

## Non-Governmental Organization (NGO) Supplement

As the local meeting that would decide the fate of several of the 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). He would like to, with the blessings of the elders, present the village with some maps and information he has gathered for them. Everyone in Caprivi 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.

He starts off 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 Caprivi (Figure 1). He gives them a good spatial context for location of region in relation to other geographic and climate features.

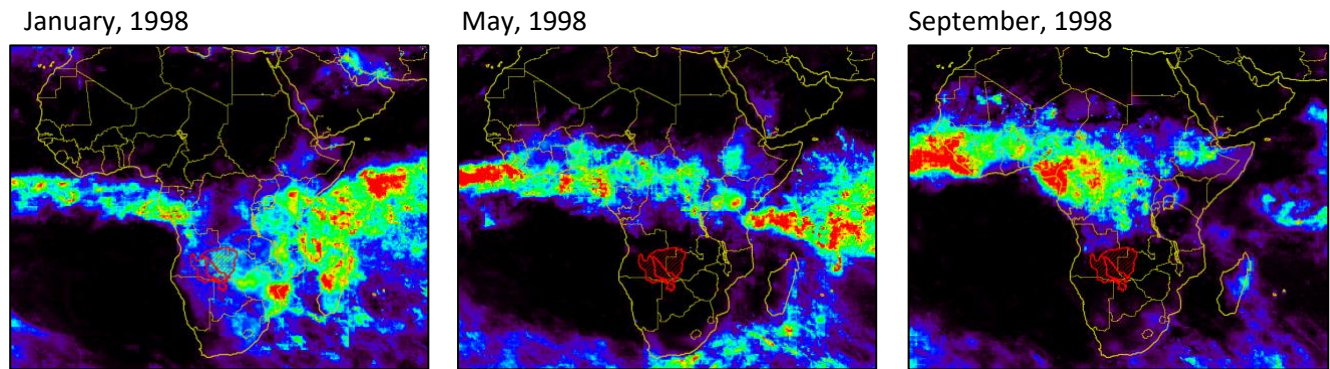
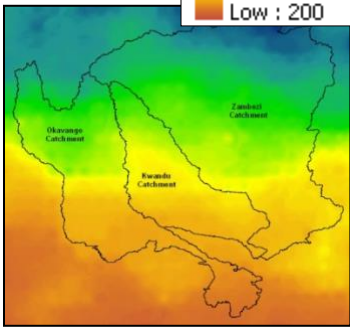
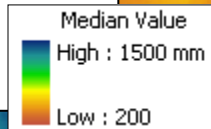
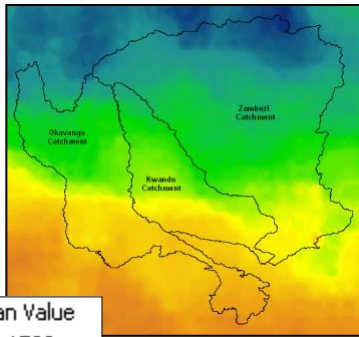


Figure 1. Inter-tropical Convergence Zone (ITCZ) seasonal movement across southern Africa. The three main watersheds that cross through Caprivi, Namibia are highlighted in red.

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. He 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 figure shows the locations where mean annual rainfall is less in recent years (1980-2005) when compared to the time period 1950-1975.

Total Median Rainfall 1950-1975



Total Median Rainfall 1980-2005

Difference in median values  
(1980-2005 minus 1950-1975)

