A 3-month qualitative study was conducted mid-September through mid-December 2005 to investigate rural southeast Kenyan teachers’ conceptions of snakes. Teachers from five villages near Mt. Kasigau were interviewed to obtain an overall sense of what they thought about snakes ($n = 60$). Of those 60 teachers, 28 attended a 6-hour seminar on reptiles and amphibians. From these 28 teachers, 8 teachers from three villages were afforded additional educational opportunities about snakes, and 2 teachers from this group of 8 were teamed with 2 herpetologists as mentors during the last 2 months of the study. In turn, seven of these eight teachers presented lessons about snakes using live specimens to their fellow teachers and students.

Observations of teacher participants during workshops and field outings were documented as well as teacher classroom pedagogy involving snakes before, during, and after the institute. Semi-structured and open-ended interviews were conducted with the eight core teacher participants and field notes were used to document participant observations during serendipitous live snake encounters, of which, there were many. In addition, village elders, including medicine men, one education administrator and one minister were interviewed to obtain a historical cultural backdrop, which teachers
expressed as being an important influence while formulating their own conceptions about snakes.

Findings suggest that teachers’ conceptions of snakes, within a culture where all snakes are feared and killed onsite, can change toward a more favorable orientation when given the opportunity to learn about snakes, witness positive modeling of snake handling through mentoring by herpetologists, and experience direct contact with live harmless nonaggressive snakes (e.g., the Brown House Snake [Lamprohis fuliginosus] and Kenyan Sand Boa [Eryx colubrinus]).
TRADITIONAL AND SCIENTIFIC CONCEPTIONS OF SNAKES IN KENYA: ALTERNATIVE PERSPECTIVES FOR TEACHING

A dissertation submitted to the Kent State University College and Graduate School of Education, Health, and Human Services in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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CHAPTER I
INTRODUCTION

“We all have a duty to protect our environment
and conserve biological diversity for posterity.”

—Mwai Kibaki, President of the Republic of Kenya

Focus and Rationale for the Study

The conservation of herpetofauna (reptiles and amphibians) through the teaching and understanding of biology, ecology, and environmental studies hinges on the ability of teachers to impart scientific and knowledgeable information about this misunderstood and sometimes feared group of animals. Unfortunately, knowledge about herpetofauna is too often based on misinformation or presented by individuals with limited knowledge who perpetuate misconceptions and superstitions (W. Gibbons, 1983). Snakes, in particular, are one of the most feared and abused taxa within this group of animals (J. Gibbons et al., 2000; Ricciuti, 2001). Many people are simply unaware that most species of snakes are completely harmless and many species are ecologically beneficial as controllers of rodent pests.

Environmental education has been charged with integrating the aforementioned subject areas while fostering informed decision making abilities in school children and the population at large. Environmental education is defined as:
A learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

(UNESCO, Tbilisi Declaration, 1978)

Conserving Earth’s biodiversity is a longstanding goal of environmental education (Kenya Organization of Environmental Education [KOEE], 2006; North American Association For Environmental Education [NAAEE], 2006). The United States and Kenya both recognize the need for environmental education and agree that biodiversity conservation is necessary to ensure a sustainable environment for all (American Association for the Advancement of Science [AAAS], 1993; KOEE, 2006; National Science Teachers Association [NSTA], 2003). This responsibility includes the efforts of conservation education as well. Conservation education can be considered a subset of environmental education and is frequently acknowledged as one of the primary antecedents of environmental education (Nash, 1976). However, environmental education has treaded lightly when it comes to promoting action due to the fear of blurring the lines between teaching ecologically sound science and politically motivated or special interest group advocacy (see Tanner, 1974; van Weelie & Wals, 2002).

Professor Wangari Maathai, 2004 Nobel Peace Prize laureate, current Kenyan Assistant Minister for Environment and Natural Resources and founder of the Green Belt Movement, said on receiving the United Nations Africa Prize for Leadership in 1991:
It is not as if leaders do not understand the impact of the unjust political and economic systems which are promoting environmental degradation and promoting a non-sustainable development model. When will such business be considered unacceptable in the world community? . . . Africa’s challenges are being tackled at different levels, and some successes have been recorded. But not fast enough. The concepts of sustainable development, appropriate development models, and participatory development are not foreign. We are aware that our children and the future generations have a right to a world which will also need energy, should be free of pollution, should be rich with biological diversity and should have a climate which will sustain all forms of life. (Green Belt Movement, italics added.)

Professor Maathai has been an outspoken advocate for the conservation of Kenya’s natural resources since before the development of the Green Belt Movement (GBM) in 1977. The GBM is an excellent example of conservation education, using advocacy to effectively raise people’s consciousness and dedicated to action through reforestation efforts (Maathai, 2004). Over 30 million trees have been planted in Kenya since the GBM was initiated. In addition to tree planting advocacy, the GBM promotes the capacity of women in the development of Kenya, dissemination of information on environment conservation (e.g., soil erosion, desertification, lack of clean drinking water), and civic education. One of the most prominent conservation advocacy efforts by the GBM was the campaign to save Karura, Mt. Kenya and Kafiru-ini forests. In 1999 during this campaign Professor Maathai along with 20 other environmental activists who had come to plant trees in the Karura forest near Nairobi were attacked by guards hired by a development
company claiming ownership of part of the forest. On the other hand, environmental education as it is now conceived by many, would not openly support such a campaign but would attempt to present both sides as fairly as possible allowing the student (or citizen) to make their own informed decision (E. Johnson & Mappin, 2005).

Unfortunately, the majority of educational efforts in the western world reinforce an anthropocentric curriculum that still views natural resources as an inexhaustible cornucopia of usable goods, and regards some forms of wildlife as unimportant, dispensable creatures (see Bowers, 1993, 1997; E. O. Wilson, 2002). Due to the influence of Christian missionaries and colonialization by westerners, many African countries have adopted this same idea of curriculum, Kenya being a prime example (Jegede, 1997). Most environmental education efforts (now with curriculum requirements in over 55 countries) follow a traditional “ecological literacy” campaign that believes informed citizens will make decisions that will promote an ecologically sustainable environment (Orr, 1992). However, this may fall short of what is necessary to get people to act.

Over the last 30 years the term conservation has evolved from a resource management term to one that includes concern for the protection of the worlds’ biodiversity, which agrees with the interests of environmental education. However, in this regard, conservation education takes concern for biodiversity one step further than environmental education by the admission of advocacy for, and the protection of, animals, plants, and the necessary environments to sustain them. Museums and zoos worldwide have adopted a conservation education mission (Carr, 2005). For example, according to the National Museums of Kenya’s Director-General, Dr. Iddle Farah, “our
Museums' mission has expanded from one of passive collection and specialized scholarship to include active participation and commitment in meeting today's many needs of Kenyan society” (Retrieved October 13, 2007, from http://www.naturekenya.org/museums.htm). This does not mean that zoos and museums are immune to the social pressures that concern environmental education efforts, it is just to point out that proponents of conservation education are willing to walk the controversial tight rope as they balance an advocacy message for the protection of biodiversity backed by the best available ecological science of the times.

Workshops facilitated by the herpetologists from the National Museums of Kenya during the present study incorporate a snake conservation education message as part of their scientific perspective. At the beginning of the study, during my first two weeks in Kasigau, I attempted to find out as much as I could about teachers’ and other community members’ conceptions of snakes while holding back my own ideas about snakes. However, I have no doubt that my own positive bias for the conservation of snakes reinforced the scientific perspectives espoused by the visiting herpetologists during the duration of the project.

Statement of Problem

In most areas where snakes are found, one will find people who are frightened of snakes (ophidiophobia) or find them to be disgusting, horrible creatures—or both (Greene, 1997; Kellert, 1996; Ricciuti, 2001; Rowan, 1988). Fear of snakes, where dangerous snakes are common, is warranted. Even though only about 20% of snake species could be considered dangerous worldwide, the potential danger that venomous
serpents possess, or the incredible power that large constrictors embody, can be threatening. However, if one can identify harmless species of snakes then the fear of snakes can be limited to those species that constitute a threat to humans. The problem of this study is the transformation of Kenyan village teachers’ conceptions of snakes from one of misunderstanding, fear, and loathing, to a more scientific conception of snakes in order to facilitate teaching about snakes in a less negative way.

In East Africa, there are close to 200 species of snakes. Of these 200 species of snakes, 47 species could be considered dangerous to humans, 45 of them are venomous and 2 are large constrictors (Spawls, Howell, Drewes, & Ashe, 2004). Of the 47 dangerous species mentioned, 18 species are known to have killed people (Spawls et al.). Of the 18 most dangerous species of snakes found in East Africa the area where the present study took place is home to several of these species, for example, the Puff Adder (Bitis arietans), Boomslang (Dispholidus typus) and Black Mamba (Dendroaspis polylepis).

This study took place in five villages surrounding Mt. Kasigau located in southeast Kenya. Mt. Kasigau is an outlier of the Taita Hills, which are part of the Eastern Arc Mountains ranging from southern Tanzania to southeast Kenya. According to the species list of reptiles that have been found on or near the Taita Discovery Centre (an ecotourist/environmental education center located near Mt. Kasigau) and range maps from *Reptiles of East Africa* (Spawls et al., 2004), there are 41 species of snakes, including 9 potentially life-threatening, venomous species and 1 large constrictor, indigenous to the Mt. Kasigau region (Appendix A). Without a comprehensive survey of
snakes found in the Mt. Kasigau area, it is still not known how many snake species may inhabit the specific study area.

It is interesting to note that in addition to the above-mentioned dangerously venomous species found in southeast Kenya, there are also at least 13 species of mildly venomous, non-life-threatening species that may live in the Kasigau area (Appendix A). Mildly venomous refers to snakes whose venom assists with subduing prey, such as lizards or frogs, but is not known to be life-threatening to humans. Symptoms from the bite of a mildly venomous snake can vary greatly depending on the species. Typical symptoms from a bite may include itching, swelling, local pain, local hemorrhaging, and nausea. These frightening symptoms may explain why many rural Kenyans believe most snakes are capable of causing death (Snow et al., 1994).

It is understandable that a dangerous snake in or near someone’s home should be removed (or even killed, if it cannot be captured safely and relocated elsewhere) for obvious reasons. Even though snakes are normally secretive creatures and avoid contact with humans, many species are nocturnal; one would not want to risk stepping on a venomous snake at night or rolling on top of a dangerous snake in bed seeking a warm place to curl up. The danger of snakebite depends on circumstances. Nearly all snakes are non-aggressive, and if unmolested, will freeze or flee if given the opportunity. Generally speaking, even Black Mambas (*Dendroaspis polylepis*), a relatively “aggressive” snake
species, if given the chance, will freeze, “hoping” to remain unseen, or crawl away rapidly to avoid confrontation with a human (Ricciuti, 2001; Spawls et al., 2004). ¹

Even though humans have good cause to keep a respectful distance from potentially dangerous snakes, snakes do provide a valuable service. Many species of snakes eat rodents, which destroy crops, and certain other harmless species of snakes specialize in eating other snakes, even venomous ones. An excellent example of a snake that villagers in southeast Kenya might consider their friend is the Cape File Snake (Mehelya capensis), which eats a wide variety of ectothermic (“cold-blooded”) prey, including venomous, life-threatening Black Mambas (Dendroaspis polylepis) and Puff Adders (Bitis arietans).

Snakes are an integral part of the food web, and over-collecting of snakes for export or the destruction of all snakes in an area can upset the ecological balance. In Kenya and northern Tanzania, the harmless Mole Snake (Pseudaspis cana) is a valuable controller of rats in the farms of rural areas. The advantages of having Mole Snakes living on a shamba (farm) provides just one example of how local farmers may benefit from learning to identify and tolerate nonvenomous species of snakes.

In Africa, damage attributed to rodents in Tanzania causes an estimated annual maize (corn) yield loss of 5–15%, which corresponds to about 45 million dollars and food for about 2 million people (Leirs, 2003). Maize is the main crop in many villages in

¹ The two Black Mambas that I encountered during this study reacted to my presence, and the accompanying teachers, in just this way. It was not until I secured the animals with snake tongs that any aggressive behavior manifested.
southeast Kenya, and many of the mashamba (farms) in the Kasigau/Taita Hills area grow maize as a major crop. Snakes are a major predator of rodents in southeast Africa, including the Taita Hills region (Spawls et al., 2004).

One extreme example that illustrates the importance of snakes in maintaining the ecological balance of an area as it relates to agricultural endeavors comes from Thailand. In 1985, 1.3 million snakes were exported from Thailand mostly for human consumption to other Southeast Asian countries whose people believe that eating parts of snakes promotes good health and longevity. Freed from snake predators, Thailand’s rat population exploded, destroying an estimated 400,000 ha (nearly a million acres) of rice fields (Spawls et al., 2004).

The mixed messages that the public receives in the United States and many other countries from today’s popular culture regarding snakes can be confusing. Shows like Fear Factor, for example, have frightened contestants by using totally harmless species of snakes poured on them while secured in coffin-like containers. The recent movie Snakes on a Plane, starring Samuel L. Jackson, exploits common fears of snakes and flying. Adding to the confusion between harmless and dangerous snakes, nonvenomous snakes are used in this movie to portray deadly, venomous species—the harmless Florida Kingsnake (Lampropeltis getula floridana) is depicted as an Inland Taipan (Oxyuranus

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2 Location of current study.
3 The movie Snakes on a Plane is now available in Voi, Kenya in VHS format. Voi is the nearest town to Kasigau where the current study took place. Villagers of Bungule (Bungule is one of the five villages surrounding Mt. Kasisgau) occasionally have a movie night and watch videos rented from Voi with the use of a gas-powered generator. Patrons are charged 10 Ksh each to watch the movie by the owner of the only TV in Bungule.
*microlepidotus*), considered one of the deadliest snakes on Earth. Even the late Steve Irwin, who is considered by many to have been one of the best-known herpetofauna conservationists in the world (and who also filmed one episode of *The Crocodile Hunter—Deadliest Snakes of Africa*—less than 20 km from Kasigau), would, on many occasions, yank around extremely dangerous venomous snakes by the tail. What are we to think? Are snakes really as frightening and “dangerous” as their portrayals on television? Or should they be respected and conserved as integral strands of the Earth’s biofabric that is continually being frayed by anthropocentric needs, wants, and desires?

In rural Kenya, including the villages surrounding Mt. Kasigau, snakes are a real and ever-present danger. With so many venomous species in the region, it is no wonder that snakes are feared and routinely killed onsite. However, with the potential of losing large quantities of grain to rodents, it would benefit people living and farming in southeastern Kenyan communities to recognize a few species of harmless snakes that eat rats and mice. According to Spawls and his colleagues (2004), “The Brown House Snakes of East Africa are the farmer’s friend and everyone should be able to identify and appreciate them” (p. 320). However, in the area of the current study, even the innocuous Brown House Snake is viewed as a deadly animal deserving death. I became aware of the overwhelming negative view of snakes while visiting Kasigau during my first trip to Kenya in 2004.

During a workshop held during the summer of 2004 in the village of Bungule, located at the base of Mt. Kasigau, seven science teachers, representing five schools from five villages (Bungule, Jora, Rukanga, Kiteghe, and Makwasinyi) expressed a fear of
snakes and agreed that snakes must be killed onsite (Wojnowski, 2004). Children in the Kasigau area who locate a snake will mob it and throw stones at the animal until “the snake looks like hamburger” (B. Molumbo, personal communication, July 30, 2004). The older children who kill most of the snakes discovered on school grounds influence younger children.

Kellert (1985) found that high school students in the U.S. were more interested in direct contact with wildlife and outdoor recreation than younger students and have an increasing ability to deal with abstract concepts, such as biodiversity and ecosystems. From my own observations and the expectations developed by the Kenyan Institute of Education (KIE), it would seem that Kenyan students are no different then those in the U.S. when it comes to interest in wildlife and their abilities to deal with abstract concepts. One major difference is that there are many students in the sixth, seventh, and eighth grades located in each village primary school that are old enough to exhibit these interests and conceptual abilities. These interests and abilities, coupled with greater knowledge about biodiversity and ecosystems, could provide increased interactive learning opportunities for this group to deepen and strengthen their knowledge and understanding of snakes. This, in turn, would provide more positive role models to younger children when dealing with snakes. The teachers of Kasigau could capitalize on their older students’ interests and abilities to deal with concepts such as biodiversity and ecology as

4 The Kenyan government declared free primary education (K-8) in 2003, which allowed a large number of children to begin schooling at various ages who previously could not attend due to lack of resources.
they relate to snakes. However, if it is deemed important for older students to have an increased appreciation for the ecological niche of snakes, Kenyan teachers will need to broaden their conceptions of snakes and adopt an alternative perspective when teaching about snakes.

Exposure to a scientific perspective toward snakes did broaden Kasigau teachers’ conceptions of snakes. This, in turn, allowed for an alternative perspective when teaching lessons about biology, ecology, and the environment as they relate to snakes. According to the Kasigau teachers’ themselves, prior concepts of snakes were limiting their ability and desire to teach about snakes from a scientific perspective. Adopting a more conservation minded perspective toward snakes in general, based on increased knowledge and positive experiences with snakes, fostered a willingness and interest to include lessons about snakes in their classrooms. As Dewey (1938) pointed out, it is an educator’s responsibility to “be able to judge what attitudes are actually conducive to continued growth [for their students] and what are detrimental” (p. 39). In the summer of 2004 during my initial visit to Kenya (the village of Bungule in particular) several teachers professed an interest in learning more about snakes and other herpetofauna and seemed to me to be genuinely interested in finding out why anyone would care about such creatures. The seven teachers I spoke with that summer, representing four out of the five villages surrounding Mt. Kasigau, expressed the desire to find out more about snakes and told me that they would be willing to work with me upon my return. They also told me they looked forward to any opportunity to learn more so that they could share what they learned with their students.
Purpose of This Study

The purpose of this study was to explore the relationship between rural southeast Kenyan teachers’ traditional conceptions of snakes and the possible effect of exposure to scientific understandings of snakes. Generally speaking, the traditional conceptions of the Wakasigau about snakes included fear, aversion, and loathing. Hostile feelings toward snakes would manifest during snake confrontations usually leading to the death of any snake encountered by those with the courage to confront snakes. In cases where individuals who found snakes did not possess the courage or ability to kill a snake they would attempt to find someone who could.

The current study entailed the documentation of teachers’ conceptions of snakes through stories shared with me and eyewitness accounts of teachers’ interactions with snakes during my 3-month stay in Kasigau. Overall, the purpose of this study was to gain entry into the conceptual world of the participants in relation to snakes (Geertz, 1973). In addition, could exposure to scientific perspectives of the visiting herpetologists influence teachers’ relationship to snakes?

In addition to myself, three other herpetologists traveled to Bungule to facilitate herpetofauna conservation education opportunities for the teachers of Kasigau. Two of

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5 Wakasigau refers to the people living in the five villages surrounding Mt. Kasigau, Bungule, Jora, Rukanga, Kiteghe and Makwasinyi.
6 I have included myself in my list of visiting herpetologists, and although I am not considered a professional herpetologist by trade or necessarily from an academic viewpoint, I have spent over 25 years studying reptiles and amphibians and taken several university courses related to herpetology (enough to constitute a minor in herpetology at NCSU if one had been offered during my masters degree work at this institution).
the herpetologists were Peter Mataka, Head of the Herpetology Department at a natural history museum in Kenya, and Ruby Ngima also with the same institution. The third herpetologist was Dr. James Frye, a specialist in fossorial herpetofauna from a European university, who was currently working on a project with Peter Mataka. Visits by the herpetologists included one full-day workshop facilitated by Ruby during the beginning of the project, and three subsequent five-day visits by Peter and James who mentored Kibonye Kituri and Vicheko Mboti, two teachers from Bungule, and the two teachers who spent the most time with me and the herpetologists.

Findings from the present study include a collection of narratives describing the conceptions of snakes held by eight rural Kenyan teachers and other influential community members living in Kasigau, Kenya, regarding snakes. Further, the study explored the relationship between teachers and snakes and the teachers’ change of perspective toward snakes during a 3-month period after exposure to visiting herpetologists’ scientific perspective of snakes. A herpetofauna professional development institute was conducted during this period in order to facilitate encounters between Kasigau teachers, herpetologists, and snakes. The following research questions were used to guide this study:

1. How do Kasigau teachers conceptually relate to snakes?

2. How might Kasigau teachers’ conceptual relationship with snakes change following exposure to scientific perspectives and experiences?
Understanding the Context and Goals of the Study

My interests in science education, teacher professional development, and herpetology were the motivational forces that led me to this project. Over the past few years, several Kent State University faculty members have traveled to the Taita Discovery Centre (TDC) and the villages of Mt. Kasigau near Voi, Kenya, in order to establish cooperative ventures for the College of Education, Health, and Human Services (EHHS).

I conducted a feasibility study while visiting the Kasigau area with the Kent State team in July of 2004. One of the motivating factors that led to this dissertation was my lifelong interest in the conservation of reptiles and amphibians and why some people have such negative conceptions of snakes. I am also curious about how these conceptions are formed, and how their conceptions originated and what personal experiences have helped to shape their ideas about snakes.

I was also interested in how their conceptions of snakes were influenced by exposure to scientific perspectives. I did not withhold my own biased interest in snake conservation, although I did attempt to dampen it somewhat until the first NMK herpetologist-facilitated workshop was held.

Setting

Mt. Kasigau is a large hill (or small mountain depending on who you are talking to and the context of the conversation) that rises out of the plain about 40 miles south of Voi in southern Kenya. Five villages are situated on the lower slopes, and the villagers’ fields occupy a band of flat plain around the base of the hill where they grow maize and a
few other crops. Beyond the cultivated areas is bushland for as far as the eye can see. A large percentage of the land is part of Tsavo National Park but cattle ranches, a mining operation and other villages occupy other smaller tracts. Most households are subsistence farmers with many families also keeping chickens and goats. A few families raise cattle.

Education and the economy of modern Kenya have brought new opportunities to the Wakasigau (people of Kasigau). Some villagers are employed locally, for example, running small shops known as kiosks. In the smaller villages some kiosks double as a convenient store and a diner. Villagers with a secondary school education or college degree usually end up moving to Voi, Mombassa, or as far as Nairobi to find work. Those that are able to land jobs as teachers in the local village primary schools where they grew up consider themselves extremely fortunate, as the Kenyan government reserves the right to employ teachers anywhere it is deemed necessary.

