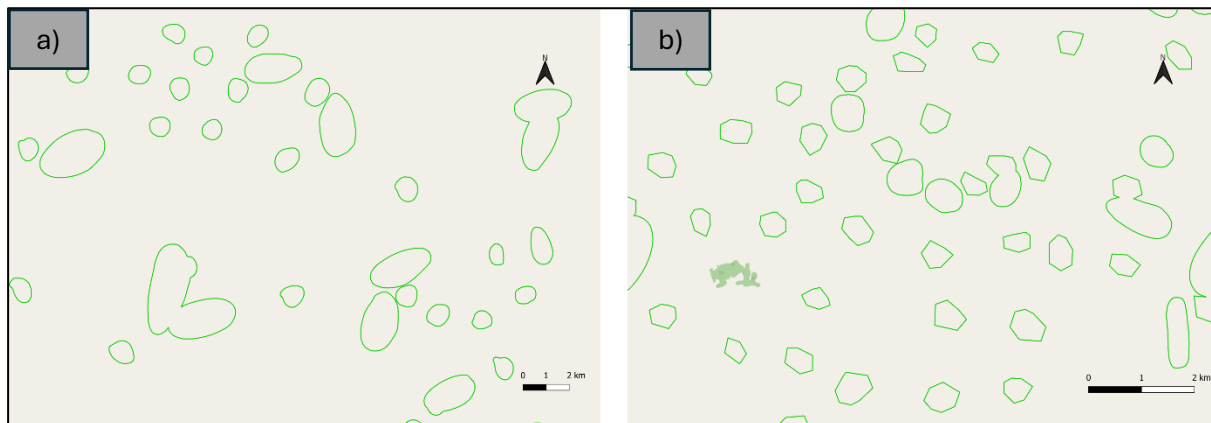


Figure 6. a) Example of large veld product site clusters. b) Example of small veld product site clusters.

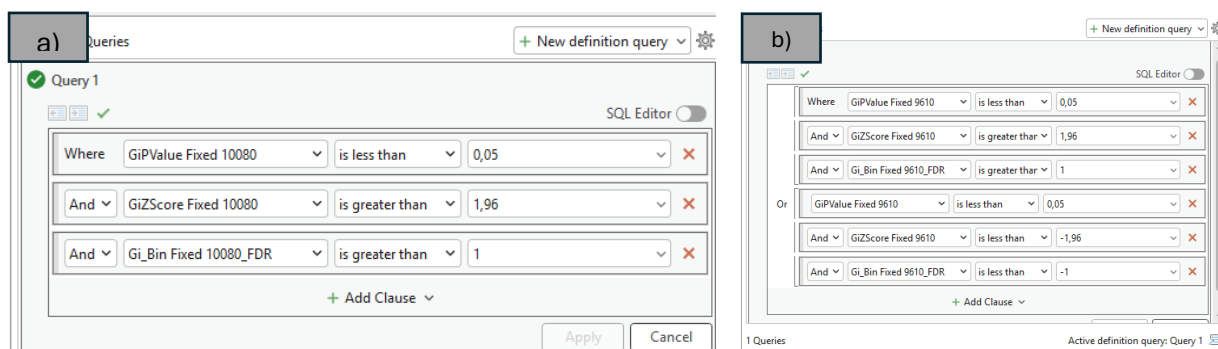


Figure 7. a) The parameters used for the definition query of the hot spot analysis on polygon center points. b) The parameters used for the definition query of the hot spot analysis on polygons.

4.3.3 Theory-guided qualitative content analysis

Since my study focuses on subjective experiences of local people, qualitative content analysis was well suited for the study, because it allows an in-depth interpretation of lived experiences that cannot be captured through quantitative methods. Following the definition by Hsieh & Shannon (2005) qualitative content analysis can be defined as “*a research method for the subjective interpretation of the context of text through the systematic classification process of coding and identifying themes and patterns*”. I use a theory-guided qualitative content analysis, in which concepts derived from theory, frameworks and the key characteristics of the phenomenon help recognize previously identified themes from the data and guide its the classification (Tuomi & Sarajärvi 2018: 117). In this research, theory guided also the framing of the questions and their categorization under certain themes in the data collection phase, which helped when classifying the results. However, the theory-guided method does not rigidly follow only classifications based on previous theory and frameworks. Instead, based on the data new categories may be formed and previously planned categories deleted or combined.

Since my research focuses HWC, Indigenous livelihoods and their entanglements, several different frameworks were used to classify the results. In the context of HWC, the coexistence framework largely guided the data collection and analysis process (Dubois et al. 2017; Pooley et al. 2021). The focus was not only on the damage and economic losses caused by wildlife, but also on the retaliatory measures it causes and negative impacts on wild animals. Another framework that influenced the questions guiding data collection was the environmental justice discourse related to HWC issues, which positions HWC as a structural issue (Brackowski et al. 2023; Alba-Patiño et al. 2025). The workshop and interview questions and therefore also the final categorization, acknowledge that HWC is not just a challenge between an individual community and wild animals living in the area, but a wider issue of who manages the conflict, how, and at whose expense.

In the context of veld product-related livelihoods, the theoretical frameworks that guided the framing of the questions and the classification of the results were mainly the biocultural diversity framework and the SLF (Ellis 1998; Morse 2025). The SLF introduced human, natural, financial, physical, and social capital as aspects to consider when looking at the sustainability of a livelihood. The biocultural framework helped recognize the importance of livelihood diversification in the conservation context.

Several studies influenced how the questions related to the third research question about the interconnections between HWC and IK were framed, and further how the responses were classified (Nyhus 2016; Carter & Linnell 2016; Jordan et al. 2020; Hatty et al. 2022; Kansky 2022; Pooley et al. 2022; Jolly & Stronza 2025; SADC TFCA 2026: 8). Following Gielen (2025: 186) I used the concept ‘rest of nature’ when referring to the relationship between humans and nature, which was central to this section. This phrasing emphasizes the role of humans as part of nature. To see how well veld product-related livelihoods may support coexistence, I used responses to research question 2 to indicate how well these livelihoods meet the requirements of coexistence. For each requirement category there was a corresponding livelihood-related category, which was looked at. The possibilities were to some degree also discussed in relation to other requirement categories, where it was relevant. These connections are presented in Table 1. Table 2 presents the categorization of all the results. Nvivo was used to classify the results.

Table 1. Connections between coexistence and veld product livelihoods.

Coexistence requirements	Veld product-related possibility for supporting coexistence
Balancing benefits from nature with conservation	Economic possibilities of veld products
Nature connectedness	Strengthening nature connectedness through veld product harvesting
Adaptive strategies and community involvement	-Indigenous knowledge related to veld products
-Increased knowledge about conflict safe income sources	-Availability of and access to veld products
-Access to conflict safe income sources	-Rules related to harvesting veld products
-Discussions about context-specific management methods	

Table 2. Connection between research questions and themes identified in the data.

Research question	Workshops - The present	Workshops - The future	Interviews – The present
1. How is human–wildlife conflict (HWC) currently managed among San communities in Ghanzi District, Botswana, and how do the communities envision HWC management in the future?	-Wildlife observations -State of conflict and economic losses -HWC management methods	-HWC management methods • Pathways • Challenges	-Wildlife observations -State of conflict and economic losses -HWC management methods
2. What kinds of veld product–related livelihood activities are San communities currently practicing in Ghanzi District, Botswana, and how do they hope these activities will develop in the future?	-Livelihood possibilities -Indigenous knowledge related to veld products -Economic possibilities of veld products -Strengthening nature connectedness through veld product harvesting -Rules related to harvesting veld products -Availability of and access to veld products	-Livelihood possibilities -Indigenous knowledge related to veld products -Economic possibilities of veld products -Strengthening nature connectedness through veld product harvesting -Rules related to harvesting veld products -Availability of and access to veld products <i>Pathways and challenges to the desired future were discussed under each theme</i>	-Livelihood possibilities -Indigenous knowledge related to veld products -Economic possibilities of veld products -Strengthening nature connectedness through veld product harvesting -Rules related to harvesting veld products -Availability of and access to veld products
3. How do veld product–related livelihoods support human–wildlife coexistence now and in the future?	-Coexistence willingness and importance -Requirements for coexistence -Possibilities of veld product use for increasing coexistence – responses to research question 2 – the current situation	-Coexistence willingness -Requirements for coexistence • Pathways • Challenges -Possibilities of veld product use for increasing coexistence – responses to research question 2 – the future situation	-Coexistence willingness -Requirements for coexistence currently -Possibilities of veld product use for increasing coexistence – responses to research question 2 – the current situation

5. Results and discussion

5.1 Human-wildlife conflict

5.1.1 Wildlife observations

Wildlife encounters are common in both villages. In Bere, carnivores, all or nearly all focus groups and interviewees mentioned seeing in the area, were black-backed jackals, cheetahs, leopards, lions and brown hyenas. They also mentioned seeing duikers, steenboks (*Raphicerus campestris*), greater kudus, red-hartebeests, ostriches, and undefined rabbit and snake species. In New Xade, the same wild animals, except for cheetahs and steenboks, were mentioned by most participants. Additionally, the New Xade harvesters emphasized the presence of African wild dogs, caracals, elephants, warthogs and porcupines in the area.

The observation frequencies of carnivore species found in the area are presented in Table 3. Importantly, these were the most common frequencies chosen by focus groups and interviewees, but there were significant differences between participants in how often they said wild animals are observed. In both villages, seeing wild animals that do not endanger livestock was more common than seeing predators. In Bere, ostriches, rabbits, snakes, steenboks and duikers were seen weekly. Harvesters in New Xade agreed on seeing duikers and kudu weekly. Most predators in both villages are observed only monthly or yearly.

The participants' observations of the animals are consistent with previous studies regarding wild animals residing in the area (Tshukudu 2024: 35). The harvesters generally agreed on the observation frequency of commonly encountered species, while opinions varied more regarding less frequently observed animals. Participants' observations of how often predators are seen varied considerably. For some wild animals it was not possible to define a single most common observation frequency, since responses varied between focus groups and interviewees. Interviewees noted that sightings can also be highly intermittent – animals such as lions may go unseen for several years, only to be encountered repeatedly within a single year. Observations

reflect subjective experiences and perceptions rather than verify objectively how often encounters happen.

Indeed, the answers are not meant to be an accurate representation of animal occurrence in the area, but rather indicative. The interviews helped to highlight that an individual's place of residence and lifestyle greatly influences which animals they see and how often. An interviewee in Bere, for example, brought up that they nowadays live closer to the village and therefore see less animals than before (Bere Interview 5). Additionally, if an individual's lifestyle is centered around spending a lot of time in the natural environment or farming, it is more likely for them to see wild animals. The New Xade harvesters' responses do not also necessarily indicate that the animals are seen near the village. The harvesters travel frequently to CKGR, where they see wildlife more frequently. Nevertheless, humans and wildlife share the space, as wild animals frequently move across WMAs, which emphasizes the need for coexistence strategies (Gielen 2025: 9).

Table 3. Wildlife observation frequencies and contribution to HWC.

For some species the observation frequency was not defined in the workshops, so Table 3 does not present this information.

Wild animal	Most commonly reported observation frequency in Bere	Most commonly reported observation frequency in New Xade	Role of the animal in HWC in Bere	Role of the animal in HWC in New Xade
Black-backed jackal	Weekly (interview and workshop data)	Weekly (interview and workshop data)	-Most frequently mentioned 'conflict' animal, tied with leopard -Frequent conflicts weekly or monthly -Kills sheep, goats and chicken	-Second most frequently mentioned animal the community comes into conflict with -Frequency of conflicts undefined -Kills sheep
African wild dog	Weekly (interview data)	-Yearly (interview and workshop data) -Yearly (workshop data)	-Second most frequently mentioned 'conflict' animal -Frequent conflicts weekly or monthly during summer -Kills cattle	-Third most frequently mentioned 'conflict' animal, tied with cheetahs and brown hyenas -Frequency of conflicts undefined -Kills cattle, horses, lions, goats and dogs

Wild animal	Most commonly reported observation frequency in Bere	Most commonly reported observation frequency in New Xade	Role of the animal in HWC in Bere	Role of the animal in HWC in New Xade
Cheetah	Monthly (interview data)	Yearly (interview data)	-Fourth most frequently mentioned ‘conflict’ animal -Yearly conflicts -Kills goats	-Third most frequently mentioned ‘conflict’ animal, tied with African wild dogs and brown hyenas -Frequency of conflicts undefined -Kills goats and cattle
Leopard	Monthly (interview data)	Monthly (interview data)	-Most frequently mentioned ‘conflict’ animal, tied with black-backed jackal -Yearly conflicts -Kills goats, foals, calves and cattle	-Was not mentioned as causing conflict within the last year -Frequency of conflicts undefined -Kills goats, foals, calves and cattle
Lion	Yearly (interview data)	Monthly or yearly (interview and workshop data)	-Third most frequently mentioned ‘conflict’ animal, tied with brown hyenas -Frequency of conflicts undefined -Kills cattle, horses and donkeys	-Most frequently mentioned ‘conflict’ animal -Frequency of conflicts undefined -Kills cattle, horses, donkeys, goats and dogs
Caracal	Yearly (interview data)	-Weekly (interview data) -Monthly (workshop data)	-Fourth most frequently mentioned ‘conflict’ animal -Frequency of conflicts undefined -No mention of killed animals	-Fourth most frequently mentioned ‘conflict’ animal -Frequency of conflicts undefined -No mention of killed animals
Brown hyena	Weekly (interviews)	-Weekly (interview data) -Weekly or yearly (workshop data)	-Third most frequently mentioned ‘conflict’ animal, tied with brown hyenas -Frequency of conflicts undefined -Kills goats	-Third most frequently mentioned ‘conflict’ animal, tied with African wild dogs, cheetahs and martial eagles -Frequency of conflicts undefined -Kills goats

5.1.2 Current state of conflict and economic losses

In both Bere and New Xade the community comes into conflict with several different species that cause economic losses through livestock predation (Table 3). However, in general, the harvesters in New Xade mentioned more livestock species being killed by wild animals. The findings exemplify the previous observation of conflict rates being high near agricultural and other production landscapes and protected areas (König et al. 2020). The potentially higher conflict rates in New Xade compared to Bere may be explained by its closer proximity to CKGR (Inskip & Zimmerman 2009).

In Bere, the risk perceptions of the conflict seemed to be higher than the actual frequency of incidents. One group, for instance, mentioned that leopards kill foals and calves every other week. However, in the validation workshop, the same group specified that the last time a leopard killed a group member's livestock animal was in September 2025. Only in one interview, the interviewee mentioned leopards killing their calf, and it had happened a year ago. Similarly, a group mentioned cheetahs killing livestock animals every week, even though in the validation workshop they mentioned the latest incident being witnessed sometime in 2025. However, the participants of both the initial HWC workshop and the validation workshop reported relatively frequent conflicts with black-backed jackals and African wild dogs. All groups mentioned black-backed jackals killing their livestock in February 2026. Except for one, all groups mentioned African wild dogs preying on their livestock either in December 2025 or during the first week of March 2026, when the validation workshop was held. The same incidents were brought up in the interviews. These results are consistent with the findings by Dickman (2010), Inskip et al. (2014) and König et al. (2020) of risk perceptions influencing how people experience HWC. Beliefs and attitudes connected to especially predators, as well as the inability to independently manage the conflict as the community may increase intolerance towards the animals and result in a fear of attacks.

In New Xade, the question concerning dealing with the uncertainty of the frequency of conflicts, was a bit different. Participants were asked to specify which wild animals have killed their livestock within the last year, instead of thinking of the conflict in general. The responses did not clarify the specific frequency of incidents. However,

based on the harvesters estimates of the worth of livestock animals, I was able to roughly estimate the financial value of livestock losses, which equaled around 92 000 Botswana Pulas that is around 5866 Euros. Despite the financial value of losses not being discussed in Bere, the losses were most likely higher in New Xade, since attacks by lions were emphasized more in the village. Since lions kill cattle, which are the most expensive livestock animals, the monetary value of the losses may be more extensive. The proximity of protected areas may expose the New Xade harvesters to a higher risk of lion attacks, whereas smaller carnivores, outcompeted near CKGR, may pose challenges in Bere, located farther from protected areas (IUCN/SCC 2015; Durant et al. 2017; Tshukudu 2024: 32&35). The identified wildlife species in both villages that are involved in HWC were consistent with previous findings (Tshukudu 2024: 91). These species are mainly also of conservation concern, since many of them are endangered (Karunya Consulting et al. 2020: 82).

Harvesters in both villages mentioned reporting livestock losses to DWNP to receive economic compensation. However, the interviewees emphasized that compensation is only available for losses caused by certain predator species and does not cover livestock killed by black-backed jackals, African wild dogs, caracals, and brown hyenas. Some harvesters suspected this may be because the animals cause livestock losses frequently making it financially difficult for the government to provide compensation for all incidents. The harvesters expressed their dissatisfaction with the system, since losses caused by black-backed jackals and African wild dogs are more common than those caused by felines. The participants also considered the compensation amounts as insufficient relative to the value of the lost animals, consistent with previous findings (LeFlore et al. 2019). For example, harvesters in New Xade estimated the compensation amounts may be about one- or two-thirds of the livestock animal's worth. According to the interviewees, the reduced compensation is intended to encourage livestock owners to improve animal protection measures, which is difficult, however, if there is not knowledge and resources to ensure better protection. Participants in both villages further described the reporting process as demanding, as it requires contacting DWNP officers and providing evidence that the livestock was killed by a compensable predator species. Such evidence may include predator tracks or fresh carcass remains showing

signs of predation. One group in New Xade additionally noted that they lacked sufficient knowledge about how to report livestock losses to the DWNP.

The major economic losses, lack of compensation or the lack of information on how to get it within these vulnerable communities are consistent with the previous findings of HWC being an environmental injustice issue (Brackowski et al. 2023; Alba-Patiño et al. 2025). Most likely, the abundance of wild animals in the area is partly due to the sustainable hunting practices exercised by the San in the CKGR before being relocated and abandoning their traditional lifestyles (Berkes 2017: 269-270). Even though communities, to some degree, benefit from the animals through the Community Trust by selling sub-leases to wildlife for tourism operators, they suffer relatively frequent losses due to conservation choices that they have not been part of making. Owning livestock has not been a choice made by the San, but the result of governments' assimilation process (Hitchcock 2011; Dowie 2011: 103). This exemplifies how HWC is essentially a human-human conflict entangled in power imbalances between people with different ideas of how to sustainably conserve wild animals (Nyhus 2016 & Haage 2023).

5.1.3 Current human-wildlife conflict management methods

In both villages, the community members aim to use non-lethal management approaches when dealing with HWC, but sometimes, especially the smaller predators are still killed. In both villages, kraals, meaning fenced-in enclosures built for livestock, were the most common non-lethal management method used, although not mentioned by all harvesters. Keeping the livestock animals safe, especially at night, was seen as important, because that is when black-backed jackals and African wild dogs are awake. However, sometimes, the livestock animals do not come back to the kraal during the night or the kraals are not strong enough to keep the strongest predators, such as lions, out.

