

# Community-Based Management and Conservation in Africa: Trade-Offs and Synergies in Land-Use Decisions in Local Villages

by

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## Background Information

### *Regional Scale: Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA)*

The KAZA TFCA is the world's largest transfrontier conservation area, spanning over 444,000 km<sup>2</sup> including national parks, game reserves, forest reserves, game/wildlife management areas and communal lands (Figure 1). The region provides vital wildlife corridors along three main perennial rivers (the Okavango, Kwando, and Zambezi) but is also home to ethnically and culturally diverse communities. The goal of the TFCA is to manage the regional ecosystem for biodiversity preservation and sustainable natural resources uses while maintaining its rich cultural heritage and developing the communities within the region.



*Figure 1.* The Kavango-Zambezi Transfrontier Conservation Area (KAZA-TFCA) is a transboundary conservation area in southern Africa spanning parts of Namibia, Botswana, Angola, Zambia, and Zimbabwe. (Source: derived from a map by Wikimedia Commons User:Lencer, CC BY 3.0, [http://commons.wikimedia.org/wiki/File:Kavango-Zambezi\\_Transfrontier\\_Conservation\\_map\\_de.png](http://commons.wikimedia.org/wiki/File:Kavango-Zambezi_Transfrontier_Conservation_map_de.png), some names changed to English.)

For sustainable development to be successful, preserving and enhancing the natural resources and biodiversity of the KAZA TFCA region are critical due to their inherent socio-economic and cultural value. One of the identified keys to sustainable development is the integration of the flourishing photographic and hunting safari-based tourism with community development. However, the opportunity costs of biodiversity conservation must be balanced with human-wildlife conflicts which may have dire effects on household food insecurity and human lives. Specifically, human-wildlife conflict includes damage to livestock or crops, injury to people, and, in some cases, death. Those that survive an attack by a wild animal may also suffer psychologically, and there are also opportunity costs associated with conflict such as farmers being forced to guard crops 24 hours a day or people being restricted in traveling at night for fear of encountering a wild animal. Successful conservation initiatives must develop an approach that balances the needs of wildlife with needs of people in the shared environment.

**Local Scale: Zambezi Region, Namibia**

Zambezi Region is a finger-shaped strip of land that the Belgians colonized as part of Namibia in order to gain access to the Indian Ocean. It is surrounded by Angola, Zambia, Botswana, and Zimbabwe. In this region, international borders cut across wetland and Kalahari woodland landscapes (Figure 2). As a result, animals frequently move across political boundaries, coming down from Zambia and up through Botswana during the dry season in search for water, resulting in vascillating numbers of different species in the wetlands of Zambezi Region. Protected areas and developing conservancies in Zambezi Region fit into a regional network of parks, forest reserves, and game management area and other community wildlife projects that are taking place in neighbouring countires. The main role of this puzzle-like landscape is to ultimately allow wildlife such as elephants, zebra, wildebeest, impala, buffalo, lions, and other African wildlife to use the rivers as corridors for movement during the alternating wet and dry seasons of the year. Access for wildlife to these river corridors is critical in this water-scarce environment, but the land closest to the rivers is also ideal for agriculture due to improved soils and proximity to the river.

