

**United Republic of Tanzania
Ministry of Natural Resources and Tourism**



**National Human - Wildlife Conflict Management Strategy
2020 – 2024**

National Human - Wildlife Conflict Management Strategy 2020 – 2024

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Statement of Endorsement

I hereby endorse this national strategy and call upon all stakeholders to support its implementation.



Dr. Hamisi Kigwangalla (MP)

Minister for Natural Resources and Tourism

Date 5th October 2020

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Essential further information is included in the **HWC Strategy Supplement**. The supplement contains:

- Expanded rationale and implementation guidance for each Strategic Objective
- Analysis by species (large carnivores, elephant, crocodile, hippo) of drivers and risk factors for human-wildlife interactions
- Review of mitigation methods by species group
- Preliminary analysis of HWC distribution and hotspots in Tanzania



Lions captured on camera traps on village land in Idodi-Pawaga. Credit: STEP.

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Executive Summary

Coexistence between people and wildlife is a national priority for sustainable development and wildlife conservation in Tanzania. Tanzania's natural heritage and conservation record are admired around the world and are critical for the development and well-being of the country. The natural services that only flow from a healthy, well protected environment – clean water, fertile soils, crop pollinators, tree cover– are critical to the livelihoods and quality of life of Tanzania's citizens, and build resilience for the nation to flooding, drought and other impacts of ongoing and accelerating climate change. Tanzania's network of Protected Areas is ecologically critical to sustaining this healthy environment, and it is critical to the national economy, with primarily wildlife-based tourism accounting for 17% of annual GDP.

However, communities living adjacent to Protected Areas experience important negative impacts from wildlife on their livelihoods and security, and this has become an increasing concern and challenge in recent years. Wildlife impacts include loss of crops, depredation of livestock, loss of human life and injury, and social disruption. This Strategy provides a path forward to increasing security and reducing the costs of human-wildlife coexistence in the short term, and, through addressing the underlying drivers and human dimensions of conflict, building the foundations for sustainable long-term coexistence across the country. The drivers of human-wildlife conflict (HWC) are multiple, and a holistic approach to the problem is therefore required.

A number of principles guide the approach of this Strategy. Crucially, management of human-wildlife conflict should focus on empowering communities to initiate and manage mitigation and protection for themselves, and to increase their resilience to wildlife impacts. This requires training and committed support from Government, NGOs, the private sector and donors. At the same time, the Government is dedicated to protection of its citizens, and the Strategy aims to increase capacity for responding to emergency situations where security is threatened.

Reducing the impacts of large carnivores, elephants, crocodiles and hippos forms the focus of the short-term goals of this Strategy. As well as being important for enhancing livelihood and security, most of these species are in decline across Africa, and are among the most significant species for Tanzania's tourism industry, adding to their coexistence value.

The Strategy provides a comprehensive overview of mitigation methods that can be deployed by communities to reduce negative impacts. The careful assessment of each method is important for understanding its effectiveness, gaps in knowledge on its usage, and the specific contexts where it is appropriate to deploy. This Strategy provides a plan for rapidly scaling up implementation and management by communities of appropriate mitigation methods.

Another important guiding principle of the Strategy is the need to prioritise resources, at least in the short term, on hotspot areas of human-wildlife conflict. Data-driven identification of these hotspots is under way and this process will continue. An improved national system of monitoring and analysing HWC incidents is vital to tracking trends that can inform and guide adaptive management, including spatial and temporal trends, and the effectiveness of the measures introduced.

For the long term, a key component of the strategy to enhance and maintain coexistence is to increase implementation of, and adherence to, wise land use planning (LUP) that meets the needs of people and wildlife in a sustainable way. Crucially, this involves proper management of Buffer Zones, and restoration and management of Wildlife Corridors, to which the Government has already committed. A National Priority Corridor Action Plan is also being developed to support the Regulations on Wildlife Corridors, Buffer Zones and Dispersal Areas. The process of land use planning must be wholly participatory, as LUPs will only be sustainable when communities have been involved in decision-making throughout the process.

Two other elements of the Strategy are vital for long-term success. First, while there are existing benefits to communities of coexistence with wildlife, increasing benefits will be important for increasing tolerance to wildlife and incentivizing land uses compatible with coexistence. The Strategy highlights some new initiatives to enhance benefits, and recommends trialling of innovative

conservation incentive schemes that have the potential to increase benefits and enhance tolerance.

Secondly, there is a lack of awareness among communities on how they can empower themselves to reduce the negative and increase the positive consequences of living alongside wildlife, and of the value and importance of coexistence for the development and well-being of Tanzania. The Strategy therefore outlines ambitious but pragmatic plans to scale up education on HWC, for both children and adults, across the country.

Human-wildlife conflict is a relatively young field of research and conservation. Continual learning is essential to making progress, hence, it is vital to monitor the outcomes of this Strategy and to explore the Research Priorities outlined in the Strategy.

In light of these identified priorities, and after wide consultation with HWC experts, practitioners and stakeholders, this Strategy outlines plans for several new initiatives to enhance human-wildlife coexistence in both the short and long terms. These new initiatives can be summarised as follows:

HWC Mitigation Unit

A specialised unit of rangers and VGS will be rapidly trained by experts on mitigation methods so that within three months, they will be helping communities to proactively implement HWC mitigation methods appropriate for their context, to rapidly improve livelihoods and security (SO 1).

HWC Training Course

A training course that combines theory of HWC with practical on-site training of effective mitigation and response methods will be developed, so that teaching of the course begins at the national VGS/ranger training colleges within six months. Local officials, VGS and community members from the HWC hotspot areas will attend the course on a rotating basis, empowering them to educate and practically lead their communities in proactive mitigation of conflict (SO 1).

HWC Response Teams

The existing HWC Response Teams that currently support communities in dangerous conflict situations (variably comprising APU/TAWA/TANAPA/NCAA/TFS rangers and VGS from WMAs and villages) will be rapidly formalised, placed on 24-hour call duty, and brought under clearer coordination from national down to district level, with each team led by the Zonal In-Charge. Tailored training of team members at the national VGS/ranger training colleges, which team members will attend on a rotational basis, will increase their effectiveness to protect communities, as well as serve as educators on HWC issues and solutions. Efforts will also accelerate immediately to raise the level of funding, to increase the number of teams and vehicles available for community support, with resources prioritised to HWC hotspot areas (SO 2).

Free Regional HWC Hotlines

To improve the effectiveness and coverage of HWC Response Teams, free 24-hour regional hotlines will be introduced within six months for reporting of dangerous conflict situations with wildlife. The hotline coordinator will be under the Zonal In-Charge and therefore able to alert and deploy HWC Response Teams rapidly and effectively (SO 2).

HWC Monitoring Teams

A small team of HWC Monitors led by the DGO will be responsible for collection of data on HWC incidents in each District. Trained and equipped with the newly developed Problem Animal Information System (PAIS), data collected in the field will be remotely transmitted to the National HWC Database, reducing lag and loss of data (SO 6). This system will also make the processing of consolation payments more efficient.

National HWC Database

A central, fully digitised HWC Database will be established, managed and analysed within the MNRT. Historical data will be entered, and current data will reach the database efficiently and automatically from all HWC Monitoring Teams via the online PAIS system (SO 6). Regular reports from the Database

will enable greater understanding of trends and hotspots of HWC across the country, in turn enabling adaptive management of the Mitigation Unit and Response Teams to increase efficiency.

Coexistence LUP Committee

A multi-sectoral Human-Wildlife Coexistence Land Use Planning Committee will be formed, chaired by NLUPC, to oversee a scaling up of LUP, beginning in conflict hotspot villages and areas. Its roles will also include coordination of planning and management of Wildlife Corridors and Buffer Zones which are essential for long-term coexistence (SO 3).

National HWC Curriculum for Schools

To raise awareness, knowledge and capacity for coexistence for the long term, new modules on wildlife and coexistence will be developed, piloted and introduced in the National Curriculum under Geography. An adult education program will also be developed (SO 5).

Visit to a Wildlife Reserve for Every Child in Tanzania

Research shows the importance of complimenting environmental classroom learning with direct experience. Therefore, a scheme will be developed to ensure that every student visits a wildlife reserve before graduating from school to truly appreciate and connect with Tanzania's natural heritage (SO 5).

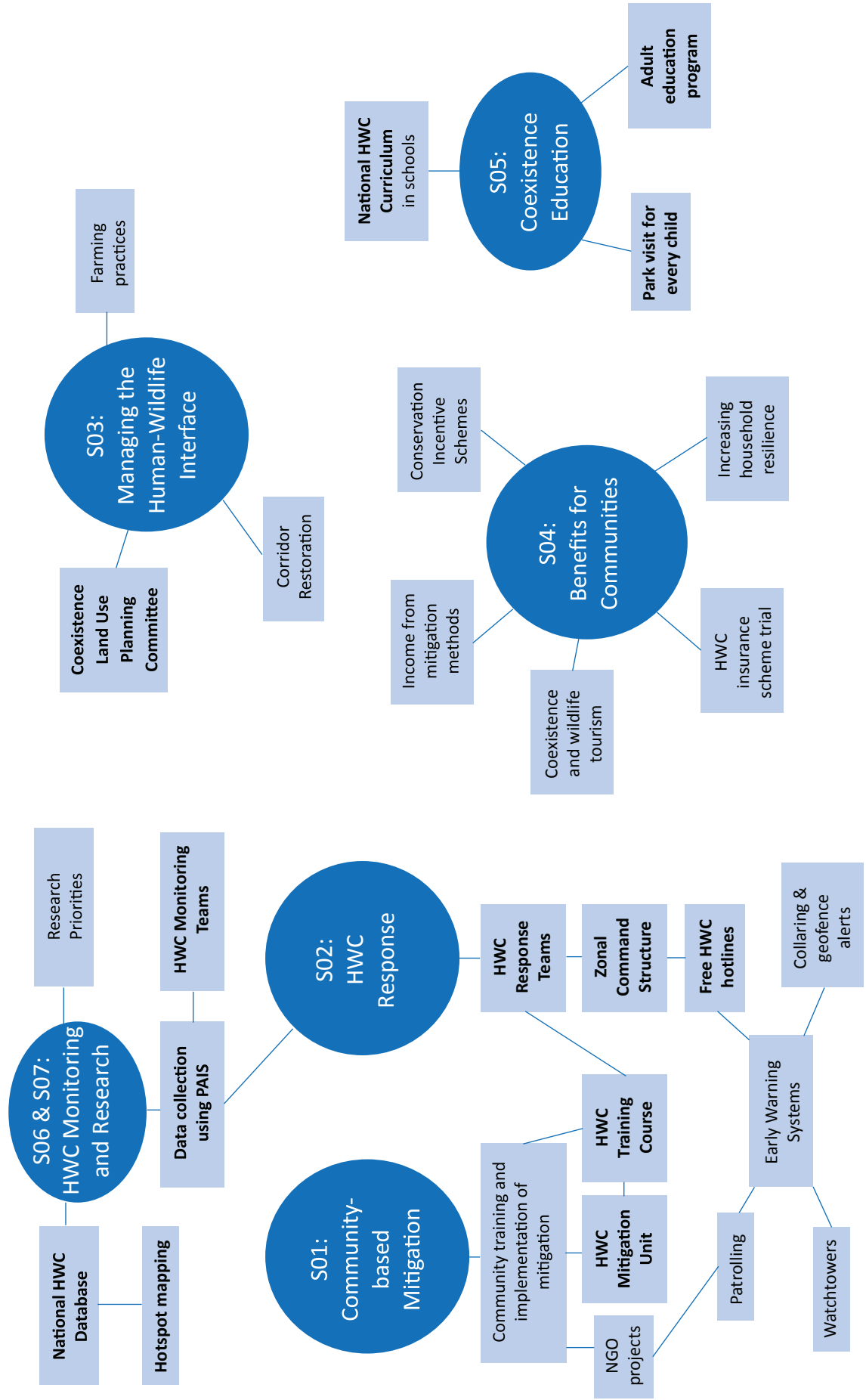
Household Resilience and Conservation Incentive Schemes

Civil society partners across the country are already trialling multiple initiatives to increase and diversify incomes, build household resilience, increase benefits from wildlife, and incentivise human-wildlife coexistence. This Strategy recommends learning from these efforts to assess their feasibility and conditions for success and to inform possible expansion of these initiatives in the longer term (SO 4).



A man enters a Living Wall in Tanzania. Credit: TPW/Felipe Rodriguez

Figure 1: Core components of the National HWC Strategy
New initiatives of the Strategy are emboldened.



Foreword

Tanzania contains globally important populations of African large mammals and many other species of flora and fauna. Various species of wildlife utilize areas outside of formally protected areas where communities experience important negative impacts on their livelihoods and security.

Conflicts between wildlife and people, particularly those who share the immediate boundaries with protected areas, are a common phenomenon all over the world. The decline in wildlife resources has been linked to human actions through overexploitation, habitat destruction, pollution and introduction of non-native species.

On the other hand, some local communities perceive wildlife as a liability to them, and this view is provoked by the bitter experience of damage to crops and other properties, livestock depredation and risks posed to people's lives through attacks by wild animals. Besides these conflicts, it is indisputable that wildlife contributes significantly to the economy of the country and it is vital to increase the welfare of the local communities who are bearing the costs of conservation.

The drivers of human-wildlife conflict (HWC) are complex, and a holistic approach to the problem is therefore required. This strategy focuses on empowering communities and provides a comprehensive overview of mitigation methods that can be deployed by communities to reduce negative impacts of wildlife on their livelihood and increase their social acceptability of wildlife conservation as an economically viable activity.

Developing a strategic plan is not easy work: it needs skilled personnel and financial resources. Recognizing this on behalf of the Ministry, I am sincerely acknowledging the financial and logistics support of USAID-PROTECT and GIZ, and extend my gratitude to Dr Trevor Jones of STEP for leading the team as a consultant and making the document available on time. Lastly, my sincere gratitude goes to all stakeholders for their inputs which have made this document available.



Dr. Aloyce K. Nzuki

Permanent Secretary

Ministry of Natural Resources and Tourism

Preface

The Ministry of Natural Resources and Tourism of the United Republic of Tanzania is responsible for the management of Natural, Cultural and Tourism resources through the development of appropriate policies, strategies and guidelines; formulation and enforcement of laws and regulations; and monitoring and evaluation of policies and laws.

Tanzania's savannahs, woodlands and forests are a stronghold for biodiversity and harbour a variety of animal and plant species of economic, ecological and socio-cultural importance. Efforts of conserving these resources against destruction and loss have involved setting aside protected areas. However, these areas and adjacent lands have long been subjected to several challenges including human-wildlife conflict which complicate their management.

This Human-Wildlife Conflict Management Strategy is a government document and one of the tools for management of human-wildlife conflict. This strategy outlines the methods of minimizing human-wildlife conflicts and increasing social acceptance and co-existence of human and wildlife.

I acknowledge and appreciate the contributions of all Government agencies, Non-Governmental Organizations, private sector, donor agencies, local communities and individuals in supporting the Government's efforts in addressing human-wildlife conflicts.

My promise to all partners is the close cooperation and support from my Ministry in managing human-wildlife conflicts and I sincerely request all interested parties to support the efforts of minimizing human-wildlife conflicts and to take initiatives which will increase tolerance of communities to wildlife and guarantee co-existence of humans and wildlife.



Dr. Hamisi Kigwangalla (MP)

Minister for Natural Resources and Tourism

Acronyms

AD-AP	-	Assitant Director of Anti-Poaching
APU	-	Anti-Poaching Unit
AWF	-	African Wildlife Foundation
CBCTC	-	Community Based Conservation Training Centre
DG	-	Director-General
DGO	-	District Game Officer
EU-CONNKT	-	Conserving Neighbouring Ecosystems in Kenya and Tanzania
FZS	-	Franfurt Zoolofigal Society
GDP	-	Gross Domestic Product
GIZ	-	Germany Agency for International Cooperation
HWC	-	Human-Wildlife Conflict
HWCMU	-	Human-Wildlife Conflict Mitigation Unit
IUCN	-	International Union for Conservation of Nature
IVR	-	Interactive Voice Response
LGA	-	Local Government Authority
LUP	-	Land Use Planning
MNRT	-	Ministry of Natural Resources and Tourism
NBS	-	National Bureau of Statistics
NCAA	-	Ngorongoro Conservation Area Authority
NGO	-	Non-Governmental Organization
NLUPC	-	National Land Use Planning Commission
NPCAP	-	National Priority Corridor Action Plan
PAIS	-	Problem Animal Information System
PAMS Foundation	-	Protected Areas Management Systems Foundation
RCP	-	Ruaha Carnivore Project
REDD	-	Reducing Emission from Deforestation and Forest Degradation
SO	-	Strategic Objective
STEP	-	Southern Tanzania Elephant Program
TANAPA	-	Tanzania National Parks
TAWA	-	Tanzania Wildlife Management Authority
TAWIRI	-	Tanzania Wildlife Research Institute
TCRA	-	Tanzania Communication Regulatory Authority
TFS	-	Tanzania Forest Services Agency
TPW	-	Tanzania People & Wildlife
USAID	-	United States Agency for International Development
VEO	-	Village Executive Officer
VGS	-	Village Game Scout
WCS	-	Wildlife Conservation Society
WD	-	Wildlife Division
WEO	-	Ward Executive Officer
WMA	-	Wildlife Management Area

Chapter One

Introduction

1.1 Importance of Human-Wildlife Coexistence for Tanzania

Coexistence between people and wildlife is a national priority for sustainable development and wildlife conservation in Tanzania. The United Republic of Tanzania is a global leader in wildlife conservation. The country has set aside 33.5% of its terrestrial area for conservation and has made significant investments in protecting its wildlife¹. Furthermore, Tanzania is one of the few nations to commit to conserving wildlife corridors. Tanzania is further unique in that it is protecting areas large enough to conserve viable populations of globally valued, charismatic wildlife. As a result, Tanzania remains a stronghold for many species of conservation concern, being home to 35% of East Africa's elephants², over 50% of East Africa's lions^{3,4}, and most of East Africa's hippos⁵.