In Bere the use of guarding dogs seems to be more common than in New Xade. Dogs are important, especially during the day for protecting goats and sheep. Many considered them helpful. However, sometimes dogs are not properly trained to guard livestock, which may lead to them wandering away. In both villages a few participants said they

also use various methods to chase animals away. In New Xade, a group gave an example of using fire, bells, and lights to scare wild animals away. Especially in New Xade, all the interviewees emphasized that current management is not enough to deal with the conflict, and especially stronger kraals and more guarding dogs are needed. This supports previous findings about the importance of developing stronger physical protection in Ghanzi District (Tshukudu 2024: 94&139). Non-lethal damage control is generally considered a more appropriate approach to managing HWC than lethal management, especially when wildlife species involved are endangered and of conservation concern (Nyhus 2016). It has been realized that the development of current non-lethal management methods is necessary, and not yet sufficient, since cattle still often roam free (Tshukudu 2024: 94&139). The lack of management in New Xade seems alarming, since the proximity to CKGR increases conflict rates.

Killing wild animals to protect livestock was mentioned by three groups in Bere and by two groups in New Xade. In both communities, this practice was motivated by anger over livestock losses when compensation was not available for damage caused by species such as African wild dogs and black-backed jackals. The harvesters did not seem to be disappointed with the wild animals, but rather at the compensation system. Some harvesters also mentioned killing wildlife to deter other predators and prevent future livestock losses. In Bere, some interviewees explained that officers from DWNP sometimes encourage the community to deal with African wild dogs themselves by trapping their pups, instead of the officials doing this themselves.

Killing wild animals has not been always associated with protecting livestock. Especially interviewees in New Xade emphasized hunting as an important part of their identity, which is nowadays restricted by hunting quotas. Hunting herbivores was in the past more common than hunting predators, which was considered as more dangerous by the harvesters. However, the harvesters noted that when they lived in CKGR, killing predators to protect goats and donkeys still happened on occasion. It was not a result of a lack of appreciation for the animals or motivated by anger, as people were previously allowed to use products derived from the animals, such as their skins, after killing them. Hunting was done sustainably, and wildlife populations were not exhausted (Hitchcock 2011). Nowadays, government restrictions prevent community

members from benefiting from the carcasses of predatory animals, which decreases the harvesters' appreciation of wild animals. Compared to the life in CKGR, harvesters are also not allowed to apply for individual hunting permits. Instead, the Community Trust is given a certain quota of wild animals that they can kill. This makes practicing traditional lifestyles more rigid and decreases the community's autonomy over their natural resources.

These responses by the participants related to lethal control show the complexities in finding sustainable ways of decreasing HWC. Mainstream conservation often focuses on separating humans from nature, since the presence of humans is seen as disrupting biodiversity and the pristine wilderness (Berkes 2017: 259). However, coexistence of humans and wildlife or even hunting cannot automatically be assumed to cause wildlife declines among Indigenous communities (Hitchcock 1996). In the past, the offtake of wild animals by the San were generally below replacement rates and remained within sustainable levels. Due to the direct benefits, such as skin and meat that was derived from the wild animals, the San appreciated even carnivores. From this perspective, hunting is not seen as a lack of appreciation for wildlife. Rather, it is seen as a form of engagement that strengthens long term capabilities of the community to sustainably manage their natural resources. However, if these benefits from wildlife cannot be received nowadays, and livelihoods are focused more on keeping livestock than depending on nature, respect towards wild animals may decrease. If simultaneously compensation rates remain low, retaliatory killings may increase, which can be seen with black-backed jackals and African wild dogs.

Protecting animals and building a connection to them seems to be connected to the benefits received from them. In New Xade, harvesters felt that large predators nowadays provide insufficient benefits to the community and willingness to protect them may start to decrease if connection to wildlife is not re-established. Unlike in the past, the community members can no longer make extensive use of wildlife resources themselves. Additionally, CBNRM activities related to wildlife tourism are not as developed in Ghanzi District compared to many parts in Botswana (Tshukudu 2024: 91). This means that Community Trusts do not monetarily benefit significantly from selling sub-leases to land and wildlife to safari operators.

In both villages the participants who mentioned not supporting lethal management said they were worried of breaking the law, if they kill animals without the DWNP's permission. In Bere the interviewees seemed reluctant to kill the larger predators due to their potential value through tourism. In New Xade this was not mentioned. In Bere the harvesters were also worried that killing would either harm the environment or their own livestock through a chain reaction. In Bere, the harvesters were also concerned that killing would either harm the environment or their own livestock through a chain reaction. Poison is commonly used in weapons, and there is a risk of secondary poisoning if the livestock animals come across the carcass.

Perceptions of responsibility for managing HWC differed between Bere and New Xade. In Bere four groups and four interviewees described the community, and its Trust as key actors in managing HWC. Two of these groups did not mention the role of DWNP at all, instead viewing management as the responsibility of individual livestock owners. This may be partly reflected in interviewees explanations that livestock owners are required to contact DWNP officers when they need assistance with livestock losses. Two of these groups also acknowledged the role of DWNP but emphasized the role livestock owners must carry themselves of management. Interviewees further explained that DWNP encourages the community to handle the conflict, because officers themselves cannot be always present on the field responding to wildlife incidents. An interviewee (Bere Interview 5) also brought up that the role of the Trust in managing HWC is gradually increasing, as the community is starting to receive benefits when wildlife tourism activities are growing.

In contrast, the participants in New Xade generally perceived HWC management as being the responsibility of DWNP. Only one group mentioned farmers alongside DWNP as co-managers, while other groups referred only to DWNP as managing HWC. Views on this arrangement were mixed. Some participants appreciated DWNP's role in controlling poaching and preventing wildlife population declines, while many were also unsatisfied with the community's limited role in conflict management. Especially harvesters, who had grown up in CKGR emphasized their capabilities of managing their own natural resources through sustainable hunting. These findings support the

argument of CBNRM initiatives not being as community-based as those affected by the initiatives would prefer (Chitsove & Madebwe 2024).

If the community is responsible for managing the animals, they can better learn to understand their behavior, benefit from them and, possibly coexist. The interviewees argued that they can manage their natural resources better than the state, precisely due to this personal connection and cultural capital. Now, DWNP may enforce the thought of wildlife as a problem, when interactions with wildlife are viewed from the perspective of conflicts (Pooley et al. 2021). When the community is not in charge of managing the conflict themselves, interactions between humans and wildlife may become centered primarily on the damage the animals impose. In such situations, wildlife may more likely be perceived as an external threat, separate from humans. This may reinforce the conceptual separation of culture and nature, where reciprocal benefits between species are ignored. The current system, where the government owns wild animals and leases Community Trusts' rights to them, does not necessarily yield benefits on the household level, unlike direct benefits from hunting or veld product harvesting would (Cassidy 2021).

One interviewee said they feel that the number of conflicts is on the rise, which is interesting, as they previously lived in an area with far more wild animals (New Xade Interview 2). Lifestyle and politics thus influence how animals are viewed and how conflict is perceived. These results support the previous findings of the lack of communal-level management in HWC, which could increase communities' sense of ownership over the wild animals (Galvin et al. 2018; Tshukudu 2024: 94).

5.1.4 Human-wildlife conflict management in the future

When discussing future management methods, the participants highlighted the need to increase non-lethal management methods in both villages. The main non-lethal management method that the participants mentioned was kraaling. The groups felt that kraaling should be more common in general and the kraals should be lit during the night to detect the movement of predators nearby. In New Xade, the participants also emphasized the need to build stronger kraals and increase kraaling not only for cows but also goats and sheep. They also mentioned the importance of feeding livestock in

kraals to protect them. Herding and managing the movements of livestock animals were mentioned by two groups in Bere, and increasing the use of guarding dogs for the same purpose was mentioned in New Xade. In Bere, one group brought up capturing and translocating wild animals as a management method and a group in New Xade suggested using drones to detect the movement of predators. The need for more efficient management methods has also been recognized in literature, where the need to build stronger kraals has been emphasized (Tshukudu 2024: 94&139).

In the future, Bere harvesters considered there is a need to discourage lethal management methods. Compared to the current situation, where three groups mentioned lethal management as a conflict management method, in the future scenarios only one group mentioned that there is a need to continue killing wild animals to protect their livestock. Another group mentioned their willingness to sometimes use lethal management methods to deal with the conflict but highlighted that they are not satisfied with this method. The rest of the groups emphasized that they will not be using lethal management in the future. They brought up how new ideas must be generated to ensure wildlife is protected, because it is an important source of income in the future. With this argument they probably referred to the growing wildlife tourism industry in Botswana (Cassidy 2021).

In New Xade, there was little apparent difference between current views and future intentions regarding the use of non-lethal management methods. In both scenarios two groups mentioned supporting the use of lethal management. The groups that wanted to restrict the use of lethal management were concerned that the lethal management will put the hunters in danger, as killing wild animals is not always safe. Two groups also highlighted the need to protect wild animals for future generations and to conserve the animals for their intrinsic value. It has been recognized in literature that communities that feel like they benefit from wild animals through the Community Trust understand the importance of those better (Tshukudu 2024: 117). In Bere, the optimism of benefitting from wild animals in the future was stronger than in New Xade.

In Bere, similarly to the current situation, there was an emphasis on the importance of communal-level management of HWC. The groups argued that the community should

be more involved than they currently are in dealing with HWC. Compared to the current situation, more groups in New Xade suggested that the community should be more involved in managing the conflict. Two of these groups did not mention the role of the DWNP at all, and said that the community, Trust, chiefs and councilors should manage the conflict independently. One group emphasized that responsibility should be shared between the government and the community. These findings support the argument of the need to improve the CBNRM framework by imposing conservation agendas from the community level and enthusiasm to practice CBC (Galvin et al. 2018; Chitsove & Madebwe 2024).

5.2 Veld product-related livelihoods

5.2.1 Livelihood possibilities

In both villages harvesting veld products is an important part of everyday livelihoods. Most have harvested since childhood, although some participants in Bere had started harvesting just within a year. Veld products are available year-round due to seasonal variations, but the time spent harvesting differs among harvesters. The harvesters reported spending from three months to a year in the natural environment each year collecting plants, although not continuously. Other common livelihoods include growing crops, herding or owning livestock, piece jobs, making traditional jewellery from ostrich eggshells and animal skins and participating in the social work program Ipelegeng that offers short term employment for unemployed people (Government of Botswana 2026).

In Bere, all groups found it easy to imagine a future, where they will continue collecting veld products. The groups hoped that in ten years the Exatheni veld processing center is fully operational and creates jobs. The groups emphasized the importance of self-employment and being less dependent on Ipelegeng reflecting previous findings of the potential of livelihood diversification in reducing vulnerability and increasing adaptive capacity (Ellis 1998; Sun et al. 2023). In New Xade harvesters described a wider variety of livelihood opportunities for the future. While veld product-related livelihoods were still emphasized, the participants expressed their willingness to have stable jobs

making craft products of ostrich eggshells, carving mortels, farming, owning businesses like tuck-shops and having formal employment.

The enthusiasm to increase veld product-related opportunities was apparent in both villages in the harvesters' willingness to allocate more time for harvesting in the future. Despite different veld products being available throughout the year, many do not currently spend the whole year harvesting. Harvesting throughout the year would ensure larger yields and benefits. These findings demonstrate, how the San are eager to utilize their ecological knowledge (Gielen 2025: 179).

5.2.2 Indigenous knowledge related to veld products

Both communities harvest several veld products and use them for food, medicine and cultural purposes. However, in Bere more harvesters seem to use a wider variety of veld products compared to New Xade. The frequencies of how often certain plants were mentioned in groups and interviews as well as the use cases of each plant in both villages are specified in Table 4.

Table 4. Most frequently mentioned veld products and their use cases.

Veld product	Frequency in Bere	Frequency in New Xade	Use case in both villages	Use case in Bere/New Xade
Sengaparile	10	6	-medicine to help with backpains, headaches, blood clearing	-medicine to cure wounds (Bere) -hunting rituals to trap steenbok (Bere) -decorations (Bere)
Mahupu	10	7	-soup	-antidote for snake or scorpion poison (Bere) -medicine for eyes (Bere)
Morama	10	6	-snacks, butter, soft porridge	-soap from seeds (Bere) -nutrient (Bere)
Motsotsojane	10	8	-snacks	-branches are used to make fire without matches (Bere)
Moretlwa	10	7	-snacks, jam -traditional beer	-bows, arrows and walking sticks from branches (Bere)

Veld product	Frequency in Bere	Frequency in New Xade	Use case in both villages	Use case in Bere/New Xade
				-leather dye from roots (Bere)
Borekhu	10	5	-jam	-medicine for achy knees and protection of bones (Bere) -medicine for increasing strength (New Xade) -attracts birds into traps (Bere)
Motlopi	10	1	-sweet drinks from fruits	-yoghurt (Bere) -coffee from grinded roots (Bere) -medicine for sores or open wounds from roots (Bere) -mortels from the trunk and branches (Bere) -burning the branches chases rain away (Bere)
Kgegwe	9	2	-source of water in the natural environment	-food and soap from seeds (Bere) -combined with gemsbok meat (Bere)
Dikgotse	7	1	-nutrient	-coffee from fried seeds (Bere)

In both villages, but especially in Bere, the knowledge seems to be widespread and has been passed down through generations. This knowledge is not only related to the use cases of the plants but also to when and where to harvest them, which plant parts to use and how to combine the species. These findings exemplify the complexities of IK as not only a way of knowing, but also as a way of transmitting information socially and applying the knowledge in practice (Fernández-Llamazares et al. 2021; Mistry et al. 2021).

In Bere, the participants agreed that nearly everyone, including people of different ages and genders, in the village have knowledge because parents continue to teach their children about veld products. Additionally, a cultural event was held the previous year to teach the youth and visitors about local culture, which the locals saw as a way of

protecting their cultural heritage. A group mentioned a society without culture being a lost society. In New Xade, the knowledge is held mainly by adults and elders, but some children and teenagers show interest in veld products during school holidays.

Specifically, elderly women and people without formal employment hold extensive knowledge about the products. The harvesters explained that people without formal employment have more time to engage in harvesting activities and learn about the plants and have an incentive to harvest the plants to get an income. However, in both villages the harvesters were concerned that the younger generation is not interested in learning about cultural heritage and it may disappear. Especially in New Xade, the harvesters were worried about this, since modern technology and the use of social media seem to interest the young people more than harvesting. School attendance also reduces the time children spend learning about the natural environment from their elders.

Commercializing veld products is a complicated issue from the perspective of IK preservation. Especially sengaparile has been identified as one of the most important national plant resources for rural development, which makes it an attractive species to harvest (UNDP 2017: 7). This may create economic incentives to protect the IK related to veld products. However, in Bere, harvesters were worried that increasing commercialization and harvesting of veld products may lead to overharvesting and essentially, knowledge loss, when there are not enough plants to collect and learn from. One of the groups in New Xade mentioned this as well. Harvesters in New Xade also emphasized Ipelegeng as a factor contributing to the erosion of IK. Employment through such programs can reduce dependence on traditional livelihoods. Unemployment has also led to alcoholism in the village, which challenges harvesting. The findings show the delicate balance that must be maintained to ensure that there are incentives to continue harvesting, but the resource base is not overexploited. If veld product-related livelihoods are detached from their original ecological and cultural context (Brinkhurst 2010; Berkes 2017), they may not offer long term solutions for pursuing sustainability.

In both villages, all participants hoped that in ten years the knowledge about veld products will be even stronger than now and the knowledge will be extensive. The harvesters emphasized that they hope to see knowledge about veld products being

translated into action. The communities suggested several ideas of reaching this state of IK. They emphasized the importance of intergenerational knowledge transmission through practice, and greater involvement of youth by teaching them about veld products in schools. In Bere, groups frequently suggested cultural heritage-related workshops and seminars organized with NGOs such as CCB, while others proposed museums, social media, and broadcasting knowledge through videos as ways to upkeep the knowledge base. A group also mentioned the importance of markets generating income and ensuring there is an incentive to protect knowledge. The harvesters in New Xade brought up the importance of protecting nature to ensure that there are veld products also in the future to learn about. These ideas demonstrate the dynamic nature of IK while maintaining its core emphasis on practice-based and intergenerational learning (Mistry et al. 2021; Berkes 2017).

Both communities also anticipated some challenges in ensuring the knowledge protection. Climate change and declining rainfall were seen as threats to veld product availability and therefore to the protection of knowledge. The harvesters in Bere also pointed out droughts, veld fires, natural disasters, diseases and a lack of nutrients as challenging the availability of veld products. This shows the connection between biodiversity and culture and highlights the need to protect the environment to preserve culture (Mbelebele et al. 2024). Some groups were also worried there might not be enough resources to fund the cultural heritage-related workshops they were suggesting, or the attendance of the community may be low. A lack of markets may also challenge the protection of knowledge. Interestingly, in Bere the community did not mention the influence of non-Indigenous cultures and social media in challenging the preservation of knowledge in the future. In New Xade, non-Indigenous cultures, social media, and alcohol use were viewed as major distractions from Indigenous culture, while some participants worried about the costs of introducing veld product-related subjects into schools. Being assimilated to the modern culture combined with being disconnected from ancestral territories is major structural challenge, which casts a shadow over the optimism regarding the preservation of IK (Berkes 2017: 247; Fernández-Llamazares et al. 2021).

5.2.3 Economic possibilities of veld products

Especially in Bere, veld products already provide economic opportunities for the harvesters. In the village, all groups and interviewees reported selling veld products in addition to consuming and using them for medical purposes. Selling products is slightly less common in New Xade. Products like sengaparile, mahupu, morama, motsotsojane and moretlwa, are sold locally, from door to door. Sengaparile has been sold in recent years in both villages to an outside buyer. Three groups in both villages also mentioned selling veld products themselves in larger towns, for example in Ghanzi, where the demand is higher.

In Bere four groups mentioned there being a demand within the village for veld products. The interviewees emphasized that selling products to outside buyers is more challenging, and demand is too low due to inaccessible markets. An outside buyer comes only once a year to the village to buy sengaparile. The harvesters were nevertheless pleased with the demand increasing within recent years, as a few years ago there was not an outside buyer for the products. The harvesters in New Xade were in general also confident about the demand being high, but not as confident as the participants in Bere. These findings support research showing recognition of the value of veld products (Brinkhurst 2010; Tshukudu 2024: 96).

Selling veld products is an important source of income for unemployed community members. The harvesters explained that the products are cheap and easy to collect, because they do not need to be watered, and the locals know where to find the products. Selling the products brings direct benefits, unlike from Ipelegeng, where payment is delayed. In practice this means that harvesters get money instantly when selling veld products, in contrast to having to wait for the end of their short-term contract to get compensated, when working in the Ipelegeng program. Most products are sold unprocessed even though in both villages, some products are occasionally grinded, dried, packaged or labelled before selling. There is no processing equipment in either village and therefore the products are mainly sold as they are, despite willingness to process the products.

In both villages, the income from selling veld products is used to buy new livestock and helps with paying school fees, buying clothes and building houses. In Bere, the harvesters also mentioned using the income to treat injured livestock animals after wild animal attacks. These findings support Berkes' (2017) and Ellis' (1998) argument of IK based livelihoods not only supporting cultural continuity but also local economies. The role of these livelihoods is also significant in reducing vulnerabilities to economic shocks on a household level, showing the potential of veld products in offering 'small wins' (Cassidy 2021). This was apparent, for example, in the notion that especially unemployed people rely on income from veld product harvesting.