Farming remains the basis of the economy. Food production entails long days of hot, exhausting work and food can be scarce at times. This is due mainly to the frequent droughts in the region and lack of irrigation. When the rains fail there is no harvest. In addition, monkeys raid the maize crops and large animals occasionally trample them. Snakes, which are common, are a real threat to life and farmers must be wary as they tend their fields. Goats and cattle are still occasionally lost to lions or other predators, although this is becoming a rare event. Illness is also a problem for the people of Kasigau and a constant worry. While I was there several people were sick with malaria and one young lady, who I took to the clinic located in the village of Rukanga, eventually died of tuberculosis.
I was invited to attend her funeral and this experience had a profound effect on me. Just weeks before I had carried this young woman in my arms up the stairs to the infirmary and now she was gone. The stark reality of the hardships that the people of Kasigau face everyday hit me very hard.

In the past, the Wakasigau did not regard themselves as being in control of the events in their lives; they lived in a world where things happened to them. Illness and misfortunes used to be blamed on sorcery, or spirits, or the anger of ancestors or living persons (Harris, 1986). Each village had its reputed sorcerers, whose crimes were usually thought to be motivated by jealousy. Spirits would take possession of individuals and these ‘possessed’ individuals would demand offerings, causing illness and misfortune if their wishes were not met. Chronic illness was sometimes believed as a sign that an ancestor was being neglected. These are examples of what might be called ‘traditional’ Kasigau culture, and there is a range of traditional medicines and charms to guard against them. (However, traditional beliefs of witches and sorcerers are still common within the Kasigau community as witnessed by me and shared in one of the narratives in Chapter 4.)

By the time of my fieldwork, Kasigau had been influenced by Christianity for 70 years or more. Some of the people that I came to know well, and professed to be Christians, still used traditional explanations of and cures for misfortune, but others seemed to have replaced the traditional beliefs about the causes of misfortune with Satan. Instead of blaming people or wild animals as being evil or dangerous in and of themselves, they are seen as instruments of Satan, or, as I noticed was most often the case, some mixture of traditional beliefs and Christianity.
Another modern influence on the Kasigau culture is the essentially British formal education that has been used by the schools since the 1930s. The teaching of a western science perspective has caused many people to question traditional beliefs about sorcery, spirits, and the harmful effects of anger. Most of the villagers I spoke with are now inclined to abandon traditional means of combating illness and misfortune, and instead use the health clinic located in Rukanga, and if it is a very serious condition, the nearest hospital in Voi. However, traditional medicines and charms are still used by many Wakasigau with the common saying that, “if one cannot get to a hospital, traditional medicine is better than nothing.” This would lead one to believe that there are still some residual beliefs in the traditional ways.

Participants

As mentioned earlier, Kibonye and Vicheko were the two teachers who spent the most time with the visiting herpetologists and me. In addition, three other male teachers, Kilabu, the High School biology teacher from the village of Rukanga, and Mwaza and Busara both from Kiteghe Primary School joined us on snake hunting expeditions to further their knowledge of snake identification and safe snake handling procedures. Farahifu and Chanua, two female teachers from Bungule, also spent additional time learning about snake identification and safe snake handling techniques.

I was also intrigued by the myths and legends about snakes that were shared with me during my stay within the Kasigau community. Many teachers discussed the influence of community elders and how the stories they heard while growing up had a definite impact on their conceptions of snakes. In order to investigate this aspect of the influences
on teachers’ conceptions of snakes, I interviewed several community elders. I also picked up many stories while eating at different kiosks in the villages or hanging out with teachers in the various teachers’ lounges, chatting with whomever I came into contact with about snakes. These impromptu discussions gave me an overall sense of what the people of Kasigau, and more specifically, the teachers, thought of snakes.

Significance of Study

Specific research on teachers’ conceptions of snakes is lacking. Determining what type of professional development may or may not be needed or desirable will be dependent on obtaining some sort of foundational knowledge of what teachers know about snakes and how they feel about snakes. Basic research that explores teachers’ perceptions of subjects or content information that was previously shunned by teachers or presented to students in a negative fashion would be helpful in justifying the type of professional development that is developed and implemented (Collins, 2000). Also, current attitudes toward animals have been studied (Kellert, 1980), but attitude changes toward animals have not been studied in depth (Herzog & Burghardt, in Rowan, 1988). However, to truly understand how people interact with animals in-depth, or any object for that matter, is dependent on circumstances and the context of the act itself, not on one’s attitude (Blumer, 1969). According to Blumer there are exceptions; for example, those persons who experience ophidiophobia (acute fear of snakes) may tend to act more from a predisposition, which may “dominate the act to the exclusion of the demands of the situation and the expectations of others” (p. 97). I did observe this phenomenon by one teacher during the present study and will elaborate more on this later.
Assumptions

Several assumptions underlie this study. The first two deal with fundamental perspectives toward snakes that many herpetologists think are essential for the positive portrayal of snakes when teaching herpetofauna conservation. The first assumption is that snakes are not inherently “bad” animals and that snakes deserve our respect and protection (W. Gibbons, 1983; Greene, 1997). Fearing snakes does not connote a lack of respect. In fact, a healthy fear of being bitten by a venomous snake is a sure sign of respect for that animal. One cause of death among herpetologists is overconfidence and lack of respect for the speed and potential harm that some species of snakes possess. However, if that healthy fear is replaced with an irrational fear of harmless snakes, snake conservation/identification education can be helpful. Secondly, snakes are an important part of many ecosystems (Spawls et al., 2004). As illustrated earlier, snakes are an important ecological control of rodents. In many environments, without the presence of snakes, rodents will overpopulate an area destroying crops and decimating food stores.

Another assumption is that people’s actions are contextual and are not predetermined by attitudes (Blumer, 1969). Accordingly, this would mean that even though a person may have extreme negative tendencies toward snakes this negativity would not necessarily be a determinant factor in how that individual may react to a snake in a particular situation.

Limitations

Findings from this study are limited by three basic factors: transferability, methodological issues, and researcher bias. First, because of time restrictions due to
financial constraints of living and working so far from home, data collection was limited to 3 months. My original hope was to stay in Kenya for 10 months. Because of the shortened time frame the initial stage of collecting baseline data of teachers’ conceptions of snakes was abbreviated. Although consistent conceptual patterns were observed during the preliminary stage of the study, perhaps more time would have provided a deeper exploration of the teachers’ conceptualization of snakes and afforded additional opportunities to obtain alternative or more reliable descriptions of teacher actions toward snakes. Further, an extended time frame would have given teachers additional opportunities for more in-depth transformative learning experiences and document if conceptual changes were long-term or if the participants’ perspectives returned to previously held ideas before the study began.

This last concern has been ameliorated somewhat by emails I have received from two of the teachers over the last eight months and by one professor who lived in the Bungule *Banda* after I had left who volunteered information about teachers continued use of an alternative scientific perspective when interacting with snakes. Additionally, although I had a fairly large sample size for a qualitative study (*n* = 60), the bulk of the study focused on eight teachers, and out of those eight, two teachers garnered the majority of the time spent with herpetologist mentors and myself. This small sample size may limit the transferability of the results. However, in order to obtain a thick description of teachers’ conceptions in qualitative research, it behooves a researcher to focus on a limited number of participants, which enables the reader to evaluate and compare this particular situation with others. As Clandinin and Connelly (2000) pointed out, narrative
texts are not created as prescriptions for applications but as a place for “readers to imagine their own uses and applications” (p. 42).

Summary

Snakes in the Kasigau region have been considered poorly in environmental education, although they are omnipresent animals difficult to overlook. This is due, in part, because knowledge about snakes is sparse and misinformation abounds, particularly in relation to the erroneous view that all snakes are dangerous. Religious beliefs that snakes are evil exacerbate the negative conceptions of snakes in the region. Because snakes are reclusive and some snakes are dangerous, many myths and legends are used to explain snake behavior. Many teachers rely on anecdotal stories of snakes passed down from community elders to explain snakes to their students. This may be due in part because it is difficult to obtain scientific information in rural areas of Kenya and continuing education opportunities to learn more about ecological issues such as biodiversity conservation are few or nonexistent (Peacock, 1995). Within this environment it may be in the best interest of the community to believe all snakes are dangerous; however, if teachers have the opportunity to learn about and recognize beneficial harmless snake species, perhaps, a different perspective can be shared with their students and other community members through conservation education. Alternative conceptions of a snake’s place within the food web, the ecological importance of predator/prey relationships, and the effect a snake’s niche has on the ecological balance of an ecosystem are all examples of related concepts that teachers could incorporate into environmental education lessons concerning snakes.
CHAPTER II

LITERATURE REVIEW

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it is the only thing that ever has.”

—Margaret Mead

Introduction

As stated in the introduction, the responsibility of teachers to impart scientific information to their students is of paramount concern to herpetofauna (reptile and amphibian) conservationists. “Conservationists” in this sense is not being used as a word to denote those that wish to control or dominate nature for the use of humanity as it is sometimes regarded by those that promote “sustainable development” or “natural resource management” (Evernden, 1992). Here, I am using the word “conservationist” in the sense of those persons interested in the preservation of snake species through the understanding of the ecologically inherent importance of biodiversity. In order for citizens to make informed decisions about the environment an ecologically sound education is an important prerequisite (Orr, 1992, 2004). Within the curriculum of Kenya, and many of the other 55 countries that have adopted environmental education programs, the responsibility of teaching about conservation issues normally falls upon those
teaching science under the heading of environmental education (Kenya National Environmental Management Authority [NEMA], 2006; NAAEE, 2006).

In order to set the stage for the narratives about teacher conceptions of snakes and the accompanying scientific perspectives espoused by the visiting herpetologists and myself, a little background about environmental education is warranted. Therefore, Chapter 2 starts with a short overview of environmental education in the United States and Kenya. Next, I touch briefly on Kenyan environmental policy following the relatively new leadership of the Kibaki administration since environmental policy can directly affect school system curriculum. This is followed by a synopsis of science education in the U.S. and Kenya and an introduction to the need for and worth of ongoing professional development for teachers who are responsible for the integration of environmental education within their curriculum. Because the bulk of my own background and educational studies have taken place in the United States context, I will be juxtaposing the development of ideas about environmental education and science education in the United States with those at play in Kenya in this literature review.

Environmental Education

The term “environmental education” (EE), as used in the United States and adopted by many other countries, is credited to Dr. Clay Schoenfield, who founded the Journal of Environmental Education in 1969 and claimed to have been the first, in 1966, to use the phrase “environmental education” in the United States (Gough, 1993). Professor Stapp (a colleague of Schoenfield), along with some of his students, proposed a definition of environmental education in an article entitled “The Concept of
Environmental Education” published in the first edition of the Journal of Environmental Education. Stapp wrote:

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to solve these problems, and motivated to work toward their solution. (Stapp, 1969, p. 30)

Shortly after the above definition was published the United States Congress passed the Environmental Education Act in 1970, which defined EE as

The educational process dealing with man’s relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment. (Environmental Education Act, 1970, p. 1312, as cited in DeBoer, 1991, p. 183)

A slightly different definition that was agreed upon by the International Union for Conservation of Nature (IUCN, 1970) and used by many as the classical definition of EE is “the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings” (Palmer, 1998, p. 7).

The following is the United Nations Educational, Scientific and Cultural Organization’s (UNESCO) definition of EE, which has been adopted by the United States Environmental Protection Agency (EPA):
Environmental education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action. (UNESCO, Tbilisi Declaration, 1978)

The Kenyan government agency National Environment Management Authority (NEMA), which is analogous to the United State’s EPA, as well as the Kenya Institute of Education (KIE) have also adopted the UNESCO definition of EE but stress education for sustainability (Otieno, 2002). The focus of Kenya’s environmental education curriculum involves increasing students’ environmental knowledge base and awareness of environmental issues to empower communities to reduce poverty, disease and desertification (Maathai, 2004; National Environment Management Authority [NEMA], 2006).

However, writers such as Henry David Thoreau and Ralph Waldo Emerson (who have been described as “ecologists before ecology” [Nash, 1989, p. 36]), along with John Muir, John Dewey, Aldo Leopold, Freeman Tilden, and more recently Rachel Carson, espoused the needs for preservation, conservation education, and the responsible use of resources—natural and artificial—long before environmental education became mainstream within science education curriculum. Rachel Carson’s *Silent Spring* (1962) may be one of the most influential books ever written in the realm of environmental education—before the term was even coined. Carson challenged the practices of agricultural scientists and the government, and called for a change in the way humankind
viewed the natural world. Linda Lear, biographer and author of *Rachel Carson: Witness for Nature* (1997), stated on her website, “In all her writings she stressed that humans were but one part of a natural ecosystem, only distinguished by their power to alter it, in some cases irreversibly” (Lear, 2005).

Historically there were three basic phases of environmental education. Beginning in 1800s the first phase focused on preservation, later from the 1930s through the end of the 1960s, the second phase emphasized environmental management; the third, and present phase, concentrates on environmental quality.

The main goal of preservation is to protect a given area in its natural state. The preservation mindset did not include accessibility of established protected areas. Consequently, the first phase was considered by most to be a dismal failure for the following reasons: (a) its traditional preservationist mentality, (b) its preoccupation with physical resources rather than environmental quality, (c) the priority given to developing naturalists rather than environmental problem-solvers, and (d) its top-down presentation in schools by outside conservation experts, rather than training teachers within the system in environmental literacy (Hobart, 1972; Vivian, 1973).

When Kenya gained independence from Britain in 1963 Kenya had inherited this preservationist mentality in the form of National Parks from former colonialist rule. Before independence from Britain, Kenyans were excluded from enjoying the huge tracts of land set aside for National Parks during British rule (McDuff, 2000). Through the advent of the Wildlife Clubs of Kenya (WCK) in 1968, the first wildlife conservation movement worldwide and the catalyst for the largest grassroots conservation effort for
students in Africa, the use of Kenyan National Parks by Kenyans became much more accessible. The WCK was the first conservation movement initiated by Kenyans, not colonialists, and one of the first non-profit organizations promoting and using environmental education for the protection of biodiversity and ecological literacy (McDuff, 2000).

The second phase of environmental education in the United States, environmental management, was also a failure. Environmental management entailed using natural resources for short-term economic gain at the expense of long-term environmental consequences. A good example of the over management of natural resources in the U.S. would be the Army Corps of Engineers during the 1950s and the 1960s; by draining of swamplands to increase farmland and the inundation of forests from the building of dams to control the flooding of rivers, the landscape has been forever altered (Vileisis, 1997). According to Ho (1998), Kenyan mainstream culture agrees that humans have the ethical right to manipulate nature for economic development. This is a very important consideration for a developing country in the short term, but the implications this has had for Kenya in the long term have been catastrophic and led to deforestation and desertification (Maathai, 2006).

To alleviate the destruction of the environment due to short-term economic gain, environmental education in Kenya is incorporating policies and curriculum aimed at teaching children about sustainable development (Ho, 1998; Otieno, 2007). In May of 2007, during the 29th International Union of Biological Sciences General Assembly and Scientific Symposium, Dorcas Otieno, Director of the Kenya Organization for
Environmental Education, spoke of education for sustainability. Her talk focused on the Eco-schools program in Kenya that uses schools to demonstrate the link between using natural resources for economic gain while planning to prevent adverse environmental degradation. Ho (1998) pointed out that the centralized top-down curriculum in Kenya, which stresses end-of-grade examinations, makes it very difficult for teachers to integrate environmental education. In addition, this tends to homogenize the content of environmental education creating a disconnect between local cultures and the diverse environmental settings within Kenya (Toili, 1996). The Eco-schools program is one example of an effort to ameliorate the situation that Ho described.

Kenya’s Eco-schools program is one way that environmental education proponents such as Otieno are using existing local environmental problems and their solutions as ways to create awareness and provide real-life situations for students to learn skills for sustainable resource utilization and conservation. Eco-schools in Kenya now number 70 and are implementing micro-projects geared towards addressing poverty related issues while at the same time promoting environmental conservation (Otieno, 2006). Eco-school micro-projects include horticulture, agro-forestry, dairy farming, poultry farming, energy alternatives, and waste management.

In Kasigau, several micro-projects have also been initiated with the assistance of the Taita Discovery Center, a nearby ecotourism facility. For example, in Bungule, two teachers oversee an afterschool environmental club called BYEM (Bungule Youth Environmental Movement). In this club students from the K-8 primary school are given the opportunity to learn about agro-forestry techniques and plant native tree seedlings, as
well as learning other environmental conservation concepts such as erosion control and
the protection of water catchment areas. The environmental education ideals used by
Eco-schools and BYEM are based partly on an environmental management philosophy
but have also infused the last phase of environmental education tenets whereby citizens
are seen as responsible stewards of the planet’s resources. The idea that students need to
value the quality of the environment and develop the skills to take action to preserve or
improve the environment brings us to the third phase of environmental education.

Phase three, the current phase of environmental education as recognized by many
countries today (including the U.S. and Kenya), involves fostering an ethic of
stewardship in citizens and teaching students to value the quality of the environment.
This current phase of environmental education is viewed as a more ecologically minded
and less anthropocentric way of interpreting how one should teach about the biosphere.
Interdisciplinary curricular approaches that began in the late 1960s and early 1970s are
still being used in environmental education settings in many countries today (Botkin &
Keller, 1987; Hamilton, 1967; Stillman, 1972). More recently, however, many
institutions involved in environmental research and curriculum development are viewing
environmental education as a transdisciplinary area of study (Schroll & Stærudahl, 2001;
that environmental research is only transdisciplinary if it draws upon both the natural and
social sciences, and in some contexts, the humanities. Morison seems to have foretold the
possibilities of a transdisciplinary approach to environmental education back in 1967
when he stated that citizens of the future needed to “know enough of science to
understand the consequences and the costs of different courses of action and enough of philosophy, the humanities, and the arts to appreciate their value” (p. 1210).

In Kenya, environmental education was officially included within the curriculum in 1985 (Toili, 1996). The Kenya Organization for Environmental Education (KOEE) was launched the same year in order to support this new initiative. This was also the year in which a new 8-4-4 educational structure comprising 8 years of primary education, 4 of secondary, and a minimum 4 of university replaced the previous 7-4-2-3 system comprising 7 years of primary education, 4 of junior secondary, 2 of senior secondary, and 3 of university education (Ho, 1998; Mackay Report, 1981). This new educational system also included vocational subjects, such as woodworking, masonry, and metalwork among others, that, according to Ho (1998), did not require higher-level thinking skills for the analysis of their surrounding environment. Because EE helps students develop higher level thinking skills Ho suggested this may be one of the reasons why Kenyan teachers perceive environmental education as an important subject.

Kenya uses a multidisciplinary approach for teaching environmental education, but environmental education is not a specific subject that is tested (Ho, 1998). This presents a dilemma for Kenyan teachers since they must prepare their students to pass an end-of-course test. In Kenya, it has been reported that teachers and pupils are appreciative of their environment; however, teachers and students are aware that the main purpose of school is to get good grades and pass examinations in order to get good jobs (Ho; Sifuna, 1992).
Another challenge faced by Kenyan educators is dealing with the difficulties of a developing nation (NEMA, 2003). Although the goal of environmental education is to “create a concern for all environments—a concern that leads to a commitment to preserve or develop optimum environments and to improve less desirable ones” (Vivian, 1973, p. 14), it may be difficult for educators living in areas lacking communications and infrastructure to educate those who lack basic necessities (e.g., food, access to clean water, and fuel for cooking; Peacock, 1995). In addition, those living adjacent to large protected areas (such as the people of Kasigau) where former indigenous uses of the land are no longer permitted (such as, hunting and harvesting of timber to make charcoal) the concern for immediate survival may, at times, outweigh the concern for the long-term protection of the environment (Akama, 1998; Dodson, 2002).

Kenyan Environmental Policy

Recently, the Kenyan government has made great strides in recognizing the value of environmental resources. Kenyan Parliament has ensured that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment (Environmental Management and Coordination Act [EMCA], 1999). The United Nations Environment Programme (UNEP), which was instrumental in assisting Kenya with the development of the EMCA, summarized the intent of the Act:

The Act [EMCA, 1999] covers virtually all diverse environmental issues which require a holistic and coordinated approach towards its protection and preservation for the present generation without compromising the interests of the future generation to enjoy the same. Consequently, the Act provides for the legal
regime to regulate, manage, protect and conserve biological diversity resources and access to genetic resources, wetlands, forests, marine and freshwater resources and the ozone layer to name a few. (UNEP, 1999)

Environmental resources underpin Kenya’s economy. Agriculture and ecotourism are two of the key components necessary for Kenya’s economic recovery, and both are dependent on the maintenance of healthy ecosystems (Kibaki, 2003). According to Kenya’s President Mwai Kibaki in an article written for Our Planet Magazine, “it is particularly necessary to conserve representative ecosystems that are rich in biodiversity. Special attention should be given to endemic, rare and threatened species and habitats with critical scientific and aesthetic values” (p. 5). Mt. Kasigau and the surrounding Taita Hills region is such a place. The Taita Hills are recognized by Conservation International as a biodiversity “hotspot” and are home to many endemic (animals found nowhere else) species of birds, reptiles (including one species of snake, the Taita Hills Purple-glossed Snake \textit{[Amblyodipsas teitana]}), and amphibians. Another endemic animal native to the region is the Taita White Eye \textit{(Zosterops silvanus)}, a small bird found only in fragmented forests of the Taita Hills and Mt. Kasigau. Mt. Kasigau is home to 80\% of the known population. The Taita White Eye is sought by many birders visiting the region who make the difficult climb to the summit of Mt. Kasigau hoping to get a glimpse of the elusive bird.

However, not all animals are sought out for pleasurable viewing. Even though biologists today recognize that reptiles are an important part of natural ecosystems and indicators of the health of the environment, snakes are still feared in many parts of the
world (J. Gibbons & Strangel, 1999). Human fear and dislike of snakes has been studied and the results published extensively (Cavendish, 1994; Morgan, 1996; Morris & Morris, 1965). Indeed from a Western perspective, the persecution of snakes by humans, both in the past and present, is one reason that many snake species and populations are now threatened (Greene, 1997).