Tanzania's investment in wildlife conservation generates several significant benefits for the country. Wildlife tourism attracts almost 1.5 million visitors to Tanzania per year, and is a significant and growing sector of the economy. Tourism constitutes 17% of GDP and generates over 1 million jobs^{6,7}. Environmental conservation also generates many vital ecosystem services for the country, including conservation of water, soil, and pollinators which are fundamental to human livelihoods.

In recent years, human-wildlife conflict has become a growing concern in Tanzania. A rapidly growing human population has increased the demand for land and natural resources for agriculture and livestock-keeping. This increased demand for land, as well as insufficient land use planning, has resulted in the expansion of livelihoods activities along protected area boundaries and into wildlife corridors and dispersal areas, where people and their livelihoods are at higher risk from wildlife impacts.

The Government of the United Republic of Tanzania recognizes that communities living adjacent to protected areas experience costs of living with wildlife, including threats to people's livelihoods, safety, and well-being. In addition, more must be done to increase the benefits of wildlife conservation to communities, and to foster community tolerance for wildlife. Increasing the security and well-being of our citizens is therefore a primary goal of this strategy.

The Government also recognizes that HWC poses a significant threat to wildlife conservation. Many of the species which are the focus of HWC, such as large carnivores and elephants, are 'keystone species' that play a significant role in shaping the ecosystems in which they live. They also include some of the charismatic 'big five' species that make Tanzania such a popular destination for wildlife tourism. Furthermore, most of the 'conflict' species are of conservation concern and have experienced significant population declines (TAWIRI, unpublished reports). The IUCN Red List classifies Lions as Endangered and Cheetah and African Wild Dog as Critically Endangered. Tanzania's lion population was estimated at 16,800 in 2010 though this figure was based primarily on best guesses by key informants rather than ecosystem-level surveys of lion abundance³. Elephants are classified as Vulnerable and populations across Africa have declined due to poaching for ivory. Tanzania's elephant population in Tanzania declined from 109,051 in 2009 to 50,433 in 2015² and remained stable between 2015 and 2019. Hippopotamus are classified as Vulnerable, and their populations are in decline in most African countries. There has been no countrywide census of hippos since 2001, when their population was estimated at 20,000 individuals⁸. The 2018 aerial survey of Nile Crocodiles found that crocodile densities inside some protected areas have increased since 1989 (e.g., lower Rufiji inside Selous) while others remained stable, but that there was a significant drop in crocodile densities in survey areas outside of protected areas (e.g. lower Rufiji outside Selous)⁹. Finally, the survival of Tanzania's wildlife populations, and especially for conflict species which utilize corridors, dispersal areas and resources outside of protected areas, is increasingly dependent on tolerance by people.

For all these reasons, The Government of the United Republic of Tanzania sees addressing human-wildlife conflict as a key goal for sustainable development and wildlife conservation in the country. We must work towards human-wildlife coexistence for the benefit of our nation's people and wildlife.



Elephant with tourists in Ruaha National Park. Credit: STEP

1.2 Defining HWC

Human-wildlife conflict has been defined in a number of ways^{10,11,12}. For the purpose of this Strategy, human-wildlife conflict (HWC) is recognised as a subset of human-wildlife interactions (which can be positive or negative). Conflict occurs when the needs and behaviour of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife¹⁰. This includes negative impacts of wildlife on human social, economic or cultural life, and negative impacts of humans on the conservation of wildlife populations¹². However, it is important to recognize that human-wildlife conflicts do not result solely from the direct impacts of wildlife on people or vice versa but may often involve disagreements between stakeholders over conservation objectives¹¹. HWC is a key obstacle to linking conservation and poverty alleviation, as the costs of living with wildlife negatively impact on rural livelihoods and erode community support for conservation¹³. HWC is also an important threat to wildlife conservation, as the fate of many wildlife populations, especially carnivores and large herbivores, is increasingly dependent on their tolerance by people¹⁴.

Impacts of wildlife on people include crop loss, livestock depredation, injury and loss of life, damage to property such as fishing gear and water infrastructure, and social costs such as increased time spent guarding farms, limitations on mobility, and reduced school attendance^{10,15}. The impacts of HWC on wildlife include retaliatory or problem animal control killing of wildlife, reduced community support for conservation, tolerance for poaching, and disputes between protected area managers and communities^{10,14,15}.

Human population growth and increased demand for agricultural and grazing land have brought people and wildlife into closer proximity. HWC occurs in areas where human presence and activities occur directly adjacent to or within wildlife habitats, including protected areas (PAs), wildlife corridors, dispersal areas, and along waterways. The drivers of HWC are discussed in more detail in Section 1.3.

1.3 Drivers of HWC

Human population growth and the associated increased demand for land and natural resources is a fundamental driver of HWC. Tanzania's human population is increasing at a rate of over 4% per year¹⁶. The population quadrupled between 1967 and 2012, and it is projected to increase to 89,204,781 in 2035¹⁶ (Figure 1.1).

Human population growth has resulted in increased settlement and conversion of habitat to agricultural and grazing land along protected area boundaries and in wildlife range¹⁷, thereby increasing the potential for HWC by expanding the human-wildlife interface and by bringing people and wildlife into closer proximity. In some cases, human population growth and land conversion is increasing at a faster rate along protected area boundaries than elsewhere in the country¹⁸. In the Serengeti

ecosystem, population growth in wards closer to the protected area was 3.5% per year, while wards further away had a growth rate of 2.5% per year. Land conversion to agriculture was also higher in areas closer to the protected area boundaries¹⁸.

Insufficient land use planning is also a driver of HWC. Historically, land use planning has been lacking or, where it has been employed, land use plans have not been enforced or were undertaken without considering the risk of HWC. As a result, settlement and agriculture have expanded into areas at high-risk from wildlife damage, including directly along protected area boundaries and into corridors, dispersal areas, and buffer zones, exacerbating the potential for conflict.

Increased human use of waterways for economic and domestic activities, as well as changes to waterways, also increase the potential for negative interactions with wildlife living inside the same water bodies, especially hippo and crocodiles¹⁹. Upstream extraction and alteration of waterways has also reduced the ability of protected areas to support wildlife year-round, forcing wildlife to seek permanent sources of water outside of protected areas and bringing them closer to people.

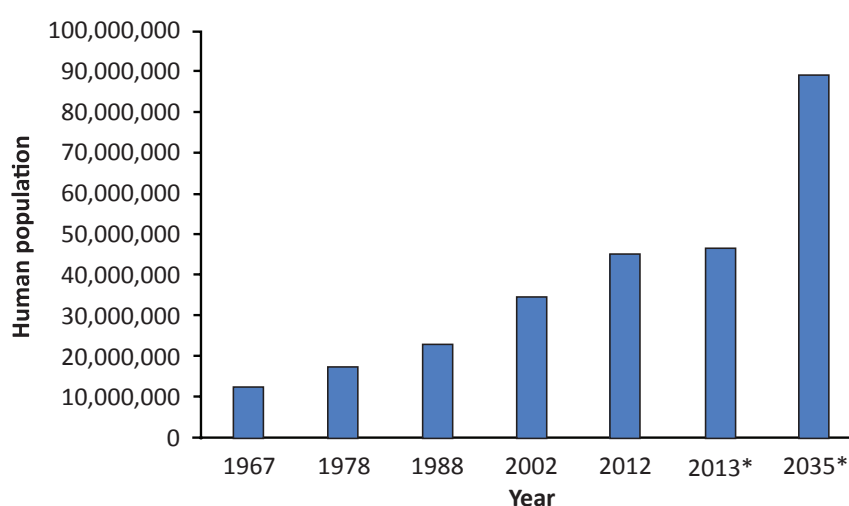


Figure 1.1: Human population in Tanzania from 1967 to 2035 (years marked with an asterisk are projections).

Another root cause of HWC is that protected areas were not designated to encompass entire ecosystems, nor were wildlife corridors and dispersal areas gazetted²⁰. This means that an important portion of wildlife range, including most of Tanzania's wildlife corridors, falls outside of officially protected areas. Elephants and large carnivores have large home ranges that often extend beyond protected area boundaries into human-dominated landscapes. While protected areas are the strongholds for many wildlife species, areas beyond protected area boundaries are important for the survival of elephant and carnivore populations, and their survival and presence in such landscapes is increasingly dependent on tolerance by people²¹.

Furthermore, many species involved in HWC demonstrate seasonal movements into dispersal areas, which may lie outside of protected areas. For example, large herbivores migrate from Tarangire National Park into dispersal areas located on communal village land during the wet season^{22,23,24,25}. Carnivores follow their wild prey out of the Park into communal land, resulting in increased livestock predation in the wet season. Aquatic or semi-aquatic species such as crocodiles and hippos also adjust their ranges seasonally. During the rainy season, the flooding of rivers and lakes allows crocodiles and hippos to disperse and expand their range, including into human areas¹⁹. During the dry season, seasonal rivers or lakes dry up to a few permanent pools. Crocodiles and hippos concentrate in these pools, some of which occur outside protected areas.

Climate change is likely to further exacerbate HWC. Climate change is already happening, and will increase the occurrence of extreme weather events, including droughts, floods, heat waves and desertification, change areas which are suitable for wildlife. Wildlife may be forced to move to new areas to adapt to climate change, potentially bringing wildlife into human areas and increasing HWC²⁶.

Displacement of people by climate change may increase encroachment in corridors and wildlife areas. In 2019, southern Africa experienced severe droughts due to disruption to the Indian Ocean Dipole, itself a result of increased ocean surface temperatures due to climate change. During the drought, animals moved into community land in search of food and water, resulting in significant increase in HWC incidents²⁷. Further research is needed into how climate change is affecting the distribution and intensity of HWC in Tanzania.

Please refer to the **Strategy Supplement** for further information on species-specific drivers of human-wildlife interactions, and risk factors for wildlife impacts.



A Living Wall conserves lions by protecting livestock in northern Tanzania. Credit: Tanzania People & Wildlife/ Felipe Rodriguez

1.4 Human dimensions of HWC

It is often assumed by conservation practitioners that the level of conflict is directly related to the level of wildlife damage, and so that by mitigating wildlife damage, conflict will be reduced. However, this assumption is likely untrue in a majority of HWC contexts²⁸. Studies show that a range of factors shape how tolerant people are of wildlife^{28,29,30,31,32}. Tolerance is defined as the willingness to accept wildlife presence³³. Where people are intolerant of wildlife, they often express negative attitudes towards a species or conservation program, and may demonstrate intolerant behaviours, such as killing of wildlife³³.

It is important for conservation practitioners to consider the range of factors that shape wildlife tolerance, as a singular focus on reducing wildlife damage may not necessarily increase tolerance for wildlife or reduce conflict. The factors that shape wildlife tolerance are likely to be context-specific, hence baseline studies of tolerance should be conducted in each conflict hotspot to inform HWC management approaches. An overview of key determinants of tolerance is provided below.

Socio-economic factors are important in shaping tolerance for wildlife. For example, people who are dependent upon a single income source may be less tolerant to wildlife, as they are less able to cope with wildlife impacts. People who have alternative income sources or assets are less vulnerable as they have access to coping strategies³⁴. Building household resilience to wildlife may be one avenue for increasing tolerance³⁵.

Tolerance of wildlife can be influenced by **who is perceived to be responsible for wildlife**, people's sense of trust in the institution perceived responsible for wildlife, and the degree to which people feel they can avoid negative outcomes through their own actions. In Tanzania, there is a common perception that the Government is responsible for wildlife^{36,37}. As a result, people feel that managing wildlife is not their individual responsibility, and that they are unable to manage potentially dangerous wildlife³⁷. While certain wildlife management options (e.g. lethal control) are ultimately the remit of

Government agencies, a central goal of this strategy is to empower communities with knowledge and resources so that they are better prepared to mitigate and cope with wildlife impacts. If successful, people may feel they have greater control of the risks associated with wildlife. As an individual's **perception of control** increases, risk perceptions should decrease, benefit perceptions should increase, and tolerance is expected to increase³⁸.

The greater the **social trust** in the institution perceived to be responsible for wildlife, the more likely people are to perceive lower risks associated with wildlife^{38,39,40}. Trust is often based on perceptions of current and past performance of the institution, the perception of shared values between stakeholders and the institution, and stakeholder perceptions of staff of the institution³⁸. Therefore, relationship and trust building between communities and Tanzania's wildlife authorities is an important avenue for fostering greater tolerance and reducing levels of conflict.

Human-wildlife conflicts can be an expression underlying **human-human conflicts**, such as between authorities and local people, or between conservation and development goals^{28,21,41}. Actual or perceived political or social injustices committed against local people by those in authority can reduce tolerance for wildlife and exacerbate conflict²⁶.

The **beliefs** that people hold about the beneficial and undesirable attributes of a species are often a key predictor of tolerance³³. For example, in the Amboseli ecosystem, the greatest predictor of lion killing among Maasai was the general beliefs and attitudes they held towards lions: the more positive their views on lions, the less likely they were to engage in lion killing⁴². People's **instinctive and emotional responses** to a species are also important. If someone's emotional response to a species is positive, they are more likely to perceive benefits from wildlife. If people experience negative feelings, including fear, they are less likely to perceive benefits from a species, and overestimate risk. This is one reason why large, visible, and potentially dangerous species such as elephants may generate disproportionate concern even if species such as rodents or invertebrates cause more damage²⁸

Perception of costs/risks and benefits: If people perceive that the costs and risks of wildlife are high, they are less likely to be tolerant of wildlife. If people perceive greater benefits of wildlife, they are likely to be more tolerant of wildlife^{39,40}. It is important to note that people often overestimate the actual degree of risk from wildlife^{43,32}. This is because people are more likely to assess risk by the impact of an event rather than its likelihood⁴⁴. For instance, livestock depredation is usually a rare event, but people consider it a great risk because of the significant negative impact of the event⁴⁴. Perceptions of costs and benefits are themselves influenced by social trust in institution, people's beliefs about species, and people's direct and indirect experiences.

People's direct and indirect experience with a species can affect their beliefs about a species, shape how people perceive the benefits, costs and risks associated with a species³³.

Additional factors that may shape tolerance include gender, social norms, social identity, culture, religion, knowledge and access to information, and framing of HWC by the media.



A Maasai woman outside her family's Living Wall in Tanzania. Credit: TPW/Felipe Rodriguez

Chapter Two

Status of HWC in Tanzania

This section provides an overview of the distribution and scale of HWC impacts in Tanzania, drawing on data from consolation claims submitted to WD (2012-2019), records from TAWA field stations (2016-2019), and published studies. The lack of a national database for recording HWC incidents means that this overview may be incomplete, and that spatial and temporal patterns may be biased by reporting effort. Trends must therefore be interpreted with caution.

Over the period 2012-2019, WD data on consolation payments made nationwide show 1,069 human deaths, 642 temporary and permanent human injuries, 792 livestock depreations, and 41,404 acres of crops damaged (Table 2.1).

Table 2.1: HWC incidents reported to WD from 2012 to 2019

Year	Human deaths	Permanent injuries	Temporary injuries	Livestock deaths	Crop damage (acres)
2012/13	69	23	38	46	1,518
2013/14	61	31	49	93	4,046
2014/15	59	20	41	107	6,786
2015/16	102	20	78	64	8,924
2016/17	132	30	54	130	4,567
2017/18	380	20	29	149	5,016
2018/19	266	60	149	203	10,547
TOTAL	1,069	204	438	792	41,404

An increase in the number of human deaths, human injuries, livestock deaths and acres of crops damaged is observed between 2012 and 2019 (Figure 2.4, 2.5).