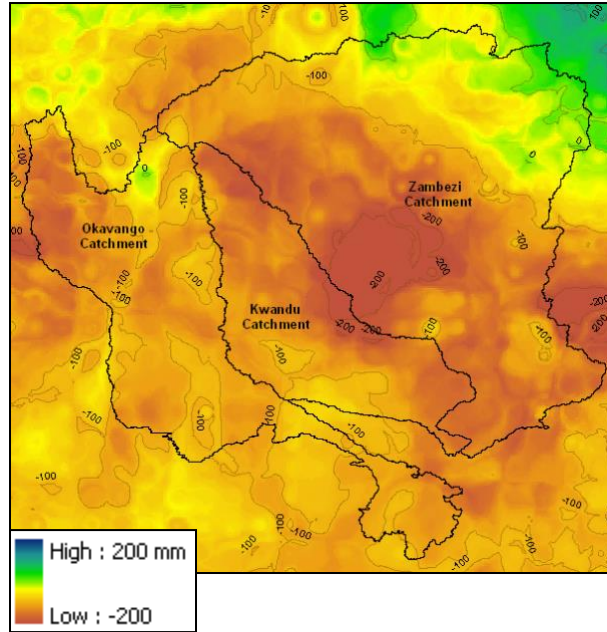


Figure 2. Image differencing between the two periods of interest with an identified buffer zone separating the two times with a global shift in climate patterns in the 1970s. The images on the left indicate an aggregated spatial depiction of all rainfall from 1950-1975 and 1980-2005 respectively.

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.

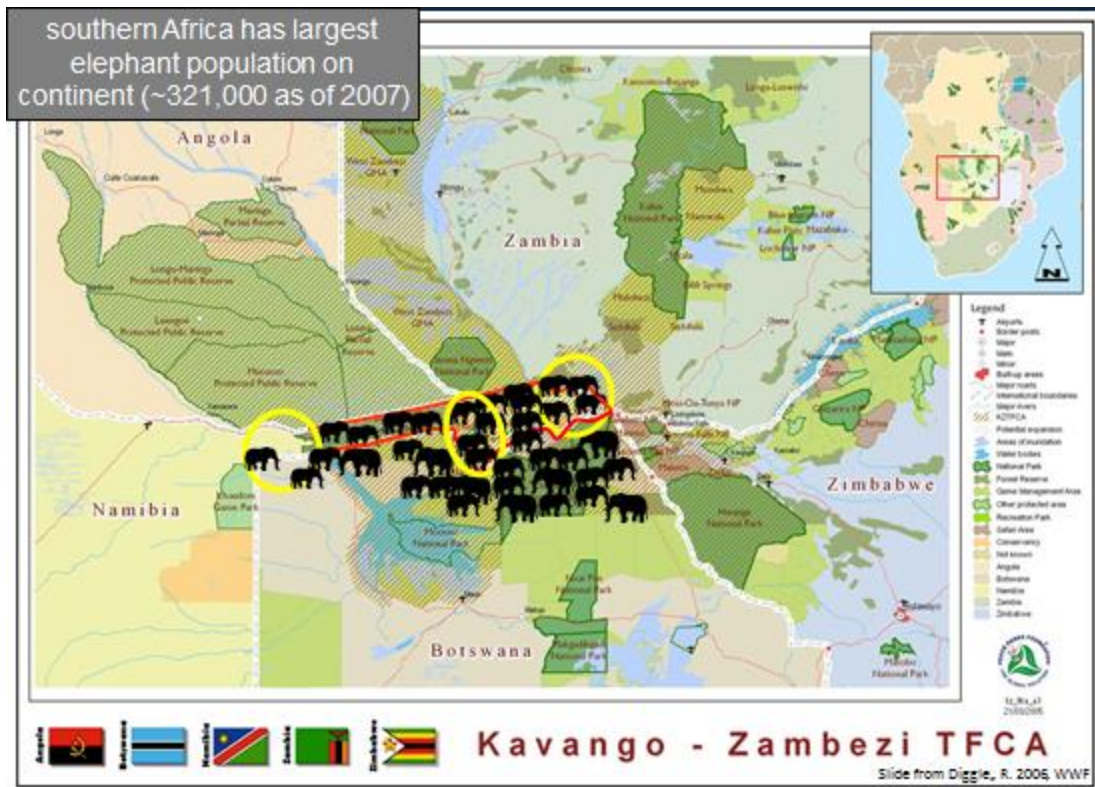


Figure 3. Elephant populations in the KAZA region.

This figure shows that 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 Caprivi 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 (ex. 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 with KAZA.

Next, Steve shows two more maps: the first one displays human population distribution in the KAZA region and the second one shows where much of the cattle grazing is taking place.