In Kenya, the way snakes are treated differs widely based on culture. There are 42 recognized ethnic groups in Kenya and many more subgroups, each with their own history and customs. One excellent example (and possibly the only published information on this topic) is documented in a study done by Thomson (2003) who collected stories from rural Kenyans about snakes in the Keiyo District in order to provide science education researchers with an in-depth account of indigenous science knowledge as it pertains to snakes. Some aspects of the present study paralleled Thomson’s study. For example I interviewed many teachers and elders as did Thomson and in both studies participants’ stories of snakes were an essential component. However, the current study focused on teachers’ conceptions of snakes and possible subsequent change in conceptions based on exposure to scientific perspectives of visiting herpetologists; whereas, Thomson’s study investigated the way indigenous knowledge of snakes was used by teachers. Another difference was in the way in which snakes are viewed in each region. In the Thomson’s study it was found that within the Keiyo indigenous culture snakes are respected and used in stories to teach morals and ethics. A very poignant quote from Thomson’s study was provided by a female elder when asked about Keiyo attitudes toward snakes compared to that of the European attitude of fear. She replied, “It is you
[Europeans] who came here and told us that the first sinner in the world was a snake” in reference to the biblical story from Genesis (p. 110). There are many examples of other cultures worldwide where snakes are revered, for example, the Hopi Indians of the American southwest, the Bassari people of West Africa, and followers of Hindu, Buddhist and Taoist religions (Campbell & Moyers, 1988). This was not the case for the Taita people of the Kasigau area (known as Wakasigau) who could not recall a time when snakes were ever revered. However, the introduction of Christianity does seem to have contributed to the hatred and persecution of snakes in the Kasigau community. I elaborate on this concept further in Chapter 4.

Science Education

*National Science Education Standards* (NSES) defined scientific inquiry as

The diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world. (National Research Council, 1996, p. 23)

The “Science as Inquiry Standard” in NSES includes the abilities necessary to do scientific inquiry and understanding about scientific inquiry. As a result, the National Science Teachers Association (NSTA) Board of Directors has outlined several recommendations regarding the use of scientific inquiry as a teaching approach. One of the recommendations is that science teachers should receive enough administrative support to use an inquiry mode of instruction in the classroom. These recommendations
are in accord with the Kenya Ministry of Education, Science and Technology (MOEST) and also with the views and guidelines established by the SMASSE (Strengthening Mathematics and Science in Secondary Education) Project adopted by MOEST in 1998. SMASSE promotes student-centered and hands-on inquiry lessons as suggested by MOEST (Wambui & Wahome, 2006).

Although MOEST has promoted inquiry-based science since 1998, according to the chairman of the Kenya Science Teachers’ Association (KSTA), Mr. John O’moragia, the science curriculum in Kenya is still too theoretical, too shallow and teacher centered. O’morgia emphasized the need to encourage teachers to use lessons that are student-driven and relevant to the students’ environment (Ng’ang’a, 2006). O’moragia also recommended that teachers keep abreast of the latest developments in science and technology. The schools in Kasigau employ a teacher-centered pedagogy. Most lessons I observed were lecture format with students memorizing information. This didactic way of teaching may be due largely because of the post-colonial influence of the British educational system and exacerbated in rural Kenya because of the lack of resources and adequate pre-service and in-service teacher training (Peacock, 1995).

After independence, Kenya adapted wholesale the educational policies of foreign countries, namely from the UK (with additional influences from the U.S., Denmark, and Japan), and continue to use a mismatched curriculum (Jegede, 1997; Otieno, 2007; Peacock, 1995). Jegede (1997, p. 8) outlined some of the difficulties experienced by African countries that imported/adopted/adapted foreign science curricula:

- The curriculum fell short of expectations.
• New curricula from the USA and the UK supported an empiricist view.
• Science teaching in Africa has not identified with context-specific issues related to what science should do for, and within the countries of the continent.
• The sociocultural and cosmological backgrounds of the learners of science in Africa have been seriously ignored or obliterated.

Jegede (1997) explained that African students learning western science display certain traits that do not correspond to “typical” learners in global science classes, stating that many African students refrain from asking questions, believing science to have very little to do with their world or view science as a special activity requiring some magical explanation. He continued that teachers who share these very same sociocultural attributes can make for a very frustrating situation, which may be worse for a teacher with a western perspective teaching students with a non-western perspective.

In Kenya, even though snakes are an integral part of the environment, reptiles are only mentioned as a taxonomic group in the national biology syllabi and are not discussed in standard Kenyan biology textbooks or included as part of the national examinations (Kenya Institute of Education, 1996; Kenya National Examinations Council, 2000).
Professional Development

The Kenya Ministry of Education Science and Technology (2001) recognized the value of in-service opportunities for teachers. However, in rural areas such as the Mt. Kasigau region of southeast Kenya teacher in-service professional development opportunities are very rare. Although Kenya has invested substantial amounts of money and resources toward teacher professional development programs (Wanzare & Ward, 2000), in rural areas of Africa, including Kenya, in-service opportunities are few or nonexistent and “are a crucial constraint on pupils’ learning” (Peacock, 1995, p. 152). However, even though the schools of Kasigau are definitely rural and not easily accessible, the Taita Discovery Centre, a nearby ecotourism lodge, has allowed for various international educators to visit the local schools of Kasigau and share their expertise while learning about Kenya and its people.

Teacher professional development can be defined as an opportunity that allows for improvement of job related knowledge, skills, or attitudes of teachers (D. Sparks & Loucks-Horsley, 1989). Oliva and Pawlas (1997) regarded teacher professional development as a program of planned activities that are carried out in order to improve the professional growth of teachers. MOEST adopted Lodiaga’s (1987) description of teacher professional development as

The process of increasing or extending the capacity of staff for performance of various duties. It could involve enrichment of an officer’s capacity for the

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7 In-service refers to any professional development experience that promotes a teacher’s ongoing learning as it relates to their educational setting (MOEST, 2001).
performance in the current post but it could also mean preparing an officer for another assignment into which he or she will be deployed after preparation. (p. 48)

In Kenya, teacher professional development is also referred to as in-service training, refresher courses, upgrading courses, and staff development (Ministry of Education, 1994).

According to Eshiwani (1993), the quality of education “is heavily dependent on the quality of staff, their motivation, and the leadership they experience” (p. 214). The quality of teachers, to some extent, depends on the quality of their professional development (Walter, Wilkinson, & Yarrow, 1996). Following this line of logic it has been argued that one way of addressing the difficulties students experience in Kenyan science classrooms is through appropriate teaching interventions that can be realized through professional development by science teachers (SMASSE Project, 1998). Recent studies in the United States have shown that many professional development programs can achieve this goal. For example, in a meta-analysis of 37 professional development programs, Tinoca, Lee, Fletcher, and Barufaldi (2004) showed an 86% positive impact on student learning following teacher professional development. What this means is that the majority of professional development programs reported that there was an overall improvement in students’ test scores for subjects correlating with teacher professional development programs. Programs in this study that focused on curriculum reform, science as inquiry, and pedagogical content knowledge and had over 50 hours of contact time over a 6-month or longer time period had the largest impacts. This study suggests
that good teaching which is enhanced by further professional development is related to improved student learning in science and supports Darling-Hammond’s (2000) earlier findings. The above professional development studies in the U.S. reinforce the findings of Wanzare and Ward (2000) who argued for more professional development opportunities for all teachers of Kenya in order to help students “to succeed in the national examinations, to fit into the job market, and to deal with future challenges” (p. 273). Although the present study was only three months in duration, six of the teachers involved experienced well over 50 hours of contact time with me and/or the visiting herpetologists, Vicheko had over 75 hours and Kibonye had over 300 hours of contact time.

**Duration**

The time a teacher spends while learning new material is an extremely important component of professional development. In Loucks-Horsley, Love, Stiles, Mundry, and Hewson’s book *Designing Professional Development for Teachers of Science and Mathematics*, they stated

The idea of building new understandings through active engagement in a variety of experiences over time, and doing so with others in supportive learning environments, is critical for effective professional development. (2003, pp. 81-82)

If learning is about change and growth in understanding, and change takes time and persistence, then the duration of a professional development opportunity will be a key factor in determining a successful outcome of the learning experience for the teacher. Significant and lasting pedagogical change can result from the combination of new
knowledge and experiences as a result of professional development (Shane & Wojnowski, 2005).

**Mentoring**

The current study was concerned with Kasigau teachers’ conceptions of snakes. The culmination of the herpetofauna institute was the change in the way the teachers of Kasigau interacted with snakes in an educational setting. The influence of the visiting herpetologists’ scientific perspective toward snakes broadened the teachers’ conceptions of snakes and gave those teachers the option of using an entirely different perspective. A total of three herpetologists from the National Museums of Kenya visited Kasigau and performed workshops for the teachers. In addition, two of those herpetologists stayed for three one-week intervals each month and worked closely with two teachers during the duration of this study. During the time the herpetologists were in Kasigau, they not only facilitated presentations for the teachers but two of the teachers were recruited as apprentice researchers assisting with an actual herpetofauna research project. This is an example of “immersion in the world of scientists and mathematicians” and present a viable teacher professional development option (Loucks-Horsley et al., 2003. p. 199).

As introduced above, one of the professional development strategies that can be used to broaden teacher conceptions about particular subject areas is the partnering of teachers with professionals in the field. Bainer, Barron, and Cantrell’s (1995) study suggests that partnering with science professionals during a teacher professional staff development institute makes learning “exciting” and more “interesting” for teacher participants.
Mentoring is a key element of immersion-type teacher professional development experiences and may be one way to facilitate the MOEST recommendations for using an inquiry approach to teaching, which includes hands-on learning and action-based instruction to enhance environmental education efforts, endorsed by KOEE (Otieno, 2002). Caton, Brewer, and Brown (2000), in a study of scientists teamed with teachers during several 3-day workshops, noticed that teachers who became familiar with inquiry-based apparatus and methods had a more positive attitude about teaching science and valued their teacher-scientist collaborations. This study highlights the importance of the relationships that developed between the visiting herpetologists and the teacher participants. It also reinforces the idea that teachers need to have enough time to work with unfamiliar apparatus or the use of new protocols in order to become comfortable enough to share their newly acquired knowledge and experience with their students.

Intensive teacher professional staff development institutes can have a profound effect on teachers’ attitudes about content, methods, and preferred ways of learning. For example, in an intensive workshop involving paleontologists and teachers working on a real dig, teachers expressed that “being in the field” and working alongside “real” scientists was highly effective and a valuable experience (K. Johnson, 2004). A study by Radford and Ramsey (1996) reported that teachers attending workshops in which they were teamed with scientists, doing actual inquiry-based activities, gained both the ability to learn more content and increased self-confidence.

Projects offering participants the opportunity to work side-by-side with scientists in the field can increase teachers’ content knowledge while also giving them an
appreciation for the theoretical underpinnings of the ethos and culture of scientists (Loucks-Horsley et al., 2003). According to Darling-Hammond (1997), “Learning to practice [teaching] in significantly different ways can occur neither through theoretical imaginings alone nor through unguided experience alone. Instead, it requires a tight coupling of the two” (p. 319). In other words, the integration of theory and practice is essential for teaching in new ways. One cannot just tell someone about a new teaching method; one has to experience it as well. The majority of teacher professional development facilitators, theorists, and writers seem to agree (see Loucks-Horsley et al, 2003; Rhoton & Bowers, 2003; Zmuda, Kuklis, & Kline, 2004). This mentoring process, allowing teachers to undergo immersion experiences doing inquiry-based science with scientists, should facilitate this “coupling” between theory and practice. Not only were the teachers of Kasigau exposed to an inquiry-based way of teaching during the workshops but a few select teachers also learned about snakes through personal experiences facilitated by experts in the field of herpetology and “in the field” searching, finding, and catching snakes themselves.

**Modeling as a Teaching Tool**

The fear of snakes in general can be alleviated by the ability to identify potentially dangerous species and understanding the behavior of snakes, and the limits of the threat they may pose to humans (W. Gibbons, 1983; Greene, 1997). People can learn about snakes by observing others. The mentoring of teachers mentioned above used modeling as one of the teaching strategies employed during interactions with participants during the duration of the current study. Bandura (1977) considered vicarious experience
(modeling) to be the typical way that human beings change their conceptions. Learning through modeling is not as simple as ‘monkey see, monkey do’ but more a matter of abstracting rules of conduct appropriate to a specific social event. This is similar to Blumer (1969) who argued that meaning is formed through the interactions of people and thus a social product. However, Blumer points out that the meaning derived by interacting participants is an interpretative process that includes self-interaction. This self-interaction is not what Bandura would consider as a psychological/cognitive event but what Blumer referred to as an intrapersonal communication, that is, “a process of communication with himself” (p. 5). Therefore, meaning making and learning through modeling do have some similarities. As Gilbert Ryle (2000) wrote, “only a person who knows what a snake looks like can fancy he sees a snake without realising that he is only fancying” (p. 234). The amount of knowledge one has about snakes can have an effect on our interactions with snakes.

New Guineans are generally not afraid of snakes. And when asked if they fear snakes, New Guineans, “laugh in scorn and say that that is a reaction for ignorant white men too stupid to distinguish poisonous from nonpoisonous snakes” (Diamond, in Kellert & Wilson, 1993, p. 265). Diamond argued that there is much ethnographic evidence that foraging peoples regularly ate snakes, and those societies that valued snakes as a potential food source must have learned to identify and exploit this resource as the New Guineans do now. This would lead one to believe that the more one knows about snakes, the less fearful one should be of snakes. However, societies that do not value snakes may not have reason to learn the various types. In these societies, therefore, it is easier to
generalize a fear of all snakes than to learn to differentiate dangerous snakes from those that are harmless and potentially beneficial.

This reasoning does not always hold true, however, for those suffering from an irrational fear of snakes (ophidiophobia or herpephobia). Bandura, Blanchard, and Ritter (1969) argued that adult persons with strong aversions to snakes could overcome their negative attitudes about snakes by viewing another person who was comfortable handling snakes. This form of therapy is called “modeling.” Other studies investigating the effectiveness of wildlife education (focusing specifically on snakes) found that attitudes of middle school-aged children toward snakes could be improved through modeling (Morgan & Gramann, 1989; Morgan & Jarret, 1995). Findings from these same studies suggest that only providing information about snakes using a 15-minute interpretive slide and tape program failed to promote positive attitudes. In addition, these studies found that mere exposure to a snake in an exhibit or terrarium did not improve their attitude about snakes. The finding that positive modeling was the key factor in changing students’ attitudes agrees with earlier findings which imply that mere exposure to snakes is not enough to shift negative attitudes toward more positive attitudes, especially for snake-phobic subjects (Bandura et al., 1969; Blanchard, 1969).

In an earlier study, Kress (1975) tested responses by elementary school children to a snake after mere exposure in the classroom and reported significantly more positive attitudes following these observational sessions. These conflicting findings can be explained, in part, by three factors that have been shown to affect the degree of attitude change: frequency of exposure, duration of exposure, and subjects’ initial attitudes. For
example, multiple mere exposure trials are generally more effective in promoting favorable attitudes than a one-time episode (Litvak, 1969; Zajonc, 1968). Kress (1975) used multiple mere exposure trials in his experiment, whereas other researchers (Bandura et al., 1969; Blanchard, 1969) tested subjects exposed to the object only once. However, results suggest that attitudes improved significantly for students who observed modeling, or another person handling a snake, or better yet by direct contact (Morgan & Gramann, 1989; Morgan & Jarret, 1995). One other interesting finding is that to get the most out of direct contact, or modeling, it appeared necessary to supplement the experience with factual information.

The psychologically-based studies above illustrate the interests in overcoming what is perceived as an irrational fear of snakes in some populations or individuals. However, in the current study I used the perspective that modeling can be used as a tool for teaching alternative conceptions about snakes. As mentioned above the mentor herpetologists were modeling a view of snakes based on expertise derived from knowledge of snake identification, behaviors, and and ecological benefits. The knowledge and practical snake-handling expertise modeled by the herpetologists in the current study was implemented to dissuade the participants’ fear of snakes, allowing for consideration of an alternative perspective.

*Follow-up*

Many staff development programs employ relatively short-term models, some involving teachers in workshops lasting from only a few hours up to several days, with limited follow-up activities. These programs may have a chance of succeeding with those
teachers whose beliefs match the assumptions of the facilitators but those participants who do not already agree with what is presented will resist new ideas (Loucks-Horsley et al., 2003). It is estimated that such staff development garners an implementation level of only 15% (Meyer, 1988).

On the other hand, not all training models result in such limited change. A substantial body of research has identified characteristics of reasonably successful training models. These qualities are summarized below (Griffin, 1986):

• The training process should be school-wide and context-specific.
• Principals (or program directors) should be supportive of the process and encouraging of change.
• The training should be long term, with adequate support and follow-up.
• The training process should encourage collegiality.
• The training content should incorporate current knowledge obtained through well-designed research.
• The process should include adequate funds for materials, outside speakers, and substitute teachers and allow teachers to observe each other.

Follow-up, one of the qualities mentioned above, is an effective way to ensure that what a teacher has experienced during a professional development workshop or institute has made a lasting impression (Joyce & Showers, 1988; G. M. Sparks, 1986). O’Sullivan (2002) performed a 3-year study on the effectiveness of professional staff development on unqualified primary teachers in Namibia and found that observational visits by a mentor or workshop facilitator were deemed effective in assisting the teacher
with implementation of what was observed or learned during a teacher professional staff
development institute in the classroom. In Kenya, teacher professional development has
five main purposes (as outlined in Wanzare & Ward, 2000, in accordance with
regulations set by the Kenya Ministry of Education, 1994):

1. To implement government-approved innovations in Kenyan schooling.

2. To prepare teachers for assignments in new areas.

3. To provide opportunities for untrained teachers to become eligible for
certification.

4. To up-grade training of teachers for better certification.

5. To enable teachers to acquire new practices in curriculum and instruction, and
in school administration and management.

Several Kenyan researchers have advocated the need for teacher professional
development in Kenya. For example, Eshiwani (1993) advised that to improve education
in Kenya, teachers must improve their competency through a systematic in-service
training program for all teachers in primary and secondary schools and colleges using
long-term and short-term courses and workshops. Wanga (1988) suggested that in-service
opportunities for head teachers and senior school staff should be available so that they
may train their staff more effectively. A study by Wanzare and Ward (2000) concluded
that

In-service programs for Kenya’s educators suffer from lack of clear government
policy, ill-defined objectives, inappropriate practices, little input from head
teachers and teachers, inadequate evaluation and follow-up, and lack of support for educators. (p. 266)

According to Peacock (1995) this rather dismal assessment of the status of teacher professional development is characteristic of many post-colonial African countries. In Kenya, several constraints responsible for this lack of success which agree with Peacock are:

- Inadequate funds are available to support courses (Lodiaga, 1987).
- In-service training opportunities are frequently available to only a small number of head teachers and teachers, especially those with certain qualifications (Wanzare & Ward, 2000).
- Head teachers and teachers have very little input into the selection and design of the course content organized by the various external agents involved in in-service training programs. Consequently, the courses do not fully address the needs of most participants (Wanzare & Ward, 2000).
- Too few qualified trainers are available to manage the training courses (Lodiaga, 1987).
- Insufficient and inappropriate follow-up procedures are used to determine the relevance and productivity of the in-service training program (Wanzare & Ward, 2000).
• Little emphasis is placed on school-based, in-service training programs. Currently, in-service training activities are far removed from the schools (Wanzare & Ward, 2000).

• Staff are wrongly employed; that is, staff are prepared for one field and deployed in another field (Lodiaga, 1987).

• Insufficient research specifically focusing on in-service training for teachers is conducted (Wanzare & Ward, 2000).

• A lack of continuity exists in the planning and execution of in-service training activities for teachers (Wanzare & Ward, 2000).

• Insufficient collaboration occurs between institutions involved in teacher professional development programs. Wanga (1988, p. 32) observed that, although the Ministry of Education provides in-service programs through its agencies such as the Kenya Education Staff Institute, “there is, unfortunately, no clear formal link or association between universities and the Ministry in organizing courses.”

In conclusion, Wanzare and Ward (2000) recommended that the Kenya Ministry of Education implement the very same qualities of professional development summarized earlier by Griffin (1986), which mirror recommendations by Loucks-Horsley et al. (2003).

Conclusion

Humans have persecuted snakes for millions of years, but only in the past few hundred years has any species of serpent gone extinct. Nearly 200 species of snakes are
now listed as endangered, threatened, or a species of special concern. No doubt there are still species of snakes to be discovered or for snakes that are known by indigenous peoples to be recognized by the scientific community. Some species of snakes are known from only one specimen or just a few, such as the Taita Hills Purple Glossed Snake (*Amblyodipsas teitana*) found near Kasigau. Worldwide the conservation status of snakes is little known. Ever growing threats of habitat alteration and indiscriminate killing of snakes is threatening the continued survival of these remarkable animals. Kasigau is one small corner in the huge landscape that is Africa, but in this ecosystem microcosm, there exists an abundant diversity of snakes. With both apprehension and curiosity many people of Kasigau bravely took advantage of the opportunity to get to know the serpents living in their villages from a scientific perspective. It is my hope that many harmless snakes will be spared because of the increased understanding of snakes by the people of Kasigau. These snakes will ultimately repay the villagers of Kasigau by consuming vast quantities of rodents.

Studies presented in Chapter 2 illustrate the possibilities and the obstacles related to snake conservation efforts in southeast Kenya, specifically, the five villages surrounding Mt. Kasigau. Herpetology and biodiversity conservation supporters view environmental education as a possible way in which snakes may be better understood and appreciated. However, many difficulties face those that believe snake conservation is a worthy endeavor. Snakes are not included in the Kenya national curriculum nor is environmental education a testable subject. In a country where national policies dictate what is to be taught and passing an end-of-course exam is considered the main reason for
attending school, teachers have no motivation to include subject material that is not explicitly listed as a testable commodity. Also, in rural areas such as Kasigau, opportunities for teacher professional development are rare. In a culture where snakes are viewed as evil and all snakes are considered venomous and feared, introducing teachers to an alternative perspective is essential for the possibility of positive lessons involving snake ecology, biology, and taxonomy.
CHAPTER III
METHODOLOGY

“We breathe, we think, we conceive of our lives as narratives.”