However, unstable markets are a major challenge in both villages. Keeping livestock is currently a more reliable livelihood and provides long-term benefits compared to inconsistent income from selling veld products. The problems in receiving a stable income from selling the products are not related to them not being valuable, but rather to inaccessible or unstable markets (Brinkhurst 2010). The harvesters in Bere explained noticing this during a cultural fair held in summer 2025, where they were selling veld products. Within a day, they were able to generate more income than during a month working in the Ipelegeng program. In New Xade the harvesters have not been involved in activities like the cultural fair, which could have demonstrated the value of veld products to them. These market related challenges have been identified also previously in the villages (Cheetah Conservation Botswana 2024). The differences between the villages in how integrated veld products are to markets also exemplify how context specific solutions are necessary even between villages within the same district (Titz et al. 2018).

The participants in both villages saw strong potential in increasing economic opportunities through veld product use in the future. All groups expected to continue selling products in the future. Many in Bere saw this as a way to decrease unemployment and dependence on Ipelegeng. One group in Bere and two groups in New Xade hoped that the subsistence consumption of veld products could continue in the future. In Bere, the groups were hoping to sell the products locally, especially in the Exatheni processing center, but also outside the village especially to tourists. In New

Xade, there was a stronger willingness to sell products outside the village in retail stores and to companies purchasing sengaparile.

Unlike currently, all groups said that they would want the products to be processed by the community in the future. Processing, packaging and labelling the products will be an important way to add value to the products and outperform potential competitors. The groups gave examples of finished products they would like to sell that are presented in Table 4. The harvesters in both villages believed that demand for the products could continue to grow in the future, especially for mahupu and sengaparile. In Bere, the ideas of income use in the future, included ideas of building predator-proof kraals and buying guarding dogs. Participants also noted that increased subsistence use and traditional medicines could reduce household expenses. In New Xade, new use cases for the income, compared to the current situation, were not mentioned.

Communities had several ideas for strengthening future economic opportunities. In Bere, the most common suggestion to increase the demand for the products and access to buyers was advertising the Exatheni processing center on social media and billboards once it opens. The harvesters were hoping to sell the products in the center in the future and attract customers from outside the village. A group in Bere also suggested introducing incentives to encourage harvesters to collect and sell veld products. If the demand increases in the future due to better market access, supply must grow to meet the demand. This requires engagement from harvesters to spend time collecting products. Incentives could include free mobile airtime, assistance with funeral costs, and annual bonuses. Since the demand for veld products may be higher in bigger towns, one group also suggested establishing mobile shops in the Ghanzi township. In New Xade, a group proposed establishing sales activities within a designated area to facilitate higher-volume transactions. Another group brought up that only permitted individuals should be allowed to sell the products and transport them to their customers.

Common challenges brought up in both villages in achieving these economic possibilities included a lack of income to buy processing equipment and insufficient funds and transport to sell the products outside the villages. Also, the groups were

worried about the changing climate. In Bere, the harvesters brought up issues related to neglect of duty, absinthism from work and alcoholism. The harvesters mentioned that the seasonality of the veld products may also complicate getting a stable income from veld products, especially if an individual does not harvest numerous products. On the other hand, in the future storage options may be more available. In New Xade, harvesters brought up their worries of still having a lack of markets in ten years and not being able to trust whether outside buyers will come or not. Despite these concerns, the harvesters had a strong willingness to benefit monetarily more from their natural resources in the future. This supports Cassidy's (2021) argument that the potential of veld product-related livelihoods should be recognized alongside wildlife tourism in the CBNRM framework. Such an approach can benefit the communities while encouraging community-level natural resource management. This requires long-term support and sufficient infrastructure, such as processing equipment (Mbaiwa et al. 2014; Cassidy 2021).

5.2.4 Strengthening nature connectedness through veld product harvesting

The findings demonstrate a strong relational connection between the harvesters and the rest of nature in both villages. Harvesters appreciated nature for its material benefits like veld products, meat, water, shade, soil and protection from erosion and winds, and saw it as a foundation for survival and wellbeing. An interviewee in Bere explained nature teaching her survival skills, like finding water in tree hollows, which enables her to spend extensive periods of time in the natural environment harvesting (Bere Interviewee 3). This reflects an appreciation for nature as something that enables survival. Nature has been the basis for the survival of the San for thousands of years, which encourages respect for nature (Silberbauer 1981; Gielen 2025: 179).

Because people see themselves as interconnected with nature, they feel responsible for giving something back to it. An interviewee in New Xade called this "*giving love to the bush*" (New Xade Interview 2). The interviewees in Bere gave an example of respecting the natural environment by harvesting sengaparile sustainably. By leaving the largest mother root to emerge successful harvests are more likely in the future. In New Xade, the harvesters explained the importance of seasonal migrations for protecting the land

and were unhappy about not being allowed to do so in settlements they currently live in. Harvesters in both villages also emphasized the importance of walking carefully in the natural environment to avoid breaking branches. The harvesters in New Xade said that to ensure that grasses needed for building regenerate, the natural environment is burned, but only after the grasses have spread their seeds. Trees or even branches are not unnecessarily cut, and berries are picked only when they are ripe to ensure maximum yields both now and in the future.

The harvesters in both villages explained developing a strong conservation mindset when harvesting, extending from plants to wild animals as well. They did not necessarily separate plants and animals from each other but rather emphasized the importance of understanding the natural environment as an entity to ensure survival. Herbivores, like duikers and gemsboks are important not only for their meat but also because their tracks can lead to veld product sites. Being brave, alert and aware of one's surroundings were also stressed as important behaviors to follow to avoid dangerous encounters with carnivores. These behaviors were emphasized in the context of harvesting, since they must be followed to ensure the harvesters safety.

The skills related to learning animal tracks, alert calls and peaceful avoidance have been learned through spending extensive periods of time in the natural environment harvesting. An interviewee in Bere argued that before living in settlements, people grew up with wild animals and learned to share their space through lived experiences while hunting and gathering (Bere Interview 2). The harvesters knew how to scare African elephants or predators away by clapping their hands and knew how to avoid eye contact with leopards when encountering them to prevent attacks. Because traditional lifestyles related to hunting and gathering were an integral part of everyday life, wildlife was seen as beneficial and harvesting veld products taught important skills related to avoiding animals to peacefully coexist with them.

Now, in contrast, hunting and gathering is restricted and children do not grow up in protected areas among abundant wildlife. Instead, they learn about wild animals mainly in school, or through discussions about HWC and do not learn to understand wild animals' behaviors. The interviewee suggested this may contribute to the separation

between humans and wildlife and to framing interactions with wild animals as conflicts (Bere Interview 2). Conservation was still understood on an ideological level as a reciprocal practice, where humans and the rest of nature give back to one another, which is a common way Indigenous people relate to their environment (Layden et al. 2025). However, the ideology may have already started to erode among younger community members due to changing lifestyles despite it still being strong among older generations.

Despite these worries, the participants in both villages were hoping to maintain or create a stronger bond with the rest of nature in ten years. One group in New Xade, for instance, said that nature offers them their future, which is why it is essential to protect it. In Bere, harvesters were hoping to create a stronger bond partly as a consequence of increased monetary benefits from the natural environment through the Exatheni veld product processing center. In New Xade, the harvesters emphasized maintaining the existing relationship by continuing current lifestyles by benefiting directly from the natural environment, since they don't yet have a processing center. They did not mention the worries the interviewee in Bere (Bere Interviewee 2) emphasized related to the conservation ethic eroding.

To conserve nature through veld product-related practices, it is important to ensure that the community benefits from the natural environment. The harvesters emphasized that spending time in the natural environment increases willingness to protect it, since it teaches how to depend on nature. Both communities had several ideas on how to ensure protection in the future. They stressed their willingness to continue practicing traditional hunter-gatherer lifestyles, since it increases understanding of animal behaviors and brings direct benefits from nature. In New Xade the harvesters emphasized the importance of following respectful behaviors, including being alert and aware in the natural environment, and continuing to traditionally hunt the animals.

In Bere, the emphasis was more on conservation through rotational harvesting, planting veld products in the village and preventing veld fires through clearances. Burning the natural environment to allow new plants to germinate was brought up in New Xade as a protection measure. In both villages harvesters supported creating stronger rules and

environmental education, which has been suggested also before (Tshukudu 2024: 116). A notable difference between the villages was the stronger emphasis in New Xade on traditional, even religious practices. These included giving offerings to nature, communicating with ancestors before going to the natural environment and listening to elders' taboos. These practices are meant to ensure that benefits will be acquired from nature, because it is respected.

Despite optimism, in Bere, harvesters mentioned unreliable rains as a challenge for creating a stronger bond with nature, since the connection is based on environmental productivity (Perkins 2019). A group that suggested protecting nature by leaving natural veld products intact and instead ploughing fields in the village said that a lack of funds or transportation may challenge the process. Another group also brought up lack of funding as a challenge for acquiring processing equipment and receiving better economic benefits from veld products. In New Xade, challenges mentioned in strengthening nature connectedness included failing to offer back to nature and disobeying the rules given by elders. The groups were worried that increasing environmental education may be a challenge, because they had heard only of the Botswana Wildlife Training Institute in Maun as offering this type of education. The groups also mentioned that not having knowledge and experience of being with wild animals may lead to uncertainty of wild animal presence, which may cause fear.

There is a willingness to rebuild a stronger connection with the rest of nature through harvesting in the future, which indicates a desire to upkeep a reciprocal relationship with nature in upcoming years. However, this requires having a relationship to the land, animals and plants to protect Indigenous ways of caring for the country (Fernández-Llamazares et al. 2021). Increased economic possibilities, especially in Bere, through veld product processing may offer incentives to continue traditional lifestyles, despite relocation from ancestral lands. If peaceful coexistence through understanding wildlife behaviors were achieved, biocultural conservation goals, relating to protecting both the ecosystem and humans as a part of it, could be met (Nemoga et al. 2022).

5.2.5 Rules related to veld product harvesting

Rules related to harvesting veld products greatly influence how the communities can benefit from their IK and apply it to livelihood diversification. Harvesting is governed both through formal and traditional rules. Commercial harvesting requires applying for a permit from the Department of Forestry in Ghanzi. The permits restrict harvesting outside the designated season and aim to ensure sustainable harvesting. Compared to Bere, in New Xade permits are not as common, because veld products are less commercialized.

In both villages, most harvesters agreed that harvesting rules are necessary to ensure sustainable harvests in the future. However, attitudes towards government rules differed. In Bere, more harvesters were relatively satisfied with the rules. In New Xade, the harvesters suggested that rules should be developed on the community level by, for instance the VDG, to improve access to permits. This was suggested in Bere as well. Permit applications must often be submitted before the availability of products is known, and since the permits are costly, this may cause financial risks for harvesters. The authorization process of the permits can also be long, with permits being issued only after the harvesting season has ended. These findings complement previous observation regarding licensing challenges (Cheetah Conservation Botswana 2024).

Traditional harvesting rules remain important in both villages as well. In Bere, the harvesters emphasized practices like leaving the mother root of sengaparile intact, harvesting only parts of the plant and gathering plants in the appropriate season. Avoiding overharvesting was considered important in both villages, but emphasized in Bere, where overharvesting of sengaparile has become an issue as markets for it have become more accessible. Traditionally, harvesting has been conducted in a communal manner, where yields have been shared, but the commercialization of the products currently challenges this. In New Xade, traditional rules were more closely linked to spiritual beliefs, including praying for protection from ancestors and communication with nature before harvesting. Some traditional rules, such as sharing yields and harvesting only in certain territories are eroding.

Overall, the participants emphasis on sustainable harvesting practices reflects previous findings of Indigenous ecological management systems, which have been developed through long-term interaction with the environment (Berkes 2017). At the same time, the tension between government and traditional rules emphasize the procedural injustice, which Indigenous people often have to encounter (Alba-Patiño et al. 2025). While licensing makes commercial use of veld products possible, the delays, costs and bureaucratic complexities related to the permits unintentionally undermine local livelihoods. Ensuring local participation would also ensure the resources are not overexploited (Tshukudu 2024: 160).

The harvesters expressed a willingness to follow rules related to veld product harvesting in the future but wanted greater influence over their design and implementation. They argued that local harvesters possess valuable knowledge about harvesting seasons and sustainable practices and should therefore play a central role in rulemaking.

Communal-level decision making was viewed to reduce costs, since transportation would not be needed to apply for permits in Ghanzi. Additionally, a new type of decision-making process could prioritize giving permits to local harvesters. This could in turn bring small monetary wins for individual households in contrast to wildlife tourism, which does not directly benefit individuals but rather the Community Trust (Chitsove & Madebwe 2024).

To support community-level governance in the future, all groups in Bere and a couple groups in New Xade suggested having Kgotla meetings, to discuss harvesting regulations. The groups in Bere suggested also nominating a committee responsible for making decisions about veld product harvesting and organizing workshops or seminars to support rule creation. The community had ideas of rotational harvesting, to avoid exhausting certain areas. These results support previous research of the importance of communal level discussions in long-term conservation (Bahetoleng & Stronza 2026) and to counter increasing individualism and threats to sustainability driven by commercialization.

Challenges identified in developing community-based rules included disagreements over harvest management and issues related to not complying with regulations. Some

harvesters were concerned about illiterate harvesters struggling to understand permit requirements and therefore not applying for permits. These findings underline the importance of addressing structural inequalities, such as limited access to education and administrative skills, when promoting community participation (Titz et al. 2018). The communities seem eager to overcome these injustices so they can control their own natural resources in the future.

5.2.6 Availability of and access to veld products

Participants identified several environmental factors influencing the availability of veld products, even though more factors were identified in Bere compared to New Xade. Low rainfall was the most frequently mentioned threat, influencing especially mahupu harvests. Even though mahupu is harvested during the dry winter, sufficient rainfall during the summer is necessary for the plant to germinate.

In Bere overharvesting was mentioned as frequently as drought as a threat for availability. Participants were worried that people harvest too much and do not follow sustainable practices when collecting the products, which has been realized as a threat in previous studies as well (Brinkhurst 2010). In New Xade overharvesting was mentioned less often, possibly because the products are less commercialized.

Wild animals were seen as competing with humans for veld products, even though most harvesters expressed their understanding of having to share the environment with other living creatures. Duikers and birds eat the same wild berries as humans, sengaparile and morama are eaten by porcupines, morama is consumed also by gemsboks and duikers and motsotsojane is eaten by kudus. Insects and ground worms may also destroy some plants. Other challenges for veld product availability included hot climatic conditions, plant diseases, veld fires, deforestation and transportation issues from harvesting sites. The first two of these factors were mentioned in both villages and the rest only in Bere.

I did not ask the groups about their hopes for environmental conditions in the future, because they most likely are the same as the optimal conditions estimated currently. However, a major future challenge for availability that came up in discussions was

climate change and more specifically unreliable rainfalls, consistent with previous studies (Mipun 2014; Favretto et al. 2014: 22). Harvesters in both villages mentioned noticing changing rainfall patterns. In New Xade the harvesters emphasized that there is less rain nowadays compared to their childhood. One group said that in their childhood the yields were bigger for sengaparile, moretlwa, motsotsojane and morama. The results indicate that Indigenous people are disproportionately affected by climate change and their livelihoods are threatened by environmental degradation (Reyes-García et al. 2024).

Being experts of the Kalahari environment (Bieseke et al. 1989; Dowie 2011: 107) the community has developed ways to adapt to droughts, which may offer opportunities to adapt to a changing climate as well. This adaptation is strongly related to IK of the seasonality of various plant species. According to the harvesters, moretlwa is harvested during November, December and January, motsotsojane, mahupu and dikgotse from March to June, morama from April to August and sengaparile from May to August. The seasonality of the plants suggests that not all plant species are equally dependent on rainfall. The harvesters specifically explained motlopi, borekhu and sengaparile as drought resistant plants that are available also in years with little rainfall. Harvesting these plants can be a way of coping in a dry climate. Many, though not all, harvesters collect a variety of plant species throughout the year. This diversification may increase reliability of veld product-based livelihoods by reducing dependence on the availability and market performance of a single species. Interestingly, livelihood diversification, even within a livelihood, offers opportunities for building resilience.

As a solution to the availability issues of veld products, cultivation was discussed. In Bere some veld products are already cultivated within the village, which has been suggested as a way to protect veld products and knowledge related to them (Brinkhurst 2010). In Bere, four groups brought up a willingness to increasingly cultivate veld products within the village in the future. Previously identified issues related to land ownership did not seem to concern the participants, since there are already cultivation plots within the village owned by the Trust (Brinkhurst 2010). One group also brought up the importance of protecting natural areas where veld products are found currently to ensure their availability also in the future.

In New Xade, the harvesters mainly emphasized protecting the natural veld product sites in the future, and resisted cultivation. Some believed the soil near the village is not sufficient for cultivation. According to them, cultivation would destroy the natural environment, crops could be grazed by livestock, or the taste of the plants would be different. Some participants had beliefs that veld products should only be harvested where God allows them to grow. According to a study conducted by CCB (2024), harvesters in New Xade were willing to cultivate several plants in the village, which contrasts with these results.

However, some New Xade groups brought up that cultivation could be a way to ensure that veld products are available, even if there is not a lot of rain. Also, since the younger generations' time is allocated to being in school rather than in the natural environment, it could be a way to bring the plants closer to them. One interviewee emphasized the importance of touching the plants and learning about them in practice, instead of only learning about them in school (New Xade Interview 1).

To understand the availability and access to veld product sites better, a participatory mapping workshop was conducted in Bere. Compared to the previous sections, which were based on a theory-guided qualitative content analysis of participatory backcasting workshop and interview data, in this section I present results from the participatory mapping workshop. The mapping results were analyzed using an optimized hot spot analysis on the veld product site polygons. The hot spot analysis revealed that there is extensive knowledge about previously unmapped veld product harvesting sites of sengaparile, mahupu, morama and other plants species, which were all grouped in one category. A significant amount of veld product sites of each plant were either hot or cold spots (Table 5).

Table 5. Number of polygons representing veld product sites, hot spots and cold spots.

Veld product	Number of marked polygons	Number of statistically significant polygon center points (hot spot cells of 1 km x 1 km)	Number of statistically significant hot spot polygons (large areas clustered near other large areas)	Number of statistically significant cold spots polygons (small areas near other small areas)
Sengaparile	515	65	75	166
Mahupu	537	15	79	272
Morاما	170	23	55	154
Other plants	484	78	83	210

The spatial distribution of sengaparile was characterized by small clusters of harvesting sites located inside the Bere development zone, on the western side of the village. Most of the statistically significant center points of mapped areas were also in the same area. This result is logical, since near the village center the plant site polygons were smaller and therefore also the center points of these polygons were more densely clustered. Larger harvesting sites were located outside the development zone, mainly on the northwestern side of the village.

The spatial distribution of mahupu was characterized also by small clusters of harvesting sites located within the Bere development zone, particularly on the northern and northwestern sides of the village. Most statistically significant center points of mapped harvesting areas were concentrated in the same region. As with sengaparile, larger harvesting areas were clustered outside the development zone, mainly on the southwestern and northwestern sides of Bere. Smaller harvesting areas were distributed around the village and along the outskirts of the development zone, suggesting that harvesters possess detailed knowledge of specific mahupu sites close to the settlement while also identifying broader harvesting areas farther away.