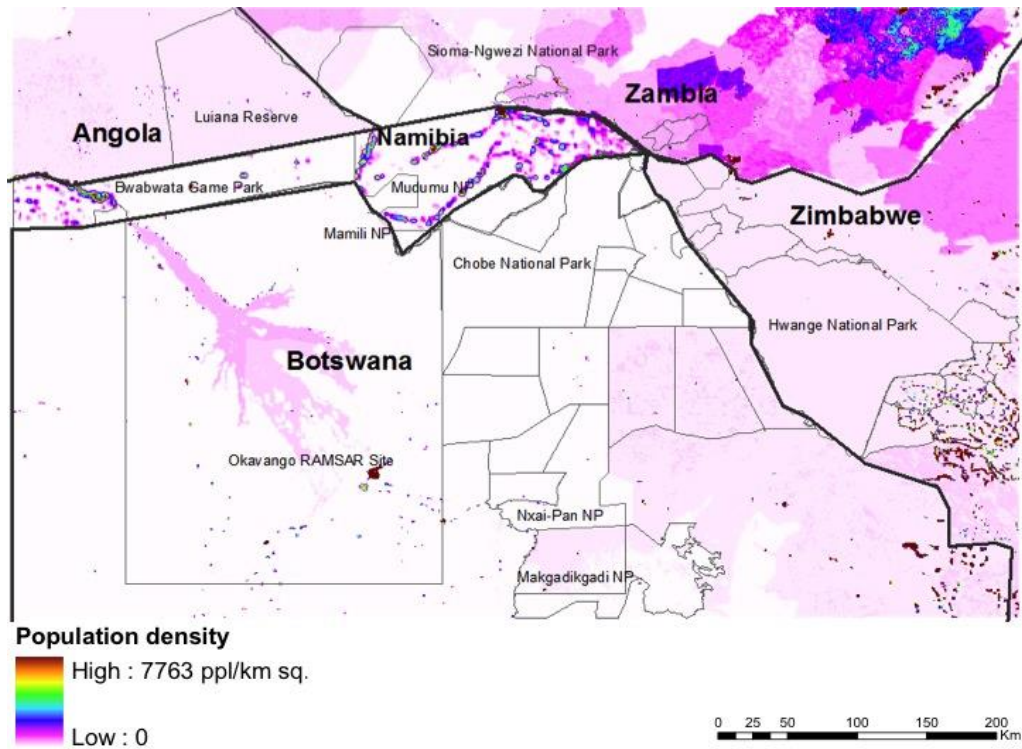


Figure 4. Population density in the KAZA region with focus on the Caprivi Strip of Namibia (based on the 2010 AfriPop dataset).