—Christopher Lehmann-Haupt

The Theoretical Framework

As the purpose of the current study was to investigate Kasigau teachers’ conceptions of snakes, and possible enactment of differing conceptions concerning snakes based on scientific perspectives, I chose a qualitative inquiry approach in an attempt to provide a more “complex, holistic picture” taken from the “natural setting” (Creswell, 1998, p. 15). More specifically, I used narrative inquiry to share a lived and told story of my experience with the people of Kasigau (Clandinin & Connelly, 2000). “Narrative inquiries are always composed around a particular wonder, a research puzzle” (p. 124, italics added). My “particular wonder” was teachers’ conceptions of snakes and the alternative perspectives of snakes as a consequence of scientific experiences.

I began with a feasibility study on my first visit to Kenya during the summer of 2004 and continued with the formulation of my research expectations. As my study progressed I found myself implementing my study plan, but simultaneously taking advantage of serendipitous interactions and experiences as they occurred. Consequently, the potential analyses applicable to my final data collection were quite different from and much more robust than those originally planned.
I began my dissertation research in a formalistic frame of mind, as a staunch believer in Descartes’ dualistic myth of mind and body (Ryle, 2000). Initially, my plan was to investigate rural Kenyan teachers’ attitudes toward snakes before and after a teacher professional development intervention using a quasi-experimental mixed-methods design with an emphasis on ethnographic methods. I had then planned to analyze the data based on psychological theory, and present the data using narrative inquiry. Even after two years of classes at Kent State, where I was exposed to the writings of scholars such as John Dewey, Herbert Blumer, Gilbert Ryle, and Clifford Geertz, I was still trapped within a positivistic perspective, what Clandinin and Connelly (2000) referred to as the “grand narrative” of social science research (p. xxv). I found Clandinin and Connelly’s book *Narrative Inquiry: Experience and Story in Qualitative Research* (2000) very compelling and planned to use narrative inquiry methodology from the outset. Unfortunately, as I put together my proposal, I did not anticipate the difficulty of combining two very different epistemologies while writing my dissertation, that of psychological theory and narrative inquiry. After much reflection on the events and experiences that transpired during my three months in Kenya and further readings (and rereadings of Ryle, Blumer, and Clandinin and Connelly), coupled with subsequent discussions with my committee, I eventually construed this as conflating two incommensurable methodologies.

As a science educator passionate about herpetofauna conservation, snakes in particular, I had envisioned this project as a way to change what I perceived as Kasigau teachers’ negative attitudes toward snakes to an appreciation of snakes. I had hoped to
bring them to understand the problematic ecological ramifications of teaching their students that all snakes are dangerous evil creatures deserving death.

I used narrative inquiry methodology to share the story of what happened during my academic sojourn to Kenya as well as my own understanding of narrative inquiry. This was no easy task. While rereading Clandinin and Connelly (2000), and, still wanting to convey the stories of the people with whom I had spent very intense moments, days, weeks, and months, I came upon this passage, “narrative inquirers need to reconstruct their own narrative of inquiry histories and to be alert to possible tension between those narrative histories and the narrative research they undertake” (p. 46). This reading helped to bring my current situation into context and gave me a broader sense of what a dissertation journey may involve.

My problem was that the earlier analysis of the data, that is, the way in which I was portraying the Kasigau teachers’ attitudes toward snakes, was that of an “either-or” concept of “snake” within a Cartesian mind/body split philosophy. This oversimplification of people’s ability to conceive of something in order to obtain a precise measurement is one example of Herbert Blumer’s critique of social science research (i.e., quantitative research methodology). Blumer (1969) stated clearly that “the concept of attitude is empirically ambiguous” (p. 91). According to Blumer there is no empirical evidence in which to identify attitudes. Attitudes cannot be perceived directly and are “devoid of any generic features which have been isolated through empirical study” (p. 92). This aspect of “attitude” is related to the current study in that attitudes cannot be used as a predictor of action. Based on the thoughts of George H. Mead, Blumer
explained that a person’s tendency to act does not presuppose his or her actions. Before an action takes place there is an intervening process whereby the actor pieces together many determinants within the context of the circumstance. This “self-interaction” allows the actor to mould the act depending on the situation. Blumer also pointed out the many problems that qualitative researchers face when doing research within the social sciences, explaining that these “problems” are only problems when seen through the lens of researchers steeped in the quantitative methodology passed on, and adopted by many, from the empirical sciences. This, indeed, was the problem I faced. Although I had come to Kent State University steeped in quantitative methodology, I wanted to get at a more substantial and deeper understanding of Kasigau teachers’ conceptions of snakes than this methodology would allow. I also wanted to share this deeper understanding of what I experienced through the use of narrative inquiry. I decided a second look through a different lens would help to bring into focus what I wished to convey.

Blumer (1969) made a distinction between “definitive concepts” and “sensitizing concepts.” According to Blumer, “a definitive concept refers precisely to what is common to a class of objects, by the aid of a clear definition in terms of attributes or fixed benchmarks” (pp. 147-148). Blumer explained how a sensitizing concept contrasts with a definitive concept; “A sensitizing concept lacks such specification of attributes or benchmarks . . . [and] . . . rest[s] on a general sense of what is relevant” (p. 148). In other words, rather than create definitive concepts, essentially by making operational definitions and looking past them for the causal relationships between various ones, social scientists should realize that the concept itself is the proper target of our study.
Therefore, if one accepts that the way in which “any given concept shapes up” is dependent on each empirical instance, and is embedded within the setting and context, qualitative research is the preferred methodology when studying the natural social world (p. 149).

The awareness, sensitivity, and acknowledgement of context by social science researchers are the crucial reasons for the use of sensitizing concepts in the social sciences, rather than using the definitive concepts employed by empirical science researchers. “Whereas definitive concepts provide prescriptions of what to see, sensitizing concepts merely suggest directions along which to look” (Blumer, 1969, p. 148). Blumer recommended the use of sensitizing concepts in the social sciences because of the “distinctive or unique nature of the empirical instance” (p. 149).

In this study the sensitizing concept of “snake” was investigated. “Snake” as a “sensitizing concept” is a different orientation from the way “snake” is used in the majority of prior research dealing with people’s attitudes and beliefs about snakes. Most studies done in the past (e.g., Bandura, 1969; Morgan & Gramann, 1989) were conducted based on a question such as, “how do people’s attitudes (i.e., fear) of snakes change when you expose them to X or Y treatment?” However, when a question such as this is asked, you are glossing over what snakes are in the first place. It is as if the concept is settled: Snakes are obviously biological creatures of a certain genus and species occupying a particular niche in the environment. But, when one focuses on sensitizing concepts, we are compelled to ask a logically prior question like, “How does this particular group of people conceive of snakes?” This is because the average person, in all likelihood, does
not conceive of snakes in the same way that, for example, a herpetologist would.\textsuperscript{8} Therefore, what Blumer is saying is that meaning matters and the interesting thing to find out about people and snakes, from a social science perspective, is how do people conceive of snakes. In order to delve into the participants’ conceptual world of “snake,” I fostered a close rapport with eight of the teachers.

First and foremost in initiating my research was getting to know the teachers and developing the trust needed to foster an environment in which they would feel comfortable sharing their stories. To accomplish these goals, I used the tool of “subjective culture” in order to attain a deeper sense and idea of how the teachers in this study conceptualized snakes. According to Dr. Kenneth Cushner (2004), KSU’s Executive Director of International Affairs:

Subjective culture refers to the intangible, invisible aspects of a people—such as the attitudes people bring with them to any interaction, the expectations they have of others, and the values they may hold about such things as education, elders, or another group of people. (p. 40)

Blumer (1969) referred to the “intangible, invisible aspects of a people” (such as attitude, impulse, aversion, and habit) mentioned above as vague concepts “in the sense that they do not have explicit features that would enable one to identify clearly the denotative thing to which the concept refers” (p. 173). He goes on to say that this is not to claim that there

\textsuperscript{8} It is interesting to note that a recent quantitative psychological study supports this line of thinking. Persons with snake expertise and positive attitudes toward snakes were not frightened by snakes as compared with those persons with little or no snake expertise and negative attitudes toward snakes (Purkis & Ottmar, 2007).
are no occasions where a vague concept can be seen as a predictor of an action, but that these vague “concepts do not [normally] allow precise identification or differentiation” (p. 173). These vague concepts that make up the subjective culture are important and should not be overlooked for they have risen from repeated empirical instances, which can highlight habitual aspects of conduct. I believe that being aware of the subjective culture during my experience in Kasigau helped to increase my analytic sensitivity. I am not claiming that I had a clear understanding of the subjective culture of the Wakasigau, just awareness, but I do feel that the close bonds that were forged between the principle participants and myself allowed me a glimpse into their personal lives and consequently the subjective culture in which I was immersed.

Blumer (1969) contended that the success of naturalistic research depends on “patient, careful and imaginative life study” (p. 152). This is similar to what Dr. Cushner shared with me during my feasibility study in Kenya over the summer of 2004. He stressed that I should be patient and listen to what the teachers had to say before attempting any educational intervention. I took his advice and during the first two weeks of my return to Kasigau during the fall of 2005, I first listened to stories about snakes as told by teachers, elders, and other members of the community and observed villagers’ interactions with snakes from a distance. While in the field, I spent all of my time immersed in the setting, trying to be wary of stereotypes, and not taking sensitizing concepts for granted or “rest content with whatever element of plausibility they [the sensitizing concepts] possess” (p. 151). In Chapter 4, I struggled to refine my interpretations of the participants’ sensitizing concepts of snakes, while staying in tune
with my own past experiences as I endeavored to “yield a meaningful picture” (p. 150) through this personal exposition of my stream of empirical instances.

Even though sensitizing concepts “are grounded on sense instead of on explicit objective traits,” Blumer asserted that sensitizing concepts can be interpreted and shared (1969, p. 150). He suggested doing this through exposition using apt illustrations while allowing the researcher to interpret the events through his own experience, as this is how we make sense of concepts and meaning in the world. I found narrative inquiry a compatible methodology for the exposition of my experience in Kenya.

Narrative inquiry, as outlined by Clandinin and Connelly (2000), agrees with the aforementioned ideas of Herbert Blumer. In particular, narrative inquiry is compatible with Blumer’s idea of sensitizing concepts. Herbert Blumer credited John Dewey as one of the intellectual founders of symbolic interactionism, Blumer’s distinct approach to the study of human and social phenomenon. Blumer (1969) declared that meaning is derived by the interaction between people and that the use of meanings occurs through a process of interpretation of these experiences. Clandinin and Connelly’s work is also strongly influenced by John Dewey. For them, Dewey transformed the word “experience” into an inquiry term. Just as Blumer identified meaning as derived through the interaction between people, Clandinin and Connelly, based on the works of Dewey, viewed experiences that people share as the conceptual backdrop of meaning making. People are individuals; however, people are always interacting within a social context (Clandinin & Connelly, 2000).
To expand on this further, the connection between Clandinin and Connelly’s narrative inquiry and Blumer’s meaning making is the idea of how people conceive of objects. According to Blumer (1969):

The nature of an object—of any object—consists of the meaning that it has for the person for whom it is an object. This meaning sets the way in which he sees the object, the way in which he is prepared to act toward it, and the way in which he is ready to talk about it. (p. 11)

However, the meaning of an object is not in a vacuum but is construed through a “process of mutual indications . . . that have the same meaning for a given set of people and are seen in the same manner by them” (p. 11). Shared experience is how people make meaning and human experience is the concern of the social sciences. A simplistic definition of narrative inquiry offered by Clandinin and Connelly is “stories lived and told” (p. 20). According to Clandinin and Connelly, “For us, narrative is the best way of representing and understanding experience” (p. 18).

The current study is my attempt at sharing a story “lived and told” of what seemed to have happened while in Kenya during the fall of 2005. Qualitative fieldwork can be uncertain. According to Geertz, as quoted in Clandinin and Connelly (2000):

What we can construct, if we keep notes and survive, are hindsight accounts of the connectedness of things that seem to have happened: pieced-together patternings, after the fact . . . It calls for showing how particular events and unique occasions, an encounter here, a development there, can be woven together
with a variety of facts and a battery of interpretations to produce a sense of how things go, have been going, and are likely to go. (p. 6, italics added)

I strived to get a sense of the nature of “snake” as an object of meaning for the people of Kasigau as their conceptions of “snake” expanded with each unique occasion. In reference to snakes, several contextual trends of action did surface during my time with the teachers of Kasigau (e.g., teaching about snakes and saving snakes from others who were trying to kill them). These trends seemed to have continued long after my absence as evidenced by subsequent emails I have received from the two primary participants and by conversations I had with two additional Kasigau teachers while they were visiting Kent State.

Although narrative inquiry positions itself on the boundary of formalistic research, I have included my theoretical perspective up front in order to share my evolving understanding of the relationship between theory and method during the writing of this manuscript. During this process I wondered why I felt schismatic at times, methodologically speaking. This may have been because, “as work proceeds, narrative inquirers will discover that aspects of their work have features that some call ethnographic, and other aspects have features that some call phenomenological, and so forth” (Clandinin & Connelly, 2000, p. 128). Clandinin and Connelly pointed out that, “formalists [i.e., researchers using quantitative methodology] begin inquiry in theory, whereas narrative inquirers tend to begin with experience as lived and told stories” (p. 40, and repeated for emphasis on p. 128). They go on to explain that narrative inquirers
should not be overly concerned with explorations of theoretical methodological frameworks but concentrate on the phenomenological aspects of the experience.

Narrative inquiry is a methodology that affords the researcher to inquire into the experiences and perceptions of the participants. The use of narratives to investigate human experience spans a range of disciplines including the field of anthropology (Bateson, 1994; Geertz, 1973), psychology (Bruner, 1985), and education (Carter, 1993; Conle, 2000). Also within the narrative arena are a plethora of studies involving oral history in various cultural settings throughout the world (e.g., Errante, 2000; Weider, 2004). More specifically, as expressed in a study conducted in a rural area of the Philippines by Arellano, Barcenal, Bilbao, Castellano, Nichols, and Tippins (2001), narrative inquiry can provide a way for the researcher involved in cross-cultural collaborations to be more aware of how ideologies shape our practices as science teacher educators. In addition, they confessed that narrative inquiry afforded them the chance to critique their own experience.

Thinking narratively agrees with Blumer’s idea of sensitizing concepts. For Clandinin and Connelly (2000) context is necessary for making sense of anything, the interpretations of events are tentative and temporal, and people can change. They also contended that action can be seen as a narrative sign. Single snapshots of action lack meaning unless an interpretation of the narrative sign is connected with it. All of these factors are interconnected. As Blumer (1969) stated, “The life and action of people necessarily change in line with the changes taking place in their world of objects” (p. 12).
Once again, the purpose of the current study was to document Kasigau teachers’ conceptions of snakes and possible conceptual changes when confronted with scientific perspectives about snakes. This was accomplished by watching the life and actions of teachers as their conception of snakes transformed within their world of objects.

Research Questions

The following research questions were used to guide this study:

1. How do Kasigau teachers conceptually relate to snakes?
2. How might their conceptual relationship with snakes change following exposure to scientific perspectives and experiences?

Design and Procedures of Study

*Background*

The design of the current study began during my first visit to Kenya during the summer of 2004. While in Nairobi, I made contacts that were extremely helpful in securing my research permit from the Kenya Ministry of Education and essential for the successful implementation of a herpetofauna institute in the Village of Bungule, Kasigau.

During an early childhood education conference co-sponsored by Kent State University and Kenyatta University (KU), I cultivated a friendship with Violet, a doctoral student in early childhood education at KU. Without her help, I do not believe I would have been successful in navigating the administrative labyrinth of the Ministry of Education. She also helped me to secure the use of the *matatus* (local minivan taxis) needed to make the trip from the outskirts of Nairobi (where KU is located) into the heart of the city. Also located in downtown Nairobi is the National Museums of Kenya
(NMK), another important destination that would have been difficult to find without her help in an unfamiliar city of nearly three million people.

Before I could apply for the Ministry of Education research permit, I had to have a local sponsoring agency for my project. I knew I would need the assistance of herpetologists in order to facilitate the experiences I had planned on offering the teachers of Kasigau so, before leaving for Kenya, I had mailed some information about myself to the Head of Herpetology at the NMK. I had the pleasure of meeting Wangu ma Makire, the then Head of the Herpetology Department, and Ruby Akoth, a NMK Herpetology Department laboratory assistant and graduate student at the University of Nairobi. Madam Makire was sympathetic to the urgency of my having only three weeks to secure the research permit and expedited the needed sponsoring agency form, which had to be signed by the Director of the NMK. I then went to the Ministry of Education and submitted my application for the research permit, which I was assured would be processed and ready for my to pick up when I returned to Nairobi in a little over two weeks.

After the conference at KU in Nairobi our group from Kent State was scheduled to spend a week at the Taita Discovery Center near Kasigau and then return to the United States. However, Dr. Kenneth Cushner had invited me to join him and his friend Bill and Bill’s daughter Sam to stay on an additional week to visit Hamisi Mutinda, an elephant researcher working in Amboseli National Park. After four days learning about elephant-human interactions, observing lions feed on a recent wildebeest kill, and almost catching my first snake in Kenya, I left my traveling companions at the Kibo Slopes Cottages in
Loitokitok near Amboseli to travel back to Nairobi. I had left early in order to give myself time to pick up my research permit before having to fly back to the U.S. I was able to navigate the 230 km trip north from Loitokitok to Nairobi without incident while conversing with a Maasai gentleman for most of the trip.

Upon my return to Nairobi, Violet was gracious enough to guide me back to the Ministry. After we arrived we were told that my permit would not be ready for another month or so. Violet explained that I was told the permit would be ready today and that I was to be on a plane back to the U.S. the following day. She insisted we speak with the Assistant Minister of Education in order to facilitate the process. After waiting nearly two hours, we were admitted to his office. He told us that my application had not, as yet, been processed and apologizing for the delay, instructed his administrative assistant out front “to get the ball rolling.” After a few more hours speaking to several other administrators and gathering the necessary signatures in person, I was finally allowed to pay the $350.00 fee and we were on our way with permit in hand.

After returning to the U.S. a few months later I was informed that that the Head of Herpetology at the NMK had been reassigned as Director of the adjacent Snake Park and that Peter Mataka was now the new Head of Herpetology. I tracked him down by Internet and found that he was also willing to work with me on this project. At this time Peter was on a leave of absence and working on his doctorate at the University of Bonn. Peter introduced me via email to James, another herpetologist working out of the University of Antwerp and one of Peter’s doctoral committee members. Fortunately, James’ and Peter’s current fieldwork was located in the Taita Hills area with Kasigau slated as one of
their future research sites. Over email and phone calls Peter, James, and I worked out the tentative logistics for the mutually beneficial herpetofauna workshop in Kasigau. (James insisted on speaking by phone in order to get to know me and to better understand my project.) They also agreed to mentor teachers who had the time and interest to work with them during their visits to Kasigau.

**Overview**

A 3-month descriptive qualitative study was conducted mid-September through mid-December 2005 to investigate rural southeast Kenyan teachers’ conceptions of snakes. Sixty teachers over a 3-month period were interviewed and observed in order to get a sense of Kasigau teachers’ overall conceptions of snakes and document any subsequent change in perspectives toward snakes due to interactions with professional herpetologists, myself, and fellow teachers who subsequently became knowledgeable, competent snake handlers. Of the 60 teachers interviewed, 8 teachers, 5 males and 3 females, with whom I had developed the closest relationships during the first few weeks and who had showed the greatest interest in my work, were invited to be primary participants. Of those eight teachers, two teachers from the village of Bungule experienced the most opportunities to learn about snakes and spend time with the visiting herpetologists and me. This was due partly to geographical factors as my banda (hut) was located in Bungule and also because one of the two teachers was temporarily unemployed at the time. These two teachers were also close friends with each other and were two of the teachers with whom I had spent the most time during my prior visit in 2004. My relationship with them was one reason for my choosing Bungule as my base of
operations. Another reason I chose to stay in Bungule was because this is where the Amy Nicholls’ Center is located. The Amy Nicholls’ Center is a memorial conference site named for a teenage volunteer who was killed by a crocodile in 2002. Built to honor her memory, friends and family contributed money and labor to the construction of the center which houses a library and is used for regional meetings and teacher workshops.

Concentrated observations and interactions with these eight primary participants were the focus of this dissertation. Interviews with elders and other community members were included in order to provide an oral history of the cultural influences that have shaped Kasigau teachers’ conceptions of “snake.” The qualitative methods used in the study were participant observations, interviews and conversations, recordings by means of field notes and audiotapes, and classroom observations.

Setting

The Kasigau region of southeast Kenya is situated in one of the world’s biodiversity hotspots. It is surrounded by Tsavo East and Tsavo West National Parks and is located 7 kilometers from the Taita Hills ecosystem in the Taru Desert. My project involved teacher participants from five small villages surrounding Mount Kasigau: Bungule, Jora, Kiteghe, Makwasinyi, and Rukanga (see Figure 1). In these villages, only about 30 of every 500 adults are gainfully employed, and from a western point of view, geographic isolation as well as rudimentary communications and transportation infrastructures make it difficult for villagers to access any means of improving the standard of living. The villagers are almost exclusively subsistence farmers. Frequent
Figure 1. Map of Kenya with location of study site and communities surrounding Mt. Kasigau
drought makes crop failure an annual reality. In this context, wildlife is often seen as a threat to survival—villagers are regularly frustrated by passing elephants who trample *shambas* (family food gardens), or baboons who help themselves to precious crops (Foeken, Owuor, & Klaver, 2002; Marekia, 1991). Alternatively, outsiders have created a lucrative market for exploiting wildlife in the area; thus, some locals participate in poaching in an effort to escape from poverty (Moran, 1994).

There are six schools within the five communities, all of which are at the foot of Mt. Kasigau. Each village has a primary school (K-8) and there is one high school (9-12) located in the village of Rukanga. The high school serves all five villages in the Mt. Kasigau area. These five villages of Kiteghe, Rukanga, Jora, Bungule, and Makwasinyi are home to approximately 10,000 Wataita people. Each village has a population of, on average, 1,500-2,000 with 200-250 households.

Historically, the Bantu-speaking Wataita appear to have arrived at their present location in the 16th century and occupied 3 major upland areas: the Sagalla, Taita, and Kasigau Hills. They are agriculturists who, until recently, supplemented their subsistence base with hunting (Fedders & Salvadori, 1989). In addition, the Taita peoples of Kasigau (the Wakasigau) have survived the cross-fire of the Anglo-German war in 1915, when they were exiled from their own land to the coast by the British, their *bandas* (homes) burned to the ground, and their livestock confiscated. Yet, they survived and were allowed to return to their ancestral homeland in 1937 (Bravman, 1998).