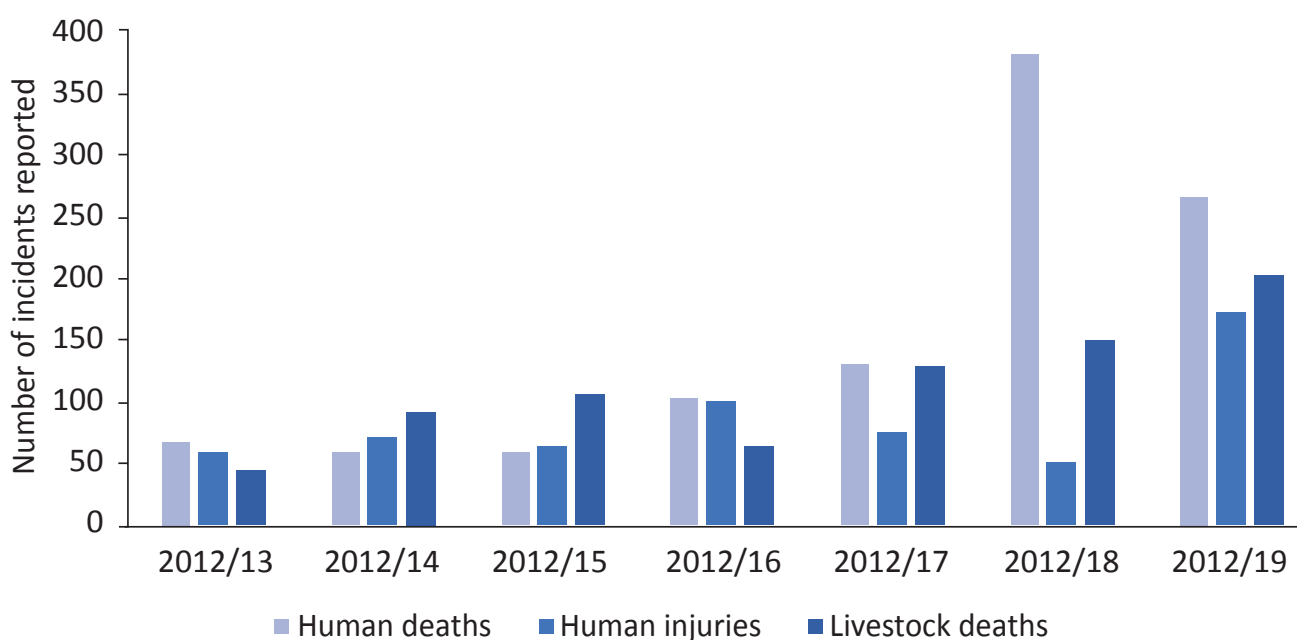


Figure 2.1 The number of human deaths, human injuries and livestock deaths reported to WD between 2012/13 and 2018/19

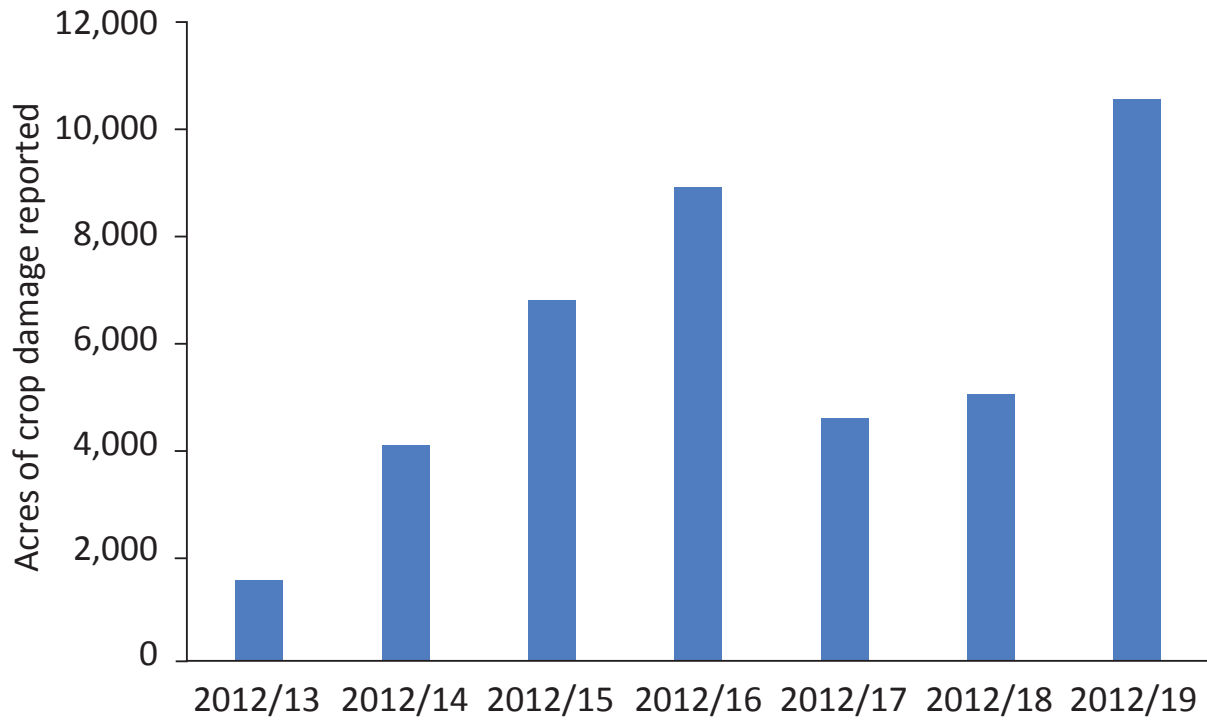


Figure 2.2 The number of acres of crop damage reported to WD between 2012/13 and 2018/19

Between 2016 and 2019, TAWA recorded 3,340 incidences of wildlife incursions from 91 Districts across the country (Figure 2.1; Figure 2.2)⁴⁵. TAWA defines wildlife incursions as any movement of wildlife onto village land reported to TAWA stations, regardless of whether wildlife caused any damage while on village land. Wildlife involved in these incidences included elephants, hippopotamus, crocodiles, hyenas, buffalos, lions, leopards and baboons. The ten districts which reported the most wildlife incursions are illustrated in Figure 2.3.

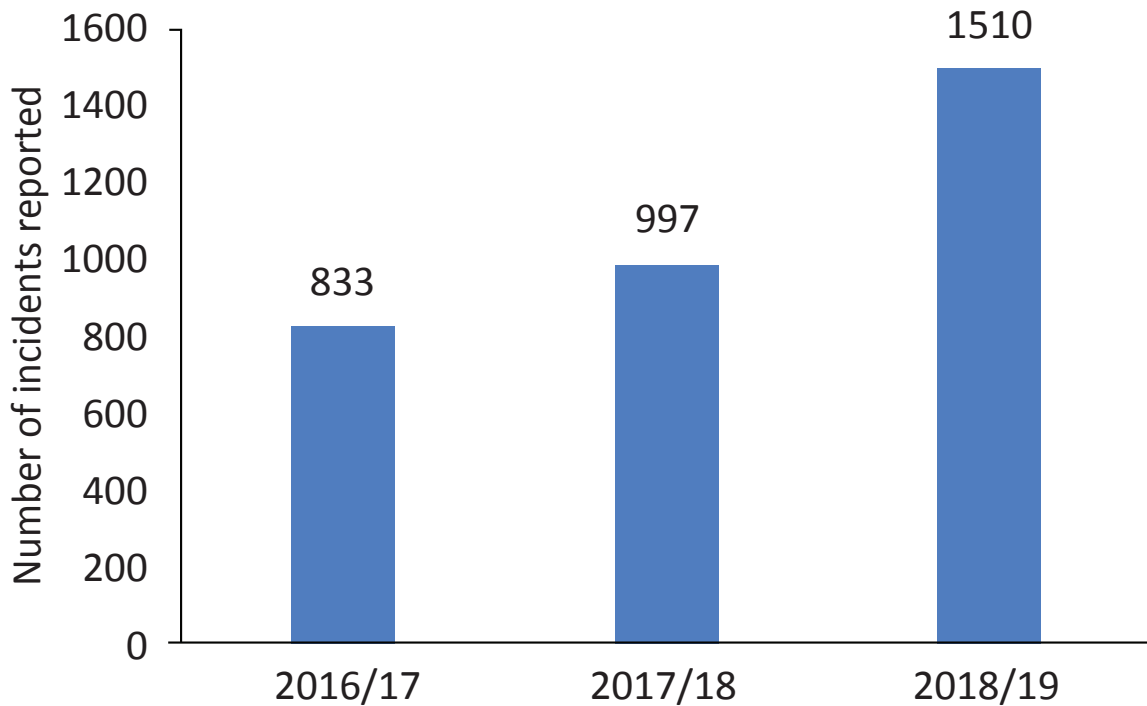


Figure 2.3. Wildlife incursions on village land reported to and attended by TAWA stations between 2016/17 and 2018/19⁴⁵

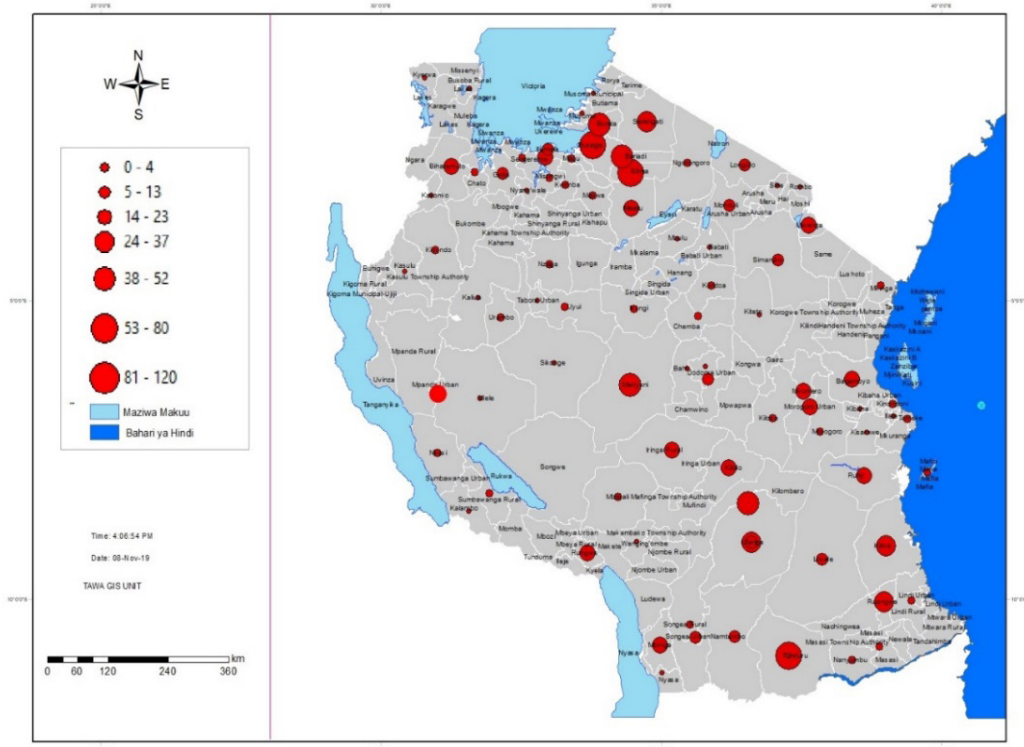


Figure 2.2 Map showing wildlife incursions onto village land reported to TAWA across 91 Districts for the period 2017/2018 to 2018/2019⁴⁵

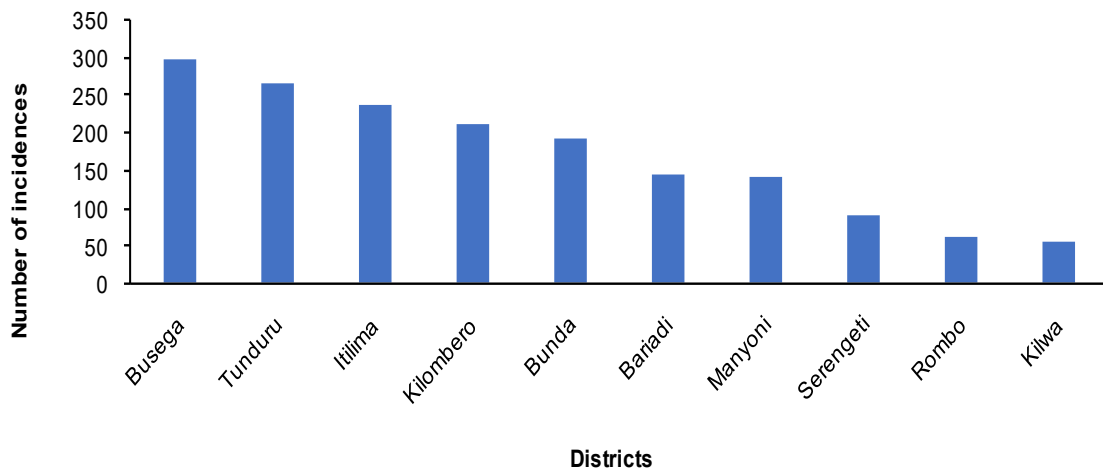


Figure 2.3 10 Districts with the highest number of wildlife incursions reported to and attended by TAWA stations in 2017/18 and 2018/19⁴⁵

The Government has taken multiple actions to address human-wildlife conflict. The Wildlife Conservation Act No. 5 of 2009 permits the Director of Wildlife to deploy authorised officers for the aim of controlling problem animals causing loss of human life and properties. Between July 2016 and June 2019, TAWA conducted a total of 29,590 patrol man-days in response to 3,340 incidences of HWC on village land. In addition, under the Dangerous Animals Damage Consolation Regulations, the Government has paid TZS 4.6 billion in consolation claims (Table 2.2) to citizens between 2015/16 and 2018/19.

Table 2.2: Sum of consolation payments to Tanzanian citizens affected by dangerous animals from 2015/16 to 2018/19

Year	Consolation Payment
2015/16	923,798,850
2016/17	1,401,356,600
2017/18	1,243,234,850
2018/19	1,102,165,000
Total	4,670,555,300

2.1 Large carnivores

Livestock depredation by carnivores, and its associated economic cost, is the most frequent and widespread form of carnivore impact. Between 2012/13 and 2018/19, 792 livestock depredations were recorded by WD (Table 2.1). However, disease is often a greater cause of livestock death in East Africa than carnivore depredation. For example, on the Maasai Steppe, cattle were 7 times more likely to die from disease than from a carnivore attack⁴⁶.

There is often spatial variation in which carnivore species are responsible for livestock depredations and the context in which they occur. On the Maasai Steppe, Simanjiro Plains and in Idodi-Pawaga, spotted hyena were responsible for most livestock depredations, followed by lions in Maasai steppe and Idodi-Pawaga^{46,47,48}; while in Tsavo East, Kenya, lions were responsible for the majority of depredations⁴⁹. Hyena attacks are more likely on small stock (goat, sheep, calves) and domestic dogs, with most depredation events occurring in bomas or at the household at night^{46,47}. Lions are more likely to attack cattle and donkeys than small stock^{46,47,48}. Lion attacks were most frequent on grazing livestock during the day on the Maasai Steppe, but more frequent on livestock in bomas at night in Idodi-Pawaga^{46,47}, highlighting the need for local data on risk factors.

Carnivores may also attack people resulting in injury or death. These attacks are primarily carried out by lions, followed by spotted hyenas. Leopard attacks on people are relatively rare, and cheetah attacks are extremely uncommon. In Idodi-Pawaga, lions were reported to cause 60% of attacks, spotted hyenas caused 30%, and leopards caused 10% of attacks⁴⁷. Most cases (60%) resulted in injuries, including all hyena and leopard attacks, but lion attacks were more likely to result in death⁴⁷. Attacks by lions increased in Tanzania between 1990 and 2005⁵⁰. Between 1990 and 2004, lions killed more than 563 Tanzanians and injured at least 308⁵⁰. More than 45% of all reported cases occurred in just six coastal districts in the southern half of the country, including Rufiji and Lindi⁵⁰. Spotted hyena attacks resulted in 14 deaths and 24 injuries between 2016 and 2018. Leopard attacks resulted in 8 injuries over the same period⁴⁵.

The potential for carnivores to harm people and their livelihoods, as well as inequitable distribution of benefits from carnivores between local communities and government and tour operators, can erode public support for carnivore conservation and increase pressure for lethal control^{51,52}. Persecution by people due to HCC is an important cause of carnivore population declines around the world^{53,54}. In the case of lions, hunts are also motivated by rite of passage traditions in Maasai and Barabaig culture⁴⁶. Several mass poisoning events have also occurred in the past few years, including adjacent to MBOMIPA WMA and Serengeti National Park. Approximately 73-77 lions are persecuted annually through PAC in high human-lion conflict regions of Tanzania⁵⁵. Records suggest 4-15 leopards are killed annually in problem-animal control⁵⁶.

A country-wide assessment of human-lion conflict was conducted for the period 2005 to 2009 through questionnaire surveys in 2010³. 46 District out of 56 Districts surveyed reported lion impacts, with livestock depredation being the most widespread (40 Districts). Livestock depredation was reported to be highest in central and northern Tanzania, where livestock abundance is high. 31 Districts reported human casualties to lions. Southern and central Tanzania reported the highest number of

human casualties, followed by northern and western Tanzania³. Similar assessments for other large carnivores could not be found.

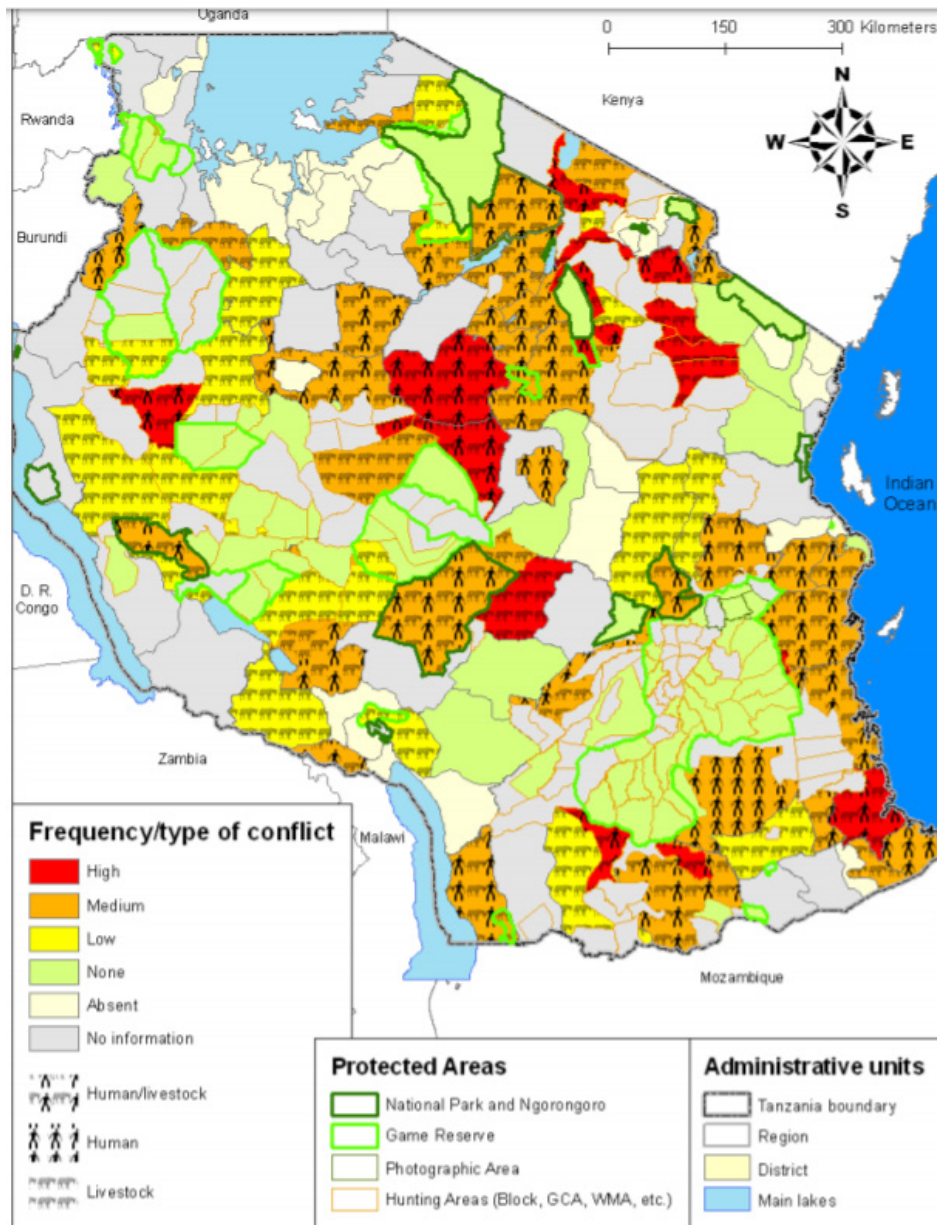


Figure 2.5 Distribution of lion impacts in Tanzania and their severity, as assessed in 2010³



Lion and spotted hyena mortality resulting from human-carnivore conflict. Credit: RCP

2.2 African elephant

Crop loss is the most frequent and widespread form of elephant impact. While elephants are often the most visible crop-using species, primates, rodents, and pigs cause greater agricultural losses at broader spatial scales¹⁵. Crop loss to elephants is often localized and unpredictable, frequently causing more loss per event than other crop-using species. Costs of elephant crop-use are therefore borne individually by a few people in a community, but crop loss to elephants at a national scale is usually insignificant¹⁵.