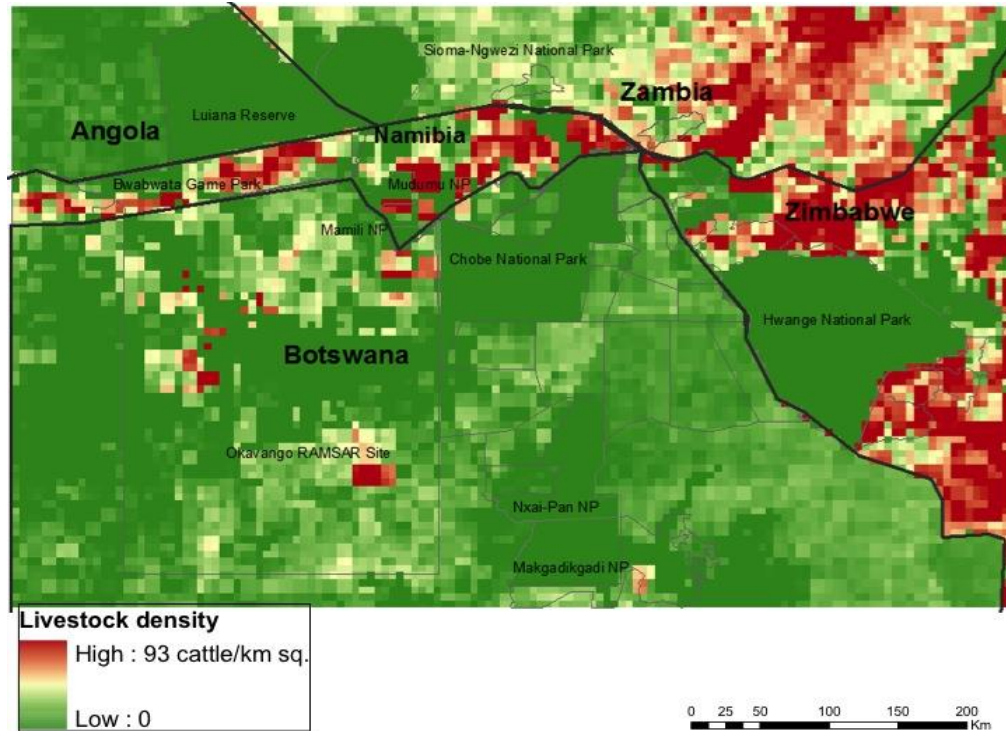


Figure 5. Map of livestock density for the central KAZA region; note the presence of the protected areas for the countries in KAZA except for the Caprivi Strip in Namibia where the protected areas are both small and they are also used for cattle grazing at times (data source: the FAO Global Cattle Density 2005 dataset).

Figures 4 and 5 show that the human and cattle populations are not evenly distributed across the landscape. For example, Zambia has the densest human populations, but Caprivi has a highly clustered, strip-like pattern the follows the main roads in the region that may affect how elephants move across the landscape. As for cattle, there are again pockets of dense cattle concentration, especially in Caprivi, 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.

After presenting all of this information, the villagers seem 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 6).

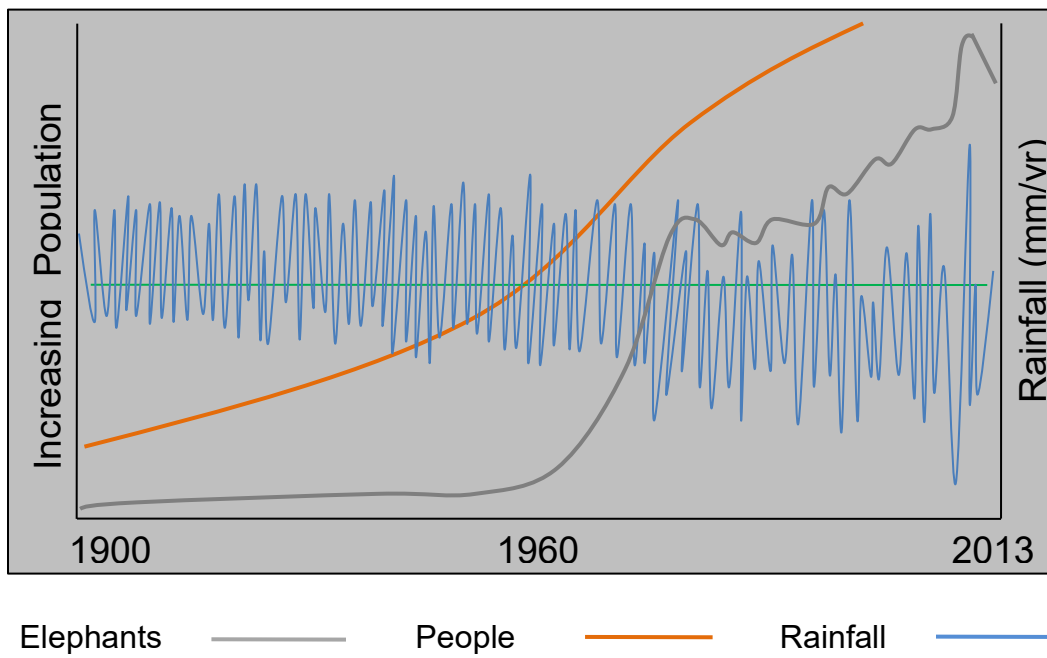


Figure 6. Graph showing the trend in rainfall, people and elephant numbers in the larger KAZA region starting from the 1900's to 2013.

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, and he wants to make sure it all makes sense to the villagers. He encourages them to discuss the following 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 Caprivi 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?