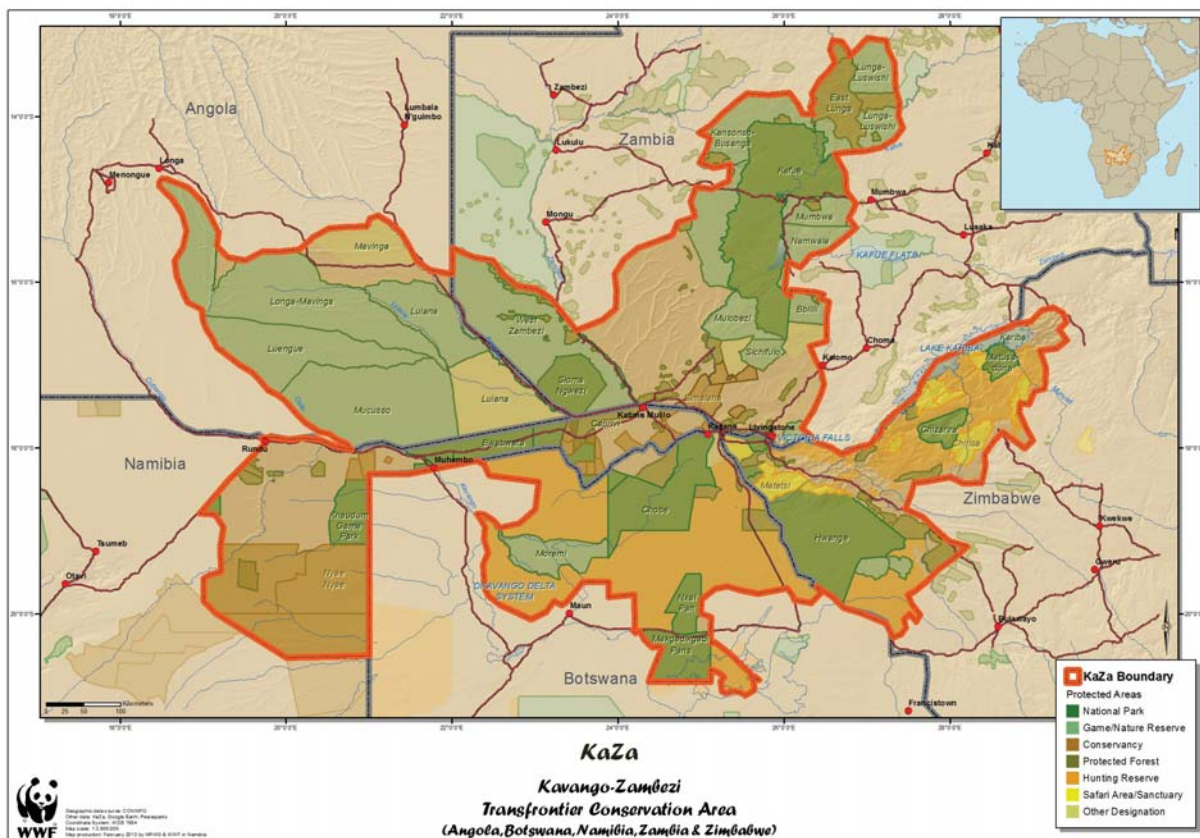


Figure 2. The general KAZA-TFCA region. (Source: Richard Diggle, WWF, used with permission).



The Kwando River separates eastern and western Zambezi Region. This river also separates communal lands from Bwabwata National Park (Figure 3). The communal lands are divided into conservancies, each of which are comprised of villages that have been engaged in community-based natural resource management (CBNRM) since the end of the Namibian Independence War in 1990. Each conservancy area has its own management office with elected officials that oversee the affairs of a given set of villages specific to natural resource management and involvement in ecotourism. Ecotourism is mainly centered around the 5 lodges operating in the region that take advantage of the national parks (Bwabwata, Mudumu, and Mamili) and the abundant wildlife the wet floodplains and wetlands draw in the dry season. Since lodge operators in the Zambezi Region Strip are required to lease the land from the government through conservancy representatives, they are automatically obliged to pay a levy to both the Traditional Authorities of the main villages and to the conservancy on whose land the enterprise was established. Thus, conservancies directly benefit financially from the existence of tourism enterprises in addition to jobs and other in-kind benefits such as meat from big game that is killed by safari hunters. Conservancy management leaders also makes decisions and interact with professional safari outfits who bring hunters of big game to this area. They also are responsible for interacting with NGO and government representatives in compensating local farmers for crop losses due to human-wildlife conflicts if occurrences are reported and documented. However, some communities struggle with lack of accountability and transparency in money flows so that only conservancy leaders benefit from the tourism efforts while farmers are left with no crops and no financial compensation.