The risk of crop loss to elephants is greater adjacent to protected area boundaries, in or adjacent to elephant habitat, refuges, or dispersal areas⁵⁷, and in or adjacent to elephant corridors or local pathways to resources⁵⁸. In Hwange National Park, distance to refuge area was the most influential determinant in decreasing crop-raiding risk, with no damage occurring further than 4.4 km⁵⁸. In Laikipia, crop-raiding incidents occurred, on average, within 1.54 km of identified daytime elephant refuges⁵⁷. In areas with rain-fed agriculture, elephant crop use peaks during the period of crop maturation (late wet season). In areas with irrigation farming, crop-use can occur year-round, with no clear seasonal patterns⁵⁹.

Additional elephant impacts which are less frequent and more localized include damage to food stores and houses, damage to water supplies, and killing of livestock. Elephant presence also induces social opportunity costs, such as restrictions on movement, lack of sleep and exposure to diseases from farm guarding, and reduced school attendance. Elephant collisions with vehicles and trains also occur where rail and road infrastructure are constructed in elephant range without appropriate measures to ensure safe passage of elephants, for example, through underpasses.

One of the most serious impacts of elephants is human injury and death. Between 2017 and 2019, TAWA recorded 70 human deaths to elephants, and 16 injuries⁴⁵. In most cases, this is when people accidentally encounter elephants, especially at night and in the early morning, or when guarding their crops^{60,61}. In the Mara region of Kenya, men were at significantly greater risk than women, as they were more likely to be walking or engaging in social activities at night⁶⁰.

The real and perceived costs of elephants can result in the erosion of support for conserving elephants, as well political pressure for the legal and illegal killing of elephants, and tolerance of elephant poaching⁶².

No country-wide assessment of elephant impacts is available. However, a non-exhaustive list of known hotspots of crop damage include western Serengeti⁶³, Burunge WMA⁶⁴, Mkomazi National Park⁶⁵, Randilen WMA, Manyara ranch, Enduimet WMA^{66,67}, Karatu⁶⁸, Idodi-Pawaga⁶⁹, western Rungwa-Kizigo-Muhesi⁷⁰, villages adjacent to Mikumi National Park⁷¹, and the Kilombero valley⁷². The five Districts with the highest number of human deaths from elephants in 2017-2019 were Bariadi, Kilombero, Itilima, Manyoni, and Tunduru⁴⁵.

2.3 Crocodiles

Human injury and deaths from crocodile attacks are a serious concern¹⁹, as crocodiles probably cause more human deaths than any other wild animal in Africa⁷³. Mapping of 65 records of crocodile attacks in Tanzania for the period 2010-2020 (available from the CrocBite database, <http://www.crocodile-attack.info/>) shows that high-risk areas of crocodile attacks include Lake Victoria, Lake Tanganyika, Lake Rukwa, and the Rufiji, Ruvuma, Kilombero and Wami Rivers (Figure 1.6). Analysis of crocodile attacks from the CrocBite database suggests that most attacks (60%) occur while bathing, swimming or fishing, and that children and youth are particularly vulnerable to attacks. Collecting water accounted for 10% of attacks, and crossing rivers accounted for 8% of attacks.

Crocodiles also cause damage to fishing nets and fishing gear. Gill nets with small to medium mesh size frequently used by artisanal fishermen are particularly risky to damage¹⁹. Loss of fishing gear and catch foregone can impact heavily on livelihoods⁷⁴, contributing towards people's negative attitude to crocodiles. Crocodile attacks on livestock and domestic dogs are rare¹⁹.

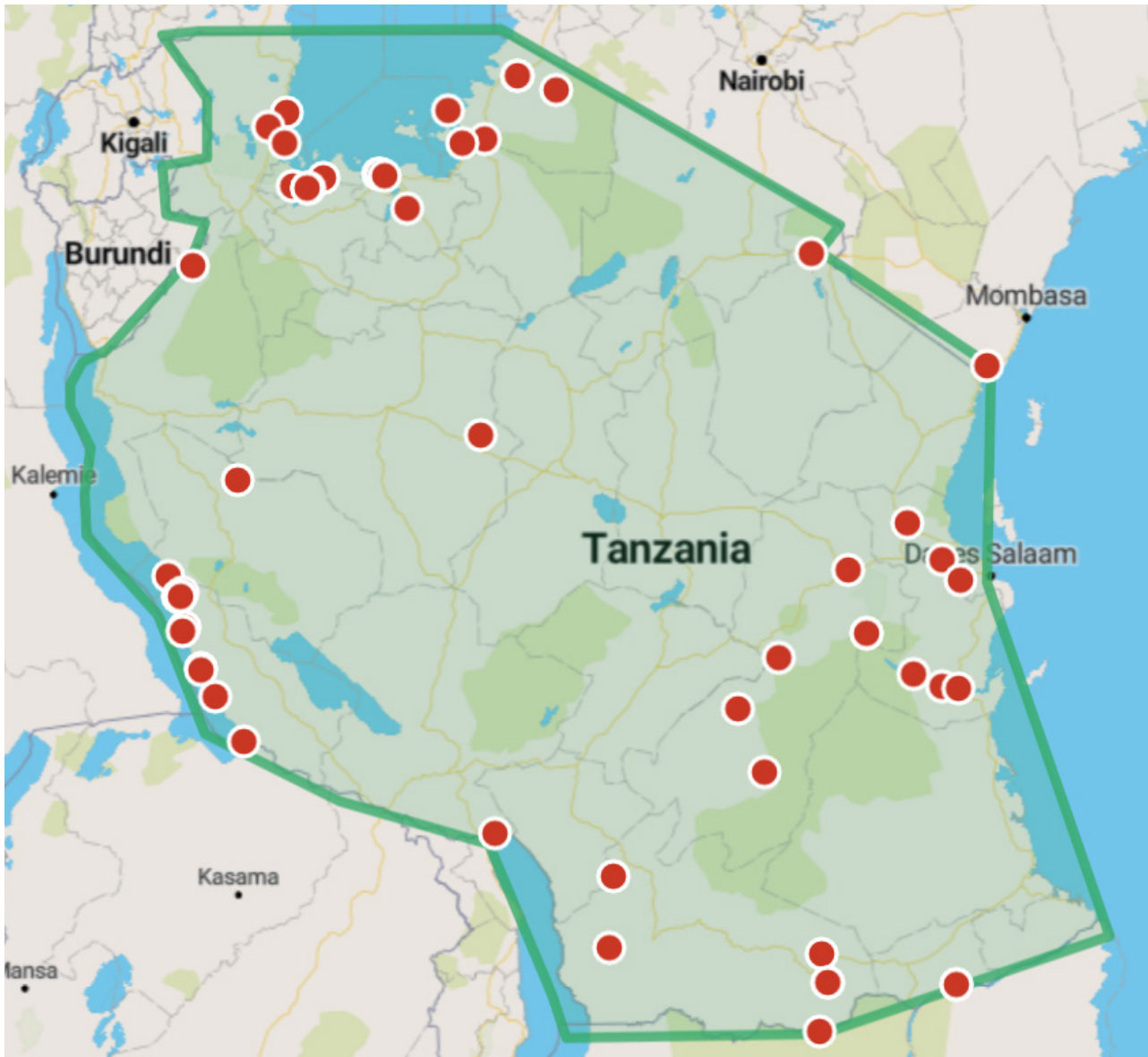


Figure 2.6 Location of 65 crocodile attacks on humans between 2010-2020. Source: CrocBITE database (<http://www.crocodile-attack.info/>)

2.4 Hippopotamus

Hippopotamus damage to crops is the most frequent impact, but it is localized and restricted to areas adjacent to wetlands and rivers¹⁰. Crop damage occurs most often in fields in close proximity to hippo river access points (where hippos exit and enter rivers⁷⁵), or within 500m of the lakeshore⁷⁶. Damage to fishing nets by hippos results in loss of property and catch foregone and can be locally common. Some fishing techniques are more vulnerable to hippo damage, especially seine or pull nets used along the shore⁷⁶. In Winam Gulf (Lake Victoria, Kenya), 80% of net damage incidents occurred at night, when fishers left nets out overnight, and fishing gears used in close proximity to lakeshore and in rivers were at greatest risk of hippo damage⁷⁶.

Human injury and deaths from hippo attacks are not commonplace and are usually the result of accidental encounters along lakeshores or in riverine areas¹⁰. Fishing techniques that require people to be in the water also increase the risk of hippo attack⁷⁶. In Kenya, human injury and mortality accounted for 3% of all hippo incidents⁷⁷. In Zambia, between 2002 to 2008, 19% of wildlife mortalities were caused by hippos⁷⁸. Livestock killing, property damage, and attacks to boats by hippos is rare^{76,78,79}.

Pressure for removal and lethal control of hippos in several African countries is high, and may in part be motivated by the incentive of meat⁷⁸. In Zambia, between 2002 and 2008, 1.6 hippos were killed for every human fatality⁷⁸. In Mozambique, between 2006-2008, 2.7 hippos were killed for every human fatality⁷⁹.

The last country-wide census of hippos was conducted by TAWIRI in 2001, and found that 80% of hippos were inside protected areas⁸. The largest concentrations of hippos were observed in Kilombero, Rufiji and Great Ruaha Rivers. Other important localities were the Katavi-Rukwa protected area complex, Ugalla and Malagarassi Rivers, and the Serengeti and Mara Rivers.

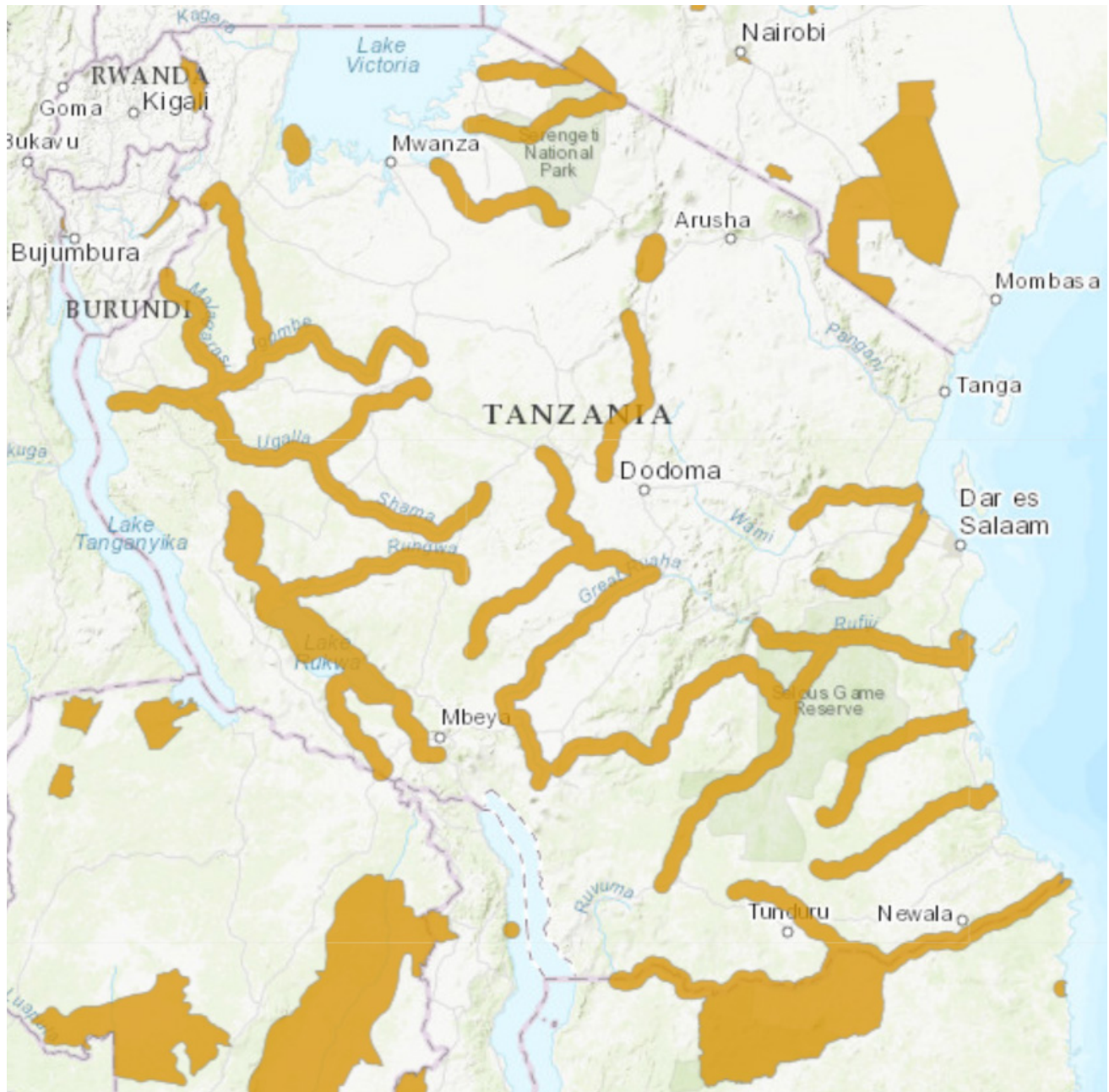


Figure 2.7 Distribution of hippos in Tanzania⁵

Chapter Three

Vision, Mission, Goal and Guiding Principles

3.1 Vision

“To enhance, foster, and sustain human-wildlife coexistence over the long-term throughout the country in ways that recognize the security and development needs of local communities and the value of biodiversity conservation to the nation, and promotes self-reliance and evidence-based short-term and long-term solutions.”

To achieve this, the Strategy provides a road map to empower and train local communities to manage human-wildlife conflicts using appropriate mitigation methods, enhance Government and civil society support to communities, install efficient nationwide monitoring to guide management, and build long-term coexistence through wise land use planning and education.

3.2 Mission

To create a framework for addressing human wildlife conflict efficiently and effectively, using evidence-based short- and long-term solutions, to meet the needs of both community welfare and biodiversity conservation.

3.3 Goal

To apply sustainable approaches in mitigating human wildlife conflicts and promoting human-wildlife co-existence.

3.4 Guiding Principles

- 1) HWC management should focus on empowering communities to initiate and manage mitigation and protection for themselves, and to increase their resilience to HWC.
- 2) HWC management should be supported by Government, NGOs and the private sector, working together with communities
- 3) Human-wildlife coexistence will be primarily enhanced in the long term by increasing participatory land use planning that meets the needs of communities while ensuring wise management of wildlife corridors and buffer zones
- 4) HWC management will also focus on increasing benefits to communities, improving livelihoods, and incentives for coexistence with wildlife.
- 5) HWC management should be a collaborative and consultative process, with information-sharing and exchange of lessons learned between actors.
- 6) Management of HWC should be guided by a sustainable approach, while acknowledging that more resources must be invested in HWC management.
- 7) This HWC strategy will identify approaches and key actions for the short-term and longer-term.
- 8) In the short-term, the lowest-cost mitigation strategies can be rolled out and resources should be concentrated in HWC hotspots.
- 9) HWC management should be sensitive to context. There is no ‘one-size fits all’ approach, and this strategy provides advice on how to consider key contextual factors in rolling out and scaling up HWC management.
- 10) Management of HWC should be informed by data on the distribution, trends, and drivers, and social dimensions of HWC, and evaluation of interventions. These subjects need more research and constant monitoring.

- 11) This HWC strategy acknowledges that there may be under-reporting of incidences and inconsistent monitoring effort, making it difficult to assess the current status of HWC. A database for improved monitoring of HWC is required.
- 12) The strategy considers the role of technology for HWC management.
- 13) In the first phase, the focus of HWC management will be on large carnivores, elephant, hippo, and crocodiles because these species are recognized as dangerous animals in the Wildlife Conservation (Dangerous Animals Damage Consolation) Regulations and are of conservation importance
- 14) The strategy recognizes the important role of education and awareness-raising programs for fostering tolerance of wildlife and human-wildlife coexistence for the long-term.