The spatial distribution of morama differed somewhat from that of sengaparile and mahupu. Clusters of harvesting sites were located primarily outside the Bere development zone. Larger harvesting areas were again clustered on the southwestern and northwestern sides of Bere, outside the development zone. In contrast to sengaparile and mahupu, small harvesting areas were also commonly found outside the development zone. This suggests that community members possess detailed knowledge of specific morama distribution sites even in more distant locations.

The category of other veld products displayed a different spatial pattern from the individually mapped plant species. Clusters of harvesting sites were concentrated on the southeastern side of the Bere development zone, indicating that knowledge of useful plants extends beyond the areas associated with sengaparile, mahupu, and morama. The smaller harvesting areas were clustered yet again in these same areas. As with the other plant categories, large harvesting areas were clustered outside the development zone, primarily on the southwestern and northwestern sides of Bere.

The results show that harvesters have extensive knowledge of the locations of veld products. The tendency to mark smaller areas near the village and larger areas further away was observed for every plant species. This suggests either that harvesters are more familiar with the harvesting sites near the village and are able to mark the areas more precisely, or that the distribution areas are indeed smaller near settlements. This may be due to cattle grazing or disturbance caused by, for instance, overharvesting (Brinkhurst 2010; Favretto et al. 2014: 19).

When examining the clustering of polygons based on their size, the results showed that a large proportion of these polygons were statistically significant with a confidence level of over 95 percent. The results may be skewed by the fact that individual groups may have drawn polygons of a certain size close to one another without carefully considering their size. The harvesters were also able to mark polygons only in certain areas of which maps were printed, which led to clustering of polygons in certain areas. However, these map sites were chosen based on the pre-mapping event of veld product sites, which suggested that plant sites are generally close to each other.

Mapping plant distributions has practical implications for future resource management and livelihood development. If interest in harvesting veld products increases, the maps can help identify areas that are most suitable for different harvesting purposes. The smaller sites close to the village may be more suitable for occasional harvesting, while the larger areas beyond the development zone may be better suited for commercial purposes. The maps can also be used to plan rotational harvesting, which the groups suggested to avoid overexploitation. Planning resource use carefully is important to avoid overharvesting and ensure sustainability, while ensuring that the community benefits from veld products.

5.3 Interconnections between veld product-related livelihoods and human-wildlife coexistence

5.3.1 The current state

a) Coexistence willingness and importance for the community

In both villages, most harvesters supported coexistence with wild animals despite HWC. In Bere, all groups and interviewees supported coexistence, and in New Xade all but one group did. In both villages, the groups mentioned this being mainly due to the monetary benefits the animals bring to the community through the Community Trust. However, wild animals are also connected to culture and survival. This was emphasized by an interviewee in Bere saying “*if wild animals disappear, we are lost*” (Bere Interview 1).

Traditionally, predators have not only conceived as threats. Prey has been shared with wild animals, when carnivores have left remains of carcasses for humans to consume and utilize parts of the animals. The use of these animal-derived products is important for protecting the cultural identity of the San. In New Xade, small carnivores, like black-backed jackals, were mentioned as beneficial because their calls warn of the presence of larger predators. In Bere, an interviewee explained how lions act as ‘bodyguards’ for the people in the natural environment by scaring away other wild animals that might threaten humans. Harvesters also explained how predators regulate the population sizes of veld product-consuming herbivores and bring beauty to the environment. In

New Xade, an interviewee said that predators are important, because they “*strengthen the ecosystem*” (New Xade Interview 1).

Coexistence with prey animals seemed easy, since the harvesters receive several benefits from them in addition to meat and skins. An interviewee in Bere explained that in a traditional hunting ritual, the bow dipped in steenbok’s blood to ensure a successful hunt (Bere Interview 2). Parts of an animal called honey-badger (*Mellivora capensis*) are used to open a congested nose, and ostrich eggshells are used to make crafts for selling (Bere Interview 2). Some herbivores also help harvesters find veld products. For instance, by following duiker tracks it is possible to find sengaparile and mahupu, because the animal consumes them. African elephants are also valued because burning elephant dung can help scare away lions while camping in the natural environment. Indeed, the idea of wild animals as knowledge holders and teachers seems to persist also in these San communities (Álvares et al. 2011; Ghosal & Kjosavik 2015; Pettersson et al. 2022; Jolly et al., 2023).

Despite these benefits, interviewees in both villages mentioned coexistence being harder nowadays due to government restrictions on hunting and changes in traditional lifestyles. In the past, the harvesters benefited more directly from the wild animals and managed them themselves. Restrictions on hunting and using carcasses, coupled with spending less time in the natural environment due to modern lifestyles, were seen as weakening knowledge of animal behavior and increasing fear of animals. These challenges were emphasized in New Xade, where relocation from CKGR has changed coexistence willingness. Moving to New Xade was a concrete sign of leaving behind traditional management methods and lifestyles and having to adapt to a new culture. In CKGR hunting was done under individual permits instead of a quota, and the harvesters felt like they owned the animals, unlike now. Coexistence willingness was higher, despite encounters with animals being more frequent, exemplifying how tolerable risk levels are part of coexistence (Pooley et al. 2021). Some interviewees expressed their sadness about losing this connection with wild animals and explained that it feels like a piece of them is missing (New Xade Interview 1).

The findings indicate that coexistence is deeply rooted in San culture rather than it being a new conservation concept (Jolly & Stronza 2025). Even now, despite the monetary losses caused by land use conflicts between livestock management and conservation, the communities mainly still support coexistence, since it is deeply ingrained in their lifestyles. The results support the previous findings, according to which coexistence does not mean conflict should be eliminated, but rather that the risk levels are tolerable (Carter & Linnell 2016; Hill 2021). The findings also strongly support the notion of people not being against the animals but rather dissatisfied with the structures of coexistence (Serenari 2024). However, risk levels certainly influence tolerance. In Bere, the monetary losses of HWC may not be as significant as in New Xade, since conflicts with large predators are less frequent (Nyhus 2016; Carter & Linnell 2016). Consequently, these risk levels seem to be more tolerable than in New Xade, which also supports a more coexistence focused mindset.

b) Requirements for coexistence

The findings suggest that coexistence mindsets in Bere and New Xade are shaped by a mixture of nature connectedness and economic security, and access to conflict safe income sources. In Bere, ‘decreasing economic losses’ and ‘creating a stronger bond with nature’ were valued equally, while in New Xade ‘creating a stronger bond with nature’ was the most selected choice, followed by ‘decreasing economic losses’. The importance of balancing conservation goals with community needs supports previous findings of coexistence depending on livelihood security (Nyhus 2016; Carter & Linnell 2016; SADC TFCA 2026:8). However, the harvesters in New Xade found nature connectedness even more important in establishing coexistence relationships. This supports the increasing emphasis on the importance of relations with nature in influencing pro-environmental behaviors (Barragan-Jason et al. 2023). Separating Indigenous people from their lands doesn’t only threaten cultural, but also ecological sustainability.

‘Having access to conflict safe income sources’ was the second most important factor supporting coexistence in Bere and the third most important factor in New Xade. In Bere, having knowledge about conflict-safe incomes was seen as the third most important factor, and in New Xade as the fifth most important factor for supporting

coexistence. This difference may be related to the emerging optimism in Bere regarding livelihood diversification opportunities and how it may reduce vulnerability to HWC. In New Xade, two participants saw ‘increasing discussions about HWC management within the community’ as an important factor for increasing coexistence. This was not chosen as a factor in Bere. Suggesting increased discussions shows the importance of community involvement and context-specific solutions (SADC TFCA 2026:8).

Individual groups in both villages also suggested that livestock owners should receive fairer compensation when livestock animals are lost to predators. Participants felt that current compensation schemes may not fully cover the economic impact of livestock losses, which can create negative attitudes toward wildlife. They also recommended using CCTV cameras to monitor animal movements. This could help detect predators earlier, improve livestock protection, and provide evidence of livestock losses when they occur. However, these factors are not directly related to veld product-related livelihoods and are not therefore further explored.

c) Possibilities of veld product use for increasing coexistence

Nature connectedness was seen as one of the most important factors influencing coexistence in both villages, and the results show possibilities of veld product-related livelihoods in strengthening this connection. Spending time in the natural environment seems to support the development of a reciprocal relationship between humans and the rest of nature, when harvesters can benefit from veld products and hunted animals through their traditional livelihoods (Silberbauer 1981). Harvesting successfully requires understanding animal behaviors so the harvester can learn to avoid them and peacefully coexist. During harvesting, people learn to read animal tracks, recognize the sounds of animals and follow their movements, which makes it possible to either avoid predators, find prey animals or veld products (Álvares et al. 2011; Ghosal & Kjosavik, 2015; Pettersson et al., 2022; Jolly et al., 2023). The explained behaviors that are followed when encountering predators were peaceful as well, mainly to ensure safety, since provoking carnivores may lead to attacks.

Now, in both villages the connection between humans and wildlife seems to be eroding, since the community members do not feel that they can benefit from the animals in

ways that they used to. In New Xade, the connection seems to be stronger than in Bere, and memories of originating with wildlife in CKGR are more recent. In Bere, many harvesters have lived for a longer time in settlements than harvesters in New Xade and adapted to the modern economy. People may not know animal behaviors thoroughly, because they have not had to learn them to survive. Indeed, since learning behaviors requires spending long periods of time in the natural environment and depending on it, younger generations who go to school and spend time on social media may not adapt these mindsets. These results emphasize the interconnection between benefiting from nature and building a reciprocal relationship with it. Since traditional livelihoods cannot be practiced as in the past, benefits are not at least as direct as before. This negatively influences nature connectedness and thus, coexistence willingness (Jolly & Stronza 2025).

Decreasing economic losses of HWC was seen as an important requirement for coexistence in both villages. Especially in Bere veld products already provide immediate and accessible earnings for those without formal employment. The money is used by many to treat injured livestock and replace lost animals, which may decrease retaliatory measures towards wildlife. These benefits exemplify small wins at the household level, which may increase pro-environmental behaviors (Cassidy 2021). In New Xade, in addition to buying new livestock with income from selling veld products, some harvesters expressed their willingness to invest in their children's education. This was a way of fostering indirect pro-coexistence attitudes, since the participants were interested in increasing environmental education.

However, the monetary benefits in both villages, but especially New Xade, are still relatively low. A lack of markets and processing infrastructure makes it challenging to rely on the income from veld products (Cheetah Conservation Botswana 2024). In New Xade licensing is less common than in Bere, which challenges commercial harvesting further. The willingness to use the revenue received to buy new livestock may also increase the conflict in the future, despite temporary relief. These challenges undermine the potential of monetary benefits from veld products, despite optimism for the future.

Access to veld products was also seen as a relatively important factor supporting coexistence. Overharvesting, especially in Bere, currently challenges access to some veld products, despite extensive knowledge of their distribution. However, the community's interest and initial trials in veld product cultivation and knowledge about drought-resilient plants show the capability of the community to adapt to a changing environment. In New Xade, overharvesting is not a major issue due to the lack of markets. All in all, the relatively good access to veld products may indirectly support coexistence in both villages.

Connecting IK to income generation—and, by extension, to supporting coexistence—was only realized in focus group discussions in Bere. This is the case despite harvesters in both villages having extensive and intergeneration knowledge about the natural environment, which is still passed on to younger generations. The groups in New Xade may not see the significance of the connection between IK and economic gains due to the unreliability of veld product markets and lack of processing. The interviews in both villages also revealed that it is difficult for locals to imagine giving up livestock farming in the area while living in settlements (Karunya Consulting et al. 2020: 83). According to the harvesters, in Botswana's economy, cattle are not just possessions, but function as a living form of wealth that can multiply over time as livestock reproduces. Additionally, owning livestock does not only represent wealth, but it also gives its owner dignity and respect. The harvesters emphasized that owning livestock is more important financially than selling veld products, because there is not yet a strong market for them. The interviews in New Xade revealed that these ideas have been largely assimilated from modern culture after moving to settlements. When the community was relocated to New Xade, they were given cattle and goats by the government to "*wipe their tears*" (New Xade Interview 4). The interviewees emphasized that if they were allowed to practice their traditional livelihoods in CKGR again, owning livestock would not be important anymore.

All in all, despite their potential, veld product-related livelihoods do not yet fit the current requirements of coexistence well in either village, despite strong coexistence willingness. This shows the lack of CBNRM initiatives in considering the potential in increasing pro-environmental behaviors (Cassidy 2021). Communities seem to

currently exist in a liminal state, where they are unable to derive significant benefits from traditional livelihoods, in a direct, subsistence way, or receive monetary benefits from them. These findings exemplify issues related to the marginalization of Indigenous people (United Nations 2025b).

5.3.2 The future state

a) Coexistence willingness and importance for the community

In Bere, similarly to the current situation, all groups said they would support coexistence also in the future, despite livestock losses. Participants emphasized the growing importance of wild animals as a source of income through tourism, which shows the focus of CBNRM initiatives on wildlife tourism in Botswana (Cassidy 2021). Nearly all groups also brought up the importance of continuing to coexist with wildlife to preserve their culture by continuing to practice traditional livelihoods. These points were also raised by three groups in New Xade, who believed willingness to coexist will increase in the future. Especially among older harvesters there was a clear desire to move back to CKGR in the future and re-establish the connection with wild animals. However, in New Xade especially younger harvesters had a harder time imagining a future where coexistence is possible. Two groups resisted the idea of coexistence emphasizing the dangers of wildlife to livestock. The other group even suggested fencing protected areas in the future to separate humans from wilderness, which opposes the idea of biocultural conservation and its dual benefits to communities and wildlife (Fernández-Llamazares et al. 2021; Layden et al. 2025).

The stronger support for future coexistence in Bere compared to New Xade may be connected to more positive experiences of CBNRM and emerging veld product-related opportunities, which help recognize the value of the Indigenous culture of the San (Tshukudu 2024: 117). In contrast, skepticism towards coexistence in New Xade may stem from the community's relatively recent relocation history and associated negative experiences, which may continue to shape future visions (Dowie 2011: 105). The separation of humans and wildlife seems to have a significant impact on perceptions of nature even within a few decades especially among young harvesters, emphasizing the cultural dimensions of coexistence (Luoma 2023; Pereira et al. 2024; Alba-Patiño et al.

2025). Additionally, high conflict rates due to the proximity to CKGR coupled with limited non-lethal management methods and compensation restrict the hopes harvesters in New Xade have for future coexistence.

b) Requirements for coexistence

When discussing the future, groups identified requirements which they see as most important to be fulfilled to reach coexistence. To make these imagined coexistence futures a reality, pathways to the futures as well as challenges to reach them were discussed. These are presented in Table 6.

Table 6. Pathways and challenges in reaching a desired state of coexistence in Bere and New Xade.

The number of groups that chose the option is presented in brackets.

Coexistence requirement	Pathways in Bere	Challenges in Bere	Pathways in New Xade	Challenges in New Xade
Creating a stronger bond with the rest of nature Bere (5) New Xade (2)	-Increasing formal education about the benefits of wild animals -Intergenerational knowledge exchange about nature to younger generations -Increasing the use of traditional attire -Reintroducing traditional hunting practices -Reintroducing totem animals to protect and appreciate wild animals more	-Inabilities to pay for school fees -Lack of traditional skills	-Wild animals targeting natural prey instead of livestock animals -Getting more benefits from wild animals -Building fences to decrease risk of danger	-Lack of knowledge about interacting with wild animals -Government restrictions on hunting and living side by side in traditional ways: Wild animals are primarily in parks and game reserves, and people do not learn to coexist with them
Decreasing economic losses Bere (2) New Xade (2)	-Using kraals and guarding dogs -Herding -Skilled manpower to use appropriate equipment	-Lack of income for buying materials for predator safe kraals	-Fair compensation -Horse patrolling -Security cars -Electrical fences -Economic gains through killing more wild animals than currently	-Lack of income for buying materials for predator safe kraals

Coexistence requirement	Pathways in Bere	Challenges in Bere	Pathways in New Xade	Challenges in New Xade
Increasing access to conflict safe income sources, for instance veld products	-Searching for veld product markets to support cultivation near the village, where they are easily accessible	-Lack of training -Lack of transport	-Intergenerational knowledge exchange about harvesting spots -Protecting nature to ensure that veld products germinate	-Acquiring fields to plough -Money to purchase equipment -Climate change and drought -Overharvesting -Destroying the rest of the nature when ploughing fields, for instance contaminating soil or causing erosion -Poor quality of soil in the village for ploughing fields -Overgrazing of veld plants by livestock -Cultural beliefs: veld products should be collected only where God decides they should grow <i>Discussed also in chapter 5.2.6 Availability and access to veld products</i>
Bere (2) New Xade (4)	<i>Discussed also in chapter 5.2.6 Availability and access to veld products</i>	<i>Discussed also in chapter 5.2.6 Availability and access to veld products</i>		
Knowledge about conflict safe incomes (4)	-Capacity building -Intergeneration knowledge exchange about experiences with wildlife	-Lack of income for organizing workshops or other capacity building activities -Resistance		
Bere (4) New Xade (0)	<i>Discussed also in chapter 5.2.2 Indigenous knowledge related to veld products</i>	<i>Discussed also in chapter 5.2.2 'Indigenous knowledge related to veld products'</i>		

Coexistence requirement	Pathways in Bere	Challenges in Bere	Pathways in New Xade	Challenges in New Xade
Increasing opportunities to discuss HWC management within the community			-Kgotla meetings with the Community Trust, councilors and DWNP officials	-Arguing and disagreeing about rules -Poor attendance
Bere (0) New Xade (2)				

The emphasis on different requirements between villages demonstrates the need for context-specific approaches to manage HWC (Cartell & Linnel 2016; Pooley 2021). In Bere, future visions strongly emphasized increasing connectedness with nature, whereas in New Xade, the focus was more on increasing access to conflict safe income sources through nature protection. In this sense, the importance of maintaining conservation-oriented mindsets was supported in both villages. As in the current situation, there was a notable difference between the villages in their emphasis on knowledge about conflict-safe income sources. In Bere, the harvesters seemed more optimistic about achieving coexistence through economic transformation within the IK framework, which is understandable given the realization of the potential of IK based livelihoods already now in the village (Cheetah Conservation Botswana 2024). In New Xade this potential has not been as realized, and the emphasis was on increasing community discussions and local governance, suggesting the lagging of these dimensions in the village.

Compared to the requirements for coexistence in the current situation, the major differences were related to harvesters in New Xade emphasizing the importance of access to conflict safe income sources and increasing communal management in the future more (Bahetoleng & Stronza 2026), as well as the lack of emphasis on decreasing economic losses in both villages. The findings demonstrate the changing nature of coexistence requirements in a changing natural environment, where worries about climate change and overharvesting in influencing access may be growing (Brinkhurst 2010). The results mainly emphasize the importance of social factors, such as

strengthening relational values and community involvement in fostering coexistence (Pooley et al. 2021; Jolly & Stronza 2025).

c) Possibilities of veld product use for increasing coexistence

In the future, veld product harvesting may offer concrete opportunities for strengthening the connection between humans and the rest of nature, especially in Bere, where this was viewed as the most important requirement for coexistence. Through improved processing, better access to markets and stronger local control over harvesting practices, the harvesters are hoping to derive greater monetary benefits from the natural environment and incentives to spend time harvesting. This may encourage people of different ages and genders to build a connection to the land, animals and plants and, thereby foster a stronger connection with the environment (Fernández-Llamazares et al. 2021). The willingness to protect natural resources also reflected the harvesters' desire to ensure long-term benefits through nature. The connection between benefits from nature and willingness to protect it shows the importance of practicing traditional livelihoods as a way to connect with the nature and thereby support coexistence.