This setting was chosen for several reasons: first, because of the work that Kent State University has already done in the area, which facilitated my entry into the
community; second, because of the prevalent negative (from a Western perspective) conceptions of snakes and the rich diversity of herpetofauna that is indigenous to the region (including over 25 species of snakes); and third, because of the close proximity to the Taita Discovery Center (TDC).

Participants

Maintaining a productive positive rapport with participants was one of my main concerns. Dealing with such an unpopular subject as snakes was worrisome. Clandinin and Connelly (2000) stated that one of the things narrative inquirers do is continually negotiate their relationships with participants, and I found that to be true. A total of 60 teachers were interviewed as well as others in the villages that were willing to talk with me about snakes. In order to have a select number of teachers involved who wished to be part of this project and who were willing to share their ideas about snakes with me, this study used purposeful sampling. I cultivated relationships with those teachers with whom I had previously developed a level of rapport. For example, Farahifu invited me to observe her class and Busara invited me to see the new house he was building. These select teachers were chosen because I realized very soon the necessity of focusing on a small number of teachers in order to get to know them well, as suggested by my committee co-chairs. Clandinin and Connelly pointed out that in formalist inquiry people are usually looked at as exemplars of a certain type of an idea, theory or representing a certain social category, whereas, in narrative inquiry people are viewed as embodiments of lived stories.
I was pleased to learn that Vicheko and Kibonye (the two teachers I had previously spent time with in their classes at the Bungule Primary School) were still living in Bungule and exhibited the same amount of enthusiasm about the project as they had during our first meeting in the 2004 KSU summer workshop. Eight teachers from three schools were invited to be the primary participants. Because of several factors, including location (my *banda* was located in Bungule), number of herpetologists available as mentors (two), availability and willingness of the participants to spend time learning about snakes, and the need to get to know the participants well during my limited three-month stay, I focused on two teachers from the Bungule village.

Unfortunately for Kibonye, but fortunately for me, Kibonye was unemployed at the time. The year before he had lost his position at the Bungule Primary School because of insufficient funds. Kibonye was one of a handful of “extra” teachers paid by local funds, rather than the normal Federal funding that pays the majority of Kenyan teachers. After leaving Bungule he had taken up a teaching position in Makwasinyi, where at the end of the 2005 spring semester, he decided to leave because he found he was only to be paid half of what he was originally promised.

Vicheko was still working at the Bungule Primary School and had been promoted to Assistant Headmaster, an added responsibility to his regular teaching assignment. However, he still managed to spend most every weekend as well as many evenings after his responsibilities at school were completed with me, Kibonye, and the visiting herpetologists when they were in the area.
The other five principle participants were Tumai, Farahifu, and Chanua from Bungule; Busara and Mwaza from Kiteghe; and Kilabu from Rukanga. Tumai is a preschool teacher and Kibonye’s wife (who I did see on a daily basis). Farahifu and Chanua teach lower primary and are both female veteran teachers. Busara had been teaching for 9 years and Mwaza had been teaching for 17 years. Both men teach grades four through eight. Kilabu is a male teacher who had taught high school biology for the past 15 years and is one of the few teachers in Kasigau who hold a bachelor’s degree in education.

Participant teachers were at various points in their professional careers. Pre-primary teachers in Kasigau are not required to hold a teaching certificate. Primary teachers within the population are required to have a minimum 2-year teaching certificate. High school teachers are required to hold a 3-year diploma or have a 4-year bachelor’s degree. Three teachers from the High School held a bachelors degree in education.

In addition to the 60 teachers I interviewed, I also spoke with others who were willing to share with me their ideas about snakes. The reason for this was to get as holistic a picture as possible of how the people of Kasigau conceived of snakes. As the actions of the teachers are intertwined with the acceptable practices of the community, I wanted to know how those in the community at-large felt about snakes. As a narrative inquiry researcher, Clandinin and Connelly (2000) suggested working in a metaphorical “three-dimensional narrative inquiry space” (p. 50). This three-dimensional narrative inquiry space is composed of temporality along one dimension, the personal and social
along a second dimension, and place along a third. Temporality refers to the continuity of the past, present and future; the personal and social dimension refers to interaction; the notion of place refers to the situation. To facilitate the use of a three-dimensional narrative inquiry space, conversations with as many folks as I could speak with broadened my understanding of the three-dimensional space of the teachers’ conceptions of “snake.”

My own gregarious nature paid off, as children, shopkeepers, and teachers alerted me to the presence of snakes whenever they were encountered within the village. This spread to other villages by word-of-mouth and because of my own frequent visits to the neighboring villages. It was not long before people would approach me and offer stories about snakes they had recently seen or stories about snakes they had just killed. I even had visitors from other villages bicycle their way from Jora and Makwasinyi to tell me where a snake was located so I could come and catch it or bring me dead snakes for me to identify.

As a matter of convenience many of the folks I spoke with on a regular basis were those with whom I came into contact during my normal routine, for example the askari (watchmen) who guarded my banda and also sat on the Bungule Village Elder Council. However, I did seek out particular elders and influential community members that the teachers felt had an influence on their conceptions of “snake.” Among those that the teachers felt were particularly influential were five elders who professed to know a little about snake medicine (the last bonafide snake medicine man died several years back and the one retired medicine man I spoke with in Makwasinyi, who dabbled in snake
Mentors

Peter Mataka, Director of the National Museums of Kenya’s (NMK) Herpetology Department, along with James (University of Antwerp, and serving on Peter’s doctoral committee), led the field practicum portion of the project involving the herpetofauna survey while mentoring Kibonye and Vicheko on the finer points of herpetology. Ruby Akoth, NMK’s Herpetology Department laboratory assistant and Ph.D. graduate student in herpetology at the University of Nairobi, facilitated the first workshop held at the Amy Nicholls’ Center in Bungule. Violet Gakii, a Ph.D. student in Early Childhood Education at Kenyatta University, was my main liaison while in Kenya and assisted Ruby with the workshop in Bungule.

Violet worked primarily with pre-K teachers from the five preschools located, one in each village, and assisted me with the initial teacher interviews at each of the five preschools. When I first met some of the female pre-school teachers they were very shy and not prone to talk with me. Having a Kenyan female who was comfortable in pre-school settings accompany me while interviewing the female pre-school teachers seemed to put the teachers more at ease. Violet’s gregarious nature was always a helpful icebreaker (e.g., she would sing songs with the children before we began the interviews) and also
allowed for translations into Kiswahili for clarification, which was necessary on occasion, during our conversations about snakes.

**Procedures**

The study was conducted September 22\textsuperscript{nd} through December 5\textsuperscript{th}, 2005, focusing on eight teachers from three Kasigau-area village schools. In order to increase the chance of observing teacher/snake interactions *in situ*, a three-part teacher professional development experience was conducted: workshops, field practicum/herpetofauna survey, and classroom visits. The following three sections constitute the organization of the herpetofauna institute from a scientific perspective. Following this section I have included a timeline chart, which outlines the activities during my 13 weeks in Kenya (see Figure 2). Logistically, many things had to fall into place for this to happen. If not for careful planning and trust between me, the visiting herpetologists, Violet, and the participating school headmasters, the opportunities for teachers would have been sorely inhibited or would not have happened at all.

*Teacher Workshops*

In October of 2005, a 6-hour workshop preceding the field practicum was held at the Amy Nicholls’ Center in the village of Bungule. Workshop topics included: how to conduct a Visual Encounter Survey of microhabitats; the construction, maintenance, and monitoring of drift fences; identification of the various reptiles and amphibians indigenous to the region; and methods museums use for preserving and cataloging reptile and amphibian specimens. Ruby Akoth of the National Museums of Kenya’s Herpetology Department facilitated the workshop with assistance from Violet Gakii,
doctoral student in Early Childhood Education from Kenyatta University. Twenty-six teachers representing all six schools from the five villages surrounding Mt. Kasigau attended the workshop.

Equipment needed for the construction of a drift fence was reviewed and the various apparatus used by herpetologists for collecting snakes were demonstrated. Workshop facilitators modeled the use of such apparatus as snake sticks and snake tongs using live snakes. Experienced facilitators modeled how one should handle a venomous snake using a snake stick and snake tongs. The live venomous snake used for modeling purposes in this workshop was a puff adder (*Bitis arietans*). Precautions were taken to avoid the possibility of any mishaps. Only professional herpetologists knowledgeable concerning the proper method of handling venomous snakes as outlined in the *Guidelines for the Use of Live Amphibians and Reptiles in Field Research* (1987) handled venomous snakes. Nonvenomous snakes were used to show how one should handle a harmless snake. Live nonvenomous snakes used for modeling purposes in this study were the Speckled Green Snake (*Philothamnus punctatus*), Kenyan Sand Boa (*Eryx colubrinus*), Brown House Snake (*Lamprophis fuliginosus*), and the Cape Wolf Snake (*Lycophidion capense*). Dichotomous keys and field guides were shared with the teachers. Preserved specimens as well as live reptiles and amphibians were available for the teachers to practice using the dichotomous keys and field guides and become familiar with measuring and labeling techniques. Observable morphological characteristics used in identifying the different snake species were stressed, especially ways to distinguish venomous snakes from nonvenomous snakes.
Field Practicum

Two teachers from Bungule, Kibonye, and Vicheko, volunteered to participate in an amphibian/reptile (herpetofauna) survey lasting two months. In addition to these two teachers who checked the drift fence traps daily, three additional teachers (Mwaza and Busara, each from Kiteghe, and Kilabu, the biology teacher from Rukanga) assisted on the weekends. Staff from the National Museums of Kenya’s (NMK) Department of Herpetology served as mentors with these five teacher participants. (Kibonye took on the most responsibility and ended up employed by the NMK through the Critical Ecosystem Partnership Fund grant. Kibonye earned more per month in this part-time position than in his previous job teaching.) “Survey” in this context refers to the identification of amphibian and reptile species captured, as well as keeping a tally of the number of each of the species encountered. In addition, participants recorded the microhabitats in which the specimens were found, along with other pertinent data, such as length and sex.

The herpetofauna survey was conducted October 5, 2005, through December 5, 2006, in order to focus during the “short rains,” which normally last from October to December, with the most rainfall occurring during the month of November. This is one of the peak times during the year for herpetofauna movement. Teachers assisted the mentor team with the herpetofauna survey in October and November. After the two teachers became familiar with the survey techniques they led a group of teachers on a field while sharing the information learned from the herpetologists with the other teachers. In addition, Kibonye and I took a three-day field trip to observe and assist with Peter Mataka herpetofauna survey in Dawida (Taita Hills) during the later part of the project.
A standard “Visual Encounter Survey” sampling method was used. The method involves selecting the habitat to be sampled and carrying out an extensive search for all of the possible amphibians and reptiles in the various microhabitats, being careful to place any disturbed cover objects (e.g., logs and rocks) back in the exact location where they were found. Day searches were conducted mostly for reptiles and night searches using spotlights for amphibians and nocturnal reptiles. Drift fences were employed where appropriate, such as around a vernal pool to catch amphibians migrating to the water to mate and lay eggs. Cover boards were also used to increase the chance of finding snakes. Careful notes about the species encountered were recorded, including snout-vent length for frogs and lizards, total length for snakes, location, weather conditions, time of day, and behavior. Digital photos were taken of each specimen. *All snakes were handled as if venomous until exact identification was determined and double checked by another member of the mentor group.*

Mentor team members modeled appropriate handling of harmless snake species. Teacher participants had the opportunity to touch and handle nonvenomous snakes (as well as other herp specimens) if and when they felt comfortable doing so. After data were taken, specimens were released unharmed in the area where they were found. Unusual or rare specimens were held captive for additional observation and used for classroom presentations. All specimens were later released in the exact spot where the individuals were found, unless it was a first capture of a species from the region, in which case it was preserved and deposited in the National Museums of Kenya’s amphibian/reptile collection.
Classroom Visits

I visited a minimum of two classrooms in each of the six schools during the project to observe teachers who had participated in the workshop conducted at the Amy Nicholls’ Center. Before these visits teachers being observed were asked to integrate snakes as part of their science lesson. I also spent time visiting teachers at the school while they were not teaching and made regular visits to all six schools, a minimum of two times each month for a total of 36 visits. This afforded the teachers and me the opportunity to get better acquainted and time to discuss their conceptions of snakes in a relaxed setting. These discussions usually took place in the teachers’ lounge or outside while the students had recess.

Each headmaster requested that I bring live snakes to their schools. In order to prepare the teachers and students for this visit each class was given a 50-minute lesson about snake ecology and snake identification. In each school, students were combined in three groups so all the students could hear the presentation. Student groups consisted of pre-K, lower primary, and upper primary. The only class where snake talks were given at the high school was during biology. Toward the end of the study I observed and took part in snake talks led by Kibonye using live snakes in each of the six schools surrounding Mt. Kasigau. We made one visit to each school with live snakes. These visits were well received with several teachers at each school taking turns handling live nonvenomous snakes and their students looking on. A few of the older students (grades 6-8) at each school also handled the snakes. Question and answer time with the students and teachers
about snakes would normally last over an hour. Snake identification, the ecological niche of snakes, and the dangers of venomous snakes were addressed.

**Theoretical Basis for Data Collection Techniques**

Participant observation was a continuous ongoing strategy during my three months living in Bungule and visiting the neighboring villages surrounding Mt. Kasigau. Narrative inquirers are never disembodied recorders of another person’s experience. They are also having an experience, which is the experience of inquiry into a “particular wonder” (Clandinin & Connelly, 2000, p. 124). Narrative inquiry is also strongly autobiographical. Life experience is a predominant source for “field texts,” the term Clandinin and Connelly used for data collected in the field. For me it was my teaching background and passion for herpetology that led me to the current study. I had and still possess a deep, abiding affection for snakes and feel keenly the need for their protection as I have worked many years promoting snake conservation efforts. However, I now have a very deep appreciation for why other people might have a very different perspective toward snakes. I elaborate further on this change in my own perceptions in Chapter 5.

Work in narrative inquiry requires close relationships with participants (Clandinin & Connelly, 2000). Participant observation can foster close relationships with participants whereas other forms of inquiry may not (e.g., the use of mailed surveys such as are used in many qualitative research designs is not likely to result in any close relationship between researcher and participant). According to Toma (2000) narrative inquiry researchers and participants should be partners. Aaronsohn (1996) also found that close personal relationships could foster healthy open communication between teacher
participants and researchers. I did become very close with Kibonye and Farahifu (as well as the other core participants) as evidenced by my daily treks to their house for supper. I am in no doubt that this was a mutually satisfying relationship in that we just enjoyed one another’s company.

One criticism of narrative inquiry is that researchers may lose objectivity by becoming too intimate with participants, but, according to Clandinin and Connelly (2000), field texts give the researcher the ability to disengage somewhat from the intimacy of fieldwork. By composing and reflecting on field texts one can slip out of intimacy for a time into “cool observation” (p. 82). Field notes, photographs, sketches, and other artifacts collected during participant observation are all considered field texts that can be used during reflection as ways to step out of the intimacy of the experience being studied and “into cool observation of events remembered within a loving glow” (p. 83). I do look back on my experience in Kasigau with a loving glow and plan to return to Bungule to visit and pursue additional research endeavors.

*Interviews*

Sixty teacher participants were interviewed during the course of the project. Interviews were done before the start of the institute the last week of September and during the first half of October, during the field practicum in November, and at the end of the institute in December (Appendices C & D). Scheduled interviews were audiotaped and transcribed. However, most interviews were impromptu and done during and after teacher workshops, during and after time spent working with the herpetologists, and anytime a snake was encountered. Impromptu interviews were also audiotaped (when
feasible) and transcribed or field notes were written as soon as possible from memory. Most interviews were conducted with a degree of informality, as I did not always follow the prescribed questions verbatim as written in Appendices C and D.

In order to foster mutual trust I kept a very conversational tone to the interviews. I did ask each teacher to share a personal story involving a snake and a traditional story about a snake if they knew of one. During the course of conversations I would also ask participants to list any local names of snakes they knew, had seen themselves, and whether or not they thought they were dangerous/venomous (capable of killing a person) or harmless/nonvenomous (incapable of killing a person). I also asked them if they were aware of any snakes in the area that were mildly venomous (can make you sick if bitten or a bite that is extremely painful but not deadly). Many of the interviews started with the simple question, “What do think about snakes?” or, “Do you have a story about snakes that you would like to share with me?” Some of the interviews were similar to what Clandinin and Connelly (2000) referred to as oral history interviews and contained autobiographical stories or stories heard from friends or passed down by family members. Interviews and conversational field texts were used as a means for collecting narratives to investigate shared meanings within the community and facilitate a conversational relationship with participants’ in reference to their experiences with snakes (Clandinin & Connelly, 2000; Van Maanen, 1988). Bogdan and Biklen (2003) put it another way; “the interview is used to gather descriptive data in the subjects’ own words so that the researcher can develop insights on how the subjects interpret some piece of their world” (p. 95). Combining participant observation with interviews afforded me the chance to
interact with the participants before interviewing, so that the interviews took on a more conversational tone as mentioned above (Bogdan & Biklen). This conversational tone allows the respondent to feel more “at ease and talk freely about their point of view” (p. 96). To know another requires openness, participation and empathy (Buber, 1958). Through participant observation that involved life-threatening encounters with dangerous snakes and other adventures coupled with guided conversation (Rubin & Rubin, 1995), I believe I was able to hear stories about snakes that may not have been shared otherwise.

In addition to teachers, village elders were also asked to share personal, anecdotal, and traditional stories about snakes in order to get an idea of the cultural influence on conceptions of snakes that had developed within the community. The teachers in Bungule, specifically, Kibonye, Vicheko, Farahifu, and Chanua thought this was a very important part of my research. They all expressed the importance of the influence elders had on their conceptions of snakes.

Data Analysis

As I deplaned in Kenya in October 2005, I was “walking into the midst of stories” (Clandinin & Connelly, 2000, p. 63). The stories that I encountered in Kenya were collected from teachers, farmers, elders, herpetologists, and ministers. And as our narratives intermingled, sometimes through sensitive observation and other times during intimate co-participation, certain themes began to emerge. For instance, there were times of sensitive observation during the beginning of the current study where I sat at the back of a classrooms silent but alert, listening intently to teachers talk about snakes as if they were evil incarnate. And just two months later, while visiting those same teachers
<table>
<thead>
<tr>
<th>Weeks</th>
<th>Timeline: Activities</th>
</tr>
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<tbody>
<tr>
<td>Week One</td>
<td>• Meetings with staff from the NMK’s Herpetology Dept.</td>
</tr>
<tr>
<td>Sept. 14-20</td>
<td>• Discussed upcoming workshop with Violet – logistics.</td>
</tr>
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<td></td>
<td>• Secured a rental car (with Violet’s assistance).</td>
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<tr>
<td>Week Two</td>
<td>• Acclimation to the TDC and the Bungule Banda.</td>
</tr>
<tr>
<td>Sept. 21-25</td>
<td>• Meetings with the new TDC Education/Research Coordinator and the Assistant Director of the TDC, about the logistics of workshops and transportation for teacher participants.</td>
</tr>
<tr>
<td>Week Three</td>
<td>• Got reacquainted with the Bungule teachers.</td>
</tr>
<tr>
<td>Sept. 26-Oct. 1</td>
<td>• Met with headmasters and lead teachers in all six schools.</td>
</tr>
<tr>
<td></td>
<td>• Began interviews with teachers I had met in 2004.</td>
</tr>
<tr>
<td></td>
<td>• Identified other Kasigau community members to interview.</td>
</tr>
<tr>
<td>Week Four</td>
<td>• Traveled to each of the six schools to make further contacts and strengthen associations and ascertain the feasibility of including teachers from the other schools in respect to a field practicum.</td>
</tr>
<tr>
<td>Oct. 2-8</td>
<td>• Invited teachers from all six schools to participate in a general workshop about reptiles and amphibians to be held at the Amy Nicholls’ Center in Bungule on October 22.</td>
</tr>
<tr>
<td>Week Five</td>
<td>• Continued interviews and collecting stories about snakes from teachers, elders and any other folks willing to discuss snakes.</td>
</tr>
<tr>
<td>Oct. 9-15</td>
<td>• Conducted observations of teachers in the schools.</td>
</tr>
<tr>
<td>Week Six</td>
<td>• Continued to do interviews and collect snake stories.</td>
</tr>
<tr>
<td>Oct. 16-22</td>
<td>• Began preparations for the upcoming workshop.</td>
</tr>
<tr>
<td></td>
<td>• Traveled to Voi to purchase necessary supplies for workshop and correspond with herpetologists via email and to pick up workshop co-facilitators Ruby and Violet.</td>
</tr>
<tr>
<td></td>
<td>• Six-hour workshop Oct. 22.</td>
</tr>
<tr>
<td>Week Seven</td>
<td>• Began field practicum (Oct. 23).</td>
</tr>
<tr>
<td>Oct. 23-29</td>
<td>• Mentoring of Vicheko and Kibonye by Peter and James.</td>
</tr>
<tr>
<td></td>
<td>• Drift fences constructed near Bungule and on Mt. Kasigau.</td>
</tr>
<tr>
<td></td>
<td>• Eight key teacher participants begin readings about snakes.</td>
</tr>
<tr>
<td>Week Eight</td>
<td>• Field trip - Kibonye and I accompanied Peter and James to their herpetofauna survey sites in Dawida (Taita Hills).</td>
</tr>
<tr>
<td>Oct. 30-Nov. 5</td>
<td>• Interviews with teacher participants continued.</td>
</tr>
<tr>
<td></td>
<td>• Classroom observations continued.</td>
</tr>
<tr>
<td></td>
<td>• Captured snakes kept for future classroom ‘snake talks’.</td>
</tr>
<tr>
<td>Week Nine</td>
<td>• Field outings looking for, identifying and capturing snakes.</td>
</tr>
<tr>
<td>Nov. 6-12</td>
<td>• Additional time spent with teachers discussing snake ecology.</td>
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<td></td>
<td>• Snake lectures without live snakes conducted at each school.</td>
</tr>
<tr>
<td>Week Ten</td>
<td>• Snake workshop conducted by Kibonye and Vicheko for four other key teacher participants (train the trainer type workshop).</td>
</tr>
<tr>
<td>Nov. 13-19</td>
<td>• Additional school visits and conversations about snakes.</td>
</tr>
<tr>
<td>Week Eleven</td>
<td>• Live snake presentations given at each school by local teachers.</td>
</tr>
<tr>
<td>Nov. 20-26</td>
<td>• Exit interviews conducted with all teachers.</td>
</tr>
<tr>
<td>Week Twelve</td>
<td>• Institute debrief with the mentor group at the NMK.</td>
</tr>
<tr>
<td>Nov. 27-Dec. 5</td>
<td>• Prepare to return to the U.S.</td>
</tr>
</tbody>
</table>

*Figure 2.* Timeline of activities during my thirteen weeks in Kenya, 2005.
witnessed them handling a Kenyan Sand Boa (*Eryx colubrinus*) in front of their classes while espousing the ecological reasons why this species of snake deserved our respect and protection. There were other times of intense intimate co-participation. For example, while scrambling through briars with Vicheko on one side and Kibonye on the other, we corralled a Flat-snouted Wolf Snake (*Lycophidion depressirostre*) using our snake sticks. We were all of bloodied by scrapes and scratches from the thorns clawing at our skin while straining to reach the elusive reptile, but all three of us felt victorious after having secured the snake. Just a few weeks prior these same two gentlemen had scoffed at the very idea of letting a snake live, let alone assisting with the safe, live capture of a snake for educational purposes.