A Warrior for Wildlife recovers a cow lost at pasture. Credit: TPW/Felipe Rodriguez

Chapter Four

Strategy Approach and Development

4.1 Rationale for Diversity of Approaches

Human-wildlife coexistence is a complex challenge, with a range of drivers and causes, requiring a diversity of approaches to address different aspects of the challenge. This Strategy adopts the following approaches:

- Empowering communities to mitigate wildlife impacts (Strategic Objective 1)
- Protecting farmers and communities on the frontline through effective response to HWC incidents (Strategic Objective 2)
- Sustainable planning of land use at broad and finer scales and identifying compatible activities for the human-wildlife interface (Strategic Objective 3)
- Improving community livelihoods (Strategic Objective 4)
- Educating the whole Tanzanian population on the importance and best ways of coexisting with wildlife (Strategic Objective 5)
- Monitoring and research (Strategic Objectives 6 and 7)

None of these approaches will resolve human-wildlife conflict on its own. By committing to a holistic approach to building coexistence— while also recognising that these elements may evolve, and that new solutions may be conceived and added to the ‘toolbox’ in subsequent renewals of this Strategy, this document lays the groundwork for building and sustaining human-wildlife coexistence in Tanzania.

The key components of this Strategy are summarised in Figure 1.

4.2 Short-term and Long-term Solutions

Recognising that human-wildlife conflict is a serious and urgent challenge in Tanzania, this Strategy presents actions and targets for both the short- and long-term. The goal of the Strategy is to achieve and sustain human-wildlife coexistence over the long term, and this requires careful and strategic identification and implementation of solutions that are sustainable. At the same time, there is an urgent need to address and reduce impacts of HWC in the short term. To this end, the Strategy identifies actions that can have immediate positive impact, in 2020, especially on the security and livelihoods of citizens in the HWC hotspots.

Key short term actions include rapidly increasing capacity of communities to reduce conflicts using tested mitigation methods (SO1), and increasing the efficiency of early warning systems and the capacity of Rapid Response Teams to respond (SO2).

Key actions for impact in the long-term comprise improved Land Use Planning and secure wise management of wildlife corridors and buffer zones (SO3); establishment of an ambitious and ongoing national education program on HWC (SO5); increasing the benefits of communities from coexisting with wildlife (SO4); and expanded monitoring (SO6) and understanding (SO7) of HWC in Tanzania.

4.3 Development of the Strategy

- Initiation of the Strategy by the Director of Wildlife
- Formation of Inception Workshop Committee comprising members from Wildlife Division, TAWA and TAWIRI
- Appointment of Dr. Trevor Jones (STEP) to coordinate development of the Strategy together with designated colleagues from WD and TAWA
- Stakeholders Inception Workshop held in Mwanza from 8th-10th December, 2019, opened by Permanent Secretary of MNRT
- Questionnaires and other consultations conducted with multiple key stakeholders engaged in HWC throughout and outside Tanzania
- Review of relevant literature, reports and consultation questionnaires by core team
- Writing of Strategy by the core team
- Draft sections shared with key stakeholders for comments and feedback, further consultations conducted
- First draft of Strategy submitted to Director of Wildlife and written feedback provided by the following MNRT institutions: Wildlife Division, TAWA, TANAPA, NCAA, Mweka Training college, Pasiansi Wildlife Training Institute, Community Based Conservation Training Centre (CBCTC)
- Revisions made to Strategy
- Final draft of Strategy sent to Stakeholders for final review, July 2020
- Strategy Validation meeting held, 23rd July 2020
- Final comments incorporated and Strategy finalized by Editors
- Final Strategy submitted to MNRT, 7th August 2020
- Final Strategy reviewed and approved by Minister and Permanent Secretary of Natural Resources and Tourism, forwarded to printers
- Launch of the Strategy by the Ministry of Natural Resources and Tourism, 27th August 2020
- Strategy translated into Swahili
- Circulation of Strategy to the relevant agencies, District Authorities, Training Colleges, conservation organisations and other stakeholders for implementation

Chapter Five

Strategic Objectives

5.1 Strategic Objective 1: Community-Based Mitigation

A key goal of this Strategy is to empower communities across Tanzania to reduce the negative impacts on their livelihoods and wellbeing of coexisting with wildlife. A major way of achieving this will be to capacitate communities to implement the appropriate mitigation methods for each context to help reduce crop and livestock loss, threats to personal security, and other economic or social disruption.

The goal of mitigation methods is to reduce the severity of wildlife impact, rather than eliminate them entirely. Mitigation methods include preventative, passive methods such as beehive fences, improved livestock bomas, or crocodile exclusion enclosures. Active response methods are deployed reactively to reduce wildlife damage, such as crop protection toolkits. A detailed overview of community-based mitigation methods for large carnivores, elephants, hippos and crocodiles, including key conditions for success and other lessons learned, is provided in the **Strategy Supplement**.

Mitigation methods do not provide a “silver bullet”, nor is there a “one-size fits all” solution. Rather, a combination of tools and methods should be developed for each area which suit the local context. Planning and deployment of mitigation methods need to be informed by local data and understanding of local drivers of human-wildlife interactions, local risk factors, factors affecting adoption of mitigation methods, social and political dimensions of conflict, socio-economic constraints, environmental conditions, funding, access to materials and external support, and consideration of long-term sustainability and exit strategies. Community involvement is also a critical element of success for all techniques and scaling up of mitigation measures is most successful when it is community-driven and led.

As a short-term action of the Strategy, MNRT in collaboration with supporting partners will establish the first **HWC Mitigation Unit (HWCMU)**. The HWCMU will comprise a select team of 20 Rangers and Village Game Scouts trained in a suite of tested HWC mitigation measures and guidelines for safety around potentially dangerous wildlife. Training of the HWCMU will be supported by a HWCMU Coordination Committee comprised of representatives from WD, TAWIRI, and supporting partners. Following training, the HWCMU will be deployed to HWC hotspots to work with communities to implement mitigation methods. The Coordination Committee will assist the HWCMU with technical guidance on selection of priority hotspots and on mitigation plans tailored for each context. After establishment, the HWC Mitigation Unit will remain managed by and under the responsibility of MNRT.

Key to greater, widespread scaling up of community HWC mitigation capacity, will be to train members of each community in need, so that they can lead and train their fellow community members to proactively adopt effective mitigation methods. An **HWC National Training Course** will be developed by a coalition of in-country mitigation method experts. This process will begin in HWC hotspots where need is greatest, and subsequently expand to other communities around the country with lower level need.

Course trainees from each community, who will work together locally on practical mitigation projects for the village, will include:

- Two Village Game Scouts who are also members of the Village Environment Committee (VEC)
- District Game Officer (DGO)
- Local TAWA/TANAPA/NCAA/TFS officers, as appropriate to the local context

The training course will be taught at the National Ranger/VGS Colleges, and there will also be a field-based component of the training, where trainers will spend time at existing field sites with ongoing mitigation projects. Trainees’ field assignments will be tailored to the appropriate mitigation method

for their home village context. Following training, trainees will return home with the necessary knowledge and expertise to initiate and manage the correct mitigation method for their village together with their community. Trainees will also have been educated on and linked to funding opportunities for investment in mitigation capital needs specific to their communities.

Further essential details on the context, aims and modalities of these initiatives are provided in the **Strategy Supplement**.



Community-based mitigation methods: Beehive fences in Kilombero (Credit: STEP), solar lights in Idodi-Pawagwa (Credit: RCP), and production of chilli bombs (Credit: Oikos East Africa)

5.1.1 Suitability Analysis of Mitigation and Response Methods

This section provides a summary of key mitigation methods that are covered under this Strategy, including the contexts in which they are suitable, conditions for success and constraints. A more detailed suitability review of each of these methods is provided in Appendix 1. Each of these methods has been tested, with results published in peer-reviewed or grey literature.

Method	Target species	Purpose	Actors	Cost	Maintenance	Suitable contexts	Success factors	Constraints
Crop protection toolkit	Elephant	Response method to reduce crop loss	Communities, Village Crop Protection teams, HWC Response Units, HWC/MU	Low	Labour intensive guarding during peak crop-loss periods	Areas with a high density of inter-connected farms, with consistent, frequent elephant incursions during a relatively short and defined peak crop-loss period.	Established commitment to and experience in communal guarding; training; early communication of exit strategy; backup vehicle and ranger response unit.	Not suitable in areas with large isolated farms, or where crop damage is infrequent and unpredictable. Potential habituation by some elephants to toolkit elements.
Beehive fence	Elephant	Preventative method to reduce crop loss. Also generates income.	Communities, NGOs, HWC/MU	Medium	Year-round maintenance (once per week)	Areas with a hard boundary between PA and farmland with defined elephant trails, an environment suitable for beekeeping, and frequent, year-round crop damage.	Ground surveys and careful planning prior to fence installation; hive occupancy; established capacity for beekeeping and beehive fence management.	Not suitable in areas with shifting agriculture, very large farms or an extensive farmland-PA interface; lacking in suitable habitat for beekeeping. Farmer participation during harvesting period can be low. Several years of external support may be needed.
Chilli fence	Elephant	Preventative method to reduce crop loss. Also generates income.	Communities, NGOs, HWC/MU	Low	Frequent maintenance (up to every 3 days) during peak crop-loss periods	Areas with a hard boundary between PA and farmland, or between fenced and unfenced farms with clear elephant trails, with frequent crop damage.	Ground surveys and careful planning prior to installation; farmers commitment to application; established capacity; income-generation	Availability of engine oil, chilli, and local suitability for chilli-growing. Frequent application of chilli-oil mixture in high rainfall areas. Farmer dislike of working with chilli-oil mixture. To reduce habituation, fences can be removed following harvest.
Drones	Elephant	Response method to reduce crop loss	Communities, HWC Response Units, TAWIRI	High	Labour intensive guarding during peak crop-loss periods	Areas with intense crop damage and frequent elephant incursions into farmland, with defined peak conflict period.	Drone operators need to be well-trained, well-equipped, and mobile. A system for rapid reporting of elephant incursions must be in place.	Where crop damage is infrequent and unpredictable, drones may not be efficient and cost-effective due to high equipment, training, and running costs. Legislation and restrictions on drone use. Risk of habituation to drones by elephants.
Improved livestock bomas (living walls, wire bomas)	Large carnivores, especially lion, hyena, leopard	Preventative method to reduce livestock loss	Communities, NGOs, HWC/MU	Medium	Low maintenance, long-lasting	Areas where lion and hyena attacks on livestock at the household or boma are common. <i>Commiphora</i> species or other indigenous trees required for living walls.	Correct construction and installation. Boma owner investment in proper use and maintenance, good herding practices ensuring livestock are returned to the boma at night.	Where pastoralist households are truly semi-nomadic or move seasonally, they will not agree to build a permanent structure. Leopards can learn to jump over the fence and climb out carrying small-stock.

Method	Target species	Purpose	Actors	Cost	Maintenance	Suitable contexts	Success factors	Constraints
Active livestock guarding	Large carnivores	Preventative and response method to reduce livestock loss	Communities, NGOs, HWC/MU	Low	Labour intensive	Areas where large carnivore attacks on livestock out grazing are common.	Use of guard dogs is key. Presence of herder. Local understanding of risk factors for carnivore attacks.	Access to labour for herding; training, food and veterinary care for guard dogs. Dogs must be vaccinated to prevent disease transfer to humans and wildlife.
Crocodile exclusion enclosures (CEEs)	Crocodile	Preventative method to reduce crocodile attacks on humans	Communities, NGOs, HWC/MU, engineers, LGAs	High	High, regular maintenance required to ensure integrity of structure	CEEs work best where water levels are relatively consistent, or attacks are highly seasonal and CEEs can be built for safe access under those conditions.	Identify local needs and ensure fair access. Defined responsibility for construction and maintenance is essential.	CEEs are ineffective where water levels change a lot, where there's frequent flood damage, repairs are not reported or made. They are usually for people, not livestock.
Alternative domestic water supplies	Primarily crocodile and hippo, also large carnivores and elephants	Preventative method to reduce crocodile and hippo attacks on humans, may also reduce risk of elephant and lion attacks.	Communities, NGOs, HWC/MU, engineers, LGAs	High	Medium	Areas without piped water supply for domestic use, where access to rivers or lakes exposes people to a high risk of attacks from crocodiles and other wildlife.	Identify local needs and ensure regular supply and fair access. In areas with elephants, stone walls can be used to protect water sources against elephant damage. Defined responsibility for maintenance.	Water from safe water points may be used for drinking and domestic use, but people may still go to rivers/lakes to bathe, swim or fish.
Bridges for crossing rivers	Crocodile and hippo	Preventative method to reduce crocodile and hippo attacks on humans while crossing water.	Communities, NGOs, HWC/MU, engineers, LGAs	Medium to high	Low	Areas where a high proportion of crocodile and hippo attacks occur at water crossing points.	Identify local needs. Defined responsibility for construction and maintenance.	Bridges will provide safety while crossing rivers, but people may still enter rivers to bathe, swim or fish.
Watchtowers or improved guarding huts	Elephants, large carnivores	Early warning method also intended to reduce risk of elephant and lion attack on farmers guarding fields	Communities, NGOs, HWC/MU	Low	Low	Areas with a high density of inter-connected farms, with consistent, frequent elephant or bush pig incursions, or where farmers guarding fields are at high risk of lion attacks.	Established commitment to and experience in communal guarding. Towers must be built securely. Huts must be built with mud or mud-brick walls and have a roof to provide protection from lions.	Watchtowers do not prevent wildlife crop damage. Rather, they provide farmers with a safe station for crop guarding and when sleeping in fields.
Education about safety guidelines and safe behaviours	Crocodile, hippo, large carnivores, elephants	Preventative method to reduce human injuries and deaths to wildlife	Communities, NGOs, HWC/MU, HWC Response Units	Low	Education and awareness-raising should be ongoing, not a one-off.	Useful in many contexts	Guidelines should be informed by local knowledge and analysis of local risk factors. Well-designed materials. Effective and respectful delivery.	Increased awareness about risky activities or behaviour may not necessarily reduce people's engagement in those activities (e.g. crop guarding); barriers to behaviour change must be identified and addressed.

Method	Target species	Purpose	Actors	Cost	Maintenance	Suitable contexts	Success factors	Constraints
Translocation	Crocodile, hippo, large carnivores, elephants	Capture and relocation of animal from 'problem area' to more suitable area. The goal of translocation is to reduce the problems caused by wildlife, and secondly, to save the animals responsible, however, translocation has low success as a conflict management tool.	TAWA, TANAPA, NCAA, TAWIRI	High	Long-term monitoring of translocated animals, e.g. through collaring or tagging for individual identification, must be conducted.	Translocation as an HWC management tool is a last resort method, as it has a low success record and can increase mortality risk for the translocated animal. A protocol should be developed to identify the limited qualifying conditions under which relocation should be considered, suitable release sites should be identified nationally, and a standard procedure for relocation and post-release monitoring must be developed.	A secure and suitable release site is an essential requirement, sufficiently far away from the capture site, with consideration of food availability, local safety concerns, territorial issues, and the impact of translocation at the release site. See Supplement for more detail. Translocation requires highly trained personnel, vehicles/boats/helicopter, traps, and drugs to calm and immobilise the animals.	The success rate of translocation is low (Holland et al. 2018; TAWIRI, unpublished data). Translocated animals often 1) return to their capture site or otherwise move away from their release site (observed for elephant, leopard, lion and crocodile) 2) have reduced survival, and 3) resume their 'conflict' behaviour at the release site (review in Linnell et al. 1997), which has the effect of simply moving the problem elsewhere. For instance, 12 habitual fence-breaking and crop-using elephant bulls were translocated from Laikipia to Meru National Park in Kenya. These bulls continued their fence-breaking behaviour at the release site, and other elephants acquired the behaviour from them, thus introducing fence-breaking to a population where it previously did not occur (Evans & Adams 2018). Translocation, by inducing stress and disrupting social ties at capture and release sites, can cause abnormal behaviour, as observed for elephants (Fernando et al. 2017).

Table 5.1 Community-Based Mitigation

Target	Activities	Actors	Timeline	Indicators
5.1.1 HWC Mitigation Unit (HWCMU) and HWCMU Coordination Committee established and communities in first 10 Hotspot Villages trained in implementing and managing appropriate mitigation methods within twelve months	5.1.1.1 Develop Terms of Reference and establish HWCMU Coordination Committee	Wildlife Division TAWIRI NGOs Donor	2020	HWCMU Coordination Committee established
	5.1.1.2 Develop training program for HWCMU on mitigation methods and safety guidelines, and identify the priority Hotspot Villages for community-led mitigation	HWCMU Coordination Committee	2020	Training program developed, and priority Hotspot Villages identified
	5.1.1.3 Recruit 20 select HWCMU members (Rangers and VGS)	HWCMU Coordination Committee	2020	20 HWCMU members (Rangers and VGS) recruited
	5.1.1.4 Train two teams of 10 HWCMU members at field sites in safety guidelines and practical mitigation methods including feasibility assessment, community engagement, and mitigation implementation and management	Wildlife Division NGOs	2020	Two teams of 10 HWCMU members trained in safety guidelines and practical mitigation methods implementation and management
	5.1.1.5 HWCMU conducts assessments and submits proposals for roll-out of mitigation methods in 10 priority communities to HWCMU Coordination Committee for review	HWCMU and Coordination Committee	2020	10 proposals submitted and reviewed
	5.1.1.6 HWCMU train and help 10 priority communities to implement mitigation methods in first year	HWCMU	2020-21	10 priority communities implementing mitigation methods by mid-2021
5.1.2 HWCMU train and help 50 hotspot communities in implementing and managing appropriate mitigation methods over the Strategy period	5.1.2.1 HWCMU train and help 50 priority communities to implement mitigation methods by end of Strategy period	HWCMU	2021-2024	50 priority communities implementing mitigation methods by end of 2024
	5.1.2.2 HWCMU Coordination Committee meets every three months to review progress of HWCMU and select next hotspot villages for training and interventions; coordinated with plans of Coexistence LUP Committee (SO3)	HWCMU Coordination Committee	2021-2024	Minutes of HWCMU Coordination Committee meetings

Target	Activities	Actors	Timeline	Indicators
5.1.2 HWC National Training Course developed and established in Training Colleges by end of 2020	5.1.2.1 Develop 3-month National HWC Training course modules and materials	HWCMU Coordination Committee Ministry of Education TAWIRI NGOs	2020	HWC National Training course and materials developed
	5.1.2.2 Train teachers at Colleges to deliver Course	HWCMU Coordination Committee Ministry of Education TAWIRI NGOs	2020	Teachers trained and Course established and ready for delivery at Colleges and field sites
5.1.3 400 Village Game Scouts from 200 selected communities, 60 District Game Officers and 200 Rangers trained in the HWC National Course	5.1.3.1 Train the following minimum numbers of people per year to complete the National HWC Training Course at the Training Colleges and field sites: 100 VGS from 50 communities; 15 DGOs; 50 Rangers	Pasiansi Wildlife Training Institute Community Based Conservation Training Centre (CBCTC) Village Game Scouts DGOs TANAPA TAWA NCAA TFS NGOs	2021-2024	Minimum quotas of trainees qualified from the 3-month course and implementing mitigation methods in their communities

5.2 Strategic Objective 2: HWC Response

This Strategy aims primarily to empower and enable communities to manage human-wildlife conflicts, in the short and long term. However, it remains the commitment and responsibility of Government to coordinate and support protection of citizens against harm from potentially dangerous wildlife. Moreover, this is usually work that is appropriate for trained and armed rangers, not for unarmed individuals.