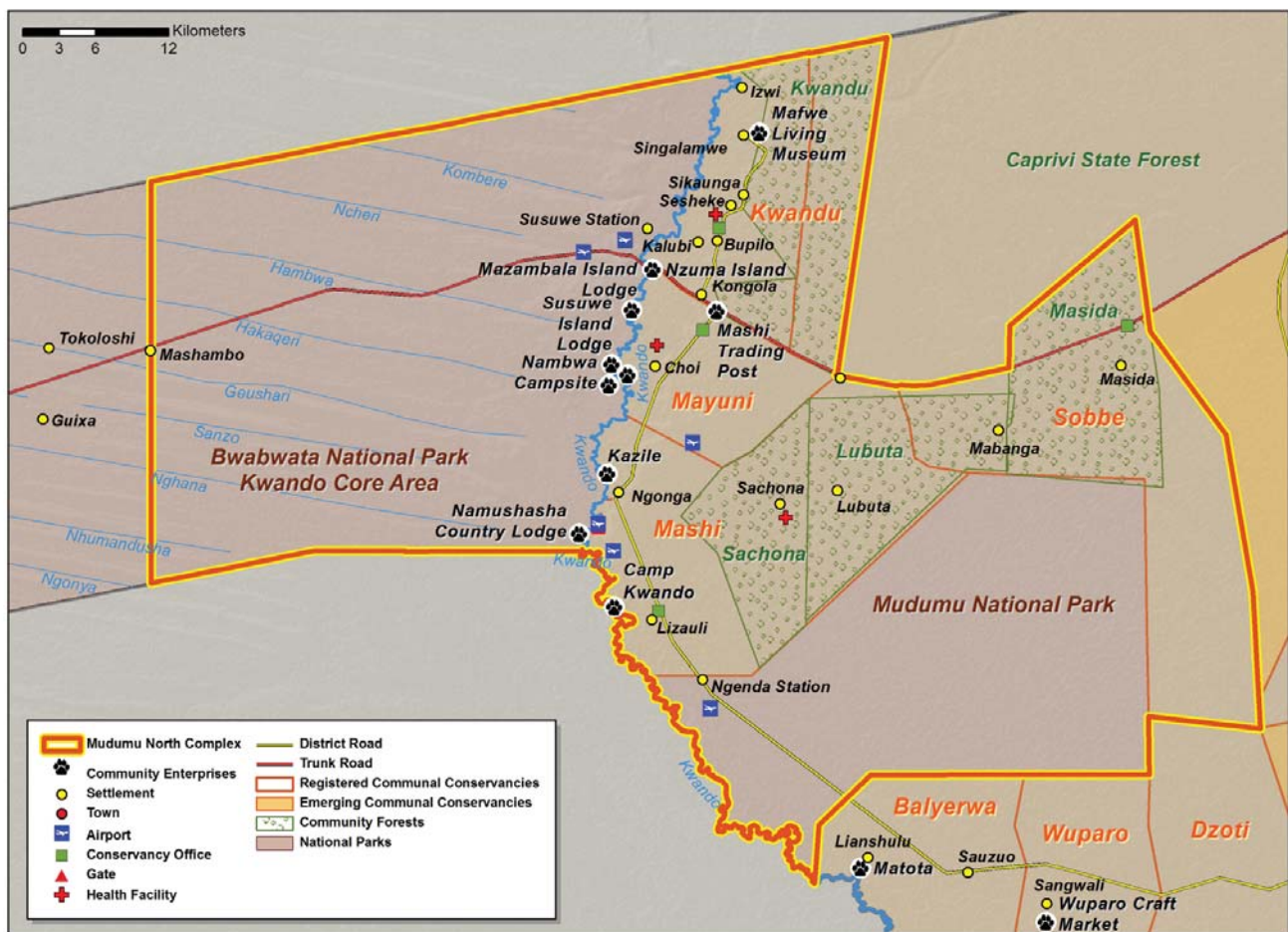


Figure 3. Mudumu North Complex in Zambezi Region, Namibia. The three main community areas of interest are Kwandu, Mayuni and Mashji conservancies, which all border the Kwando River. (Source: Natural Resource Working Group, NACSO).

## The Scenario

As the African sun continued to inch higher overhead, Niko paused to scuff his bare foot into the dry, crumbling soil at the edge of his father's field. Staring blankly at the ground, his gaze eventually sharpened on a half-buried chili pepper. He remembered the man who had assured his father that stringing chili peppers along the edges of the field would deter the elephants. Niko suspected that while elephants might have been dissuaded from the burgeoning harvest, other animals had been less so, and the crops were still damaged. It probably didn't help that the field was right next to the river either. He glanced up at the sun thinking about the 5 kilometer walk he needed to start in order to reach the community meeting. He should go or he'd be late. He felt anxious about the meeting, as the vote would determine whether this field would be here next year. He dug a little deeper into the dirt with his toe and again glanced up at the clear blue sky. Not a cloud in sight. He sighed. Maybe it wouldn't matter. He knew his father would settle on millet for the following season regardless of where the field was located. He wouldn't have the money or security to plant anything else. He would tell Niko and his younger brother Milo that they would plant the whole field in millet, just as they had this year.

It depressed Niko because he knew the chain of events that would result from that decision as it played out every year much the same. He knew his father had no choice. For a number of years the rain had yet to come any sooner than November. Planting anything other than millet on the tired dirt would result in a failed crop. And, as his father always said, at least with millet there would be a chance to keep the family from going hungry. However, there would be no extra income that something like maize might provide at the market. And this year, what they had managed to salvage from the fields would be barely enough to see them through.

As Niko continued down the road he heard a vehicle coming up from behind him. He turned to see a cloud of dust and Marcus's pickup truck coming up over the slight hill 100 meters behind him. He smiled and shook his head. His brother Milo was in the back with the rest of the conservancy game guards. Milo wasn't as worried about the crop, or lack thereof. He was so sure that the conservation agenda put forth by the management committee would be the answer to all of their prayers. Niko wasn't so sure. But, unlike many of the elders in the community, he was willing to listen to both sides of the argument that would be presented this afternoon.

It was a big decision—whether to move the fields by the river upland or not. It would be a lot of work; crops might not fare as well in the upland sands. Niko snorted to himself. Then again, it's not like it was much better near the river with how dry the past year had been and the increase in wildlife that apparently had a taste for riverside crops. Sigh. At least close to the river meant access to water and the reeds that his little sisters had to collect every few days.

“Hey Niko, want a ride to the community meeting?” asked Milo as the truck slowed in approach.

“Yeah, thanks,” Niko said as he jumped the side of the truck to squeeze in next to Big Jim.



## Kwando Conservancy

Welcome to the Kwando conservancy (KC)! Yours is the northernmost of the three conservancies along the Kwando River (see Figure 4 below). This means the villages closest to the boundary with Zambia, directly north, are relatively isolated from many opportunities accessible from the main tar road that runs west to east (as shown in Figure 3 in the Background Information handout you received earlier) and from other villages in the conservancies to the south. KC borders Bwabwata National Park across the Kwando River and a state-owned forest reserve to the east. Your conservancy is characterized by sandier soils with lower soil fertility and the general vegetation is denser than other parts of this region, dominated by shrubs and a variety of tree species and very little grass. As villagers in a rural African community, you know that some tree species are better than others and recognize that the silver cluster-leaf (*Terminalia sericea*) has become dominant in the floodplain area during the past number of very dry years. Your conservancy is not as “developed” as the ones more to the south, with most settlements located along the main road and relatively fewer people overall.