These two examples above illustrate a pervasive theme that I first encountered in Kasigau, and contained in my field texts, that snakes are evil and deserve death. The later actions of the teachers illustrate a narrative thread that began to develop consisting of a transformative process whereby participating teachers’ conceptions of snakes seemed to have broadened allowing for an alternative perspective about snakes when involved in an educational context.

For data analysis I relied heavily on Clandinin and Connelly’s (2000) work *Narrative Inquiry: Experience and Story in Qualitative Research*. The way I perceive data, and subsequently, the way in which I prefer to present data, has also been influenced by the work of ethnographic scholars such as Clifford Geertz, John Van Maanen, and Harry Wolcott. These qualitative researchers present their data in narrative formats, which I find powerful, interesting, and convincing. According to Clandinin and
Connelly (2000), the literary uses of narrative texts are not for generalizability but “offer readers a place to imagine their own uses and applications” (p. 42).

For narrative inquirers data analysis involves converting field texts to research texts (Clandinin & Connelly, 2000). Clandinin and Connelly stressed that moving from field texts to research texts is very complex. Arellano et al.’s (2001) work in the Philippines illustrates the complex nature of narrative inquirers’ data analysis. From field texts collected/generated from a multitude of data collection techniques (e.g., cases featuring dilemmas of science teaching and learning [written by pre-service teacher participants], transcripts of large group discussions of cases, paired interviews, and research team meeting reflections . . . [p. 214]) a restorying occurs during the development of the research texts. In a paper by Richard Wilson (2007) he described the reasons why he chose a narrative inquiry method for his dissertation finished in 2005, “As a qualitative research method, narrative inquiry allows the researcher to provide a rich description, contextual understanding, and explanation of the person, place, or event under observation” (p. 26).

Following Clandinin and Connelly (2000) field texts are first sorted and positioned within the three-dimensional narrative inquiry space (temporal, spatial, personal and social), with initial analysis dealing with matters of coding narratively. For example, plotlines, names of characters, scene, context, tension, and tone can all be possible codes. This conversion of field texts to research texts consists of reading and re-reading of field texts to develop a summarized or chronicled account of what is within the various field texts. I listened to taped conversations over and over again while
transcribing, listening as intently as I could to decipher some phrase here or word there. I also took notes while listening to transcriptions. During these times of intense listening, I would relive the experience and attempt to see the process through the eyes of the participant. I would then return to the transcriptions to find the stories that were “notable and hence reportable” (Van Maanen, 1988, p. 102). I also re-read my field notes where I had jotted down some interesting interaction or comment while visiting a school or chasing down a sand snake.

While rereading field texts (i.e., transcribed conversations, field notes, and participants’ journals) I first sorted the various stories into the actual chronological order in which they occurred. After which, I intuitively coded participants’ relationships with snakes, using sub-categories of gender, age, social roles, and profession. I then coded stories by participants’ descriptions of snakes when I first arrived and then again towards the end of the study looking for any differences that would illustrate a transformation in conceptual understanding of snakes or use of an alternative view. I also coded stories according to myths and legends and how these stories may conflict with scientific views or have possible scientific explanations. To keep track of the codes I categorized each transcribed story according to the date and person telling the story or involved in the story and I also kept an outline of the various themes listed above. During this process I made choices as to which stories would “highlight the experiences and interactions of the individuals” (Ollerenshaw & Creswell, 2002, p. 343).

Narrative inquirers must continually revisit field texts, as there is “no one gathering of the field texts, sorting them through, and analyzing them” (Clandinin &
Connelly, 2000, p. 132). This is an important point. During my first analysis of the data, the themes I recognized were clustered around ambiguous terms such as attitudes and beliefs. The themes I used in my first completed draft consisted of teachers’ negative attitudes toward snakes, versus what I then considered the teachers’ subsequent change in attitudes due to learning opportunities about snakes and positive modeling. After subsequent readings and further research regarding narrative inquiry, I was able to take another look at the data and recode the participants’ stories as discussed previously.

The main themes that were distilled from my data as related to Clandinin and Connelly’s (2000) approach to data analysis were (a) teachers’ conceptions and relationships with snakes, (b) one another and the community (personal/social), (c) the setting (spatial), and (d) their conceptual transformations through time (temporal). Below are the narrative themes that surfaced based on the initial conceptions of snakes I experienced with the Wakasigau:

- Snakes are enemies of humans
- Snakes have purpose and act with intention
- Snakes are semi-immortal and have supernatural abilities
- People’s relationships to snakes are well defined:
  - Those that take an interest in snakes are supernatural themselves
  - There are gender-appropriate responses to snakes
  - There are role or position-appropriate responses to snakes
  - One should not aid or comfort someone who harbors a snake
In addition, the following themes were manifested and observed as a consequence of exposure to an alternative scientific perspective:

- Ability to differentiate snakes (i.e., identify harmless from dangerous)
- Willingness to ask different questions about snakes
- Define a new positive-appropriate response to snakes in an educational setting

I had brought my own story with me to Kenya and rather than thinking of it as excess baggage, according to Clandinin and Connelly (2000), I was to embrace it and make it a part of my narrative. The autobiographical aspect of narrative inquiry is an essential part; therefore, inclusion of one's own narrative of experience is central to narrative inquiry. That is why I have included myself in these stories as I worked alongside teachers in the field, conversed with teachers in classrooms bustling with activity, and enjoyed late night dinners in participants’ homes. For example, in Chapter Four, I share the story of how I got bitten by a mildly venomous snake and the effect this had on Kibonye, who at that point in the current study still conceived of all snakes as potentially deadly and feared for my life.

Chapter 4 is my attempt at sharing the lived and told story of my three months in Kenya. It is my hope that I have captured some of the stories that best illustrate the themes I have listed above as well as my interpretations (taken from my own snake conservation/western science perspective) of my experiences with the people of Kasigau.
CHAPTER IV

FINDINGS AND ANALYSIS

“The serpent subtlest beast of all the field.”

—John Milton

Background

The banda, my home for the next three months, rests on the side of Mt. Kasigau and overlooks the forested village of Bungule and beyond, where the lower elevation ecosystem of acacia-comiphora savannah predominates this part of southeast Kenya.

The banda was just up the hill from the Amy Nicholls’ Center, which was used for community meetings and education. I organized a herpetofauna workshop at the Center and the Bungule Primary School, which were next to one another in the heart of the village proper. My session was held in a classroom and in the open area just outside the cement-block, aluminum-roofed building. There is no electricity, and the tree filtered sunlight coming through the windows of the classroom offered little light for reading.

I fist met Kibonye as a participant at this workshop in the summer of 2004 during my initial visit to Kasigau. Kibonye and I hit it off right away. He took me under his wing and let me know that he would be glad to assist me with my project. After a short walk up a dirt path, passing several small mashamba (farms/ gardens), we came to a small office building and a fairly large circular hut. Kibonye explained that this was the Bungule Banda, owned and managed by the community and booked and promoted by the Taita
Discovery Center. I told Kibonye this would be a great place to stay while conducting my research, and hoped I would be able to make it happen. As it turned out, Kibonye became one of two primary participants in my study.

Kibonye was born and raised in the village of Bungule and holds a Primary Teacher’s Certificate (P1), which takes approximately two years of full-time study to obtain. He is married to Tumai who teaches at the Bungule Preschool and they have one young son, Ben, who attends the preschool. Kibonye has worked several other jobs, mostly in the hotel industry. He has worked in an ecotourism lodge in the region and a hotel as far away as Mombassa but prefers teaching and living in his home in Bungule so he can be close to his extended family. However, teaching jobs are hard to come by in the area. Once a person in the Kasigau area gets a permanent teaching position they rarely leave, unless they are transferred to another district.

Because of overcrowding, occasionally extra teachers are hired using community funds. During the beginning of this study Kibonye was a 42-year-old unemployed male who taught in the village of Bungule for the last three years up until community funds ran out, after which he took a position at the primary school in the nearby village of Makwasinyi, a position he lost just prior to my arrival in October of 2005 due to the same reason for his quitting Bungule Primary School. Kibonye told me they would have let him stay on at a reduced salary but that he was not willing to work without fair compensation. Kibonye’s best friend is Vicheko, who also teaches at the Bungule Primary School. Vicheko shared with me that “Kibonye does not like sports, loves company and talking with people, and cares deeply about the environment.”
Vicheko became the other primary participant in my study. He is a 33-year-old male and has taught in Bungule for eight years, and was just recently promoted to assistant head teacher. Vicheko is married to Bustani, who teaches at the Bungule Preschool. They have two sons, both attending the Bungule Elementary School. Vicheko and Kibonye are best friends and socialize together during and after work on a daily basis. They have known each other well starting in 1997 when they were both working as teachers in Bungule (before Kibonye left to obtain his teaching certificate, which is not a requirement to teach but increases your salary once obtained). Even though they both grew up in the same village, they did not know each other well previously because of their difference in age. Both Vicheko and Kibonye consider themselves environmentalists and together started BYEM (Bungule Youth Environmental Movement) in 2000 in order to stop environmental degradation around the school grounds and adjacent community area. Vicheko is athletic and enjoys working outdoors on the family shamba (farm) and hiking up and down Mt. Kasigau. Kibonye confided in me that Vicheko is “a very competent and serious science teacher” but also an “aggressive environmentalist who has the true zeal” for saving the earth.

Introduction

During my stay in Kasigau, Kibonye and Vicheko became my cultural informants and connection to other community members. They accompanied me on snake hunting expeditions, during interviews with elders, and on school visits in neighboring villages, and they helped conduct teacher professional development workshops at each of the six schools and the Taita Discovery Centre. Kibonye and Vicheko were essential to my
study. Without their assistance I do not believe I would have been able to collect the information needed for this project.

The purpose of my research was to document initial Kasigau teachers’ and community members’ perspectives toward snakes and also to investigate how conceptions/ideas of snakes might change, or alternative ways of relating to snakes may be employed depending on circumstances in the face of scientific perspectives and experiences. Chapter 4 conveys my experience with the Kasigau community as a lived and told story (Clandinin & Connelly, 2000). I hope to capture what Van Maanen (1988) called “dramatic . . . periods the author regards as especially notable and hence reportable” in his description of “impressionist tales” (p. 102). Impressionist tales are ones that are told in the first person and comprise a series of recalled experiences in which the author was usually present and personally involved (Van Maanen). These tales, taken directly from transcripts and/or crafted from field notes, participants’ journals, and recollected events, were used to illustrate for the reader the relationships between the teachers of Kasigau with various snakes co-inhabiting the five villages encircling Mt. Kasigau and the surrounding landscape.

In this chapter I endeavor to give the reader a feel for the perspectives of rural Kenyan teachers (and other members of the Kasigau community) toward snakes before, during, and after a herpetofauna (reptile and amphibian) teacher professional development institute. The first section of chapter 4 deals with the conception of snakes as related to me and observed upon my arrival in September of 2005, followed by narratives about snakes that illustrate the possible changing perspectives or the use of
alternative perspectives of teacher participants toward snakes during my 3-month stay in Kasigau. This was done through the (re)telling of stories gleaned from participants and live snake encounters observed by me or shared with participants in the field (literally “in the field” and also in classrooms, schoolyards, the Amy Nicholls’ Center, participants’ homes, and the banda [hut] where I lived during the duration of this project). In addition, perspectives toward snakes noted by other influential members of the Kasigau community (i.e., a school administrator, pastor, and three community elders or “snake medicine men”) were included. The elders’ stories also afford a multigenerational historical account of the community’s ideas about snakes in this region and provide possible causal antecedents of practical action towards snakes (Vayda, 1996). I have stressed the word ‘possible’ to point out that the tendency to act does not control the acts of humans but is merely “an initial bid for a possible line of action” (Blumer, 1969, p. 97).

The second section of Chapter 4 presents narratives depicting the use of alternative conceptions about snakes during live snake encounters. Their stories reflect the nature of “snake” as a sensitizing concept (Blumer, 1969). After exposure to scientific views and experiences the way in which the teachers interacted with snakes was now open to new possibilities. Teachers’ conceptions of “snake” had been broadened to include the ideas that there exist harmless snakes, mildly venomous snakes not dangerous to humans and that snakes are an important component within the local ecosystem.
Research Question #1

The first section of Chapter 4 focuses on Research Question #1: How do Kasigau teachers conceptually relate to snakes? The term “conceive” can characterize many things about how a person relates to something. I use the word “conceive” as a way to refer to a person’s various beliefs, attitudes, notions, and feelings about snakes. Generally speaking, I use the word “conceive” to refer to one’s “idea” of something as it relates to the moment or anticipated action (Dewey, 1933). Encompassed within this very loose definition of “conceive” is also one’s perspective of something, or more specifically, how one perceives one’s interrelationship to an object or thing within a context, in this case, snakes (Blumer, 1969). According to Blumer, “conception arises as an aid to adjustment with the insufficiency of perception; it permits new orientation and new approach; it changes and guides perception” (p. 156). Thus, conception is the fashioner of perception.

Several recurring conceptions of snakes became evident through the Kenyans’ stories and reactions to their snake encounters. These included the conceptions that snakes act with intention and that they possess supernatural abilities. Another finding that emerged from the study is that the Kasigau teachers and community members considered snakes to be enemies of humans. Furthermore, there were many stories about snakes indicating that relationships between snakes and people are well-defined. For example, persons who take an interest in snakes are thought to be supernatural. Perhaps for this reason, another understanding seemed to be that one should not aid a person who harbors a snake. Finally, for the community members I spoke with there were role- or position-appropriate responses to snakes (e.g., farmer, medicine man), as well as definite
gender-appropriate responses to snakes. I have organized the first part of Chapter 4 to elaborate upon these findings.

I address each category by sharing narratives crafted from participants’ journal entries, short answers to open-ended survey questions (which were followed up by personal interviews to allow for explanation and elaboration), formal and informal interviews, field notes, and memory. Participants’ and elders’ stories, constructed dialogues from transcriptions, and autobiographical vignettes based on participant observation are followed by my own interpretation of the events in relation to the questions addressed by this study, as well as my own explanations of participants’ stories, as discussed with them when relevant. The goal of these stories is to allow the reader to visualize the events while at the same time providing a deeper understanding of the participants’ ideas and actions in relation to snakes. My own western scientific interpretations of the participants’ stories were also included. This was done in order to afford the teachers an alternative way of viewing snakes in the future and an attempt to explain questions during conversations about snakes from my own perspective and the perspectives of the visiting herpetologists from the National Museums of Kenya.

You may recall from Chapter 3 that I interviewed 60 teachers in the Kasigau area. Among those interviewed were seven primary (Pre-K through 8) teachers and one high school teacher representing the following three villages around Mt. Kasigau:

1. Bungule—Interviewees: Kibonye, Vicheko, Tumai, Farahifu, and Chanua
2. Kiteghe—Interviewees: Busara and Mwaza
3. Rukanga—Interviewee: Kilabu, the high school biology teacher
I spent the most time with these eight teachers, with the bulk of my time being spent with Kibonye and Vicheko and less with the other six. Speaking with several teachers, elders, and key members of the community gave me additional insight as to perspectives toward snakes within the five villages—Bungule, Jora, Rukanga, Kiteghe, and Makwasinyi—which comprise the Kasigau community, which I might not have been able to garner had I confined my interviews exclusively to the two primary participants.

Conceptions of Snakes

Most of the people I encountered on a day-to-day basis when I first arrived in September of 2005 shared stories with me depicting snakes as bad, evil, unpleasant, or disgusting, while relating emotions of fear and hatred connected with their stories about snakes. It is very interesting to note that although everyone in Kasigau with whom I spoke about snakes did not like them and feared them, many teachers also said that they thought some types were tazamika (pleasant to look at). Snakes, such as green snakes and sand snakes, were considered tazamika. Some teachers went so far as to say that some snakes were beautiful and that they appreciated the way the sun played across their scales, making a rainbow of colors. In talking with the teachers, I explained that this iridescence is due to parallel ridges found on most smooth-scaled snake species. These ridges make a diffractive surface causing the light to scatter like a prism over the surface of the scales. One example is the Sunbeam Snake [Xenopeltis unicolor], but many other species of smooth-scaled snakes exhibit this characteristic including several species found in the Kasigau area such as the Small-scaled Burrowing Asp [Atractaspis microlepidota] and the Southern African Rock Python [Python natalensis], which also features an attractive pattern [one reason pythons are hunted in other parts of Africa are for use in the making of boots and purses].
villagers’ way of reminding me that “a snake is a snake,” which, according to the Wakasigau idea of a snake, meant all snakes were dangerous and deserved death, which is elaborated on further in subsequent narratives. I also witnessed villagers killing snakes while exhibiting observable actions suggesting fear.

For instance, if a child spotted a snake on the school grounds and called out “nyoka” in Kiswahili, or “snake” in English (Kiswahili is the national language of Kenya, and English is the official language of Kenya) or “choka” in Kitaita, other children came running. (Most everyone in Kasigau is trilingual by grade 4.) They proceeded to mob it, picked up stones, sticks, bricks, anything, and threw these at the snake attempting to kill it or render the animal unable to escape. If they were able to wound it sufficiently, they then took sticks and branches and beat it to a pulp. Adults reacted to a snake in the same fashion, sometimes using pangas (machetes) to kill small snakes or a bow and arrow to kill large snakes.

The only exceptions to these fearful reactions to snakes were from the medicine men I interviewed who could identify a few species of snakes and were knowledgeable about some snake behaviors. Their views of snakes were businesslike, and they considered snakes as unwitting animals that bit people in defense, and considered those who were bitten to be unfortunate patients seeking assistance. In the past it was acceptable traditional practice of medicine men to seek out snakes in order to concoct medicine for victims of snakebites. This practice has just recently become very rare, as

Kitaita is the “mother tongue” of the Wakasigau.
there are now very few practicing medicine men in Kasigau, and the ones that still do practice do not consider themselves specialists in snake medicine; however, three medicine men I spoke with did claim to remember how to concoct a proper snake potion. Victims and their families paid for the knowledge, wisdom, and treatment of the healers. The medicine men did profit from treating those who sought them out for help and told me they were sympathetic to the victims of snakebite, doing all they could to alleviate their pain and curtail the possibility of death. The medicine men I spoke with, who were aware that some snakes were nonvenomous, admittedly perpetuated the belief that all snakes were “poisonous” (venomous). They told me they did this not to increase business, but because it was just too difficult to tell the difference between a harmless snake and a dangerous snake, insisting that, “one should not take chances.”

During interviews, every teacher professed a fear of snakes and believed that all snakes were dangerous and capable of delivering a poisonous (venomous) bite. No one I spoke to, including Kilabu, the high school biology teacher, differentiated between poisonous or venomous, which is not unusual among science teachers worldwide.11 One noticeable exception to the belief that all snakes should be dealt with as if they were “poisonous” was the python. During group discussions about snakes while visiting teachers’ lounges in the six schools around Kasigau, one or two teachers

11 Through a subsequent workshop, the teachers learned that one must ingest something that is harmful to be poisoned. For example, eating poisonous mushrooms affects the ingester via the digestive system, or poison may be absorbed through the skin by touching a poison dart frog. However, if a snake bites a person, the transmission of venom is injected via fangs into the flesh [or, in the case of a scorpion, its stinger], and one has been envenomated, affecting the victim via the circulatory system.
expressed awareness that pythons were supposed to be “nonpoisonous,” but in every school I visited, the teachers still all agreed that pythons should still be feared and killed because they are capable of crushing a person to death and also prey on livestock. Even though none of the teachers claimed that they could identify with certainty whether or not a particular snake was a python (and told me they still harbored doubts about whether pythons were “nonpoisonous”), it really did not seem to matter (and this was emphasized repeatedly) since all snakes were treated the same way when encountered—killed if possible.

One of the most pervasive conceptions about snakes in the village was that “a snake is a snake.” During my first few weeks in Kasigau visiting schools and talking with teachers, conversations about snakes often included these words: “a snake is a snake.” Several teachers explained to me that this phrase referred to the belief that a snake, or any animal that was legless, had scales and resembled a snake, was an enemy of humans; a dangerous animal that should be killed. This idea of “a snake is a snake” is the phrase that villagers use to refer to the recurring theme that all snakes are dangerous and deserve death. This idea is extended to any snakelike animal including the worm lizard or amphisbaenian (*Geocalamus acutus*), a nonvenomous legless fossorial reptile commonly found after rains when plowing fields and the nonvenomous caecilian (*Boulengerula taitanus*), a legless fossorial amphibian only found on the forested upland areas on Mt. Kasigau that occasionally is washed downstream into the village mashamba (family farms) after hard rains. For example, even though caecilians do not have scales, when Kibonye and I caught our first caecilian during a 5-day field trip to the rainforest on top
of Mt. Kasigau, Kibonye was hesitant to handle the animal due to its snakelike morphology. Further elaboration on the concept of “a snake is a snake” is detailed in subsequent descriptions.