Response methodologies, unlike preventative measures, generally do not have a deterrent effect and are thus unlikely to reduce HWC incidences on village land. Hence the primary function of HWC response is to provide assistance to communities for managing present or imminent HWC incidents, and response methods must be used alongside preventative mitigation measures and other key actions outlined in this Strategy.

In recognition of the increased challenge of HWC, a network of specific **HWC Response Teams** will be established to respond to human-wildlife conflict incidents. HWC Response Teams will be **coordinated** using Tanzania's existing command structure for intelligence-led anti-poaching, which is coordinated by the Assistant Director Anti-poaching (AD-AP) under the Ministry of Natural Resources and Tourism. In each of the country's nine Ecological Zones, the In-charge zonal commander leads the members of all groups who can be active in that zone in HWC response, namely TAWA, TANAPA, NCAA and TFS, working where appropriate with VGS, NGOs, and, in the case of some hotspots, VEOs and villagers. The HWC Response Teams will be selected from existing personnel operating under this structure.

As a first step, a **HWC Response Decision Framework** will be developed, in the form of a manual. This framework will outline which types of HWC incidents will be responded to, and how requests for assistance received through hotlines will be prioritized in a fair and transparent manner. The framework will also outline how different response methodologies should be deployed by response teams, and identify the narrow qualifying circumstances under which the highly invasive and costly methods of translocation and lethal control may be applied.

HWC Response Teams will need training in use of response methodologies, the decision framework for deploying response methodologies, animal behaviour, personal safety, first aid, and conflict resolution. Therefore, on a rotating basis nationally, HWC Response Team members will attend the **National HWC Training Course** (SO1). Exchanges with local organizations in specific response methodologies and early warning systems are also advised. Response Teams will also be trained to collect data on the incidents to which they respond, actions taken, and the outcome of responses, for input into the **National HWC Database** (SO6). This data collection is also an important part of oversight for response teams, such that supervisors can verify their activities and reported outcomes.

The main duties of the HWC Response Teams are to assist communities with specialist help in dangerous situations. A detailed review of HWC response methodologies for each focal species is found in the Strategy Supplement (5.2.4, Appendix 3).

For HWC Response Teams to operate effectively, it is vital that early warning and clear communications systems are put in place. Free zonal **HWC Hotlines** will be established to encourage people to report immediately on potential conflict situations. Each zonal hotline will go directly to a Coordinator based at the office of the Zonal Commander, so that they can convey the information to the closest response team for immediate action. Hotlines have to be manned and response teams have to be ready *24 hours a day*. It is unlikely that rapid response teams will be able to respond to every call they receive. Hence, it will be *critical* to manage community expectations and to ensure a transparent and fair process for deciding which calls will be responded to, and in what order. Which HWC incidents qualify for rapid response, and the decision process for responding to calls, should be clearly communicated to communities from the very beginning and stated in all materials advertising the hotline.

At the village level, watchtowers and patrolling by community members can enhance early detection of wildlife entering village land. In addition, collaring of wildlife can be used in combination with geofence alerts to monitor wildlife movements into village land and to help deploy HWC response teams.

Please refer to the **Strategy Supplement** for more information on the vision, rationale, content and implementation of this Strategic Objective.

Table 5.2 HWC Response

Target	Activities	Actors	Timeline	Indicators
5.2.1 HWC Response Command and Oversight Structure established	5.2.1.1 Revise Zonal Operating Structures to formalize HWC Response Command Structure	MNRT, AD-AP	2020	HWC Response Teams formalized following existing paramilitary command structure
	5.2.1.2 Assessment of HWC situation analysis, training and resource gaps, and response strategy for each Zone	Zonal In-charge of TANAPA, TAWA, NCAA, TFS	2020	Assessment completed
	5.2.1.3 Equip each zone with necessary resources, supplies and equipment	MNRT Donors	2020-24	Increase in resources and capacity of Response Teams
	5.2.1.4 Monitoring and record-keeping of all requests and deployment	MNRT Response Teams	2020-21	Annual reports of Zonal Commanders
5.2.2 HWC Response Decision Framework established and SOPs completed	5.2.2.1 Write Draft HWC Response Decision Framework	MNRT NGO partners, including animal behaviour experts	2020	HWC Response Decision Framework drafted
	5.2.2.2 Share with and receive feedback from key experts and stakeholders	MNRT, NGOs and other practitioners	2020	HWC Response Decision Framework shared with stakeholders
	5.2.2.3 Finalize HWC Response Decision Framework and incorporate into HWC Response Teams SOPs	MNRT	2020	Standard Operating Procedures of Response Teams completed including Decision Framework
	5.2.2.4 Disseminate HWC SOPs to all Zonal Command Structures and provide training	MNRT, NGOs and other practitioners	By end of 2020	All Zonal Commanders and HWC Response Teams following SOPs
	5.2.2.5 Review and refine HWC Response Decision Framework	MNRT, NGOs and other practitioners	2022	Review completed

Target	Activities	Actors	Timeline	Indicators
5.2.3 HWC Response Teams trained	5.2.3.1 Develop tailored HWC response module in national HWC Training Course, including use of response methodologies, HWC Response Decision Framework, animal behaviour, personal safety, first aid, and conflict resolution	MNRT, NGOs and other practitioners	2020	Module ready for delivery at Training Colleges
	5.2.3.2 Train all zonal HWC Response Team members at Training Colleges on rotational basis	Pasiansi Wildlife Training Institute Community Based Conservation Training Centre (CBCTC) Response Teams	2021-2023	Number of Response Team members trained
	5.2.3.3 Train all HWC Response Units in data collection on actions taken and their outcome	Pasiansi Wildlife Training Institute Community Based Conservation Training Centre (CBCTC) Response Teams MNRT, NGOs and other practitioners	2021-2023	Number of Response Team members trained

Target	Activities	Actors	Timeline	Indicators
5.2.4 Establish reporting and early warning systems	5.2.4.1 Develop plan for establishment and management of zonal hotlines early warning systems in collaboration with local stakeholders	MNRT Zonal command Telecom Companies TCRA NGOs	2020	Plan developed
	5.2.4.2 Activate Free HWC Hotlines	MNRT Zonal command Telecom Companies TCRA	2020	Hotlines active Number of reports on hotlines and resulting responses
	5.2.4.3 Advertise hotline in conflict hotspots	Response Teams Donors	2020	Number of villages with posters Number of local radio advertisements
	5.2.4.4 Advertise hotline in all Districts with HWC incidents	Response Teams Donors	2021	Number of villages with posters Number of local radio advertisements
	5.2.4.5 Revise hotline advertisements to include reporting on illegal activity	MNRT Zonal command	2023	Number of villages with revised posters Number of new local radio advertisements
5.2.5 Deployment of HWC Response Teams	5.2.5.1 Deploy HWC Response Teams in conflict hotspots	MNRT Zonal command Response Teams Donors	2020	Responses and outcomes as reported in annual Zonal reports
	5.2.5.2 Deploy HWC Response Teams in all Districts with HWC incidents	MNRT Zonal command Response Teams Donors	2021-22	Responses and outcomes as reported in annual Zonal reports
	5.2.5.3 Ongoing data collection by HWC Response Teams	MNRT Zonal command Response Teams Donors	2020-2024	Data points submitted to National HWC Database

5.3 Strategic Objective 3: Managing the Human-Wildlife Interface

The human-wildlife interface can be defined as those areas where people are living and/or carry out their livelihood activities alongside wildlife. In the context of the coexistence challenges addressed in this Strategy, these are areas where people are living and working close to areas that are managed for the conservation of wildlife that can negatively impact the security or livelihoods of people, and the conservation of wildlife and ecosystems. In the short term, these impacts can be mitigated, as discussed in SO1. However, in the medium to long term, the most efficient and cost-effective way of minimising these impacts is through wise management of the human-wildlife interface.

HWC often arises because of uninformed and avoidable land use choices, where a proper participatory land use planning process has not been undertaken or has not been implemented and enforced. For example, building or farming in a wildlife corridor inevitably increases human-wildlife interactions and conflict. Tanzania still has enough land to enable all required farming, grazing, building and other community activities in areas away from the human-wildlife interface, though this requires careful and participatory **Land Use Planning (LUP)** and management. In the long term, this approach will significantly reduce the need and costs of implementing conflict mitigation projects (SO1), HWC response (SO2), and consolation payments.

LUP can also have a rapid positive impact by focusing first on those hotspots with the greatest levels of conflict, including re-shaping of current LUPs where they are not fit for purpose and can be improved or revised to enhance coexistence. This Strategy therefore recommends a review of LUPs in all conflict hotspots around the country to evaluate whether they best serve national coexistence goals, or can be improved, in ways that align with other sectoral interests for sustainability. A cross-sectoral **Coexistence LUP Committee**, chaired by the NLUPC, will be formed. The Committee should first develop the Guidelines on best planning practice required to carry out these spatial assessments, before proceeding with the review. Participatory LUP processes for villages identified as HWC hotspots will serve to reduce conflicts over the short and long term.

Wildlife corridors are another essential tool for enhancing human-wildlife coexistence over the long term. Complex land tenure arrangements and lack of management of wildlife corridors are some of the key drivers of human-wildlife conflicts. Unregulated or poorly planned development in wildlife corridors inevitably leads to increased crop losses, livestock losses, endangerment of human lives, and other economic and social disruption. Species such as elephants have knowledge of migratory routes that are passed down from generation to generation, and continue to attempt to move along these paths even when they are blocked by farmland, settlements or infrastructure, creating conflict hotspots.

Tanzania is a conservation leader in Africa in its recognition of the importance and benefits of wildlife corridors for national development and natural resource management. In March 2018, the Minister for Natural Resources and Tourism put in to practice a provision in the Wildlife Conservation Act No. 5, 2009 by signing the new regulations, Wildlife Conservation (Wildlife Corridors, Dispersal Areas, Buffer Zones, Migratory Routes), 2018. As called for in the Regulations, a National Priority Corridor Action Plan (NPCAP) has identified 50 corridors for restoration and protection assessed on several criteria which are both ecological and socioeconomic, including the potential for corridor management to reduce HWC.

Corridors vary greatly in many factors including size, type, and the land use mosaic which they cross, thus, a flexible approach to restoring and managing corridors is essential. However, in all cases, Participatory Land Use Planning is the primary tool for developing a network of corridors to enhance human-wildlife coexistence across the country.

Buffer zones are also essential for reducing human-wildlife conflict and improvement of human livelihoods^{63,75,80,81}. The Tanzania Wildlife Conservation Act No. 5 of 2009, Section 74, states that "A human activity, settlement or any other development that will adversely affect wildlife shall not be permitted within five hundred meters from the wildlife protected area borderline without the permission of the Director". However, where communities are not involved in the decision-making on land use in buffer zones, or where the permitted land uses are not clear or not enforced, the buffer

zone is unlikely to function effectively. Once again, Participatory Land Use Planning is the essential tool in successful management of buffer zones to manage HWC.

Finally, over the long term, improvement of farming practices outside of wildlife areas which lead to land use efficiency, higher yield, and maximised food security, will logically reduce the need of farmers to use areas in the human-wildlife interface where conflict between people and wildlife is highest. Therefore, as part of the road map towards coexistence, this Strategy supports steps towards making **improved agricultural practices** available to farmers across the country.

Please refer to the **Strategy Supplement** for more information on the vision, rationale, content and implementation of this Strategic Objective.



Elephant bulls in farmland in the Kilombero Valley. Credit: STEP.

Table 5.3 Managing the Human-Wildlife Interface

Target	Activities	Actors	Timeline	Indicators
5.3.1 Participatory Land Use Plans completed and implemented to Stage 6 in 20 HWC Hotspots	5.3.1.1 Form Coexistence LUP Committee	NLUPC to identify members and Chair the Committee	2020	Committee formed and first meeting held
	5.3.1.2 Develop Guidelines for monitoring and evaluating LUPs in conflict areas	Coexistence LUP Committee	2020	Guidelines developed
	5.3.1.2 Review Land Use Plans of all HWC Hotspots, identify gaps and inadequate plans	Coexistence LUP Committee	2020	Evaluation of Hotspot LUPs completed
	5.3.1.4 Release plan for Priority Coexistence LUPs with Budget and convene Fundraising and Partnerships Workshop	Coexistence LUP Committee	2020-2021	Workshop completed and partners and funding in place for Hotspot LUPs
	5.3.1.5 Phase 1: Undertake participatory LUPs and detailed Management Plans across first 10 priority HWC Hotspots	NLUPC with identified site-specific partners	2021-2023	10 LUPs implemented to Stage 6

Target	Activities	Actors	Timeline	Indicators
	5.3.1.6 Phase 2: Undertake participatory LUPs across next 10 priority HWC Hotspots	NLUPC with identified site-specific partners	2023-2024	10 LUPs implemented to Stage 6
	5.3.1.7 Enable Village Governments to enforce village by-laws by formulating strong coordination between VG and local Govt, with capacity building to VC, VLUM, VLC	NLUPC Local Govt Village Councils	2020-2024	20 LUPs lead to implementation of Village By-Laws
	5.3.1.8 Undertake regular monitoring and evaluation of implementation of participatory LUPs across priority HWC Hotspot areas	NLUPC, respective District and specific partners	2021-2024	Number of villages Complies with LUPs, availability of village By-laws at village level
5.3.2 5 priority wildlife corridors restored and protected in HWC Hotspots	5.3.2.1 Top 10 priority corridors identified and ranked	National Priority Corridor Action Plan: MNRT, USAID, multiple stakeholders	2020	NPCAP published with ranking of corridors
	5.3.2.2 Form Land Restoration Committee	NLUPC to identify members and Chair of the Committee	2020	Restoration Committee formed
	5.3.2.3 Planning Workshop convened to determine corridor-specific actors and funding	MNRT (lead) Ministry of Lands NLUPC Donors NGOs Private sector	2020	Workshop completed and plans with partners and funding in place for corridor restorations
	5.3.2.4 Minimum 5 priority corridors demarcated, mapped, restored and/or protected under long-term community-Government co-management	NLUPC MNRT District Authorities NGOs Donors Private sector	2021-2024	Number of Land Restoration orders served, Number of Wildlife Corridors protected under long-term sustainable management, Area of land for corridors restored, Number of Persons prevented from causing harm to the land, Amount of compensation paid and amount of levy charged/paid, Number of persons who have taken action

Target	Activities	Actors	Timeline	Indicators
5.3.3 Buffer Zones under clear demarcation and management in all HWC Hotspots	5.3.3.1 Establish and maintain all legally authorised buffer zones along boundaries of PAs through consensus process with communities	Coexistence LUP Committee NLUPC TANAPA NCAA TAWA TFS	2020-21	Number of Buffer zones identified
	5.3.3.2 Formulate compatible land use in the buffer zones identified and prepare management plans and natural resource assessment	Coexistence LUP Committee NLUPC, respective District and specific partners	2021-2023	Respected use in the buffer zone and compatible uses implemented
	5.3.3.3 Awareness creation to the community on the use of buffer zone and creation of various business models	Coexistence LUP Committee NLUPC, TANAPA, TAWA, other partners	2021-2023	Number of communities educated
5.3.4 Make improved agricultural practices available to farmers across the country in an effort to increase efficiency on cultivated land and optimize cultivation to maximize food security and land use efficiency.	5.3.4.1 Train Agricultural Extension Officers on best practices for row spacing and plant spacing.	Ministry of Agriculture	2020	Number of Agricultural Extension Officers Trained Number of Agricultural Extension Officers scoring above 90% on knowledge retention exams Number of Ag. Ex. Officers that pass a Training of Trainer evaluation
	5.3.4.2 Involve Agricultural Extension Officers (at all levels) in Land Use Planning	Ministry of Agriculture, NLUPC, Coexistence LUP Task Force	2020	Percentage of Land Use Plans to which Agricultural Extension Officers contribute
	5.3.4.3 Use model farmers who plant outside of buffer zones and follow high efficiency agricultural practices	Agricultural Extension Officers	2020-2021	Number of model farmers identified Number of farmers who visit model farms
	5.3.4.4 Work to expand access to high quality inputs: including fertilizer through the Bulk Procurement System (BPS) and hybrid seed to marginal areas. Work to support funding gaps through micro-credit or subsidy programs.	Ministry of Agriculture, Ministry of Finance	2020-2023	Number of districts/villages that have BPS-fertilizer Number of villages with at least 2 suppliers of improved seed Number of farmers in hot spots with access to microcredit for agriculture
	5.3.4.5 Explore corporate partnerships for guaranteed market access or outgrower programs	Ministry of Agriculture	2023-2024	
	5.3.4.6 Explore 'pay for best practices' programs that incentivize sustainable agriculture (REDD)	Ministry of Agriculture	2023-2024	



Tanzania's first elephant underpass under construction, July 2020, Mang'ula. Credit: STEP

5.4 Strategic Objective 4: Benefits to Communities of Human-Wildlife Coexistence

Increasing the benefits that people perceive from wildlife is critical to achieving human-wildlife coexistence⁸². There can be significant benefits to communities of coexisting with wildlife, even though they are not felt in the short-term by many communities while they are experiencing disruption. An important goal of this Strategy is to increase the benefits of coexistence, and the recognition of these benefits among communities.