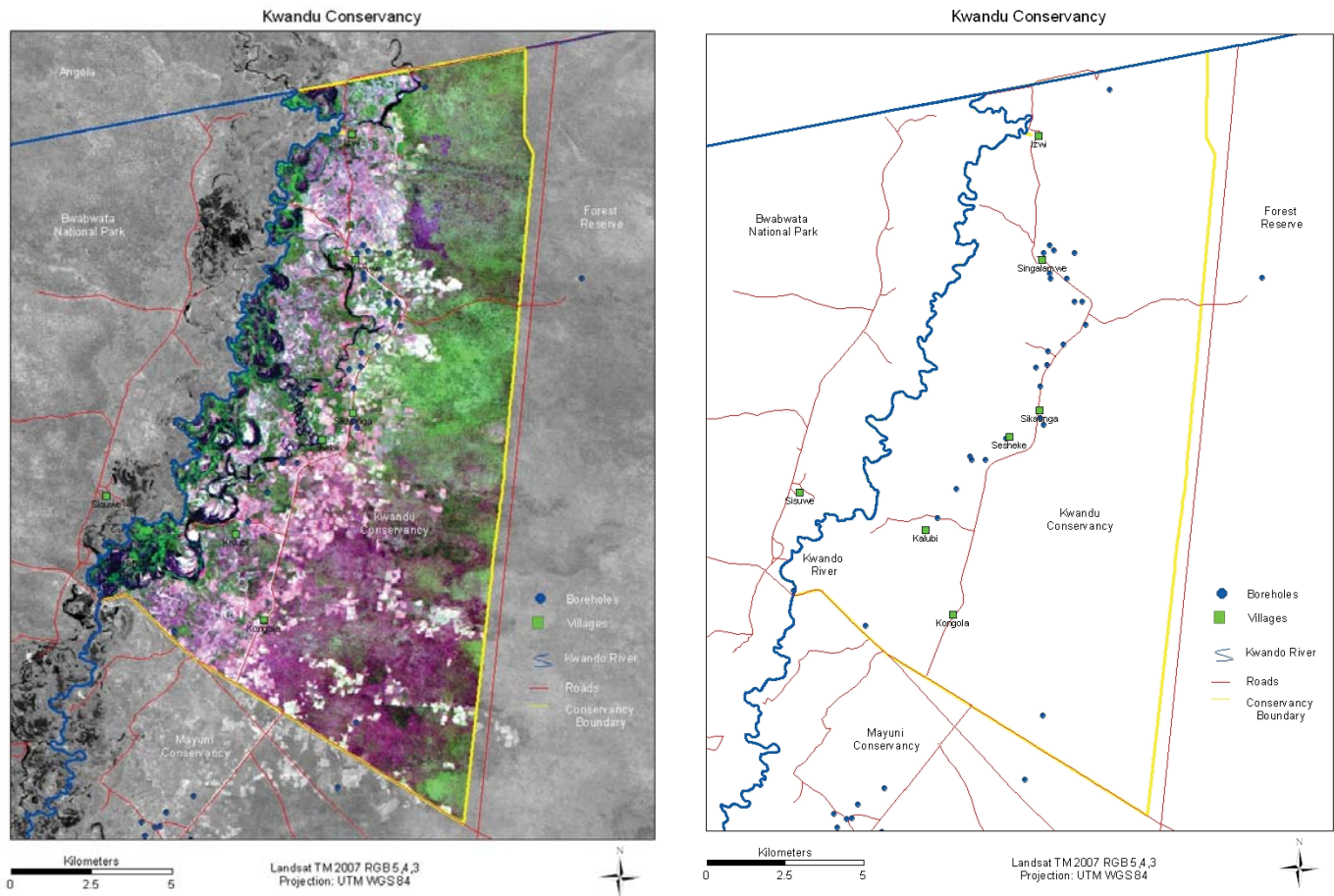


Figure 4. Kwando Conservancy, located along the Kwando River with most settlements along the main dirt road that runs from the main tarmac road in the south, up into Zambia. The satellite image shows dense vegetation in green, shrub areas in purple, and settlement/agricultural plots in white. The river is outlined in blue.



## Mashi Conservancy

Your conservancy, called Mashi (MC for short), is the largest, southernmost conservancy of the complex of conservancies that border Bwabwata National Park (see Figure 4 below). Along with sharing a border with Bwabwata National Park to the west, separated by the Kwando River, Mashi also shares a border with Mudumu National Park to the south and another conservancy to the east. Your access to the main tarmac road is limited to only an area in the northwest of the conservancy. MC is generally characterized by clay soils that are more fertile than areas with sandier soils and mixed vegetation dominated by an elephant-favored tree: Mopane (*Colophospermum mopane*). Your conservancy also has the highest population density but the settlements are more dispersed with some present near the river, some along the main gravel road that links MC to Mayuni Conservancy and the park to the south, and others farther inland. Most of the community members are engaged in rain-fed agriculture and livestock rearing, but some members are also heavily involved in ecotourism activities due to their proximity to the two national parks. Also, the hardworking women in MC, with the help of a local NGO, have successfully established a community-owned crafts center that manufactures and sells baskets and other crafts. The raw materials for these crafts are mainly reeds, papyrus, and grasses collected along the river.