While interviewing elders in the five villages surrounding Mt. Kasigau, Kibonye suggested I speak with the three-legged man to get a first-hand view of what can happen to someone bitten by a snake. Darius Mataka, who resides in the village of Jora, is known as the three-legged man since he has one missing limb and uses crutches.

I spoke with Darius Mataka, the three-legged man, on October 3, 2005, about his injury. He told me he was bitten just above the ankle by a large Puff Adder back in 1977. He inadvertently had stepped on the snake while working in his shamba. After being bitten, he went to the hospital located in the nearby town of Voi, but received no antivenin. Several days later, he was transferred to Mombassa. The doctors there decided that too much time had elapsed without the administration of an antivenin allowing extensive tissue damage, and his leg could not be saved. Darius’ injured leg was amputated just above the knee. Darius also told me about the Chief’s brother’s wife who died from being bitten by a very large grey snake just a few years back. I was able to track down a photo of the snake that was reputed to have bitten the woman who died. From the photo, I could tell it was a very large Black Mamba—a likely suspect from the description of the speed at which the woman died—found near where the woman was working, according to eyewitnesses.

With this very tragic story in mind, and the three-legged man as an ever-present reminder of what can result from a venomous snakebite, I was beginning to understand
why nearly everyone I met did not like snakes (even though I found snakes to be fascinating creatures). Whenever I asked local villagers what they thought about snakes, they would tell me that snakes were evil and must be killed if given the chance. If they were too scared of snakes, or if the particular snake in question was too big and they did not have a weapon capable of killing the snake safely, they would call friends, relatives, and neighbors to help kill the snake. The following narrative involves an interview with Vicheko and Kibonye conducted at Vicheko’s house after I had observed Vicheko teaching that same afternoon. This initial interview highlights the profoundly negative feelings Vicheko had toward snakes expressed to me upon my arrival and shared by nearly everyone I spoke with in Kasigau.

In the following narrative the negative feelings toward snakes expressed by Vicheko were influenced by the tragic events described above, which he referred to during our conversation. The Kasigau community is closely linked with most locals having friends and relatives in neighboring villages surrounding the mountain (also known as “The Hill” by the local inhabitants). Any village news, especially one involving snakes, is soon shared with the rest of the villages around the hill.

My First Instinct is to Kill It!

After a few days in Bungule, familiarizing myself with the village and getting reacquainted with some of the teachers who remembered me from my visit in 2004, I asked the Bungule Primary School Headmaster, Mr. Kichoi, if I could observe some of the teachers in their classrooms, specifically, Vicheko, Farahifu, and Chanua. Kibonye, who had set up our meeting, and Vicheko, who was now an Assistant Headmaster, were
both in attendance. Mr. Kichoi told me that this would not be a problem as long as I did not observe their classes during the month of November as the students prepared for final exams. I started with Vicheko’s class that very day.

After observing Vicheko’s class during the afternoon, Kibonye, Vicheko, and I walked up to Vicheko’s house for our first formal interview. The path to Vicheko’s house winds its way uphill past a couple of other mashamba (plural for shamba), and when we arrived, I was somewhat winded, whereas Vicheko and Kibonye chatted easily the entire time.

Vicheko explained to me “during this time of the year my shamba consists mostly of mango trees,” adding, “It’s still a bit early for planting maize or cowpeas.”

Kibonye said, “I may plant some maize soon. The rains could begin any day now.”

There is usually a short rainy season in Kasigau, which can begin as early as October and last through December, and a long rainy season, which normally starts in late March or early April and can continue as late as June. According to Vicheko and Kibonye, they had not had what they would consider to be a successful harvest in over four years. It was now late September, and the Kasigau area had not experienced any appreciable rainfall since the long rainy season back in May of 2005, except for on top of the mountain, which almost always has a cloud on top. Because of the microclimate at the top of Kasigau, caused by the cloud forest at higher elevations, rain is a common occurrence at the peak. This, in turn, feeds the perennial streams that flow down into the
villages, sustaining a population that would otherwise be without water for most of the year.

We settled into Vicheko’s house. Vicheko put on a pot of chai (tea). The furnishings were sparse, but the chair and couch did have thick foam pads and were comfortable. I thanked Vicheko for the chai and began the interview. I asked Vicheko, “What do you think about snakes?”

Vicheko replied, “I personally, I don’t like snakes. We were brought up to believe that snakes are dangerous animals. And I’ve seen people limping, just because of snakes. I have also experienced a time when a snake has done something bad to me personally. One time a snake came into on my poultry house, and it created a lot of havoc, killing one of my most lovely cocks. So once I see a snake, then the first instinct is to kill it! Yeah. Because I might leave it and the snake may harm somebody. And so, since I can’t tell which snake is poisonous and which is not, once I see a snake, I’ll have to kill it.”

In the passage above Vicheko reflected on different experiences that have influenced his perspective toward snakes. The stories that follow further illustrate the perspectives toward snakes of other Kasigau community members. This chapter focuses on stories passed down from relatives, elders, and other community members, vicarious experiences, personal experiences of participants, and my own personal observations to address the question of how snakes are perceived by the members of the Kasigau community.
**Snakes Are Enemies of Humans**

The most profound idea about snakes exhibited by the people of Kasigau was that snakes are enemies of humans. Nearly everyone I spoke with about snakes commented on how snakes were evil creatures that would kill people if given the chance. (The few medicine men I spoke with did not seem to share this perspective, as well as the local pastor of the Bungule Anglican Church of Kenya [ACK]. As the study progressed, it became clear to me that as one became more informed from a scientific perspective about snakes, alternative ideas about snakes were possible.)

The following stories comprise several vignettes woven together to illustrate the perspectives of Bungule children, teachers, and a pastor toward snakes. The events depicted are not necessarily in chronological order as they happened but are based on experiences, observations, interviews, and conversations I had with teachers, a pastor, and students over the course of my first few weeks in the village of Bungule:

*All Snakes Deserve to Die*

I awoke that morning refreshed. As I made my way down the hill from the *banda*, located just above the village of Bungule at the base of Mt. Kasigau, to the Bungule Primary School, I was glad it was not as hot as the lower elevation savannah area known as the Taru Desert, where temperatures in September and October average about 98° F. This particular day the temperature was around 88° F, but the temperature was ameliorated by the slightly higher elevation and the abundant shade from large trees. Of the five villages circling Kasigau, Bungule is the lushest and coolest by a few degrees on
 Feeling good about getting the chance to finally get to talk to Farahifu and Chanua, I practically skipped down the dusty path.

Three main buildings comprise the Kasigau school system: the kindergarten/preschool building, where Bustani (Vicheko’s wife) and Tumai (Kibonye’s wife) teach; the lower-primary building, where Farahifu’s and Chanua’s rooms are located; and the upper-primary building, which is where Vicheko teaches and Kibonye used to teach and substitutes on occasion. The interview with Farahifu and Chanua was to take place in the lower-primary building.

As I entered the school compound on my way to my appointment with the teachers, I noticed a huge commotion. I walked over to see what was happening, and keeping back far enough to where I wouldn’t interfere, I noticed over 100 students, clad in their school uniforms of yellow shirts (with green shorts for boys and green skirts for the girls), attacking a thicket of thorny bushes. Some of the older students were brandishing long branches and sticks, and the younger students were throwing rocks and stones at a small snake I could barely discern trying desperately to get away. As I moved in a little closer, I watched as the little serpent wound its way through the thorn bushes, attempting to make its way to a low branch of a nearby tree. There it could climb to the relative safety of the tree’s upper branches. Under the barrage of flying projectiles, the snake froze, relying on its superb camouflage to thwart its determined attackers. Having given up on its escape route, the little snake was doomed. Unfortunately for this snake, holding perfectly still in order to avoid being killed (which may have worked on an avian predator) gave the children the chance to take careful aim and finally manage to knock it
out of the sticker bush. I recognized that it was an arboreal species, and once on the ground, the snake had little chance of escape. The big kids came in and thrashed it with their branches and sticks. They kept hitting it and hitting it and hitting it, until finally it was an unidentifiable mashed string of scales, guts, and bones. Some of the students began poking what was left of the head with sticks.

Now that the carnage was over and some of the children were getting what I considered to be too close to the snake’s head, I shouted, “Hatari!” (danger) and “Tahadhari!” (be careful). I was sure this was a Savannah Vine Snake (*Thelotornis capensis*); an inoffensive species, yet, even smashed as it was, potentially deadly. If a child were to accidentally prick his or her finger on one of the needle-sharp fangs, they could still be envenomated. If they had left it alone, it would most likely have crawled away.

I asked the students why they killed the snake, and most of the kids just laughed. Some ran away. (Even though I was no longer a complete stranger in Bungule, I would probably always be considered strange to most of the students in Bungule.) A few of the older kids looked at me quizzically, and one bold young man said, “Why shouldn’t we kill the snake?” adding, “Snakes are bad. Snakes are very bad.”

I told the thinning group of students, “Later, if I have the chance, and it’s okay with your teachers, I’ll come to your classrooms and we can discuss the benefits of snakes and snake identification.” I asked them, “Do you know what kind of snake it was?”

“No, a snake is a snake,” the same young man answered.
The other kids chorused, “All snakes deserve to die.”

I flicked the mangled head of the snake deep into the sticker bush thicket so no one would accidentally step on it and walked back towards Farahifu and Chanua’s building that house grades one through four.

The above narrative typifies what usually happens when a snake is discovered by anyone in the Kasigau community. Even matatu (mini van taxis/bus) drivers will swerve dangerously in order to attempt running over a snake crossing the road while traveling the dirt roads from Kasigau to Voi, the nearest large city located on the Nairobi/Mombassa Highway (personal experience in addition to many stories shared with me during this study, 2005).

*Anything Called a Snake*

Inviting me to come inside her classroom, Farahifu, with a great big smile, greeted me, saying, “*Jambo* (Hello)! *Bwana* (Mr.) David, *karibu* (welcome)!” Farahifu has been teaching for 15 years and has the most bubbly, outgoing personality in Bungule. I stepped into the dark, noisy classroom overflowing with children. Chanua was already there, and we exchanged pleasantries. Chanua is a veteran teacher of 33 years and somewhat reserved in comparison to Farahifu. She is Farahifu’s closest friend and colleague. They have combined their classes so I can speak with them together. Both teachers attempted to shuffle the children outdoors for a recess break, but only about half of the students actually left the room. Those that did crowded the doorway, blocked what little sunlight there was near my seat; the only other light came through the decorative
openings in the cement block walls. Farahifu picked up her discipline stick and waved it at the children. The children quieted down as I began the interview.

“Okay, Farahifu, what do you think about snakes?” I started.

Erupting into a burst of nervous laughter (with Chanua joining in), Farahifu composed herself quickly. “According to my point of view, I said surely I really fear snakes, and my assumption to snakes is that snakes are very dangerous animals. Really dangerous! And when I see a snake, or I see a snake has been sitting anywhere, I won’t dare going near there. Of course, when I happen to see it myself, personally, I’d very much run away, very fast. I won’t dare even to throw a stone or a stick. I run away very fast—a big snake or a small snake—I just assume that a snake is a snake.”

“When you say ‘a snake is a snake,’ what are you implying?” I asked.

“Anything called a snake,” she stated flatly.

“Is what?” I probed, still not knowing exactly what she meant.

“Is dangerous,” she said looking at me like I was some strange person who might actually like snakes.

“My reputation precedes me,” I said. Farahifu and Chanua both giggled at my remark.

“That answers my question, okay,” I said, beginning to understand.

Farahifu continued, “Very, very dangerous, yeah. And they always associate snakes with the biting.”

“And in your opinion, are all snakes poisonous or venomous?” I said.

“To my mind, I always assume that any snake is poisonous, yeah,” she answered.
I wondered if Farahifu was aware of nonvenomous pythons and asked, “Do you know of any snakes that are ‘nonpoisonous’?”

She replied, “I just hear people talking about the snakes that they are nonpoisonous or less poisonous. But I don’t believe in it.”

I changed tactics a bit and asked, “Okay. If you were walking on a path, like either to the shamba, your house, or the school and a snake crossed your path, what would you do?”

“Oh, of course, I say it in the first place that just running away or running to find where there are people to come and kill it,” Farahifu said without a moment’s hesitation.

Addressing Chanua, I asked, “How do you feel about snakes?”

“Oh, really bad,” she said gravely. “I don’t like seeing them. I don’t like seeing snakes.”

“Oh, even looking at them?” I said.

“Oh, even looking at them,” she echoed in disgust.

At this point in the interview, I found it hard to believe that even after exposure to an alternative perspective, like the ones of the visiting herpetologists I had scheduled to visit Kasigau, there would be any change in the way teachers and other community members thought about snakes. The teachers were so adamant in their negative opinion of snakes. Not only was I curious about their personal perspectives toward snakes, but I also wanted to know if the teachers around Kasigau perpetuated an overall negative idea of snakes to their students.

“Have you taught anything in your class about snakes?” I asked Chanua.
“Pardon?” she said. The din from the children made hearing one another almost impossible at times.

“Have you taught anything in your classroom about snakes?”

“Yeah, in fact I have a lesson I use every year,” she stated simply. “The lesson is about how poisonous snakes are. And children, they are told not to play with any of the snakes, because snakes are poisonous.”

“Do you teach about any that are nonpoisonous?”

She gave me a stern look like I was an irresponsible person and said, “No, no. I just made sure that I told them that all snakes are poisonous.”

“And what grade do you teach?” I asked.

“Grade three.”

“Grade three,” I repeated. Looking about the room, I saw children of all ages.

“And the children are how old in grade three here?”

“Some are 9 years—ranging from 9 years to 16.”

“And what grade do you teach?” I asked Farahifu.

“Grade one,” she said.

“And what are the ages of your students?”

“Traditional from age 5 to 11.”

That certainly explained why there were little kids mixed with students as tall as their teachers represented in a class of first and third graders. There is no age-based promotion in the Kasigau schools, and the recent development of free primary education
in January 2003 has afforded many children the opportunity to start school, but at a much older age.

“Okay, so have you done any lessons on snakes?”

“Snakes?” she said thinking. “Hmm, maybe very shallow.”

“What is your usual lesson about?”

Farahifu described her lesson: “I just draw it for them and maybe ask if they have ever seen snakes, and many of them, of course, suggested that day they have come across snakes. As I continue the lesson, I asked them if the snakes they saw are poisonous, and of course many of them will agree with me that they are poisonous.”

I paused in deliberation. If most (or all) of the teachers only teach that snakes are poisonous, dangerous creatures, and elders and medicine men also confirm this, it is no wonder that everyone in Kasigau would be unaware of any other possibilities. Later, after speaking with all of the teachers in the five villages, there was no doubt that most of the teachers of Kasigau did believe that all snakes were dangerous, and even the few teachers who were aware that there are nonvenomous species taught their students that all snakes were dangerous. No teacher that I spoke with was aware that there are several mildly venomous (not considered dangerous to humans) snakes indigenous to the Kasigau area.

Mchungaji

A few days later, I had the opportunity to talk with the Reverend Mchungaji. He is a pastor with the Anglican Church of Kenya (ACK). This is the largest church in Bungule with the majority of the Bungule population making up the congregation. On Wednesday evenings and on the weekends, I heard the beautiful sound of the Bungule
ACK choir singing hymns in Kiswahili directed by the Reverend. Mchungaji is a very intelligent man, soft-spoken, and extremely articulate. He invited me over to the parsonage where he lived next to the church, located just a stone’s throw from the Bungule Primary School.

The Reverend Mchungaji shared a couple of stories with me that explained why he did not like snakes. The first story he shared was about a time when he was a kid and was climbing in a fruit tree. While collecting fruit for his family, he felt a wriggling sensation underneath his shirt. He realized it must be a snake. He immediately began climbing down and ended up falling out of the tree. The snake was still in his shirt when he hit the ground. He tore off his shirt; the snake fell to the ground and crawled away. Even though he was not bitten, the experience left him extremely shaken and very, very frightened of snakes to this day. He told me that he was brought up to fear snakes and believed that all snakes were dangerous.

The other story he shared with me was very sad. He told me that just a couple of years after being scared half-to-death by the snake in the tree, his older sister, who was two years his senior and about 15 years of age at the time, was bitten by a snake while collecting firewood. She came back to the house hysterical, saying that she had been bitten and from what he could remember, she was already weak and suffering from a high fever. When she got in the house, she just collapsed on the floor. His family was not able to get any medical attention in time, and she ended up dying from the snakebite. Mchungaji’s family lives in the Embololo Hills, which are about 50 kilometers from the Kasigau area, just north of the Taita Hills. This was about 20 years ago, and Mchungaji
said there were very few cars back then and finding transportation to the nearest hospital was next to impossible. Because of his tragic loss, I certainly do understand why Mchungaji hates snakes.

Even though I have been around people who hunt snakes, keep snakes as pets, and study snakes for a living all my life, before coming to Kenya, I had never before met anyone who had lost a limb due to snakebite, nor had I met family members who had lost a loved one due to ophitoxaemia (snake envenomation). At this point, I began to rethink my own personal biases about snake conservation in such a rural environment.

During the course of my time in Bungule, Mchungaji and I had several conversations about snakes. He also counseled me about my concerns about the possibility of someone being injured by a snake during the course of my study or later, because of the study. Mchungaji assured me that educating people about snakes was a good thing, but felt one must always present information as fairly and accurately as possible.

The following narrative explains how Kibonye and I reconciled Mchungaji’s concerns about balancing the information about snakes displayed in the Amy Nicholls’ Center. The one thing that Mchungaji was extremely concerned about was a poster entitled “Harmless Snakes of Kasigau” that hung in the Amy Nicholls’ Center. In the summer of 2004, I had put together this poster with the help of a budding herpetologist from the University of Florida while staying at the Taita Discovery Centre. We brought it to the Bungule village, and it now hangs on the wall in the Amy Nicholls’ Center. We had secured permission to display the poster from the librarian, and I was quite proud of
the poster. However, Mchungaji did not appreciate the poster and, after listening to his stories, I now understood his reservations about having a poster showing just the nonvenomous snakes of Kasigau. He did not ask me to take it down but felt it was extremely important that there should also be a poster depicting the dangerous snakes of Kasigau. I agreed fully and explained that I had planned on creating one in the summer of 2004 but ran out of time before having to return to the United States. In such a rural place as Kasigau, educational posters are a rare commodity. In the west, students are inundated with posters in their schools and libraries alongside other advertisements, which may or may not be “factual.” From my 15 years teaching in public schools in the United States it has been my experience that many students (and adults) do not give posters much attention, nor give too much credence to the messages portrayed by posters, but according to Mchungaji, posters are a powerful tool in Kenya and can be extremely influential. So, with Mchungaji’s urgings and Kibonye’s help, we put together another poster, “Dangerous Snakes of Kasigau,” to balance out the information about snakes in the Kasigau area.

During one of our many conversations, I asked Mchungaji, as a man of the cloth, what he thought about snakes being depicted in the Bible as evil. Mchungaji’s simple explanation was that most stories in the Bible are analogies for teaching, and that a learned person should realize that a snake is not inherently bad but is one of God’s creatures. Even though he personally does not like snakes and fears them (and would kill one if found on his property or around the church), he agreed to keep an open mind.
**Fight Until the Bitter End**

After watching students kill a snake, meeting and talking with Darius about the tragic loss of his leg, and listening to Farahifu’s, Chanua’s, and Mchungaji’s stories, I began to understand just how much the people of Kasigau feared and hated snakes, and with good reason. From many conversations with Vicheko and Kibonye, I knew they both hated and feared snakes as well and were adamant about killing any snake that crossed their paths. Therefore, I wanted to know exactly what Vicheko and Kibonye would do when confronted by a snake. The following conversation, taken from transcripts of an interview with Vicheko and Kibonye and other informal discussions, illustrates how their actions toward snakes are consistent with both their professed attitudes and their inability to identify snakes (*all* snakes are hated and killed when encountered).

I asked Vicheko, “If you saw a snake on a path, what would you do?”

Vicheko answered, “Well, if I don’t have a panga in my hands then I would have to look for a stick immediately. And if I’m in a good position, then I’ll have to hit the snake anywhere on its body. I cannot always aim at the head because sometimes a snake might hide their head. So I aim at first anywhere, and make it injured. Then I look for the head. We believe you have to hit the snake anywhere, and then get in a position to crush the head. Of course, if you have a *panga* (machete), the best thing you can do is subdivide that animal into so many pieces.”

“What if it’s a big snake; like a big snake that can strike a long distance and your *panga* is only this long?” I asked, holding my hands up about two feet apart.
Vicheko responded with obvious familiarity, explaining, “Traditionally, in order to kill a big snake, we use a bow and arrow or we use a catapult—what Kibonye tells me you call a slingshot. Or we use a stick of this size (holding his hands as wide as he can), or we pick a stone for throwing, anything that has greater range. Like I was telling you, the last time a snake got into my house, I got a bow and arrow and then shot it. After you shoot it once, and you have injured it, then you can look for a long stick to thrash it, or call the neighbors to help you kill it. But you just can’t leave it and run away.”

I then turned to Kibonye, who was listening as if he had heard these stories before but was still interested in how Vicheko was relating the information, and asked him, “If you found a snake on the path, what would you do?”

“Well, my first instinct will be to look for some form of or kind of a weapon,” Kibonye said. “If I have a panga in my hand, I might throw the panga at the snake. Because that will be the first weapon that I use.”12 “Of course, it depends on the size of the snake anyway,” Kibonye continued. “If the snake is too big, there are chances of me letting it go. I can’t risk it, because if I throw my panga at the snake, and I miss, the snake may not move, then I’ll be forced to leave my panga because I’m frightened of snakes. Any snake that is called a snake, especially when it’s too big, to me it’s an enemy. Okay,

12 Kibonye did, on most occasions, have a panga in his hand. He was rarely without it, carrying it around with him wherever he went. If he did not have it in his hand, it was usually within arms reach: laying on a table nearby during dinner, stuck in the side of snag while talking to someone in the bush, or propped up against a kiosk wall during breakfast while taking chai or shopping.
I prefer to hit it from a distance or let it go. It’s definitely the way I would work it, or how I can handle it.”

“What if it’s in your house or on your *shamba*?” I added quickly.