In contrast, the importance of having a stronger connection with nature to ensure coexistence in the future was not emphasized as much in New Xade as in Bere. This may reflect the lack of support the community has received in re-establishing the connection through traditional livelihoods in recent years (Conservation Botswana Government 2024). Consequently, there may be less incentives to spend time in the natural environment collecting, which may in turn negatively affect nature connectedness in the future. The community is however hoping to improve the market for veld products and is eager to continue veld product-related livelihoods.

Increasing the economic value of veld products through processing, market development and stronger value chains was also seen as an important way in both villages to diversify livelihoods and cope with HWC (Ellis 1998). Participants also emphasized the importance of communal decision-making related to harvesting licenses as a means of ensuring that benefits remain within the community (Mugari et al. 2024). In Bere, harvesters also proposed investing money from selling veld products

into long-term coexistence measures such as predator-proof kraals and fences. Environmental education was considered important in both villages for strengthening future human–nature relationships, and harvesters in Bere suggested using income from selling veld products to pay for school fees.

Despite the opportunities for increasing nature connectedness and decreasing livelihood vulnerability through monetary gains of traditional livelihoods, there may be challenges too. As market access expands and the processing center in Bere opens, harvesting may become a more lucrative livelihood opportunity (Mugari et al. 2024) and availability of products may drop. If people increasingly gather plants in the hope of quick cash without a deeper connection to the land and an understanding of the interdependent relationship between animals, plants, and people, gathering may rather lead to the deterioration of nature than building a stronger connection with it.

Knowledge related to veld products was expected to remain strong especially in Bere, through intergenerational learning, new methods of sharing knowledge and a motivation to protect the knowledge since it can bring benefits in the future. The harvesters seemed to connect this knowledge to livelihood diversification possibilities and thus increased coexistence willingness, showing how Indigenous communities can adapt their knowledge in a changing environment (Mistry et al. 2021). In New Xade the participants expressed willingness to pass knowledge to future generations, but the connection between IK and livelihood diversification was less clearly recognized than in Bere. This suggests a need for innovative ideas to engage especially the youth in traditional livelihood practices to ensure the continuation of biocultural conservation of the culture and land (Nemoga et al. 2022). For instance, involving young people in marketing the veld products on social media platforms may simultaneously offer economic opportunities and protect the culture and environment (Noor & Maha 2025).

Participants in both villages found it unlikely that livestock keeping would be abandoned entirely in favor of conflict-safe livelihoods, not only because of the economic security livestock brings but also because of its cultural significance. However, in Bere two groups brought up their willingness to quit livestock rearing if they had another reliable source of income. Similarly, in New Xade some harvesters brought up that if they had

the opportunity to move back to CKGR, they would prefer to continue traditional livelihoods. This suggests that dependence on livestock may partly reflect present settlement conditions rather than genuine livelihood preferences.

There were differences between the villages in both, the emphasis on the importance of having access to veld products, as well as pathways to achieve this. In Bere, where increasing access to veld products was not seen as important, the community is already cultivating veld products and especially experienced harvesters follow traditional rules that limit overharvesting. Therefore, the community may already be satisfied with the access and does not see a need to improve it. In New Xade, on the contrary, the harvesters emphasized the importance of increasing access to products but did not strongly support cultivation. They seemed rather pessimistic about the realization of good access to veld products in ten years' time also due to climate change and possibly increasing overharvesting but were eager to create rules to prevent the unsustainable use of the products. Participants in New Xade also emphasized the importance of increasing communal level HWC management within the community. Discussions related to creating communal rules for harvesting could also encourage broader discussions about natural resource management, related to HWC as well.

The results suggest that veld product-related livelihoods may play an important role in the future for supporting coexistence, especially by strengthening nature connectedness and access to conflict-safe livelihoods, although the emphasis and pathways to coexistence differed between villages. The differences between the villages show, how current livelihood strategies and coexistence willingness are shaped by context specific structural conditions related to the possibilities and encouragement to practice traditional livelihoods and live in ancestral areas, as well as the heterogenous nature of the San community (Titz et al. 2018).

6 Conclusions

In my thesis, I examined biocultural conservation among veld product harvesters belonging to the Indigenous San community in Ghanzi, Botswana. I scrutinized their perceptions of HWC and coexistence, Indigenous veld product-related livelihoods, and the possibilities of these livelihoods in enhancing human-wildlife coexistence. I focused in my research on both the current situation and desired futures envisioned by the communities in Bere and New Xade. I formulated three research questions, which I sought to answer by organizing two participatory backcasting workshops in both villages, and a participatory mapping workshop in Bere. Furthermore, I conducted nine thematic interviews to gain an in-depth understanding of the themes researched. To analyze the results of the participatory backcasting workshops and interviews, I used a theory-guided qualitative content analysis method and an optimized hot spot analysis to analyze the mapping data.

With my first research question, I asked, how HWC is currently managed among San communities in Ghanzi, Botswana, and how the communities envision managing HWC in the future. I found that economic losses through livestock predation are high in both villages, despite various non-lethal management efforts between villages. Government restrictions on practicing traditional livelihoods and encouragement to practice livestock farming, relocations of the San from their ancestral lands and limited participation in decision making concerning the communities' natural resources have positioned humans and wildlife as opposite to each other. This is contrary to the Indigenous culture of the San, where they emphasize the interdependencies between humans and wildlife species. In the future, both communities advocate for stronger non-lethal management methods, such as predator-proof kraals, combined with a shift to increased communal-level governance to build resilience.

My second research question focused on understanding what kinds of veld product - related livelihoods the San communities are practicing and how are they hoping these activities will develop in the future. Currently, veld products form a cornerstone of local lifestyles in both villages, underpinned by vast, intergenerationally transmitted IK. Despite strong willingness especially in Bere, veld products do not yet bring a reliable

income, even though they provide occasional immediate cash. In both villages, challenges related to market access, lack of processing machinery, and challenges related to licensed, commercialized harvesting persist. In Bere, these challenges may soon be overcome with the opening of the Exatheni veld product processing center. In New Xade, the knowledge base related to veld products is more vulnerable, as it is being eroded by assimilation into modern culture and livelihoods and further weakened by limited integration into external support frameworks.

In my third research question, I studied how veld product-related livelihoods could support coexistence now and in the future. My research shows that a deeply rooted, reciprocal human–nature relationship shapes communities’ willingness to coexist with wildlife, but that this relationship is increasingly strained by the structural realities of life in modern settlements. The connection with nature, in the past, strengthened communities’ ability to directly benefit from the veld products they harvest and wildlife they hunt, which increased respect towards nature and led to the development of conservation ideologies. At present, the challenges of sustaining and deriving benefits from Indigenous livelihoods—outlined under the second research question—are undermining socio–ecological harmony and weakening local ownership and stewardship of the ecosystem. Despite this, knowledge about Indigenous livelihoods remains strong in both villages. In Bere, the harvesters see strengthening connectedness to nature while enhancing conflict-safe sources of income as a key pathway for supporting coexistence in the future. In New Xade, the community hopes to ensure access to veld products through conservation, thereby supporting the development of a conflict-safe source of income. Differences between villages highlight the heterogeneity of villages and the need to find context-specific coexistence solutions. They also underscore that small Indigenous communities are often perceived as homogeneous from the outside, whereas closer scrutiny reveals substantial variation in priorities, constraints, and opportunities. These are related to their past experiences, connections to outside stakeholders and proximity to protected areas, which influence how they experience HWC, coexistence and veld product-related livelihoods.

Because current coexistence realities are strongly shaped by factors beyond the San communities’ control, government-level frameworks—especially CBNRM—should

more explicitly recognize what is required to enable genuine, long-term coexistence in these communities. By supporting veld product-related livelihoods through better market access, acquiring processing equipment, and increasing communal control over natural resources, communities have more opportunities to benefit from their livelihoods sustainably. Moreover, assimilation into the modern culture, climate change and overharvesting are challenges for the preservation of IK in the future. Therefore, to support both cultural and ecological sustainability, the adaptive and dynamic characteristics of IK need to be actively incorporated into initiatives promoting coexistence. This can include engaging young people in marketing veld products and strengthening environmental education through formal education and NGO-led initiatives.

My study highlights several important directions for future research. Since the results reinforce the relational and culturally embedded nature of coexistence, comparative studies between San communities living inside conservation areas and those more assimilated into modern culture can provide valuable insights into the socio-cultural realities that shape coexistence. In the future, it is important to research how market development, expanded local processing, and stronger community decision-making shape the (re)building of nature connectedness and willingness to coexist over time. Overall, this thesis shows that strengthening biodiversity conservation in Kalahari requires moving beyond one-size-fits-all approaches by supporting locally defined, context-specific veld product livelihoods and governance arrangements. They can enable conflict-safe benefits from nature and thereby contribute to rebuilding nature connectedness and creating more durable foundations for human–wildlife coexistence.

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References

- Achiba, G. A. (2018) Managing livelihood risks: Income diversification and the livelihood strategies of households in pastoral settlements in Isiolo County, Kenya. *Pastoralism* 8(1), 20. <https://doi.org/10.1186/s13570-018-0120-x>
- Adeyanju, S., O'Connor, A., Addoah, T., Bayala, E., Djoudi, H., Moombe, K., Reed, J., Rostonen, M., Siangulube, F., Sikanwe, A. & Sunderland, T. (2021) Learning from community-based natural resource management (CBNRM) in Ghana and Zambia: lessons for integrated landscape approaches. *International Forestry Review* 23(3) 273–297. <https://doi.org/10.1505/146554821833992776>
- Agrawal, A., & Gibson, C. C. (1999) Enchantment and disenchantment: The role of community in natural resource conservation. *World Development* 27(4) 629–649. [https://doi-org.ezproxy.utu.fi:2443/10.1016/S0305-750X\(98\)00161-2](https://doi-org.ezproxy.utu.fi:2443/10.1016/S0305-750X(98)00161-2)
- Alba-Patiño, D., Martín-López, B., Delibes-Mateos, M., Requena-Mullor, J. M. & Castro, A. J. (2025) Environmental justice gaps in human-wildlife conflict research from a social-ecological systems perspective. *Biological Conservation* 312. <https://doi.org/10.1016/j.biocon.2025.111515>
- Álvares, F., Domingues, J., Sierra, P., & Primavera, P. (2011) Cultural dimension of wolves in the Iberian Peninsula: Implications of ethnozoology in conservation biology. *Innovation: The European Journal of Social Science Research* 24(3) 313–331. <https://doi.org/10.1080/13511610.2011.592049>
- Andreotti, F., Speelman, E. N., Van den Meersche, K. & Allinne, C. (2020) Combining participatory games and backcasting to support collective scenario evaluation: an action research approach for sustainable agroforestry landscape management. *Sustainability Science* 15(5) 1383–1399. <https://doi.org/10.1007/s11625-020-00829-3>
- Angoletti, M. & Rotherdam, I. D. (2015) The Cultural Landscape Heritage of Mankind. *Biodiversity Conservation* 24(1) 3155–3165. <https://doi.org/10.1007/s10531-015-1003-8>
- Anyan, F. (2013) The Influence of Power Shifts in Data Collection and Analysis Stages: A Focus on Qualitative Research Interview. *The Qualitative Report* 18(18) 1–9. <https://doi.org/10.46743/2160-3715/2013.1525>
- Armitage, D., Mbatha, P., Muhl, E. K., Rice, W. & Sowman, M. (2020) Governance principles for community-centered conservation in the post-2020 global biodiversity framework. *Conservation Science and Practice* 2(2). <https://doi.org/10.1111/csp2.160>
- Bahetoleng, O., & Stronza, A. (2026) Botho: A cultural framework for resilient human–wildlife coexistence in Botswana. *Ambio* 55(1) 1155–1163. <https://doi.org/10.1007/s13280-026-02347-5>

- Barragan-Jason, G., Loreau, M., De Mazancourt, C., Singer, M. C., & Parmesan, C. (2023) Psychological and physical connections with nature improve both human well-being and nature conservation: A systematic review of meta-analyses. *Biological Conservation* 277(1), 109842 <https://doi-org.ezproxy.utu.fi:2443/10.1016/j.biocon.2022.109842>
- Berkes, F. (2017) *Sacred Ecology*. 4. Edition. Routledge, London.
- Biesele, M., Guenther, M., Hitchcock, R., Lee, R. & Macgregor, J. (1989) Hunters, Clients and Squatters: The Contemporary Socioeconomic Status of Botswana Basarwa. *African Study Monographs* 9(3) 109–151. <https://doi.org/10.14989/68042>
- Boschmann, E. E., & Cubbon, E. (2014) Sketch maps and qualitative GIS: Using cartographies of individual spatial narratives in geographic research. *The professional geographer* 66(2) 236–248. <https://doi.org/10.1080/00330124.2013.781490>
- Botswana National Spatial Plan database (2017) ESRI Shapefile. Government of Botswana, Gaborone.
- Braczkowski, A. R., O'Bryan, C. J., Lessmann, C., Rondinini, C., Crysell, A. P., Gilbert, S., Stringer, M., Gibson, L. & Biggs, D. (2023) The unequal burden of human-wildlife conflict. *Communications Biology* 6(1). <https://doi.org/10.1038/s42003-023-04493-y>
- Brinkhurst, M. F. (2010) Fruit of sand: complexities of Botswana's veld plant resources. *SURG Journal*, 3(2) 10–22. <https://doi.org/10.21083/surg.v3i2.1092>
- Brito Salas, K. & Avento, R. (2023) *Ethical guidelines for responsible academic partnerships with the Global South*. Finnish University Partnership for International Development, UNIPID. <http://hdl.handle.net/10138/566406>
- Brooks, J. S., Waylen, K. A. & Mulder, M. B. (2013) Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioral, ecological, and economic outcomes. *Environmental Evidence* 2(1), 2. <https://doi.org/10.1186/2047-2382-2-2>
- Brown, G., & Kyttä, M. (2018) Key issues and priorities in participatory mapping: Toward integration or increased specialization? *Applied geography* 95(1) 1–8. <https://doi.org/10.1016/j.apgeog.2018.04.002>
- Campbell, A. (1981) A Comment on Kalahari Wildlife and the Khukhe Fence. *Botswana Notes and Records* 13(1) 111–118. <http://www.jstor.org/stable/40979642>
- Campbell, A. (1997) A History of Wildlife in Botswana to 1966. In Monggae, F. (eds.) *Proceedings of a National Conference on Conservation and Management of Wildlife in Botswana: Strategies for the Twenty First Century*, 7–31. Department of Wildlife and National Parks of Botswana and the Kalahari Conservation Society, Gaborone.
- Campbell, A. (2004) Establishment of Botswana's National Park and Game Reserve System. *Botswana Notes and Records* 36(1) 55–66. <https://www.jstor.org/stable/40980360>

- Campbell, C. O., Cheyne, S. M. & Rawson, B. M. (2015) *Best Practice Guidelines for the Rehabilitation and Translocation of Gibbons*. IUCN SSC Primate Specialist Group, Gland. <https://doi.org/10.2305/IUCN.CH.2015.SSC-OP.51.en>
- Carlsson-Kanyama, A., Dreborg, K. H., Moll, H. C. & Padovan, D. (2008) Participative backcasting: A tool for involving stakeholders in local sustainability planning. *Futures* 40(1) 34–46. <https://doi-org.ezproxy.utu.fi:2443/10.1016/j.futures.2008.06.001>
- Carter, N. H. & Linnell, J. D. C. (2016) Co-adaptation is key to coexisting with large carnivores. *Trends in Ecology & Evolution* 31(1) 575–578. <https://doi.org/10.1016/j.tree.2016.05.006>
- Cassidy, L. (2021) Power dynamics and new directions in the recent evolution of CBNRM in Botswana. *Conservation Science and Practice* 3(1). <https://doi.org/10.1111/csp2.205>
- Cassidy, L., Wilk, J., Kgathi, D. L., Bendsen, H., Ngwenya, B. N. & Mosepele, K. (2011) Indigenous knowledge, livelihoods and government policy in the Okavango delta, Botswana. In Kgathi, D. L., Ngwenya, B. N. & Wilk, J. (eds.) *Shocks and rural livelihoods in the Okavango Delta, Botswana*, 75–97. Development Southern Africa, 24(2).
- Chapron, G., Kaczensky, P., Linnell, J. D. C., von Arx, M., Huber, D. et al. (2014) Recovery of large carnivores in Europe's modern human-dominated landscapes. *Science* 346(1) 1517–1519. <https://doi.org/10.1126/science.1257553>
- Cheetah Conservation Botswana (2018) *Cheetah Conservation Botswana Strategic Plan 2018-2023*. https://www.cheetahconservationbotswana.org/uploads/6/4/3/3/64330039/ccb_strategic_plan_2018-2023_lo.pdf 15.9.2025
- Cheetah Conservation Botswana (2022) *Annual Report*. https://www.cheetahconservationbotswana.org/uploads/6/4/3/3/64330039/ccb_annual_report_2022.pdf 15.9.2025
- Cheetah Conservation Botswana (2024) *Info of some of the most important spp.* Produced as part of the Kgalagadi-Ghanzi Dryland Ecosystems Project.
- Chen, S., Yi, Z. F., Campos-Arceiz, A., Chen, M. Y. & Webb, E. L. (2013) Developing a spatially-explicit, sustainable and risk-based insurance scheme to mitigate human–wildlife conflict. *Biological Conservation* 168(1) 31–39. <https://doi.org/10.1016/j.biocon.2013.09.017>
- Chitsove, E., & Madebwe, T. (2024) Community Based Natural Resources Management in Botswana. *Journal of African Law* 68(1) 59–72. <https://doi.org/10.1017/S0021855323000293>

- CI. (2010) *Consultancy to identify important habitats for key wildlife in the Western Kgalagadi Conservation Corridor (WKCC)*. Conservation International Botswana, Gaborone.
- Conover, M. R. & Conover, D. O. (2022) *Human-Wildlife Interactions: From Conflict to Coexistence*. 2. Edition. CRC Press.
- Cooke, H. J. (1985) The Kalahari Today: A Case of Conflict over Resource Use. *The Geographical Journal* 151(1) 75–85. <https://doi.org/10.2307/633282>
- County Meters (2026) Botswana population. <https://countrymeters.info/en/Botswana> 12.1.2025
- Denwood, T., Huck, J. J., & Lindley, S. (2022) Participatory mapping: A systematic review and open science framework for future research. *Annals of the American Association of Geographers* 112(8) 2324–2343. <https://doi.org/10.1080/24694452.2022.2065964>
- Department for International Development (1999) *Sustainable Livelihoods Guidance Sheets*. London.
<https://www.livelihoodscentre.org/documents/114097690/114438878/Sustainable+livelihoods+guidance+sheets.pdf/594e5ea6-99a9-2a4e-f288-cbb4ae4bea8b?t=1569512091877>
- Department of Environmental Affairs (2016) *National Biodiversity Strategy and Action Plan*. <https://www.cbd.int/doc/world/bw/bw-nbsap-v3-en.pdf>
- Dickman, A. J. (2010) Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. *Animal Conservation* 13(5) 458–466. <https://doi.org/10.1111/j.1469-1795.2010.00368.x>
- Dowie, M. (2011) *Conservation Refugees: The hundred-year conflict between global conservation and native peoples*. The MIT press.
<https://doi.org/10.7551/mitpress/7532.001.0001>
- Drawson, A. S., Toombs, E., & Mushquash, C. J. (2017) Indigenous Research Methods: A Systematic Review. *The International Indigenous Policy Journal* 8(2), 5.
<https://doi.org/10.18584/iipj.2017.8.2.5>
- Dubois, S., Fenwick, N., Ryan, E. A., Baker, L., Baker, S. E., Beausoleil, N. J. et al. (2017) International consensus principles for ethical wildlife control. *Conservation Biology* 31(4) 753–760. <https://doi.org/10.1111/cobi.12896>
- Durant, S. M. (2000) Living with the enemy: avoidance of hyenas and lions by cheetahs in the Serengeti. *Behavioral ecology* 11(6) 624–632. <https://doi.org/10.1093/beheco/11.6.624>
- Durant, S. M. (2002) Competition refuges and coexistence: an example from Serengeti carnivores. *Journal of Animal ecology* 67(3) 370–386. <https://doi.org/10.1046/j.1365-2656.1998.00202.x>