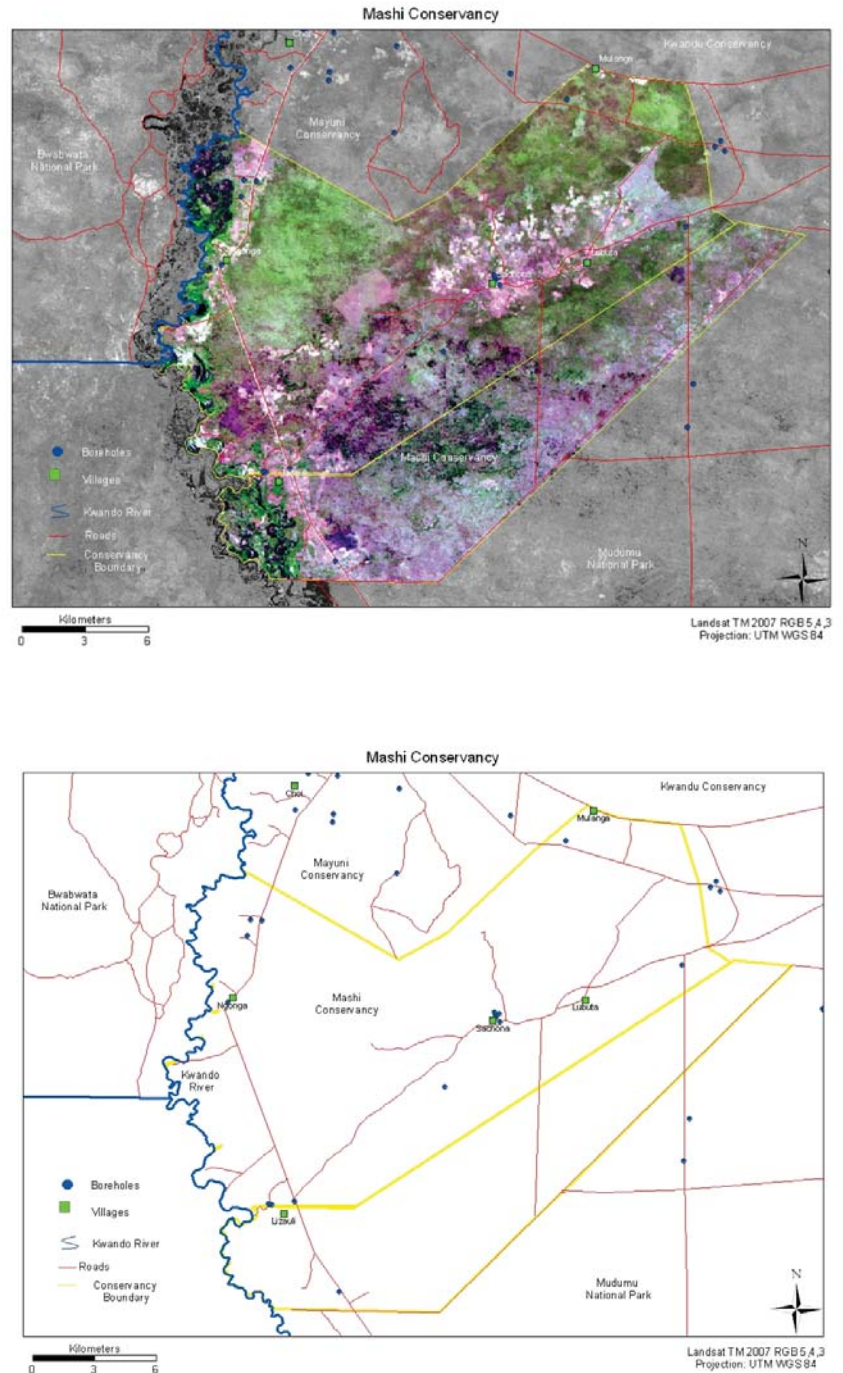


Figure 4. Mashi Conservancy, located along the Kwando River with settlements scattered along the main dirt road and inland. The satellite image shows dense vegetation in green, shrub areas in purple, and settlement/agricultural plots in white. The river is outlined in blue.

## Mayuni Conservancy

Welcome to Mayuni conservancy (MyC)! Your conservancy is located between the Kwando and Mashu conservancies along the Kwando River. To the west, it borders Bwabwata National Park across the river and has a sliver of access to the state-owned forest reserve to the northeast. It also borders the main tar road which connects the larger urban centers in the Zambezi Region Strip to the rest of Namibia and KAZA. From a biophysical perspective, your conservancy is characterized by sandy soils, with mixed vegetation dominated by large, economically-important trees such as Zambezi Teak (*Baikiaea plurijuga*) as well as trees adapted to dry, sandy conditions such as the silver cluster-leaf. This conservancy is the second largest, with most settlements along two main roads as well as in close proximity to the Kwando River (see Figure 4). Livelihood strategies are dominated by rain-fed agriculture largely for household consumption. Villagers mainly rely on boreholes provided by the government for daily water needs and they already have contracts in place with two tourism lodges and one safari hunter that bring in-kind and economic benefits to community members that work for these enterprises. The community also owns and operates a campsite near the river called Bum Hill.