Reduction of wildlife impacts through mitigation (SO1) and response (SO2) will improve wellbeing and household income, by reducing the economic losses of crops and livestock, and human injuries and deaths. Some mitigation methods recommended by the Strategy can generate additional revenue streams, for example, through sale of honey and chilli. Planting of alternative cash crops which are less preferred by elephants can also provide alternative income. The income-generating potential for these methods depends on the ecological suitability of an area, the amount of surplus crop produced, and market access and value. Government and partners will support farmers with conducting feasibility studies, and with capacity-building for growing and marketing these products.

In addition to reducing the direct impacts of HWC through mitigation measures, this Strategy recommends strengthening **household resilience** to HWC impacts. Household resilience can be defined as the ability to prepare and anticipate; absorb and recover; and adapt and transform to risks and changes⁸³. Research should be conducted to understand baseline household resilience to HWC impacts in Tanzania, and to identify the best options for increasing household resilience to HWC impacts. Measures for increasing household resilience should be piloted and evaluated at a local level, and their feasibility for scaling up assessed before considering wider implementation. Research from other countries suggests some avenues for strengthening household resilience that should be trialled⁸⁴. Households may be better able to cope with and recover from HWC impacts if they have an alternative income source and if they are able to respond to mitigate the impact, such as by replanting farms, replacing stock, purchasing food, repairing nets, or other property. Household preparedness and adaptation to HWC may be improved with greater access to information and strategies to reduce HWC risk, as well as greater capacity and resources to invest in suitable mitigation measures. Increasing access to funds, loans or other services to help households prepare for, adapt to and recover from HWC impacts may help to build resilience. Income diversification is also important, with a focus on supplementary income-generating activities that are not subject to HWC impacts. Microfinance or entrepreneurship schemes could also be explored to help diversify incomes, and to provide training in financial skills and saving money.

The Government and partners will support **community-led tourism initiatives** in coexistence landscapes and community Wildlife Management Areas or concessions to provide another avenue for income from living with wildlife. Community-led tours about living with wildlife provide income from paying visitors as well as an opportunity to market local products. Coexistence tourism initiatives

have the potential to be scaled up by communities in collaboration with tourism investors, camps and operators, in areas sufficiently close to tourism hubs. External support for developing and marketing coexistence tours and products will likely be necessary.

A local trial of an **insurance scheme** for offsetting the costs of wildlife damage, as a potential alternative to compensation or consolation schemes, is recommended. The aims of insurance schemes are usually to increase tolerance for wildlife, to reduce or prevent retaliatory killing of wildlife, and, in some cases, to incentivize preventative measures to reduce wildlife damage. To be effective, insurance schemes require cost-effective administration of insurance claims and verification, clear rules and guidelines, timely and fair insurance payments, incentives for damage prevention, financial sustainability of premium payments, sufficient funding, sustainable and secure funding models, and stakeholder trust and participation^{85,86}. Regional programs tend to be more efficient and successful than national programs^{13,86}. It is crucial that a local, small-scale trial (at Ward or District level) be conducted during the period of this Strategy to learn lessons about the feasibility and sustainability of insurance schemes in the Tanzanian context, before considering wider implementation.

Protection of wildlife habitat on village land is unlikely to be feasible unless communities derive benefits from conserving habitat, as opposed to converting it to agriculture or grazing land that is unsuitable for wildlife. **Conservation incentive schemes** aim to incentivize wildlife presence and habitat conservation on community land by providing monetary or material benefits and can be used in conjunction with land use planning. These schemes are most appropriate where habitat and wildlife are still present on village land and where land use is compatible with coexistence. These schemes require a locally based organization with sufficient capacity for administering these programs; long-term funding for conservation payments; trust, engagement and agreement from the local communities; and transparent and participatory frameworks developed with extensive consultation. Several incentive schemes are currently being trialled in Tanzania (see Strategy Supplement), and it is recommended to continue these trials to assess their impacts on tolerance and conflict, their success at conserving wildlife and wildlife habitat, their practicality and sustainability, and conditions for success. A mid-term review of conservation incentive schemes should be conducted to document experiences and lessons learned, and to assess the feasibility of expanding conservation incentive schemes to other parts of the country.

Further critical background and information on conditions for success of these initiatives, including case studies in Tanzania, are provided in the **Strategy Supplement**.

Table 5.4 Benefits to Communities of Human-Wildlife Coexistence

Target	Activities	Actors	Timeline	Indicators
5.4.1 Increased community capacity for generating income from mitigation methods	5.4.1.1 Support community-based beehive and chilli fence projects with marketing and market access for chilli products and honey	NGOs, private sector, CBOs	2021-2024	Number of community groups generating income from honey and chilli
	5.4.1.2 Trial alternative crops (garlic, ginger, lemongrass) in elephant crop-use hotspots and assess their income-generating potential	NGOs, private sector	2021-2023	Number of trials completed and their results
5.4.2 Increased income generation from community-led coexistence tourism	5.4.2.1 Support communities to develop coexistence tourism products in viable areas	NGOs, private sector, CBOs	2021-2024	Number of coexistence tourism initiatives established
	5.4.2.2 Monitor visitor numbers and income generated	NGOs, private sector, CBOs	2021-2024	Annual trends in visitor numbers and income generated
5.4.3 Increased understanding of household resilience to HWC impacts and measures for increasing resilience explored	12.3.1 Conduct baseline studies of subjective household resilience to HWC impacts and identify key factors for resilience	Researchers, NGOs, academic institutions	2020-2023	Baseline studies conducted
	12.3.2 Identify, trial and evaluate methods for increasing household resilience	NGOs, researchers	2021-2024	Methods trialled and evaluated
	12.3.3 Implement VSLAs and income-diversification support in HWC hotspots and evaluate their impact on resilience	NGOs, CBOs	2021-2024	Evaluations of VSLAs and income-diversification initiatives on household resilience
5.4.4 Local, small-scale trial of HWC insurance scheme completed	5.4.4.1 Develop NGO-Government partnership to explore feasibility and scope for first in-country trial of an HWC insurance scheme	MNRT, NGO	2021	Partnership developed
	5.4.4.2 Develop and plan trial of HWC insurance scheme on a small scale	MNRT, NGOs, LGAs, communities	2021	Plan developed
	5.4.4.3 Implement and evaluate trial	MNRT, NGO, LGAs, communities	2022-2024	Trial conducted and evaluated

Target	Activities	Actors	Timeline	Indicators
5.4.5 Local trials of alternative funding models for coexistence landscapes conducted and expanded where appropriate	5.4.5.1 Continue local trials of conservation incentive schemes	NGOs	2021-2023	Trials conducted and evaluated
	5.4.5.2 Review conservation incentive schemes trials and assess feasibility of expansion to other HWC hotspots	NGOs,WD, MNRT	2023-2024	Review and feasibility assessment completed
	5.4.5.3 Explore feasibility of expanding carbon payment schemes to incentivize compatible land use for coexistence in HWC risk zones	Private sector partners, MNRT, WD, NGOs	2021-2023	Feasibility assessment completed, plan for expansion developed



Community benefits of coexistence: healthcare and veterinary supplies provided to communities through its Community Camera Trapping program. Credit: RCP.

5.5 Strategic Objective 5: Coexistence Education

In order to foster coexistence for the long term, collaborative management of the human-wildlife interface and building of livelihood stability and household resilience to HWC must be combined with conservation education. Conservation education can play a vital role in increasing knowledge and changing attitudes towards the value of wildlife and conservation⁸⁷ and must be targeted at both youth and adults.

To this end, the Ministry of Natural Resources and Tourism will work with the Ministry of Education to develop a **student curriculum** at three levels focusing on HWC for teaching in schools nationwide. The first, for nursery and lower primary school students, will approach learning about wildlife with the goal of building empathy, respect and love to foster students’ connection to and investment in the natural world. In the second level, upper primary and lower secondary students will build on this empathy and understanding with knowledge and respect. Lessons will encourage students to think critically to connect what they have learned about wildlife and humans in order to build an understanding not only of how they come into contact and conflict, but what can be done about it. In the third level, upper secondary students will synthesize knowledge about HWC with their growing understanding of their role as emerging citizens ready to join the nation by focusing on case studies that illustrate drivers of conflict and actions taken to address conflict. An experiential foundation for this knowledge will be built through a wildlife reserve visit program guaranteeing that each student will visit a protected area by the time they complete secondary school. Positive personal and emotional connections to wildlife are critical for tolerance and sustained coexistence³⁸. The student curriculum will be taught by skilled teachers already working within school systems, and training materials will be developed to deliver content.

Table 1. Overview of Target Audiences, Focus Areas, and Standard Modules

Level	Focus	Modules (see Standard Modules below)
Level 1: Nursery School and Lower Primary Schools	Focus: Love, Empathy, Respect	Two Modules: Combined 1&2, Combined 3&4
Level 2: Upper Primary and Lower Secondary Schools	Focus: Respect, Knowledge	Five Modules: 1-4, 6
Level 3: Upper Secondary School	Focus: Knowledge, Action	All Modules
Level 4: Adult Education at Village Level	Focus: Action, Knowledge	One Module: Combined Content from 1-6

An **adult education program** will be developed to provide HWC education to key audiences and decision-makers in HWC hotspot areas, including farmers, pastoralists, village leaders, district officials and regional officials, and village environmental committees. This program will be a condensed version of the content delivered to students and will emphasize safety measures, mitigation techniques, the importance of landscape level actions such as land use planning, and the ecological and economic value of wildlife. Regional consultation workshops will be held to tailor content to the most relevant species and associated ecological information, suitable mitigation methods, critical context and key actions for safety. Consultation workshops will also facilitate barrier analysis to determine what factors may motivate or impede behaviour change. In addition to the active training program, a passive learning platform will be developed using existing models in the agriculture and public health sectors, whereby telecom providers offer guidance using Interactive Voice Response (IVR), a technology in which users interact with a company’s host system via phone keypad or speech recognition to access pre-recorded or dynamically-generated audio (e.g. skits) that can engage users with educational content, often providing discrete recommendations that the user can take away from the system⁸⁸.

Please refer to the **Strategy Supplement** for more information on the vision, rationale, content and implementation of this Strategic Objective.

Standard Curriculum Components and Modules per Level by Species Group (Large Carnivores, Elephant, Crocodile, Hippo)	
1. Basic Biology, Ecology, Behavior, Conservation Status	
Level 1:	Focus on similarity to humans, highlight engaging aspects of behavior
Level 2:	Build on complexities of behavior, introduce detail around conservation status
Level 3:	Full detail of biology, ecology, behavior, conservation status
Level 4:	Summarized full detail
2. Benefits of the species (ecological, cultural, economic)	
Level 1:	Similarity to humans: empathy and compassion, right of animals to exist
Level 2:	Introduce importance of animal in ecosystem, begin to introduce animal as important for tourism (jobs for family)
Level 3:	Follow up with importance of animal in ecosystem, build on importance for family employment and introduce employment opportunities, jobs for community, national economy
Level 4:	Brief overview of importance of animal in ecosystem (highlight interaction with human activities), contribution to existing employment, national economy.
3. Human Interactions: how does human presence affect the species (case studies)	
Level 1:	Overview of how it can happen: key focus on safety
Level 2:	<i>How</i> does this happen: introduce the role of humans (why does it happen)
Level 3:	<i>Why</i> does it happen: What are the factors that drive it? Case Studies to see how human-wildlife interactions can look different in different ecosystems because of different pressures.
Level 4:	Connect animal behavior and human behaviour to illustrate the reasons for human-wildlife interactions [connect to any local Community-Based Natural Resource Management]
4. Safety around the animal: how does species presence affect humans	
Level 1:	How to stay safe as a child, key things that your family can do to stay safe.
Level 2:	How to keep yourself safe (adolescent) and how to keep your family safe (younger siblings)
Level 3:	How to plan for the safety of yourself now and in the future
Level 4:	How to plan for the safety of yourself and your family: household level safety
5. Mitigation Methods	
Level 1:	Omit
Level 2:	Omit
Level 3:	Introduce 2-3 methods per species: target communicating to family
Level 4:	Major Focus with 2-4 methods for top species (targeted)
6. Way Forward	
Level 1:	Re-establish the right of animals to exist and their importance
Level 2:	Review causes of interaction/conflict and brainstorm what can be done about them
Level 3:	Introduce Land Use Planning, review importance of wildlife to economy and heritage
Level 4:	Advocate for Land Use Planning, review importance of wildlife to economy and heritage



Students learning about coexistence and corridors in the Kilombero Valley. Credit: STEP

Table 5.5 Fostering Coexistence for the Long Term

Target	Activities	Actors	Timeline	Indicators
5.5.1 Finalize Curriculum Content	5.5.1.1 Draft curriculum content: develop each module for key species (large carnivores, elephant, crocodile, hippo) 5.5.1.2 Outline regionally focused content, first draft (Case Studies) 5.5.1.3 Share with Ministry of Education for feedback	MNRT, Ministry of Education, Key Stakeholders	2020	All levels of curriculum drafted Hotspot areas identified for case studies from Inception Workshop Materials shared to Ministry of Education
5.5.2 Develop pilot for national curriculum approval	5.5.2.1 Develop curriculum pilot in collaboration with Ministry of Education, make sure to include regional variation for species-specific modules 5.5.2.2 Pilot in Regional Hubs	MNRT, Ministry of Education, Regional Hub Schools, Education NGOs	2020	Pilot locations and pilot partners identified Systems and structures to receive feedback set up and feedback intervals established
5.5.3 Continue pilot development for national curriculum approval	5.5.3.1 Develop Teaching Aids and Student Materials, Refine routinely within pilot	MNRT, Ministry of Education, Regional Hub Schools, Education NGOs	2020-2021	Materials outlined Materials drafted

Target	Activities	Actors	Timeline	Indicators
5.5.4 Regional Validation Workshops to Generate Regionally-tailored content	5.5.4.1 Develop and refine Case Study content and other regional variation in species-specific content at regional validation workshops 5.5.4.1 Conduct barrier analysis at Regional Validation workshops to inform adult education messaging”	MNRT, Regional Leaders, Ministry of Education, Content Experts, NGOs	2020	Number of validation workshops held Percentage of workshops where Barrier Analysis Workshop is held Key behaviour change priorities identified Number of barriers identified for each key barrier
5.5.5 Assess Adult Education Delivery Options	5.5.5.1 Assess VGS Coverage: Are they widespread enough to provide training? 5.5.5.2 Assess viability of VGS as adult education providers	MNRT, TAWA, WMAs, Ministry of Education for evaluation	2020-2021	Percentage of villages with VGS within hotspot areas Percentage of VGS who pass knowledge retention standards Percentage of VGS who pass training evaluation Decision as to whether VGS are involved with delivering adult education
5.5.6 Finalize Educator Materials	5.5.6.1 Finalize Teacher Guides and Textbooks	Ministry of Education, Key Stakeholders	2020-2021	Feedback from pilots incorporated Materials reviewed with at least 20 teachers and at least 20 students across country
5.5.7 Capacity Building for Educators	5.5.7.1 Training of Trainers for Teachers 5.5.7.2 Training of Trainers for VGS (TBC)	Ministry of Education, Key Stakeholders	2020-2021	Percentage of teachers who pass knowledge retention exam Percentage of teachers who pass training evaluation
5.5.8 Regional Leader Education	5.5.8.1 Conduct regional leader education with findings from Regional Validation Workshops and finalized adult education content	Ministry of Education, Key Stakeholders	2021	Trainings with insight from regional validation workshops created Number of Regional Leaders trained
5.5.9 District Leader Education	5.5.9.1 Conduct district-level leader education with findings from Regional Validation Workshops and finalized adult education content	Ministry of Education, Key Stakeholders	2021	Trainings with insight from regional validation workshops created Number of District Leaders Trained
5.5.10 Support active adult education with passive methods (IVR)	5.5.10.1 Pilot content for IVR (informed by Barrier Analysis at Regional Workshops) 5.5.10.2 Record Regional Variation in HWC and livelihoods practices 5.5.10.3 Launch IVR Together with adult education programming	Mobile Phone Companies, Technology Companies, Ministry of Education, Key Stakeholders (Regional level)	2021-2022	Key findings from barrier analysis at Regional Validation Workshops organized and prioritized Messaging and training content developed Messaging and training content prototyped and piloted Regional variation recorded to inform tailoring of content by region IVR Training and Communication Strategy developed

5.6 Strategic Objective 6: Monitoring of HWC

Monitoring is critical to effective adaptive management of HWC. A **National HWC Monitoring Database** will be set up and managed by Wildlife Division in the MNRT to collect data on the spatial distribution and temporal trends of HWC incidences and the effectiveness of mitigation and response efforts.

Data collection in the field and transmission to the central database will be facilitated by the **Problem Animal Information System (PAIS)** Technology. Data on HWC incidents will be collected at the village level by District Game Officer HWC data teams and by HWC Response Teams using Android smartphones. PAIS will be used to collect information required for consolation claims, as well as details on the circumstances around HWC incidents, and actions taken in response to incidents. Measures will be taken to ensure security of data throughout the system. A National HWC Database Technician in MNRT will be responsible for managing and analysing the database and for producing regular reports from the data.