- Durant, S. M., Mitchell, N., Groom, R., Pettoirelli, N., Ipavec, A., Jacobson, A. P., Young-Overton, K. et al. (2017) The global decline of cheetah *Acinonyx jubatus* and what it means for conservation. *Proceedings of the National Academy of Sciences* 114(3) 528-533. <https://doi.org/10.1073/pnas.1611122114>
- Ellis, F. (1998) Household strategies and rural livelihood diversification. *The Journal of Development Studies* 35(1) 1–38. <https://doi.org/10.1080/00220389808422553>
- Eskola, J. & Suoranta, J. (1998) *Johdatus laadulliseen tutkimukseen*. Vastapaino, Tampere.
- Eskola, J. & Suoranta, J. (2014) *Johdatus laadulliseen tutkimukseen*. Vastapaino, Tampere.
- Esri (2026a) Optimized Hot Spot Analysis. <https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/optimized-hot-spot-analysis.htm> 20.1.2026
- Esri (2026b) What is a z-score? What is a p-value? <https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/what-is-a-z-score-what-is-a-p-value.htm> 20.1.2026
- Exatheni veld products centre ready for business (2025) Cheetah Conservation Botswana 29.7.2025. <https://www.cheetahconservationbotswana.org/news/archives/07-2025> 6.10.2025
- FAO (2004) *The Role of Local Institutions in Livelihood Adaptation to Climate Change*. Food and Agriculture Organization of the United Nations, Rome. <https://openknowledge.fao.org/server/api/core/bitstreams/fec3c473-cc34-4742-b96a-bbe99bb1d2d9/content>
- Favretto, N., Stringer, L.C., Dougill, A.J., Perkins, J.S., Akanyang, L., Dallimer, M., Athlopheng, J.R., Mulale, K. (2014) *A case study of Botswana's Kalahari: Assessing the socio-economic and environmental dimensions of land degradation: Report for the Economics of Land Degradation Initiative*. Leeds, UK. https://www.eld-initiative.org/fileadmin/ELD_Filter_Tool/Case_Study_Botswana_2014/Botswana_Kalahari_2015_Ecosystem_Services_ELD_Case_Study_Report_EN.pdf
- Fernández-Llamazares, Á., Lepofsky, D., Lertzman, K., Armstrong, C. G., Brondizio, E. S., Gavin, M. C., Reyes-García, V. et al. (2021) Scientists' Warning to Humanity on Threats to Indigenous and Local Knowledge of Biodiversity. *Journal of Ethnobiology* 41(2) 144–169. <https://doi.org/10.2993/0278-0771-41.2.144>
- Fiasco, V., & Massarella, K. (2022) Human–wildlife coexistence: Business as usual conservation or an opportunity for transformative change? *Conservation and Society* 20(2) 167–178. https://doi.org/10.4103/cs.cs_26_21
- Galley, W. & Anthony, B. P. (2024) Beyond Crop-Raiding: Unravelling the Broader Impacts of Human-Wildlife Conflict on Rural Communities. *Environmental Management* 74(1) 590-608. <https://doi.org/10.1007/s00267-024-02018-9>

- Galvin, K. A., Beeton, T. A. & Luizza, M. W. (2018) *African community-based conservation*. *Ecology and Society* 23(3), 39. <https://doi.org/10.5751/ES-10217-230339>
- Ghosal, S. & Kjosavik, D. J. (2015) Living with leopards: Negotiating morality and modernity in western India. *Society & Natural Resources* 28(10) 1092–1107. <https://doi.org/10.1080/08941920.2015.1014597>
- Gielen, M. (2025) *Refining track-based surveys to support wildlife conservation and human coexistence in the Kalahari*. Doctoral dissertation. Université Catholique de Louvain, Faculty of Sciences. <http://hdl.handle.net/2078.1/302937>
- Gielen, M. & Albertson, A. (2019-2021) & CCB (2022–2025) Roads. ESRI Shapefile
- Gielen, M. & Albertson, A. (2024a) Fossil valleys. ESRI Shapefile.
- Gielen, M. & Albertson, A. (2024b) Open pan surfaces. ESRI Shapefile.
- Gielen, M. & CCB (2019-2021) Cattle posts. ESRI Shapefile.
- Gilchrist, A. & Taylor, M. (2022) *The Short Guide to Community Development*. 3. Edition. Policy Press, Bristol.
- Government of Botswana (2022) About our country. <https://www.gov.bw/about-our-country> 12.1.2026
- Government of Botswana (2026) Ipelegeng. <https://www.gov.bw/social-upliftment-programme/ipelegeng> 31.5.2026
- Government of Botswana. (1992) Wildlife Conservation and National Parks Act. Government of Botswana, Gaborone.
- Graham, E. (1997) Philosophien underlying human geography research. In Flowerdwe, R. & Martin, D. M. (eds) *Methods in Human Geography*, 8– 29. Routledge, London <https://doi.org/10.4324/9781315837277>
- Gross, E., Jayasinghe, N., Brooks, A., Polet, G., Wadhwa, R., & Hilderink-Koopmans, F. (2021) *A future for all: the need for human-wildlife coexistence*. The United Nations Environment Programme (UNEP) and World Wildlife Fund for Nature (WWF), Gland.
- Gupta, A. C. (2017) Elephants, safety nets and agrarian culture: understanding human-wildlife conflict and rural livelihoods around Chobe National Park, Botswana. *Journal of Political Ecology* 20(1) 238– 254. https://library.wur.nl/ojs/index.php/Botswana_documents/article/view/16075
- Haage, M. (2023) Beyond Human-Wildlife Conflicts: Ameliorating Human/Nonhuman Animal Relationships through Workshops on Terminology. *Relations. Beyond Antropocentrism* 11(1) 29– 39. <https://doi.org/10.7358/rela-2023-01-yahg>
- Habib, N., Ariyawardana, A., & Aziz, A. A. (2023) The influence and impact of livelihood capitals on livelihood diversification strategies in developing countries: a systematic

- literature review. *Environmental Science and Pollution Research* 30(27) 69882– 69898. <https://doi.org/10.1007/s11356-023-27638-2>
- Hatty, M., Goodwin, D., Smith, L., & Mavondo, F. (2022) Speaking of nature: Relationships between how people think about, connect with, and act to protect nature. *Ecology and Society* 27(3), 17. <https://doi.org/10.5751/ES-13369-270317>
- Heikkilä, L., Kuokkanen, R., Lehtola, V., Magga, P., Magga, S., Näkkäläjärvi, J., Valkonen, S. & Virtanen, P. K.(2024) *Etchical guidelines for research involving the Sámi people in Finland*. University of Oulu. 29.5.2024 <https://urn.fi/URN:NBN:fi:oulu-202405294076> 15.4.2026
- Hill, C. M. (2015) Perspectives of “conflict” at the wildlife-agriculture boundary: 10 years on. *Human Dimension of Wildlife* 20(1) 296–230. <https://doi.org/10.1080/10871209.2015.1004143>
- Hill, C. M. (2021) Conflict is integral to human-wildlife coexistence. *Frontiers in Conservation Science* 2(1) <https://doi.org/10.3389/fcosc.2021.734314>
- Hill, C. M., Webber, A. D. & Priston, N. E. (2017) *Understanding conflicts about wildlife: a biosocial approach*. Berghahn Books, New York
- Hirsjärvi, S. & Hurme, H. (1988) *Teemahaastattelu*. Yliopistopaino, Helsinki.
- Hitchcock, R. K. (1996) Subsistence Hunting and Special Game Licenses in Botswana. *Botswana Notes and Records* 28(1) 55– 64. <https://www.jstor.org/stable/40980133>
- Hitchcock, R. K. (2002) 'We are the first people': land, natural resources and identity in the Central Kalahari. *Journal of Southern African Studies* 28(4) 797–824 <https://doi.org/10.1080/0305707022000043520>
- Hitchcock, R. K., Sapignoli, M., & Babchuk, W. A. (2011) What about our rights? Settlements, subsistence and livelihood security among Central Kalahari San and Bakgalagadi. *The International Journal of Human Rights* 15(1) 62–88. <https://doi-org.ezproxy.utu.fi/2443/10.1080/13642987.2011.529689>
- Hitchcock, R. K., Frost, J. & Sapignoli, M. (2024) Botswana. In Mamo, D. (eds.) *The indigenous world 2024. The International Work Group for Indigenous Affairs (IWGIA)*, 34–43.
- Hitchcock, R. K., Sapignoli, M., & Babchuk, W. A. (2011) What about our rights? Settlements, subsistence and livelihood security among Central Kalahari San and Bakgalagadi. *The International Journal of Human Rights* 15(1) 62–88. <https://doi.org/10.1080/13642987.2011.529689>
- Hitchcock, R. K., Winer, N., & Kelly, M. C. (2020) Hunter-Gatherers, Farmers, and Environmental Degradation in Botswana. https://doi.org/10.4103/cs.cs_19_87 *Conservation & Society* 18(3) 226–237. https://doi.org/10.4103/cs.cs_19_87

- Holm, J. D. (2013) *Botswana*. Oxford Bibliographies 30.9.2013
<https://www.oxfordbibliographies.com/display/document/obo-9780199846733/obo-9780199846733-0110.xml>
- Hsieh, H. F., & Shannon, S. E. (2005) Three approaches to qualitative content analysis. *Qualitative health research* 15(9) 1277–1288.
https://doi.org/10.1177/1049732305276687?urlappend=%3Futm_source%3Dresearchgate.net%26utm_medium%3Darticle
- Inskip, C. & Zimmermann, A. (2009) Human-felid conflict: a review of patterns and priorities worldwide. *Oryx* 43(1) 18–34. <https://doi.org/10.1017/S003060530899030X>
- Inskip, C., Fahad, Z., Tully, R., Roberts, T., & MacMillan, D. (2014) Understanding carnivore killing behaviour: Exploring the motivations for tiger killing in the Sundarbans, Bangladesh. *Biological Conservation* 180(1) 42–50.
<https://doi.org/10.1016/j.biocon.2014.09.028>
- International Labor Organization (1989) Indigenous and Tribal Peoples Convention (No. 169) Geneve.
https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169
- International Organization for Community Development (2025) *Annual report and summary of accounts 2024/25*.
https://assets.nationbuilder.com/iacd/pages/30/attachments/original/1761137007/IACD_062_Annual_Report_Compressed_24-25.pdf?1761137007
- IPBES (2019) *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES secretariat. Bonn, Germany.
https://www.ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf
- IUCN (2023) *IUCN SSC guidelines on human-wildlife conflict and coexistence*. First edition. Gland, Switzerland. <https://portals.iucn.org/library/sites/library/files/documents/2023-009-En.pdf>
- IUCN/SSC (2015) *Regional Conservation Strategy for the Cheetah and African Wild Dog in Southern Africa*. IUCN/SSC Gland, Switzerland and Range Wide Conservation Program for Cheetah and African Wild Dogs.
https://cheetahconservationinitiative.com/storage/2022/02/Revised-And-Updated-Southern-African-Conservation-Strategy-For-Cheetah-And-African-Wild-Dogs_2015_English.pdf
- Jiren, T. S., Riechers, M., Kansky, R., & Fischer, J. (2021) Participatory scenario planning to facilitate human–wildlife coexistence. *Conservation Biology* 35(6) 1957–1965.
<https://doi.org/10.1111/cobi.13725>

- Jolly, H., & Stronza, A. (2025) Insights on human– wildlife coexistence from social science and Indigenous and traditional knowledge. *Conservation Biology* 39(2), e14460. <https://doi.org/10.1111/cobi.14460>
- Jolly, H., Satterfield, T., Kandlikar, M., & Suma, T. (2023) Locating Kadu in Adivasi portrayals of protected forest areas in southern India. *World Development* 173(1), 106390. <https://doi-org.ezproxy.utu.fi:2443/10.1016/j.worlddev.2023.106390>
- Jordan, N. R., Smith, B. P., Appleby, R. G., van Eeden, L. M., & Webster, H. S. (2020) Addressing inequality and intolerance in human–wildlife coexistence. *Conservation Biology* 34(4) 803–810. <https://doi.org/10.1111/cobi.13471>
- Kabra, A. (2009) Conservation-induced displacement: A comparative study of two Indian protected areas. *Conservation and Society* 7(4) 249. <https://doi.org/10.4103/0972-4923.65172>
- Kansky, R. (2022) Unpacking the challenges of wildlife governance in community-based conservation programs to promote human–wildlife coexistence. *Conservation Science and Practice* 4(10). <https://doi.org/10.1111/csp2.12791>
- Kansky, R., Kidd, M. & Fischer, J. (2020) Does money “buy” tolerance toward damage-causing wildlife? *Conservation Science and Practice* 3(3). <https://doi.org/10.1111/csp2.262>
- Kansky, R., Maassarani, T., & Fischer, J. (2024) Participatory co-learning for human wildlife coexistence: Reflections on a novel program applying systems thinking, nonviolent communication, and learning-based approaches. *Ambio* 53(10) 1479–1491. <https://doi.org/10.1007/s13280-024-02032-5>
- Karunya Consulting, Cheetah Conservation Botswana, & Kalahari Research and Conservation (2020) *Final Scoping Report: Research on Human-Wildlife Conflict in the Kalahari Landscape. Under UNDP Kgalagadi & Ghanzi Drylands Ecosystem Project: Managing the human-wildlife interface to sustain the flow of agro-ecosystem services and prevent illegal trafficking in the Kgalagadi and Ghanzi Drylands*. Karunya Consulting, Maun.
- Kimmerer, R. (2013) *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.
- Klein, R. A. (2013) An Assessment of Human Carnivore Conflict in the Kalahari Region of Botswana. M.Sc. Thesis, Rhodes University, Grahamstown.
- Klonner, C. & Blessing, L. (2019) Gathering Local Knowledge for Disaster Risk Reduction: The Use of Sketch Maps in Group Discussions. In Anon. (eds.) *Proceedings. 16. International Conference on Information Systems for Crisis Response and Management (ISCRAM 2019)*, 1397–1398. Valencia, Spain. https://iscram2019.webs.upv.es/wp-content/uploads/2019/09/ISCRAM2019_Proceedings.pdf

- Klonner, C. & Norze, J. (2023) Sketch Map Tool. In Burnett, C. M. (eds.) *Evaluating Participatory Mapping Software*, 71-92. Springer, Switzerland.
- Kololo, P., and E. Kari. (2021) Politeness in language use in Tswana Kgotla Meetings. *Studies in Linguistics* 59(1) 215–252. <https://doi.org/10.17002/sil.59.202104.215>
- König, H. J., Kiffner, C., Kramer-Schadt, S., Fürst, C., Keuling, O., & Ford, A. T. (2020) Human–wildlife coexistence in a changing world. *Conservation Biology* 34(4) 786–794. <https://doi.org/10.1111/cobi.13513>
- Kvale, S. (2006) Dominance through interviews and dialogues. *Qualitative inquiry* 12(3) 480–500. <https://doi.org/10.1177/1077800406286235>
- Laituri, M., Luizza, M. W., Hoover, J. D. & Allegratti, A. M. (2023) Questioning the practice of participation: Critical reflections on participatory mapping as a research tool. *Applied Geography* 152(1). <https://doi.org/10.1016/j.apgeog.2023.102900>
- LaRocco, A. A. (2020) Botswana’s hunting ban and the transformation of game-meat cultures, economies and ecologies. *Journal of Southern African Studies* 46(4) 723–741. <https://doi.org/10.1080/03057070.2020.1773083>
- Lateef, T. (2011) Indigenous knowledge: The way to sustainable development – Community participation in environmental issues. In Ugaili, M.A., Harijan, K. (eds.) *Energy, environment and sustainable development*, 321–328. Springer, Vienna. https://doi.org/10.1007/978-3-7091-0109-4_31
- Layden, T. J., David-Chavez, D. M., García, E. G., Gifford, G. L., Lavoie, A., Weingarten, E. R. & Bombaci, S. P. (2025) Confronting colonial history: toward healing, just, and equitable Indigenous conservation futures. *Ecology and Society* 30(1). <https://doi.org/10.5751/ES-15890-300133>
- LeFlore, E. G., Fuller, T. K., Tomeletso, M., & Stein, A. B. (2019) Livestock depredation by large carnivores in northern Botswana. *Global Ecology and Conservation* 18(1), e00592. <https://doi.org/10.1016/j.gecco.2019.e00592>
- Liebenberg, L. (2006) Persistence hunting by modern hunter-gatherers. *Current Anthropology* 47(6) 1017–1026. <https://doi.org/10.1086/508695>
- Lorand, C., Robert, A., Gastineau, A., Mihoub, J. B., & Bessa-Gomes, C. (2022) Effectiveness of interventions for managing human-large carnivore conflicts worldwide: Scare them off, don't remove them. *Science of the Total Environment* 838(2). <https://doi.org/10.1016/j.scitotenv.2022.156195>
- Lundsgaard-Hansen, L., Tun, N.N., Htun, A. M., Myint, W. & Schneider, Fl (2024) *Participatory visioning and future planning: Backcasting with Myanmar farmers for a more sustainable future. Methodological Report*. Bern, Switzerland: Centre for Development and Environment (CDE), University of Bern.