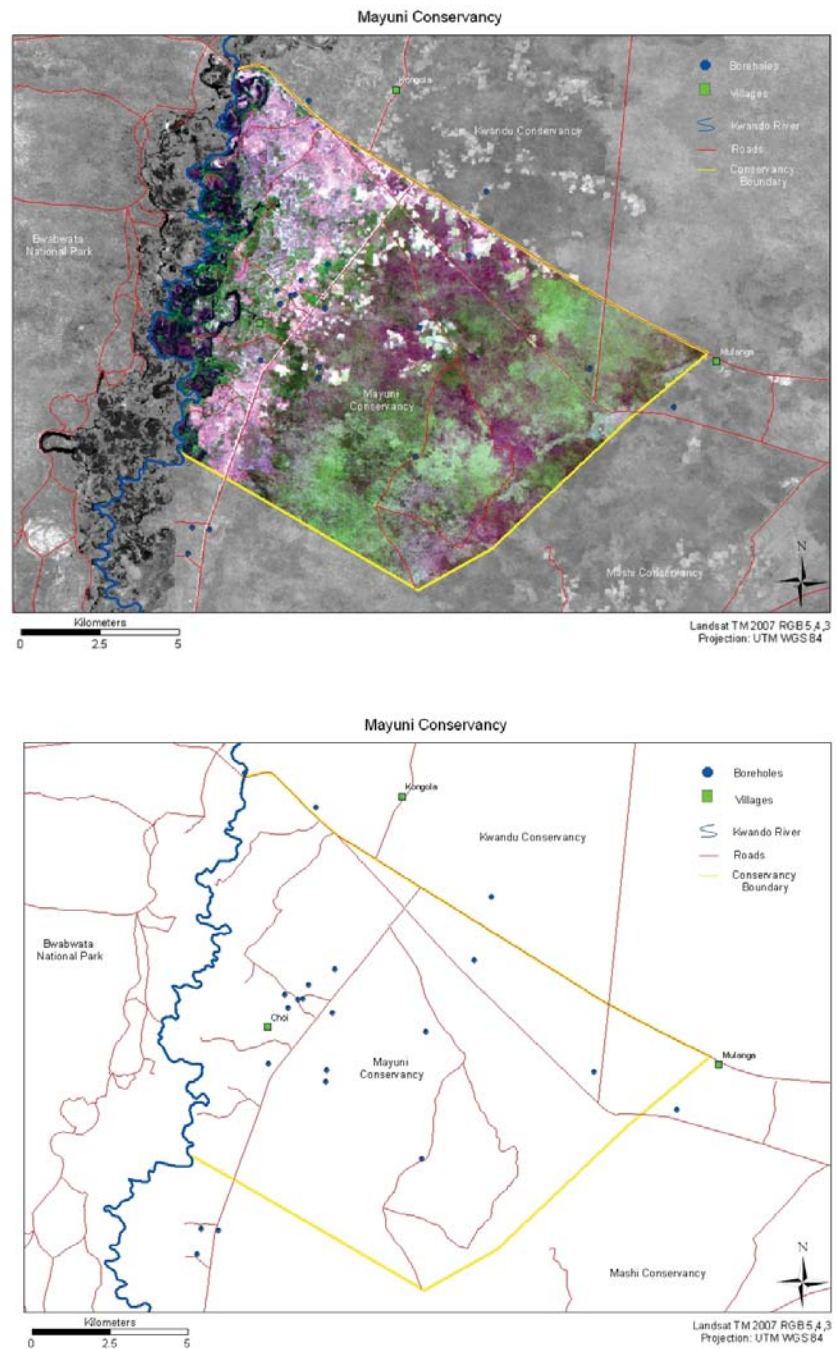


Figure 4. Mayuni Conservancy, located along the Kwando River with settlements mostly scattered along the main dirt road. The region craft and tourism market located within the boundaries of this conservancy near the main tarmac. The satellite image shows dense vegetation in green, shrub areas in purple, and settlement/agricultural plots in white. The river is outlined in blue.



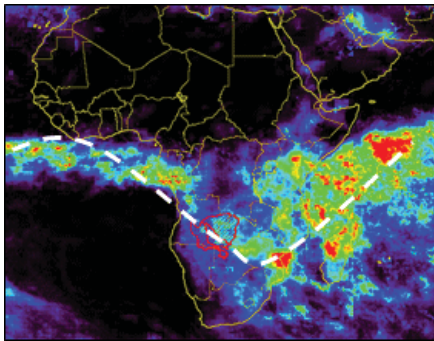
## Non-Governmental Organization (NGO) Supplemental Information

As the local meeting to decide the fate of several villages along the Kwando River is unfolding, Steve arrives. Steve is a representative from a Namibia-based NGO called Integrated Rural Development and Nature Conservation (IRDNC). With the blessings of the elders, he would like to present the village with some maps and information he has gathered for them. Everyone in Zambezi Region always asks him about regional trends in three main areas: rainfall, elephants and cattle. So his main goals for this meeting is to explain what brings the rains, describe how the elephants move, and show where the people and cattle are located beyond the boundaries of this community.

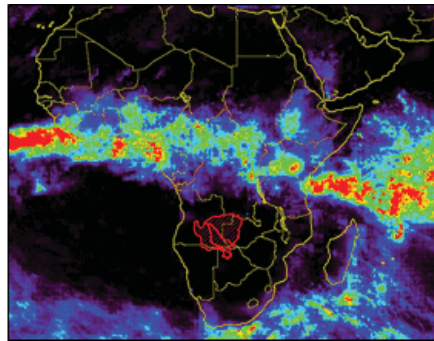
### Rainfall

Steve begins by showing the meeting attendees how seasonal rainfall is distributed across tropical latitudes (23°N to 23°S) of Africa. He points to the band of rain associated with the ITCZ (Inter-tropical Convergence Zone) that brings the rainy season from October to April in Zambezi Region (Figure 1). He gives them a good spatial context for the location of the region in relation to other geographic and climate features.

January, 1998



May, 1998



September, 1998

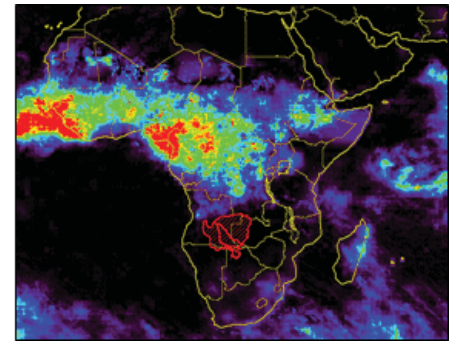


Figure 1. Inter-tropical Convergence Zone (ITCZ) seasonal movement of rainfall across southern Africa. The three main watersheds that cross through the Zambezi Region of Namibia are highlighted in red. (Source: Forrest Stevens, used with permission.)

But what everyone *always* wants to know about is what is happening with rainfall over time, whether they can expect good rains starting in October and whether the rains will be consistent through the growing season. Steve next shows the villagers pictures that demonstrate that recent decades have been drier in the region (Figure 2). The small insets show the total median rainfall between 1950 and 1975 and 1980–2005, respectively, indicating that precipitation amounts generally tend to increase as one moves farther north in latitude. The third inset shows the locations where mean annual rainfall is less in recent years (1980–2005) when compared to the time period 1950–1975.