The National HWC Monitoring Database will enable the MNRT to update the picture of spatial trends and hotspots of HWC around the country to guide adaptive management and prioritisation of resources. The Database will also be used to identify risk factors for wildlife impacts in conflict hotspots to inform HWC management. The locations, demographic groups and activities most at risk of wildlife attacks should be identified for each species, in order to inform safety guidelines and zoning. Similarly, the risk factors for crop loss and livestock depredations should be analysed to inform mitigation measures, land use planning, and zoning.

Please refer to the **Strategy Supplement** for more details on the implementation and modalities of PAIS and the National HWC Monitoring Database.



Warriors for Wildlife record evidence of big cat presence. Credit: TPW/Felipe Rodriguez

Table 5.6 Monitoring of HWC

Target	Activities	Actors	Timeline	Indicators
5.6.1 Establishment of National HWC Database, based in Wildlife Division, MNRT	5.6.1.1 Install HWC Database in central computers and server of MNRT, linked to all PAIS data devices	Wildlife Division, MNRT TAWIRI Development partners	2020	National HWC Database established
	5.6.1.2 Train HWC Database Manager in managing and analysing Database	Wildlife Division, MNRT TAWIRI	2020	Quarterly and Annual HWC status and trends reports
	5.6.1.3 Data entry assistants to input all historical HWC data currently held at Wildlife Division	Wildlife Division, MNRT TAWIRI	2020	All historical data in the Database
5.6.2 PAIS system finalized and ready for rollout, hardware purchased and ready for distribution	5.6.2.1 Purchase and prepare all hardware necessary for initial rollout to all HWC Hotspots	Wildlife Division, MNRT TAWIRI Development partners	2020	Hardware ready with PAIS installed in all devices
5.6.3 National network of PAIS data collectors established and equipped				
	5.6.3.3 District HWC Data Teams assembled by DGOs in rest of the country	MNRT DGOs District Agricultural Officers TAWA TANAPA TFS NCAA WEOs, VEOs, VGS NGOs	2021	Teams assembled in every District with HWC incidents
	5.6.3.4 Data Team members equipped with PAIS devices (smartphones) and trained to submit data in rest of the country	MNRT DGOs District Agricultural Officers TAWA TANAPA TFS NCAA WEOs, VEOs, VGS NGOs	2021-2022	Data being submitted using PAIS throughout the country by end of 2022

Target	Activities	Actors	Timeline	Indicators
5.6.4 HWC Response Teams submitting data on HWC incidents and their responses	5.6.4.1 Develop, test and implement Rapid Response Team form in PAIS	Wildlife Division, MNRT TAWIRI GIZ, USAID	2020-2021	Form established
	5.6.4.2 Train all HWC Response Team leaders in collecting data on the HWC incidents to which they respond, and the outcomes of their responses	MNRT TAWIRI DGOs APU TAWA TANAPA NCAA TFS VGS, VEOs NGOs	2020-2021	Data being submitted to the National HWC Database by HWC Response Teams throughout the country by end of 2021

5.7 Strategic Objective 7: Research Priorities

This section lists cross-cutting and species-specific research priorities which have been formulated from knowledge gaps identified by stakeholders, questionnaire respondents, and review of scientific literature. The research priorities outlined here link to the priority research theme of Human-Wildlife Interactions in TAWIRI’s Research Agenda. Key knowledge gaps include the location of conflict hotspots, local drivers and risk factors, drivers of tolerance and social dimensions of conflict, and household resilience to wildlife impacts. Developing a detailed understanding of these elements in each hotspot is essential for developing a management strategy tailored to the local context. Additional knowledge gaps include drivers of land use change along protected area boundaries and opportunities and approaches for leveraging land use planning processes for reducing and preventing HWC. Furthermore, mitigation methods, rapid response techniques, education and awareness-raising programs, and conservation incentive schemes require further monitoring and evaluation.



Elephants captured by camera traps on village land in Idodi-Pawaga. Credit: STEP.

5.7.1 Cross-cutting research priorities

- Identify and map human-wildlife conflict hotspots across the country, monitor long-term trends in human-wildlife interactions in these hotspots, and use the National HWC Monitoring Database to identify emerging conflict hotspots
- Identify important risk factors (environmental, spatial, temporal, behavioural, species-specific) for wildlife impacts in conflict hotspots
- Investigate local drivers of human-wildlife interactions and the cultural, historical, political and social dimensions of human-wildlife conflict in hotspots
- Investigate drivers of tolerance for different 'conflict species' in a diversity of conflict hotspots. This includes clarifying the links between direct and indirect benefits from conservation activities, engagement in illegal resource extraction, and tolerance for losses to wildlife.
- Investigate the drivers of land use change along protected area boundaries, including how people make decisions about land use, farming and grazing in conflict hotspots
- Identify key gaps in land use planning processes, and identify and evaluate opportunities and means for increasing the consideration of HWC risk in land use planning
- Evaluate the effectiveness of education and awareness-raising activities in reducing wildlife impacts on humans, including the impact of safety advice on reducing human injuries and deaths to wildlife
- Evaluate the effectiveness of education and awareness-raising activities in increasing tolerance for wildlife
- Monitor and evaluate the efficacy mitigation methods and rapid response techniques as HWC management tools, and investigate their impact on tolerance for wildlife
- Assess the feasibility, practicality and usability of mitigation methods for communities. Identify what tools and approaches communities are most interested, willing, and able to adopt and invest in, and investigate possible trade-offs between efficacy and adoption
- Analyse the timing, distribution and context of wildlife attacks on people by conflict species nationally and in conflict hotspots in order to develop and refine safety guidelines
- Investigate the relationship between corridors and human-wildlife conflict, and evaluate corridor designation and management as a solution to HWC
- Investigate the current and future impacts of climate change on human-wildlife conflict occurrence and intensity
- Assess the effectiveness and practicality of conservation incentive schemes and carbon payment schemes for increasing community tolerance for wildlife, conserving wildlife on village land, and their impact on HWC incidents
- Assess baseline resilience to HWC impacts in conflict hotspots, identify key factors for resilience and explore and evaluate opportunities for strengthening resilience to HWC impacts
- Explore the efficacy and practicality of community-based self-insurance schemes as an alternative to national consolation schemes.
- Quantify the income-generating potential of mitigation methods and coexistence tourism, and identify key conditions for success
- Develop guidelines for electric fencing. What are the contexts in which its use may be effective and appropriate, in which situations should be avoided, and what requirements should be implemented for: 1) impact studies preceding any potential fencing initiatives and 2) assessments throughout implementation which consider the social, ecological and environmental impacts of fencing.

5.7.2 Species-specific research priorities

5.7.2.1 Large carnivores

- In each conflict hotspot, identify the predators responsible for most livestock depredations and human attacks, and the context in which these incidents occur
- Investigate whether reducing livestock deaths to disease (e.g. through better access to veterinary care and disease prevention methods) can increase tolerance for livestock loss to carnivores
- Research the ecological role of apex predators at the community level and investigate trophic cascades
- Investigate the ecological impact of interventions used to mitigate carnivore impact, including Living Walls and other types of fortified bomas

5.7.2.2 African elephant

- Quantify and map high risk areas of elephant impacts at the village level to inform land use planning and implementation of mitigation strategies at village level
- Identify corridors and local pathways used by elephants on village land and their relationship with crop loss
- Identify water sources on village land used by elephants and investigate temporal and seasonal patterns in their use by elephants to help manage shared access to water sources
- Investigate the number, age and sex of crop-using elephants in crop-loss hotspots, and monitor individual differences in the frequency of crop use and responses to mitigation methods
- Elephants are likely to habituate to mitigation measures, hence long-term monitoring of the efficacy of mitigation methods is needed
- Quantify the ecological, economic and social impacts of crop loss mitigation measures
- Quantify crop loss to other crop-using species in hotspots, and explore measures for reducing crop loss to other crop-using species
- Further research into the efficacy of the elephant dung-spraying method and the feasibility and effectiveness of planting alternative crops less preferred by elephants

5.7.2.3 Nile crocodile

- Conduct regular surveys of Tanzania's crocodile population to monitor population trends, map crocodile distribution inside and outside of protected areas, and identify conflict hotspots. This information should inform land use planning and zoning to reduce conflict risk.
- Analyse the risk of crocodile damage for different fishing gears and methods, and explore alternative fishing gears
- Monitor and evaluate the efficacy of translocation, problem animal control, and limited harvest programs in reducing crocodile attacks, as well as the impact of these interventions on crocodile populations

5.7.2.4 Hippopotamus

- Conduct regular surveys of Tanzania's hippo population to monitor population trends, map hippo distribution and corridors inside and outside of protected areas, and identify conflict hotspots. This information should inform land use planning and zoning to reduce conflict risk.
- Investigate the effect on human-hippo conflict of upstream diversion of water and changes to riparian habitat to rivers in Katavi National Park, Ruaha National Park, and Tarangire National Park
- Analyse the risk of hippo damage for different fishing gears and methods, and explore alternative fishing gears
- Monitor and evaluate the efficacy of translocation, problem animal control and limited harvest programs in reducing hippo attacks, as well as the impact of these interventions on hippo populations

6. Coordination

Successful implementation of this Strategy requires strong and well established coordination of all components. Figure 6 summarises a well-coordinated management structure that will effectively coordinate all stakeholders and actors implementing the various activities. An essential next step is for MNRT and all wildlife institutions to clarify modalities and coordination of the Strategy, and all the different institutional roles under each of the Strategic Objectives of the Strategy.

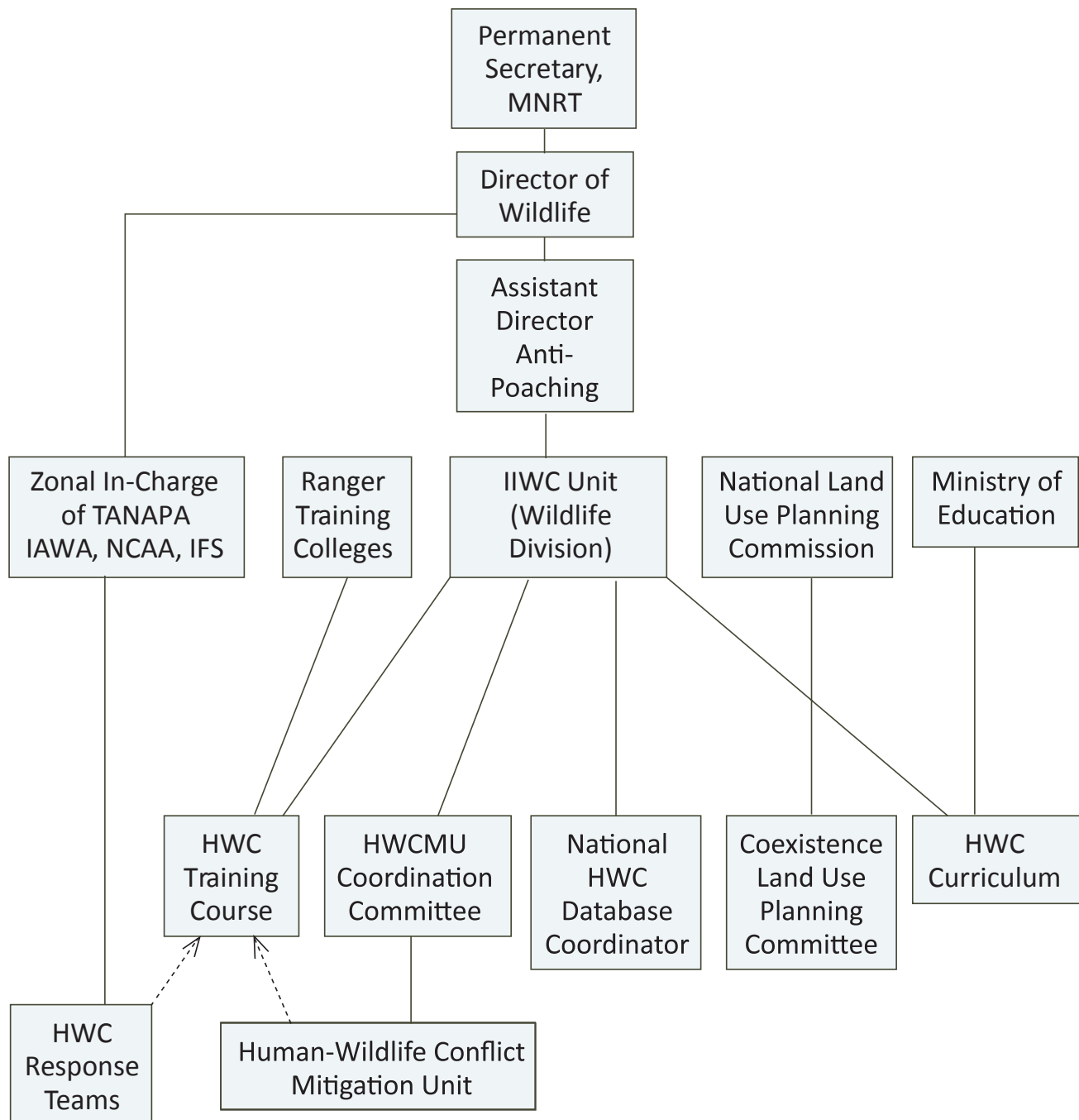


Figure 6. Coordination of the various components of the HWC Management Strategy

7. Priority Next Steps

This section outlines the first actions that need to be taken within months of the launch of the Strategy, in order to build a solid foundation for successful implementation of the Strategy.

For each Strategic Objective, refer to the relevant Implementation Table above, and extended narrative details in the Strategy Supplement, for further explanation and subsequent actions.

The focus here is on the short-term solutions of the Strategy (Strategic Objectives 1 & 2) that are designed to have rapid impact to assist and empower hotspot communities affected by HWC. However, first steps for the medium to longer term actions (Strategic Objectives 3-6) are also outlined.

General Actions

1. HWC Strategy Coordination Meeting

This will be an in-house MNRT meeting involving all the MNRT Institutions (TANAPA/TAWA/NCAA/TFS) and NLUPC, with the goal of clarifying modalities and coordination of the Strategy, and all the different Institutional Roles under each of the Strategic Objectives of the Strategy.

2. HWC Strategy Resource Mobilisation Workshop

This workshop will bring together donors with Government and NGO implementers of the Strategy, with the goals of:

- a. Sketching out an Indicative Budget for implementation of the Strategy
- b. Clarifying Government capacity to financially support the Strategy
- c. Seeking commitments of donors to support different components of the Strategy
- d. Seeking commitments of NGOs and other expert practitioners to provide in-kind support for the Strategy, e.g. training, consultations, joining Coordination Committees, participation in other actions (see below)

3. It is also recommended that the HWC Unit (WD) hold a meeting every six months with key partners to review progress and challenges of implementing the Strategy.

Strategic Objective 1: Community-Based Mitigation

1. HWC Mitigation Unit Workshop

This workshop will bring together MNRT, the Ranger Training Colleges, and NGOs who are implementing mitigation methods with communities, with the goal of mapping out collaboration to:

- (i) Rapidly train and begin deploying the HWC Mitigation Unit (HWCMU) to HWC hotspot areas with the main goal to conduct on the job training to DGOs and other relevant HWC stakeholders
- (ii) Assess resource gaps for the HWCMU and how these will be filled
- (iii) Develop HWC Training Course

2. Terms of Reference for HWC Mitigation Unit Coordination Committee developed, and Committee formally established.

3. Committee continues HWC Hotspot analysis (see Supplement, Appendix 2) which will guide selective deployment of Mitigation Unit, as well as resource prioritisation for HWC Response Teams (SO2).

4. Committee recruits the 20 members of the HWC Mitigation Unit, and begins deploying them to hotspots.

Strategic Objective 2: HWC Response

1. Meeting of the National Wildlife and Forest Security Committee (NWFSC) to formalize the HWC Response Command Structure and determine coordination and composition of the HWC Response Teams under each Zonal In-charge.
2. Meeting of MNRT, wildlife institutions and NGO partners to develop the HWC Response Decision Framework and Standard Operating Procedures of the HWC Response Teams.
3. Each Zonal In-charge assigned to carry out resource needs assessment for HWC Response in their Zone.
4. Meeting of MNRT and relevant donors to plan increase in capacity and resources of priority HWC Response teams.
5. Coordination between AD-AP and the HWC Mitigation Unit Coordination Committee on results of HWC hotspot analysis for prioritising HWC Response resources.
6. Collaboration initiated between Zonal In-charges and the HWC Mitigation Unit Coordination Committee on development of module in the National HWC Training Course tailored for HWC Response.

Strategic Objective 3: Managing the Human-Wildlife Interface

1. Coexistence Land Use Planning Committee formed and Terms of Reference developed. Meeting between Committee and donors to elicit funding.

Strategic Objective 4: Benefits to Communities of Human-Wildlife Coexistence

1. Meeting of MNRT and NGO partners to explore feasibility and scope for first in-country trial of an HWC insurance scheme

Strategic Objective 5: Coexistence Education

1. MNRT to meet with Ministry of Education to initiate collaboration and form inter-ministerial working group together with non-governmental HWC and education experts for development of HWC module and roadmap for integration into National Curriculum.

Strategic Objective 6: Monitoring of HWC

1. MNRT to appoint HWC Database Manager and install the HWC National Database in the central computers of the MNRT HWC Unit, linked to all PAIS data devices.
2. Plan for roll-out of PAIS to be developed and implemented.

Table 7.1 Timeline of Priority Next Steps

Strategic objective	Timeline (days from launch of the Strategy)
1. Community-Based Mitigation	120
2. HWC Response	90
3. Managing the Human-Wildlife Interface	90
4. Benefits to Communities of Human-Wildlife Coexistence	365
5. Coexistence Education	120
6. Monitoring of HWC	180

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