- Luoma, C. (2023) Reckoning with conservation violence on indigenous territories: possibilities and limitations of a transitional justice response. *International Journal of Transitional Justice* 17(1) 89-106. <https://doi.org/10.5751/ES-15890-300133>
- Ma, D., Abrahms, B., Allgeier, J., Newbold, T., Weeks, B. C., & Carter, N. H. (2024) Global expansion of human-wildlife overlap in the 21st century. *Science Advances* 10(34). <https://doi.org/10.1126/sciadv.adp7706>
- Macdonald DW., Sillero-Zubiri, C. (2004) *The Biology and Conservation of Wild Canids*. Oxford, UK: Oxford Univ. Press.
<https://static1.squarespace.com/static/612ee136efc1241e1fcc567e/t/632d0eeb8822ed4ca1b7a025/1663897339376/The+Biology+and+Conservation+of+Wild+Canids+-+MacDonald+and+Sillero-Zubiri.pdf>
- Maggetti, N. (2025) *A British Approach to Colonial Development? Community Development Rhetoric in British Late Colonialism (1940s–1950s)*. Cambridge University press, Itinerario 6.10.2025. <https://doi.org/10.1017/S016511532510020X>
- Mapular (2026) Hot Spot Analysis. <https://mapular.com/glossary/hot-spot-analysis> 29.5.2026
- Martin, A., Armijos, M. T., Coolsaet, B., Dawson, N., AS Edwards, G., Few, R. et al. (2020) Environmental justice and transformations to sustainability. *Environment: Science and Policy for Sustainable Development* 62(6) 19–30. <https://doi-org.ezproxy.utu.fi:2443/10.1080/00139157.2020.1820294>
- Matarrita-Cascante, D., & Brennan, M. A. (2012). Conceptualizing community development in the twenty-first century. *Community development* 43(3) 293–305.
https://doi.org/10.1080/15575330.2011.593267?urlappend=%3Futm_source%3Dresearchgate.net%26utm_medium%3Darticle
- Mbaiwa, J. E. (2014) Community-based natural resource management in Botswana. In Van der Duim, R., Lamers, M. & Van Wijk, J.(eds.) *Institutional arrangements for conservation, development and tourism in Eastern and Southern Africa: A dynamic perspective*, 59-80. Dordrecht, Springer, Netherlands.
- Mbaiwa, J. E. (2018) Human-wildlife conflicts in the Okavango Delta, Botswana: What are sustainable management options. *PULA: Botswana Journal of African Studies* 32(1) 22–35. <https://journals.ub.bw/index.php/pula/article/view/1524>
- Mbelebele, Z., Mdoda, L., Ntlanga, S. S., Nontu, Y., & Gidi, L. S. (2024) Harmonizing traditional knowledge with environmental preservation: Sustainable strategies for the conservation of indigenous medicinal plants (IMPs) and their implications for economic well-being. *Sustainability* 16(14) <https://doi.org/10.3390/su16145841>
- Miller, B., Soulé, M. E., & Terborgh, J. (2014) New conservation'or surrender to development. *Animal Conservation* 17(6) 509–515. <https://doi.org/10.1111/acv.12127>
- Ministry of Local Government (2009) Revised Remote Area Development Programme (RADP). ESRI Shapefile. Government of Botswana, Gaborone.

- Ministry of Local Government. (2009) *Revised Remote Area Development Programme (RADP)*.
- Mipun, P., Bhat, N.A., Borah, D., Kumar, Y. (2019) Non-timber forest products and their contribution to healthcare and livelihood security among the Karbi tribe in Northeast India. *Ecological Processes* 8 (41) <https://doi.org/10.1186/s13717-019-0194-4>
- Mistry, J., Jafferally, D., Xavier, R., Albert, G., Robertson, B., Benjamin, R. et al. (2021) Assessing the state of traditional knowledge at national level. *Global Environmental Change* 71(1). <https://doi.org/10.1016/j.gloenvcha.2021.102409>
- Mmopelwa, G., & Mpolokeng, T. (2008) Attitudes and Perceptions of Livestock Farmers on the Adequacy of Government Compensation Scheme: Human-Carnivore Conflict in Ngamiland. *Botswana Notes and Records* 40(1) 147–158. <http://www.jstor.org/stable/41236040>
- Morse, S. (2025). Having Faith in the Sustainable Livelihood Approach: A review. *Sustainability* 17(2). <https://doi.org/10.3390/su17020539>
- Mugari, E., Nethengwe, N. S., & Gumbo, A. D. (2024) The utilization and contribution of timber and non-timber forest products to livelihoods under a changing climate in the Limpopo River Basin. *Environmental Research Communications* 6(2), 025005. https://doi.org/10.1088/2515-7620/ad23f0?urlappend=%3Futm_source%3Dresearchgate.net%26utm_medium%3DArticle
- Muzah, P. (2016) Indigenous knowledge and sustainability. *Journal of Sustainable Development* 24(1) 13–31. <https://doi.org/10.1177/09725558X241227859>
- NAILSMA (2014) *Looking After Country: The NAILSMA I-Tracker story*. North Australian Indigenous Land and Sea Management Alliance Ltd. Darwin.
- Nash, D. (2017) Changes in precipitation over southern Africa during recent centuries. In von Storch, H. (eds.) *Oxford Research Encyclopedia of Climate Science*.
- Nemogá, G. R., Appasamy, A., & Romanow, C. A. (2022) Protecting indigenous and local knowledge through a biocultural diversity framework. *The Journal of Environment & Development* 31(3) 223–252. <https://doi.org/10.1177/10704965221104781>
- Ngami Data Services (2017) Landuse_CHA. ESRI Shapefile. Edited by Marie-Charlotte Gielen.
- Nikolakis, W. (2020) Participatory backcasting: Building pathways towards reconciliation? *Futures* 122(1). <https://doi.org/10.1016/j.futures.2020.102603>
- Noor & Maha (2025) The Transformation of Marketing Communication through Social Media among Local MSMEs of the Baduy Luar Indigenous Community. *Jurnal Penelitian Ilmu Pendidikan Indonesia* 4(4) 2187–2196. <https://doi.org/10.31004/jpion.v4i4.737>

- Nyhus, P. J. (2016) Human–wildlife conflict and coexistence. *Annual review of environment and resources* 41(1) 143-171. <https://doi-org.ezproxy.utu.fi:2443/10.1146/annurev-environ-110615-085634>
- Ogilvy, J. A. (2002) *Creating better futures: Scenario planning as a tool for a better tomorrow*. Oxford University Press, New York.
- Oliva-Vidal, P., Hernández-Matías, A., García, D., Colomer, M. À., Real, J., & Margalida, A. (2022) Griffon vultures, livestock and farmers: Unraveling a complex socio-economic ecological conflict from a conservation perspective. *Biological Conservation* 272 (1) <https://doi.org/10.1016/j.biocon.2022.109664>
- Parsons, N. (2026) *History of Botswana*. Britannica. 1.6.2026 <https://www.britannica.com/place/Botswana/British-protectorate>
- Pédarros, É., Fritz, H., Hutchinson, A., Louw, C., Parès, N., Pienaar, D., Guerbois, C. et al. (2025) Living with Wildlife: How Relational Values and Care Ethics Shape Conservation Action. *OSF preprints*. https://doi.org/10.31235/osf.io/8gqut_v2
- Pereira, J. G., Rosalino, L. M., Ekblom, A., & Santos, M. J. (2024) Livelihood vulnerability and human-wildlife interactions across protected areas. *Ecology and Society* 29(1) <https://doi.org/10.5751/ES-14605-290113>
- Perkins, J. S. (2019) ‘Only connect’: Restoring resilience in the Kalahari ecosystem. *Journal of Environmental Management* 249(1), 109420. <https://doi-org.ezproxy.utu.fi:2443/10.1016/j.jenvman.2019.109420>
- Perkins, J. S. (2019) ‘Only connect’: Restoring resilience in the Kalahari ecosystem. *Journal of environmental management*, 249(1), 109420. <https://doi.org/10.1016/j.jenvman.2019.109420>
- Peterson, M. N., Birckhead, J. L., Leong, K., Peterson, M. J., & Peterson, T. R. (2010) Rearticulating the myth of human–wildlife conflict. *Conservation Letters* 3(2) 74-82. <https://doi.org/10.1111/j.1755-263X.2010.00099.x>
- Petrontino, A., Di Santo, N., Sisto, R., Tria, E. & Bozzo, F. (2025) Designing a regional wildlife management plan through participatory multi-criteria methods: evidence from Apulia. *Agricultural and Food Economics* 13(1), 83. <https://doi.org/10.1186/s40100-025-00433-y>
- Pettersson, H. L., Quinn, C. H., Holmes, G., & Sait, S. M. (2022) “They belong here”: Understanding the conditions of human–wolf coexistence in NorthWestern Spain. *Conservation and Society* 20(2), 113–123. https://doi.org/10.4103/cs.cs_13_21
- Pooley, S., Bhatia, S., & Vasava, A. (2021) Rethinking the study of human–wildlife coexistence. *Conservation Biology* 35(3), 784–793. <https://doi.org/10.1111/cobi.13653>
- Pyle, R. M. (2003) Nature matrix: Reconnecting people and nature. *Oryx* 37(2) 206–214. <https://doi.org/10.1017/S0030605303000383>

- Quist, J., Thissen, W., & Vergragt, P. J. (2011) The impact and spin-off of participatory backcasting: From vision to niche. *Technological Forecasting and Social Change* 78(5) 883–897. <https://doi.org/10.1016/j.techfore.2011.01.011>
- Ramsay (2023) *Losing the world in the Kalahari-Some Aspects of the History of the Ghanzi District and CKGR to 1900*.
- Redpath, S. M., et al. (2013) Understanding and managing conservation conflicts — Biological Reviews. *Trends in ecology & evolution* 28(2) 100–109. <http://dx.doi.org/10.1016/j.tree.2012.08.021>
- Reyes-García, V., García-Del-Amo, D., Porcuna-Ferrer, A., Schlingmann, A., Abazeri, M., Attoh, E. M., Torrents-Ticó, M. et al. (2024) Local studies provide a global perspective of the impacts of climate change on Indigenous Peoples and local communities. *Sustainable Earth Reviews* 7(1) <https://doi.org/10.1186/s42055-023-00063-6>
- Ripple, W. J., Newsome, T. M., Wolf, C., Dirzo, R., Everatt, K. T., Galetti, M., Van Valkenburgh, B. et al. (2015) Collapse of the world’s largest herbivores. *Science advances* 1(4). <https://doi.org/10.1126/sciadv.1400103>
- SADC TFCA (2026) *Human-Wildlife Coexistence in Botswana and Beyond: Drivers, Impacts and response mechanisms – Briefing Paper*. Gaborone, Botswana. <https://tfcaportal.org/repository/repository385.pdf>
- Salmón, E. (2000) Kincentric ecology: Indigenous perceptions of the human– nature relationship. *Ecological Applications* 10(5) 1327–1332. [https://doi.org/10.1890/1051-0761\(2000\)010\[1327:KEIPOT\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2000)010[1327:KEIPOT]2.0.CO;2)
- Schell, C. J., Stanton, L. A., Young, J. K., Angeloni, L. M., Lambert, J. E., Breck, S. W., & Murray, M. H. (2021) The evolutionary consequences of human–wildlife conflict in cities. *Evolutionary Applications* 14(1) 178–197. <https://doi.org/10.1111/eva.13131>
- Schiess-Meier, M., Ramsauer, S., Gabanapelo, T. & König, B. (2007) Livestock predation-insights from problem animal control registers in Botswana. *The Journal of Wildlife Management* 71(4) 1267–1274. <https://doi.org/10.2193/2006-177>
- Serenari, C. (2024) Beyond tolerance: Mitigating human-wildlife conflict with hospitality. *Animals* 14(8), 1185. <https://doi.org/10.3390/ani14081185>.
- Shepherd, N. (2018) Epistemic decolonization. In Andersen, C., Timm, B. & Kolvraa, C. (eds.) *Anthoropology exploring the keywords of colonial heritage*. ECHOES: European Colonial Heritage Modalities in Entangled Cities. <https://keywordsechoes.com/>
- Silberbauer, G. B. (1981) *Hunter and habitat in the central Kalahari Desert*. Cambridge University Press, Cambridge. <https://ehrafworldcultures.yale.edu/cultures/fx10/documents/030>
- Sinthumule, N. I. (2025) The Role of Traditional Ecological Knowledge in Managing the Collection of Non-Timber Forest Products in Limpopo, South Africa: A Community-

- Based Resource Governance Approach. *Human Ecology* 53(1) 959–971.
<https://doi.org/10.1007/s10745-025-00641-6>
- Smith, L. (2021) *Decolonizing Methodologies: Research and Indigenous Peoples*. Zed Books.
- Sollis, K., van Eeden, L., Rajeevan, U., Lee, K., Lin, B., Keniger, L. & Flies, E. (2025) Protecting nature in diverse ways: The socio-demographic spread of benefits from connecting with nature. *Ambio* 55(1) 312–326. <https://doi.org/10.1007/s13280-025-02233-6>
- Soulsbury, C. D. & White, P. C. L. (2015) Human-wildlife interactions in urban areas: a review of conflicts, benefits and opportunities. *Wildlife Research* 42(7) 541–553.
<https://doi.org/10.1071/WR14229>
- Spanio, M. & Rowland, N.J. (2019) Defining Scenario. *Future Foresight* 1(2) 1–13.
<https://doi-org.ezproxy.utu.fi:2443/10.1002/ffo2.3>
- Spoon, J. (2014) Quantitative, qualitative, and collaborative methods: Approaching indigenous ecological knowledge heterogeneity. *Ecology and Society* 19(3).
<http://dx.doi.org/10.5751/ES-06549-190333>
- Squires, A. (2009) Methodological challenges in cross-language qualitative research: A research review. *International journal of nursing studies* 46(2) 277–287.
<http://dx.doi.org/10.1016/j.ijnurstu.2008.08.006>
- Stone, L. S., Stone, M. T., Mbaiwa, J. E. (2017) Tourism in Botswana in the last 50 years. *Special issue on Environment, Tourism and Contemporary Socio-economic Issues in the Okavango Delta and other Ecosystems* 49(1) 57–72.
<https://www.jstor.org/stable/90024334>
- Sumner, A. (2022) *What is development studies?* European association of development research and training institutes 6/2024.
https://www.eadi.org/fileadmin/user_upload/EADI/03_Publications/EADI_Policy_Paper/What_is_Development_Studies.pdf
- Sun, Q., Fu, C., Bai, Y., Oduor, A. M., & Cheng, B. (2023) Livelihood diversification and residents' welfare: Evidence from Maasai Mara National reserve. *International Journal of Environmental Research and Public Health. Botswana Notes and Records* 20(5) 57–72. <https://doi.org/10.3390/ijerph20053859>
- Swatuk, L. A. (2005) From “project” to “context”: Community based natural resource management in Botswana. *Global Environmental Politics* 5(3) 95–124.
<https://doi.org/10.1162/1526380054794925>
- The Department for International Development (1999) Sustainable Livelihoods Guidance Sheets. London.

- Titz, A., Cannon, T., & Krüger, F. (2018) Uncovering ‘community’: Challenging an elusive concept in development and disaster related work. *Societies* 8(3), 71.
<https://doi.org/10.3390/soc8030071>
- Togoch, K. H. (2020) *Analysis of human-wildlife conflicts on livelihood diversification of communities living adjacent to Kamnarok national reserve, Baringo County, Kenya*. Doctoral dissertation. University of Nairobi, Department of Geography and Environmental Studies.
<https://erepository.uonbi.ac.ke/bitstream/handle/11295/154535/Kemboi%20Togoch%20final%20phd%20thesis%202020.pdf?sequence=1&isAllowed=y>
- Treves, A., & Santiago-Ávila, F. J. (2020) Myths and assumptions about human-wildlife conflict and coexistence. *Conservation Biology* 34(4) 811–818.
<https://doi.org/10.1111/cobi.13472>
- Tshukudu, K. (2024) *Integrated Land Use Management Plan (ILUMP) for the Kgalagadi-Ghanzi Drylands Ecosystem Project (KGDEP): Draft Final Report*. Government of Botswana and the United Nations Development Programme (UNDP), Gaborone.
- Tuomi, J. & Sarajärvi, A. (2018) *Laadullinen tutkimus ja sisällönanalyysi*. Tammi, Helsinki.
- Twyman, C. (2000) Livelihood opportunity and diversity in Kalahari Wildlife Management Areas, Botswana: rethinking community resource management. *Journal of Southern African Studies* 26(4) 783–806. <https://doi.org/10.1080/713683606>
- UNDP (2017) *Non timber veld products in Botswana*. United Nations Development Programme, Gaborone.
- UNEP-WCMC & IUCN (2025) Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM). ESRI Shapefile. www.protectedplanet.net. 3.10.2025
- UNHCR (2008) *A Community-based Approach in UNHCR Operations*. Geneva, Switzerland.
- United Nations (2025a) Indigenous Peoples. <https://www.un.org/en/fight-racism/vulnerable-groups/indigenous-peoples> 15.11.2025
- United Nations (2025b) Indigenous Peoples at the United Nations.
<https://social.desa.un.org/issues/indigenous-peoples/indigenous-peoples-at-the-united-nations> 15.11.2025
- United Nations Office for the Coordination of Humanitarian Affairs. (2025) *Botswana – Subnational Administrative Boundaries*. Humanitarian Data Exchange.
<https://data.humdata.org/dataset/cod-ab-bwa> 15.10.2025
- Upreti, Y., Poudel, R. C., Gurung, J., Chettri, N., & Chaudhary, R. P. (2016) Traditional use and management of NTFPs in Kangchenjunga Landscape: implications for conservation and livelihoods. *Journal of Ethnobiology and ethnomedicine* 12(1).
<https://doi.org/10.1186/s13002-016-0089-8>

- Van der Weyde, L. K., Mbisana, C. & Klein, R. (2018) Multi-species occupancy modelling of a carnivore guild in wildlife management areas in the Kalahari. *Biological Conservation* 220(1) 21-28. <https://doi-org.ezproxy.utu.fi/2443/10.1016/j.biocon.2018.01.033>
- Van Nes, F., Abma, T., Jonsson, H., & Deeg, D. (2010) Language differences in qualitative research: is meaning lost in translation? *European journal of ageing* 7(4) 313–316. <https://10.1007/s10433-010-0168-y>
- Westad, O. A. (2005) *The global Cold War: Third World interventions and the making of our times*. Cambridge University Press.
- Woodroffe, R., Thirgood, S. & Rabinowitz, A. (2005) *People and Wildlife: Conflict or Coexistence?* Cambridge University Press, Cambridge.
- Woolaston, K., Flower, E., Van Velden, J., White, S., Burns, G. L., & Morrison, C. (2021). A review of the role of law and policy in human-wildlife conflict. *Conservation and Society* 19(3) 172–183. https://doi.org/10.4103/cs.cs_176_20
- World Bank Group (2026) Botswana. <https://www.worldbank.org/ext/en/country/botswana#tab-about> 13.1.2026
- World Population Review (2026) Botswana. <https://worldpopulationreview.com/countries/botswana> 12.1.2026
- Worm, B. (2015) A most unusual (super)predator. *Science* 349(6250) 784–785. <https://doi.org/10.1126/science.aac8697>
- Yeshey, R., Pickee, R. M., Ford, R. M., Keenan, R. J., & Nitschke, C. R. (2023) Religious beliefs and wildlife value orientations influence tolerance of wildlife impacts in Bhutan. *Human Dimensions of Wildlife* 29(3) 300–318 <https://doi.org/10.1080/10871209.2023.2234389>

Appendices

Appendix 1. Human wildlife conflict – Participatory backcasting workshop and interview questions

Phase 1 – Framing the workshop (discussed only workshops)

- The goal of this workshop is to discuss current HWC management and imagine, what the desired state of HWC management would look like.
- The results of this and the other workshop about veld product-related livelihoods will also be used to consider whether veld product livelihoods could promote sustainable HWC management.

- The workshop is not about predicting the future of HWC and its management. It is about imagining what you would like the future to be like in ten years. We are looking for best case scenarios.
- You can let your imagination run wild and have fun!