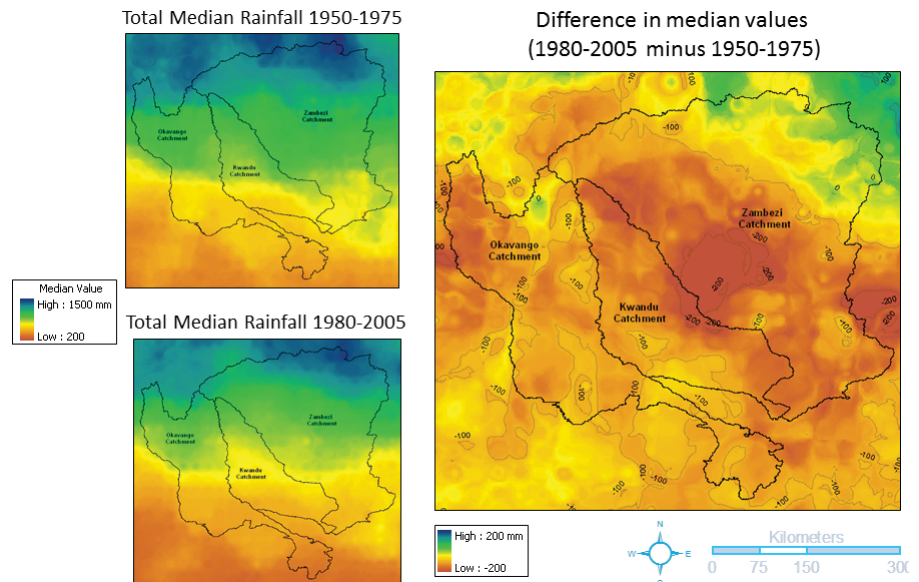


Figure 2. Image differencing between the two periods of interest with an identified buffer zone separating the two times with a global shift in climate patterns in the 1970s. The images on the left indicate an aggregated spatial depiction of all rainfall from 1950–1975 and 1980–2005, respectively. (Data from Center for Ocean-Atmospheric Prediction Studies (COAPS), Florida State University.)



Then Steve provides some detail on the other regional trends of interest:

### Elephants

First, Steve provides a bit of background information on elephants in general. Elephants are considered to be a keystone species, which means that their presence is critical to the functioning of the ecosystem in its current state. No other species, other than humans, can modify a habitat as rapidly or as extensively. This means that the removal of elephants from the system has a cascading effect on other aspects of the system, and when the landscape is pushed past critical thresholds, one cannot shift the system back to its original state. Thus, managing elephant populations is an important component of general ecosystem management, which has effects on other aspects of human survival.

Elephants are present in Botswana and Namibia but not Angola and Zambia. This is likely because poaching (Zambia) and mines (Angola) previously deterred elephants from moving north. The KAZA initiative relies on cooperation across political borders to provide elephants (and other wildlife) to move freely along corridors that roughly follow perennial rivers in the region. However, elephants are not necessarily a positively regarded presence in the region; 5–10 years ago, the growing elephant populations in northeast Botswana and Zambezi Region wreaked havoc on vegetation in these regions. Now, poaching has increased in response, which can affect tourism efforts, and in turn, negatively impact community benefits from elephant hunting, safari photography, and so forth. In short, conservation success breeds more challenges and threats. The only way to ensure the safety of elephants is by increasing their value in a variety of ways (e.g., increasing the price of permits for safari hunters or more effective policing of poaching). Steve reiterates how important it is for everyone to work together to maintain the wildlife corridors important to the success of regional initiatives established within KAZA.

### Cattle

Next, Steve shows two more maps; the first one (Figure 3) displays human population distribution in the KAZA region while the second one (Figure 4) shows where much of the cattle grazing is taking place.

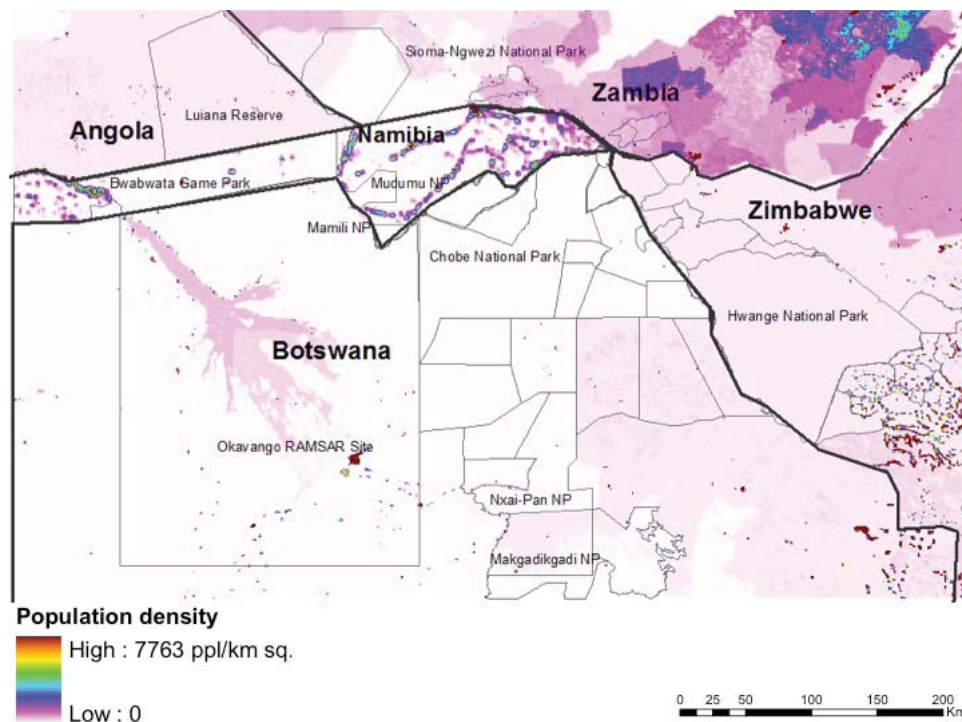


Figure 3. Population density in the KAZA region with focus on the Zambezi Region Strip of Namibia (based on the 2010 AfriPop dataset).