Phase 2 – Current HWC situation and management (discussed in workshops and interviews)

- 1. What wild animals live in the area? (Bere and New Xade) (the list included images which cannot be included here for copyright reasons)
 - Brown hyena
 - Spotted hyena
 - African wild dog
 - Cheetah
 - Leopard
 - Lion
 - Martial eagle
 - Elephant
 - Black-backed jackal
 - Caracal
 - Snakes
 - Warthog
 - Eland
 - Ostrich
 - Red hartebeest
 - Gemsbok
 - Blue wildebeest
 - Duiker
 - Rabbit
 - Porcupine
 - Baboon
 - Greater kudu
 - Springbok
 - Steenbok
- 2. How often do you see or hear each of them? (Bere and New Xade)
- 3. State of conflict and economic losses (Bere)
 - 3.1 What types of interactions do you have with wildlife?
 - 3.2 How often do you have these interactions?
 - 3.3 Which species are involved?
 - 4.1 Do you suffer from economic losses from HWC?
 - 4.2 Can you give examples of the losses?

- 4.3 Have you received economic compensation of the losses? If not, why?
- 3.State of conflict and economic losses (New Xade)
 - 3.1 What livestock animals does each group member have? Please make a list under everyone's name.
 - 3.2 Please make a list of the prices of each animal, if you sell them.
 - 3.3 Which livestock animals and how many of them has each group member lost in 2025 due to wildlife predation?
 - 3.4 Which wild animals killed this livestock?
 - 3.5 Did you receive economic compensation for the losses? If yes, why? If not, why?
- 4. Current HWC management (Bere)
 - 4.1 Are non-lethal management methods used, and have you been satisfied with the outcome?
 - 4.2 Are lethal management methods used, and have you been satisfied with the outcome?
 - 4.3 Why are lethal management methods used?
 - 4.4 Who decides, how HWC is managed?
 - 4.5 Do you support coexisting with wildlife?
 - How would you describe your relationship to wildlife?
 - Do you think wildlife is important for Botswana?
 - What shapes your relationship with wildlife?
 - What would make it easier to support coexistence with wildlife?
 - Financial capital: If wildlife didn't cause economic losses?
 - Cultural capital: If people saw themselves as part of the nature and understood the benefits of wildlife?
 - Natural capital: If people had physical access to income sources, like veld products, which are not threatened by wildlife?
 - Cultural, human and social capital: If people had knowledge about livelihoods that are not threatened by HWC?
 - Political capital: If people had legal access to conflict safe income sources and an opportunity to participate in decision making about sustainable livelihoods?
 - What other factors support coexistence?
- 4. Current HWC management (New Xade)
 - 4.1 Which management methods are used to deal with the conflict with wildlife?
 - 4.2 Do you ever kill or try to kill the wild animals? If yes, why? If not, why?
 - 4.3 Who decides, how HWC is managed?

Coexistence with wildlife

- 4.4 What do you think about living side by side with wildlife?
- 4.5 Are you friends with some wild animals? Which ones? Do they help you somehow? Which ones are you not friends with?
- 4.6 Do you think wildlife is important for New Xade? If yes, why? If no, why?
- 4.7 Choose as many of the following as you wish.

Continue the sentence: It would be easier to coexist with wildlife, if

- 4.7.1...wildlife didn't cause economic losses (didn't kill livestock)
- 4.7.2...people were better friends with wildlife
- 4.7.3...veld products were more easily available (eg. cultivated in the village) to be consumed or sold
- 4.7.4...people had knowledge about other livelihoods than keeping livestock
- 4.7.5 ...people had more opportunities to discuss about other livelihoods besides livestock keeping in for example Kgotla meetings
- 4.8 What other factors could support coexistence?
- 4.9 Why do you want to own livestock?
- 4.10 Could you imagine yourself someday not wanting to own livestock? If yes, why? If not, why?

Phase 3 – Group imagining of desired HWC management in 2035 (discussed only in workshops)

- 5. Future HWC management (Bere)
 - 5.1 Which non-lethal management methods are used, and have you been satisfied with the outcome?
 - 5.2 Are lethal management methods used, and have you been satisfied with the outcome?
 - 5.3 Why are lethal management methods used?
 - 5.4 Who decides how HWC is managed?
 - 5.5 Do you support coexisting with wildlife?
 - How would you describe your relationship to predators?
 - Do you think wildlife is important for Botswana?
 - What shapes your relationship with wildlife?
 - What would make it easier to support coexistence with wildlife? (multiple choices given for respondents)
 - Financial capital: If wildlife didn't cause economic losses?

- Cultural capital: If people saw themselves as part of nature and understood the benefits of wildlife?
- Natural capital: If people had physical access to income sources, like veld products, which are not threatened by wildlife?
- Cultural, human and social capital: If people had knowledge about livelihoods that are not threatened by HWC?
- Political capital: If people had legal access to conflict safe income sources and an opportunity to participate in decision making about sustainable livelihoods?
- What other factors support coexistence?
- 5. Future HWC management (New Xade)
 - 5.1 Which management methods are used to deal with the conflict with wildlife?
 - 5.2 Do you ever kill or try to kill the wild animals? If yes, why? If not, why?
 - 5.3 Who decides, how HWC is managed?
 - Coexistence with wildlife
 - 5.4 What do you think about living side by side with wildlife?
 - 5.5 Are you friends with some wild animals? Which ones? Which ones are you not friends with?
 - 5.6 Do you think wildlife is important for New Xade? If yes, why? If no, why?
 - 5.7 Choose as many of the following as you wish.

Continue the sentence: It would be easier to coexist with wildlife, if

- 5.7.1...wildlife didn't cause economic losses (didn't kill livestock)
- 5.7.2...people were better friends with wildlife
- 5.7.3...veld products were more easily available (cultivated in the village) to be consumed or sold
- 5.7.4...people had knowledge about other livelihoods than keeping livestock
- 5.7.5 ...people had more opportunities to discuss about other livelihoods besides livestock keeping in for example Kgotla meetings
- 5.8 What other factors could support coexistence?
- 5.9 Do you still want to own livestock?
- 5.10 Could you imagine yourself someday not wanting to own livestock? If yes, why? If not, why?

Phase 4 – Pathways to this future (discussed only in workshops)

- 6. What has made the imagined state of HWC and sustainable HWC management possible? (Bere)
 - Financial capital: Why are there less economic losses?
 - Cultural capital: What has made people see themselves as part of the rest of the nature?
 - Natural capital: What has increased access to veld products?
 - Cultural, human and social capital: Why is there more knowledge about these livelihoods?
 - Political capital: What has improved access to HWC safe livelihoods and increased participation to decision making about sustainable livelihoods?
- 6. The future of sustainable HWC management (New Xade)
 - 6.1 Why are there less economic losses? (discuss if you chose 5.7.1)
 - 6.2 Why are people better friends with wildlife? (discuss if you chose 5.7.2)
 - 6.3 Why are veld products more easily accessible? (discuss if you chose 5.7.3)
 - 6.4 Why is there more knowledge about other livelihoods besides livestock keeping? (discuss if you chose 5.7.4)
 - 6.5 Where and with who do the community members discuss about sustainable livelihoods? (discuss if you chose 5.7.5)
- 7. What obstacles may there be in reaching this sustainable HWC management? (Bere)
- 7. Challenges for sustainable HWC management (New Xade)
 - 7.1 What challenges could there be in decreasing economic losses? (discuss if you chose 5.7.1)
 - 7.2 What could prevent people from being friends with wildlife? (discuss if you chose 5.7.2)
 - 7.3 Why may veld products not be easily accessible? What could threaten them (climate, overgrazing, overharvesting)? (discuss if you chose 5.7.3)
 - 7.4 What could challenge knowledge transfer about other livelihoods than livestock farming? (discuss if you chose 5.7.4)
 - 7.5 What could prevent having conversations in these places and with these people? (discuss if you chose 5.7.5)

Appendix 2. Veld product-related livelihoods – Participatory backcasting workshop and interview questions

Phase 1 – Framing the workshop (discussed only in workshops)

- Background: Relying on livelihoods related to livestock causes HWC in the area. My research focuses on understanding if veld product related livelihoods could help manage human wildlife conflict in the area now and in the future. To respond to this, I try to understand the current state of livelihood now, but also what your hopes are for the future.
- The workshop is not about predicting the future of livelihoods. It is about imagining what you would like the future of your livelihoods to be like in ten years. We are looking for best case scenarios.
- You can let your imagination run wild and have fun!

Phase 2 – Current veld product-related livelihoods (discussed in workshops and interviews)

- 1. What different livelihoods or income sources do people have? (Bere)
- 1. How does each group member make a living? Please make a list. (New Xade)
- 2. Veld products as a part of livelihoods (Bere)
 - 2.1 What veld products do you collect? (the list included images in the workshops and interviews which cannot be included here for copyright reasons)
 - sengaparile
 - mahupu
 - morama
 - motsotsojane
 - kgegwe
 - moretlwa
 - borekhu
 - dikgotse
 - motlopi
 - 2.2 How long have you been collecting veld products?
 - 2.3 How common is veld product harvesting?
 - 2.4 Why do you collect them?
 - 2.5 What do you use them for?
 - 2.6 How much time do you set aside for veld product harvest?
 - 2.7 How important is it financially, compared to other livelihood activities?
 - 2.8 In case of income losses due to HWC, does relying also on veld products give a sense of security?
- 2. Veld products as a part of livelihoods (New Xade)
 - 2.1 What veld products do you collect?
 - 2.2 What do you use each veld product for? Please explain.
 - 2.3 When did you start collecting veld products?
 - 2.4 Who in the village collect veld products? Who don't?

- 2.5 Do you collect veld products to sell, to consume yourself or because of something else?
- 2.6 How many months of the year do you spend harvesting veld products?
- 2.7 How reliable are veld products as a source of income?
- 2.8. If you lose livestock due to predation, do you use the money collected by selling veld products to buy a new livestock animal, or rather for something else?
- 3 Indigenous knowledge related to veld products (Bere)
 - 3.1 Who has taught you what you know about veld products?
 - 3.2 What do you know about veld products?
 - 3.3 What is the condition of this type of knowledge in the village?
 - 3.4 Does everybody in the village have this knowledge?
- 3 Indigenous knowledge related to veld products (New Xade)
 - 3.1 Who has taught you what you know about veld products?
 - 3.2 Is knowledge about veld products strong in the village? Are there any signs of it disappearing? Please explain.
 - 3.3 Which groups of people have the most knowledge of veld products in the village? Which groups have less knowledge? Why is this?
- 4 Relationship with nature (Bere)
 - 4.1 How would you describe your relationship with the rest of the nature?
 - 4.2 How has collecting veld products influenced this relationship?
- 4 Relationship with nature (New Xade)
 - 4.1 When you go in the bush, what type of attitude do you have and how do you behave? What do you admire? What do you watch out for?
 - 4.2 If you see a wild animal in the bush, what do you do?
 - 4.3 What does the nature offer you and what do you offer for the nature?
- 5 State of markets supporting veld product harvesting (Bere)
 - 5.1 Where do you sell veld products?
 - 5.2 Are the products sold as they are or further processed?
 - 5.3 Is there a demand for the products?
- 5 State of markets supporting veld product harvesting (New Xade)
 - 5.1 Where do you sell veld products?
 - 5.2 Are the products sold as they are or further processed?
 - 5.3 How would you describe the demand for the products?
- 6 Rules related to veld products (Bere)
 - 6.1 Where are veld products collected?
 - 6.2 What rules are followed when collecting veld products?
 - 6.3 Do you agree with these rules?
 - 6.4 Are you apart of decision-making concerning veld product harvesting?
- 6 Rules related to veld products (New Xade)
 - 6.1 Where are veld products collected? Would you want some to be closer?

- 6.2 What rules are followed when collecting veld products?
- 7 Access to veld products (New Xade) (questions included into participatory mapping workshop in Bere)
 - 7.1 What environmental conditions help veld products grow?
 - 7.2. How have these conditions changed during your lifetime?
 - 7.3 Does something challenge veld product growth, like overharvesting, overgrazing or a certain type of climate?

Phase 3 – Group imagining of desired livelihoods (discussed only in workshops)

- 1. What different livelihoods or income sources do people have? (Bere)
- 1. How does each group member make a living? Please make a list. (New Xade)
- 2. Veld products as a part of livelihoods (Bere)
 - 2.1 How common is veld product harvesting?
 - 2.2 Why do you collect them?
 - 2.3 What do you use them for?
 - 2.4 How much time do you set aside for veld product harvest?
 - 2.5 How important is it financially, compared to other livelihood activities?
 - 2.6 In case of income losses due to HWC, does relying also on veld products give a sense of security?
- 2. Veld products as a part of livelihoods (New Xade)
 - 2.1 Do you collect any different veld products than in 2026?
 - 2.2 Who in the village collect veld products? Who don't?
 - 2.3 Do you collect veld products to sell, to consume yourself or because of something else?
 - 2.4 How many months of the year do you spend harvesting veld products?
 - 2.5 How reliable are veld products as a source of income?
 - 2.6. If you lose livestock due to predation, do you use the money collected by selling veld products to buy a new livestock animal, or rather for something else?
- 3 Indigenous knowledge related to veld products (Bere)
 - 3.1 Who has taught you what you know about veld products?
 - 3.2 What is the condition of this type of knowledge in the village?
 - 3.3 Does everybody in the village have this knowledge?
- 3 Indigenous knowledge related to veld products (New Xade)
 - 3.1 Do you teach what you know about veld products to others? Who do you teach it to, and why?
 - 3.2 Is knowledge about veld products strong in the village? Are there any signs of it disappearing? Please explain.
 - 3.3 Which groups of people have the strongest knowledge of veld products in the village? Which ones have less knowledge? Why is this?
- 4 Relationship with nature (Bere)

- 4.1 How would you describe your relationship with the rest of the nature?
- 4.2 How has collecting veld products influenced this relationship?
- 4 Relationship with nature (New Xade)
 - 4.1 When you go in the bush, what type of attitude do you have and how do you behave? What do you admire? What do you watch out for?
 - 4.2 If you see a wild animal in the bush, what do you do?
 - 4.3 What does the nature offer you and what do you offer for the nature?
- 5 State of markets supporting veld product harvesting (Bere)
 - 5.1 Where do you sell veld products?
 - 5.2 Are the products sold as they are or further processed?
 - 5.3 Has the Bere Veld product center been operating well?
 - 5.4 Is there a demand for the products?
- 5 State of markets supporting veld product harvesting (New Xade)
 - 5.1 Where do you sell veld products?
 - 5.2 Are the products sold as they are or further processed?
 - 5.3 How would you describe the demand for the products?
- 6 Rules related to veld products (Bere)
 - 6.1 Where are veld products collected?
 - 6.2 What rules are followed when collecting veld products?
 - 6.3 Do you agree with these rules?
 - 6.4 Are you apart of decision-making concerning veld product harvesting?
- 6 Rules related to veld products (New Xade)
 - 6.3 Are there other rules than in 2026 that control veld product harvesting?
 - 6.4 Are you apart of making rules for veld product harvesting? Why, or why not?

Phase 4 – Pathways to this future (discussed only in workshops)

Questions Bere

- State of Indigenous knowledge and human capital
 - How can this state of IK be achieved?
 - What obstacles could there be in reaching this state?
- Relationship with nature
 - How could this relationship with the rest of nature be achieved? How could this state of wildlife acceptance be achieved?
 - What obstacles could there be in reaching this state?
- Economic aspects
 - How could veld products be sold in these places and to these people?
 - What obstacles could there be in reaching this state?
- Politics and decision making
 - How could rules that the community agrees with be created?

- What obstacles could there be?

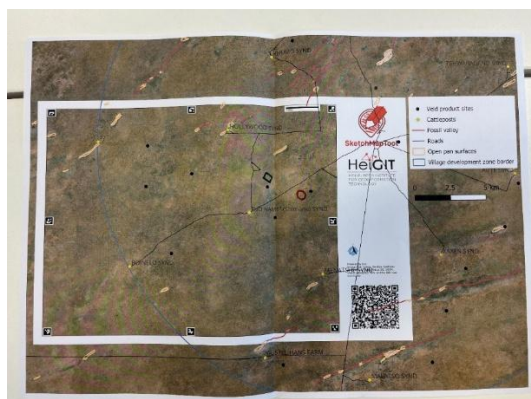
Questions New Xade

- 7. State of Indigenous knowledge and human capital (look at responses to 3.1.-3.3.)
 - 7.1 How can this state of knowledge about veld products be achieved?
 - 7.2 What obstacles could there be?
- 8 Relationship with nature (look at responses 4.1-4.3)
 - 8.1 How could these attitudes and behavior be achieved?
 - 8.2 What obstacles could there be in reaching this state?
- 9 Markets (look at responses 5.1-5.3)
 - 9.1 How could veld products be sold in these places and to these people?
 - 9.2 What obstacles could there be in reaching this state?
- 10 Politics and decision making (look at responses 6.3-6.4)
 - 10.1 How could rules that the community agrees with be created?
 - 10.2 What obstacles could there be?

Appendix 3. Distribution of veld products in Bere and GH11 - Participatory mapping workshop

Guide for mapping

- How to mark areas:
 - Communicate with your group members, where plants are usually found.
 - Draw a thick line around the area, where the plant grows.
 - Draw only within the inner white area.
 - You do not need to fill the polygon, only draw the outline. Follow the example in the image below (no true veld product sites are revealed in the image).



- On the map, mark these veld plant areas with assigned colors:

- Red: Sengaparile/Devil's claw (grapple plant)/Harpagophytum procumbens



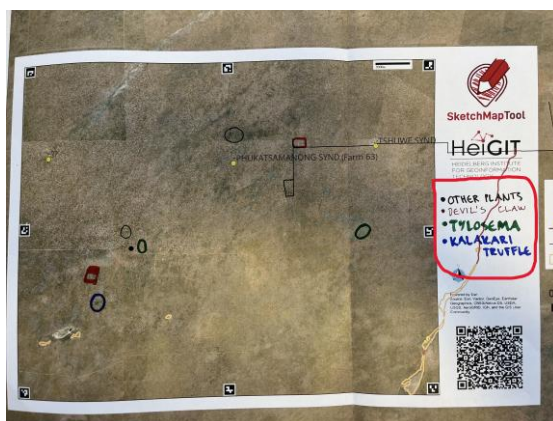
- Green: Morama/Morama bean/Tylosema esculentum



- Blue: Mahupu/Kalahari truffles/Kalaharituber pfeili



- Black: Other plants
- Drawing a legend
 - To explain what your markings mean, draw a description in the white space on the right explaining what your markings mean. Follow the example in the reference image below (no true veld product sites are revealed in the image).



- Discussion after mapping of environmental factors influencing veld product use
 1. What environmental factors influence veld product availability?
 2. Have the environmental conditions been favourable recently for veld product harvest?
 3. Is there seasonality in veld product occurrence?
 4. How is this seasonality changing related to climate change?
 5. How does seasonality influence the use of veld products?
 6. Are veld product plants threatened by invasive species? If yes, how?
 7. Are veld products threatened by overharvesting? If yes, how?
 8. Does something else challenge veld product use?
- Validation workshop questions about the use of the maps
 - 1. Are there risks for misuse if the maps are publicly available?
 - 2. How do you want to use the maps?
 - To coordinate or plan how to harvest?
 - To help with discussions with government or other actors about land use plans?
 - To sell at the Exatheni processing center?
 - To use for teaching at schools, seminars, workshops?
 - For something else?
 - 3. Should I publish the maps in my master's thesis? Please explain.