Figures 3 and 4 show that the human and cattle populations are not evenly distributed across the landscape. For example, Zambia has the densest human populations, but Zambezi Region has a highly clustered, strip-like pattern the follows the main roads in the region, which may affect how elephants move across the landscape. As for cattle, there are again pockets of dense cattle concentration, especially in Zambezi Region, Zambia, and Zimbabwe. The villagers are interested in whether cattle owners in these other regions are facing the same struggles they are, and while Steve does not know the details of all places, he can say with confidence that all of the humans in the region are struggling with issues with elephants, cattle, and rainfall.

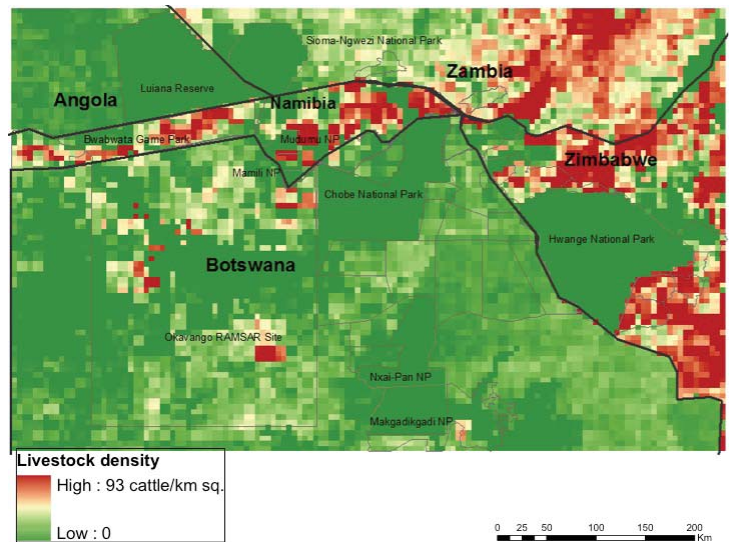


Figure 4. Map of livestock density for the central KAZA region; note the presence of the protected areas for the countries in KAZA except for the Carpivi Strip in Namibia where the protected areas are both small and they are also used for cattle grazing at times (data source: the FAO Global Cattle Density 2005 dataset).

After presenting all of this information, the villagers seemed a bit overwhelmed. So in order to help them understand the relationships between the different types of data, Steve presents the following chart to the village in which some relationships are made a little clearer (Figure 5).

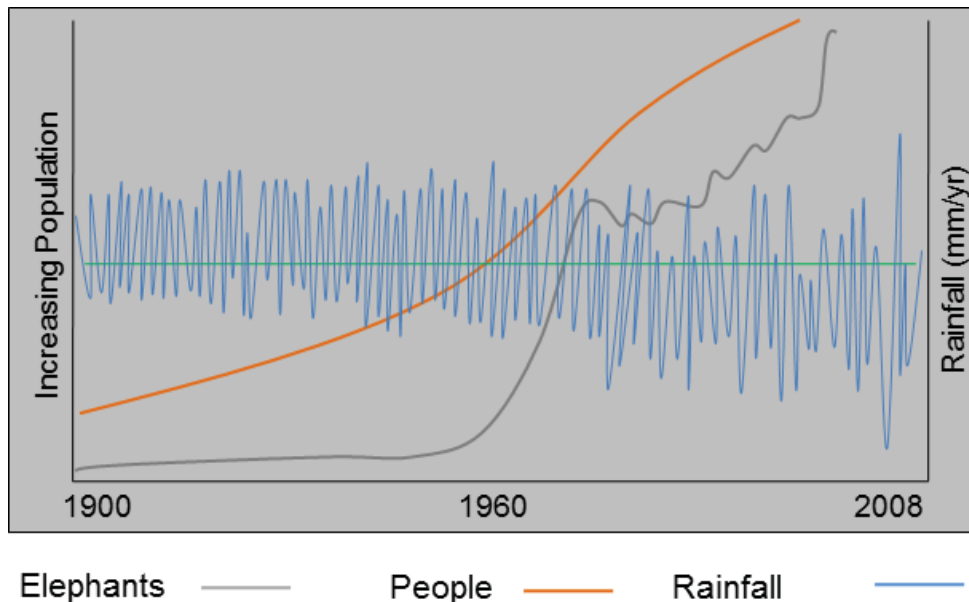


Figure 5. Hypothetical relationship between increasing variability and decreasing mean annual precipitation relative to increasing population and elephant numbers in the KAZA region from 1900–2013.

Near the end of the meeting, the villagers are exhausted but excited to start thinking about how they can use this new information to decide what their next steps will be. Now that Steve has shown all of his information, he wants to make sure it all makes sense to the villagers. He encourages them to discuss the following questions.



*Questions*

1. What are some of the relationships you can identify between trends of elephants, people, and rainfall over time?
2. What are some of the spatial relationships between all of the different regional trends that might play a role in how management decisions are made locally? Specifically, how is Zambezi Region similar to or different from surrounding areas?
3. What are some of the barriers and opportunities KAZA faces in facilitating the movement of wildlife between the 5 countries that comprise this trans-frontier conservation area?
4. Are you optimistic that KAZA will succeed in stabilizing wildlife populations in the region?
5. How does this village balance its responsibility to make decisions for its own welfare and its desire to participate in regionally-focused management activities?