Without a pause, Kibonye said, “Well, when it is in my house, that’s where I have to fight it until the bitter end. Because there’s no way I can sleep in that house with an enemy. You might end up sharing a bed with the snake—you can’t get any sleep with such an enemy in the house. Imagine how can you feel having a snake as a bedmate. It would be very uncomfortable. I would not sleep in a house with a snake inside. There’s no way I can sleep in that house. If I feel like it’s a bit past my ability to kill it, I would even call neighbors because I don’t have a bow and arrow. I might use my catapult (slingshot). But I would call in neighbors that have bows and arrows, or other daring people. There are people who don’t fear snakes as much as me. Me, I have some reservations. I don’t know which snake spits or which snakes dive at you.”

When it comes to killing snakes, Vicheko is the more courageous of the two, but if one is discovered in the house, even Kibonye will “fight it until the bitter end.”

Kibonye referred to snakes as enemies three different times in this short narrative. This is a clear indication that at this point Kibonye only perceived snakes in a negative way. There is a community perception that all snakes are enemies of humans. This pervasive negative perspective has implications that most, if not all, community members would be hesitant to change the way they conceive of snakes or interact with snakes.

“So if you had a big snake in the house, or one that can spit venom a great distance, the best weapon to kill it would be what?” I asked.
“A bow and arrow,” Kibonye shot back. “It’s not very common to find Puff Adders in the house. You usually find them in the *shamba* or the wayside. The only common snakes that come into the house are Red Spitting Cobras, called the *Nguluku*, with a black band on the neck.”

“And how about the other cobra common to this area, the Black-necked Spitting Cobra?” I added.

“Yeah, that one spits also,” Kibonye said with conviction. “It’s never spat at me, but I know from stories that it does spit. So when you’re having that snake—anyway we’re not comfortable with any snake. But at least we have some evidence that the Red Spitting Cobra can spit. And it’s even very dangerous to your eyes; you can even get blind from being spat upon!”

“Can you tell the Red Spitting Cobra from other snakes?” I said. I was becoming intrigued by Kibonye’s use of different local snake names, wondering whether he could identify one species from another.

Kibonye commented nervously, “Well, the Red Spitting Cobra has a black band on its neck. And well, we might confuse this snake with another snake with the color red, but there is no way we can take chances. So any red snake we call *Nguluku*. *Nguluku* is the Kitaita name for the Red Spitting Cobra.”

I could tell that Kibonye was uncomfortable talking about snake identification, so I switched over to a more personal-knowledge kind of question and asked, “Do you have a personal story about a snake you would like to share with me and Vicheko?”
Dying Dogs

“Okay, apart from the myths that we learned as we grew, is that experience I personally encountered,” Kibonye began. “When we were looking—a friend and I were looking for cattle, and we had two dogs, a male and a female. The male dog was called Rooster. So when we were looking around, we came across a hole dug by an aardvark. We were looking for a wart hog, so when we were observing the hole, hoping a wart hog was inside [small wart hogs often shelter in abandoned aardvark dens], there was movement in the bushes. We did not know what it was, something just terrified us and we scampered for safety. When we had run some 10-15 steps away from the hole, we heard the dog bark. When we looked back, we saw the male dog, Rooster, holding a big snake by its tail. And it was like a stick protruding from the mouth of the dog. Then the snake vanished into the hole. We walked a few steps towards the hole. After a few minutes, the dog went away from the hole a few steps and then looked at us like somebody who was very sad, and then dropped down dead. And we knew the dog had been bitten. We walked some 20 to 50 yards with the other dog trailing behind. That is the female dog started acting strange—staggering and biting grass, and it fell down dead. Because the dogs died so fast, we knew a very poisonous snake must have bitten them. I suspect maybe the mamba class.”

“Would you have known that before I came, that it was a mamba?” I asked. This question was prompted by the fact that in the short time I had been staying in Bungule, Kibonye and I had spent a lot of time together, and the subject of our discussions would drift toward snakes. Kibonye is a very curious man. And even though I did not want to
taint our first formal interview by sharing information about snakes, I did not want to appear rude and ignore his questions about snakes.

Somewhat sheepishly he responded, “Okay, I cannot specifically classify . . . Okay, before you came, I never knew the difference between the mamba and the green snake. Like the harmless green snake that the snake medicine man we spoke with called Ikumbo, but we normally call all green snakes mamba. So it’s mamba, mamba, mamba. But we just use that common name for any green snake, venomous or not, because we have it from stories, and think it should be the mamba. So I can’t actually tell you exactly if it was a Green Mamba or what. But I’m just assuming it’s a mamba, because they’re said to be very dangerous. And, as I have already told you; the dogs, shortly after being bitten, dropped dead in their tracks!”

He ended the last sentence emphatically and looked at me as if to say, “Go ahead, tell me that wasn’t a mamba that bit my two dogs.”

Lapsing into my teacher mode I told Kibonye and Vicheko, “It probably wasn’t a Green Mamba (Dendroaspis angusticeps) because, to my knowledge, Green Mambas have not been found in this area. According to the book Reptiles of East Africa [Spawls et al., 2004], the Green Mamba’s range is restricted to the coast of southeast Africa except for a couple of small areas inland. However, it is possible that Green Mambas are here, since one of the inland areas where they have been found is not too far from Kasigau. But the Mamba species that is common to this area would be the Black Mamba (Dendroaspis polylepis).”
Kibonye interrupted my short lecture on mambas declaring, “The snake was greenish in color and very large.”

I replied, “Actually, I am not questioning what you saw. Let me explain. There have been several accounts of Black Mambas from the area around Taita Discovery Centre (TDC), and I am sure they would also be common around Kasigau, since they are so close to one another. However, it was probably a Black Mamba. Most Black Mambas are in fact olive-green in coloration, and the Black Mamba is one of the few snakes with venom that can act so swiftly. The name Black Mamba actually comes from the dark black color of the interior of the mouth, which is displayed when angry by gaping the mouth and spreading a small hood in a cobra-like fashion.”

“Ahh,” Kibonye exhaled, “that explains the question of color.”

You Can’t Spare a Snake

Turning my attention back to Vicheko, I stated, “You mentioned to me earlier that during the rainy season, there are lots of snakes in your shamba.”

Vicheko agreed with a nod of his head.

“Just give me a rough idea how many snakes you might encounter during any given rainy season and what you do with the snakes when you find them,” I asked.

After thinking a few moments, Vicheko replied, “Now, during the rainy season, we believe all the animals that have gone for aestivation will come back to the field when

13 At times my need to explain a western perspective about east African snakes probably came off as presumptuous or pretentious; however, students and colleagues have told me in the past that this is just my nature.
there is some green grass. Many animals like eating the newly grown grass and come into the *shambas* to graze. I think snakes also have to come now, and these snakes have to follow the small reptiles, rats and frogs. You see, the insects come to eat the grass, and the frogs come to eat the insects, and the rodents also come to eat the grass, maybe even some birds come to eat the bugs, too. So since we’ve got *shambas* down in the field, then normally when it’s rainy season, we see a lot of big snakes crossing over the road. When this is happening always we walk with a lot of caution when it is rainy season, especially when we are walking somewhere where there is no path. Especially in the *shamba* when you have to look for firewood, and maybe you are taking care of the animals, you have to take care, because there are normally a lot of snakes."

Vicheko continued, “So once we see the snake, as I said earlier, you can’t spare it. Because you won’t know who is going to be the next victim if you leave the snake. So automatically you know when you are in the *shamba*, always you have to hold something in your hand, a strong stick of if you have a *panga* or a bow and arrow, always; or anything that can protect you from any animal. So it’s the order of the day that when any number of ten farmers working down there, if you come in the afternoon or evening and you ask them how many snakes they have seen. At least one will say, ’I’ve seen a big snake along the fence‘ or somebody might say, ’There is a snake that has gone into a hole where I was digging.’ So if that happens, the person will at least try to move away from the portion they are digging in, especially ladies if you tell them you’ve seen a snake, or they see one themselves, and they are in the middle of a portion that you have cut, or want to dig, they’ll drop their *jembes* (hoes) right there, and run for their lives. So if there
is a man around, he’ll rescue the situation, but if all of them are ladies, even if they have not run for their lives, I think they still have to come back home without food. During rainy season, we’ve got many funny things happening with snakes [said laughing].”

I was impressed with Vicheko’s ecological knowledge of snakes, which was substantially more than any other Kasigau teacher I spoke with or United States teacher for that matter, and asked, “During the rainy season, on average, how many snakes would you possibly kill per week?”

“Per week, hmm . . .” Vicheko thought aloud. “Now, every kind of farmer—you know sometimes, since our shambas are just too close—those who border the bush at least they have to kill a snake a day.”

“One a day by a farmer whose shamba borders the bush,” I repeated.

“One a day,” Vicheko confirmed. “If one is not killed, another farmer might kill two or three. Sometimes—yeah, yeah. So . . .”

“That’s a lot,” I declared.

“A lot, yeah,” Vicheko agreed. “Because—especially the Puff Adders in the shambas all of the day, especially now, once we have harvested the last season. We pile the maize stalks together. Now, when it rains, we have to upset the stalks. Once you have upset the stalks, most likely you will find a Puff Adder or some other species of snake.”

I grew up in southern Arizona where there are numerous snakes but I was still surprised at the abundance of snakes that Vicheko claimed lived in and around his village. However, as soon as the rains came in late October (the usual start of the short rainy season), I learned just how common snakes were in this region of southeast Kenya.
During the short rainy season (October to December) not a day went by without receiving word of a snake being spotted somewhere near the village of Bungule or one of the other villages around the hill. And even though all snakes encountered are killed if possible, there are so many snakes living in the surrounding countryside in respect to the number of snakes killed by villagers that I do not believe there would be a significant threat to the overall population of snakes in Kasigau. However, it is possible that certain species may be extirpated within the village depending on the species’ ecological niche and ability to evade notice by villagers or escape when discovered.

During the next couple of weeks, I set out to capture as many different species of snakes as possible in order to have live snakes for demonstration purposes for the upcoming workshop. Kibonye and Vicheko accompanied me on several snake-catching adventures, giving me opportunities to observe their reactions to snakes in situ.

Close Encounters

The following three tales are used to illustrate reactions of Kibonye and Vicheko toward live snakes in the field prior to the first herpetofauna workshop. The first involves catching a Speckled Sand Snake (*Psammophis punctulatus*) with Kibonye. This story exemplifies how Kibonye believed all snakes to be deadly, a fear highlighted by his concern that I might die after being bitten by a relatively harmless, mildly venomous species of snake. When I did not die, he was quite surprised; telling me that he really thought a bite from any snake would cause death.

The next story depicts Vicheko and Kibonye’s reaction to a Puff Adder (*Bitis arietans*). This story is used to convey their sense of apprehension during the capture of
one of the most feared and dangerous snakes of the region. It was especially interesting to
witness Kibonye’s reaction to a snake he believed could spring through the air. I was also
curious to see what Vicheko would do. He was so adamant about killing any snake that
crossed his path that I wondered if he would allow me to capture the snake and keep it in
my banda until it was time for the workshop at the Amy Nicholls’ Center.

The last tale takes place in the middle of the Bungule village where a small
Southern African Rock Python (Python natalensis) had been spotted. This story is used to
show how Kibonye and Vicheko were beginning to appreciate an alternative perspective
toward snakes as they continued to have new experiences with snakes that did not involve
killing them. It seemed to me that their perspectives toward snakes were beginning to
change, and instead of instantly trying to kill the snake, they both exhibited curiosity and
volunteered information about the snake to the crowd. Pythons are one of the only snakes
that both Kibonye and Vicheko believed to be nonvenomous at this time, albeit still
dangerous after attaining a large size. They were still very uncomfortable being near the
snake, and Kibonye would not touch it, even when I was holding it securely behind the
head. Vicheko did touch it briefly with his finger, but quickly drew his hand away as if he
just touched a hot stove.

*Snake Overhead*

People in the Bungule village already knew that I was looking for snakes. This bit
of information seemed to spread like wildfire throughout Bungule and eventually to all
the villages surrounding Mt. Kasigau. This was not so surprising because I had
mentioned to several young men while assisting with the clearing of vegetation around
the Bungule ACK Church that I would give a finder’s fee for information leading to the capture of a snake. I was hoping to collect a few live snake specimens for the upcoming teacher workshop, thinking this would also give me a chance to witness Kibonye’s and other teachers’ reactions when confronted with live snakes. Anytime a snake was spotted, therefore, someone was sent to fetch me. Undoubtedly, if I were not there looking for snakes and offering a reward for information leading to the successful capture of a live snake, from what I had been told thus far, these snakes would have probably been killed or perhaps ignored. For example, snakes that are seen high in a tree are usually left alone since they are too difficult to get close enough to kill.

During my third week in Bungule, Kibonye and I received word that there was a snake in a field not far from where we were enjoying our breakfast, and leaving our half eaten chapattis (flatbread), we quickly followed the young man who had been sent to fetch us. After a brisk 15-minute walk, we came to an abandoned house where the snake was reported to have been seen. We were met by a small group of young people anxiously waiting to see the mzungu (Caucasian) catch a snake.

I said to them, “Choka yeko hao nii wade?” (“Where is the snake so I can catch it?”). This was one of the few Kitaita phrases that Kibonye had taught me for just such an occasion. Shouting wildly, they all pointed in the direction of the house. Not needing any translation, Kibonye said, “They say it’s inside the house.”

I crept into the house cautiously, not knowing anything about the size, type, or exact whereabouts of the serpent in question. My mind raced. The snake could be a 10-foot Black Mamba or an 8-foot Boomslang, both capable of killing me with one bite.
Looking about frantically in the shadows of the dilapidated old house, I shouted nervously to the group standing just outside the doorway in my very limited Swahili, “Nyoka kubwa or ndogo (Snake big or small)?” and in English, “How big is this snake?” followed quickly with “Wapi nyoka? (Where is the snake?)” and in English, “Where did you last see it?” I was hoping to get some information that would assist me in finding and securing the snake without being caught by surprise. If it was a large venomous species, I would use a different tack than if it was a small harmless one. From outside of the house, one of the excited onlookers exclaimed in English, “It’s a small snake, we saw it overhead—up in the rafters—you know, the roof of the house.”

The house was old, in disrepair, and made from mud bricks. It was a fairly small structure, maybe 14’ by 12’. The thatched roof had holes in places, but it was still fairly dark. I strained my eyes, and sure enough, I spotted a little snake’s head sticking out from one of the beams in the ceiling; the rest of its body was lost in the roof’s thatching. I couldn’t reach it, not even with my snake tongs. I looked around for something to climb to get closer. In the middle of the house was a half-broken mud brick wall, which used to separate the main room from the only bedroom. I climbed the four-foot wall and stood precariously on the top of the clay-molded bricks. I kept my balance by holding on to a support post with my left hand, and with my snake tongs in my right, stretched as far as I could. The jaw of the tongs just barely reached the ceiling where the snake was still hiding in the thatching. I noticed that Kibonye had bravely entered the house to assist me, the rest of the crowd not daring to enter the building. I leaned further, and slowly, carefully, the mud bricks crumbling under my boots, brought the snake tongs closer and
closer to the snake’s head. Just when the tongs were in the correct position, I closed the tongs and flung the snake from the roof down to the ground. Practically falling off the wall, I scrambled to get the snake before it took off and found a hole in which to hide. I looked to Kibonye for assistance, but he panicked, and stumbling backwards, he fell into the group huddled in the doorway straining to get a look, knocking them down like bowling pins.

I heard the screams and nervous laughter outside as I dashed over to grab the snake, which was crawling quickly towards the base of the wall riddled with small holes (probably made by rodents that were very common throughout the village *shambas*).

Regaining his composure, Kibonye rushed back into the house to help. By that time, I’d already caught the snake. I had grabbed the snake mid-body, giving the frightened reptile a chance to tag me. The snake had bitten me firmly between the thumb and forefinger of my left hand. I would have used the tongs, but after seeing just how small the snake was, I decided to use my bare hands to avoid injuring the little snake. Even though it was a small snake and rear-fanged, it had managed to sink those fangs deeply into my flesh. I knew I had been envenomated. I was not too worried because I had carefully studied the photos in the book *Reptiles of East Africa* (Spawls et al., 2004) and had identified this snake when I first spotted it as a Speckled Sand Snake (*Psammophis punctulatus*), a nondangerous species. Looking down at the bite, I saw a small amount of blood oozing from the fang marks. I dropped the snake in a sack I carried just for this purpose and tied the end securely with an overhand knot.
Noticeably shaken and concerned, Kibonye took my hand in his and looked at the wound closely. His eyes were wide and he asked me gravely, “Are you going to live?” I said matter-of-factly, “I’ll be fine—this species is only mildly venomous. And even if I have a strong reaction, it isn’t going to kill me.” I explained further, not only for Kibonye’s benefit but also for the rest of the group who looked on in shocked amazement, “I might get a little drowsy, though. I think we should head back to the Main Kiosk to get something to eat and drink before the venom begins to take effect.” Kibonye nodded vigorously in agreement.

We hurried as quickly as we could back to the kiosk, which I’m sure helped to get the venom flowing through my body. By the time we got to the kiosk, I was feeling lightheaded to say the least. I sat down. Kibonye was very kind. He brought me some chai (tea) and a fresh chapatti (flat bread). I began to eat the chapatti and sip my chai. About 30 minutes went by as I experienced the effect of the snake’s venom. I felt a little bit disoriented, somewhat delirious, and intoxicated.

Later, Kibonye said that he had given me a glass of milk to drink because he thought the milk would help to dilute the poison and that I drank the entire glass in an instant. I told Kibonye that I didn’t remember him offering me the milk or drinking it. Kibonye made it very plain that if he had not witnessed this incident personally, he would not have believed that someone could be bitten by a snake and live without receiving some kind of medicine—traditional or otherwise. He expressed to me that reading about the snake in the book *Reptiles of East Africa* (Spawls et al., 2004), especially the part about this species being mildly venomous, reinforced what he now was beginning to
believe; that in fact, there are some species of snakes that are venomous but not deadly to humans. According to Kibonye, this was a revelation and one he would ponder for a while.

I asked Kibonye why he insisted that I drink milk after being bitten by the snake. He told me that there is a belief among the Taita that if one is spat in the eye by a spitting cobra, the victim should have his eye rinsed by a “lady’s breast milk.” There is also a traditional Wutasi (traditional Taita religion) belief that, “a man who is bitten by a snake could be cured if a woman with milk in her breasts suckled him” (Harris, 1986 p. 169). Both Kibonye and Vicheko claimed that they did not believe in such things, but when it is not possible to get to a hospital, they claimed it is better than nothing.

One in Hole

It was Saturday about three weeks after I first arrived, and Kibonye and Vicheko had planned an outing that would take us to Rukinga Hill to look for Pancake Tortoises (Malacochersus tornieri). This is a strange species of tortoise with a disjunct population. Peter Mataka (the National Museums of Kenya [NMK] head of herpetology) studied this species for his Master’s degree. While in Nairobi, Peter told me all about his study and how he thought it strange that there were no naturally occurring populations of Pancake Tortoises living in the Tsavo area, even though there seemed to be perfect habitat to support this particular species, especially around Mt. Kasigau. He had told me that the Pancake Tortoise is found south of Tsavo just over the Tanzanian border and north of Tsavo in central Kenya. Peter had requested that if I had time, in addition to looking for snakes, I should look for Pancake Tortoises. After telling Vicheko and Kibonye about the
Pancake Tortoise, and my careful description of Malacochersus tornieri habitat requirements, they had decided that Rukinga Hill might harbor this elusive species. They had also assured me that this area should be great for finding snakes.

The cycling trip was a bit longer than I would have liked, but they insisted we take bicycles instead of the car, both men commenting that I could use the exercise. Vicheko and Kibonye were both in excellent physical condition. I told them that I did not have a bike, but Kibonye said that was not a problem. He had arranged for us to pick up Tama’s bike on the way out of Bungule. Tama is the contractor who helped plan the construction of the Amy Nicholls’ Center. His house was just down the road in the direction of Rukinga Hill.

I asked Vicheko and Kibonye, “What about elephants?”

Vicheko said, “Kibonye and I are familiar with the elephant’s routine on the way to the Rukinga Hill. We will leave after breakfast when the elephants are normally in the bush foraging for food and return before they make their way back to the river to slack their thirst and raid our fruit trees.”

Having driven around Mt. Kasigau many times, I was familiar with the road leading from Bungule, past Rukinga Hill to Makwasinyi. I recalled an area along the road where there were many elephant droppings the size of soccer balls and figured this was the area where our risk of running into the elephants was greatest.

I told Vicheko and Kibonye, “I do not like the idea of meeting an elephant while I’m riding a bicycle. It is unnerving enough to confront a powerful pachyderm sitting
behind the steering wheel of a little Toyota Corolla station wagon, let alone while riding a bicycle.”

I abandoned the idea of taking the relatively safer mode of transportation in order to experience the mode of transportation that Vicheko and Kibonye used to traverse the dangerous terrain between the village of Bungule and Rukinga Hill. Vicheko and Kibonye were both surprised that I could ride a bicycle, especially in the areas of the road where there was loose sand, which made steering the bicycles very difficult.

Vicheko said, “Don’t worry. We can sense when elephants are close, and we will go another direction if we think they are near.”

At first I was not so sure. I viewed Kibonye and Vicheko as teachers and not familiar with the bush. On this trip, I learned that my perspective was wrong. They could both read animal signs as easily as I read a first grade primer. This was another experience that added to my growing respect for indigenous knowledge and increased the trust between Kibonye, Vicheko, and me.

Just as we were beginning our day trip to Rukinga Hill, a young man ran up to us and said, “We found a snake.”

I asked, “What kind and how far is it?” I was anxious to get on with our trip but did not want to miss the chance of catching a different species of snake to add to our growing collection for the workshop.

“I don’t know,” came the common reply. He added, “The snake is near askari Majani’s shamba.” He was referring to elder Majani, one of the two watchmen who keep an eye on the banda.
Kibonye and Vicheko knew exactly where that was located, and we set out in search of another snake. Since it was some distance, we decided to bicycle our way to the spot. We headed out. The young man trotted at a good pace with Kibonye close behind. Vicheko, easily keeping up with Kibonye, rode expertly with me seated on the metal rack on the back. Bumping along the path, I knew after just a few minutes that this little adventure would leave my fanny bruised and sore for several days. Gritting my teeth, I held on tightly, hoping to arrive soon.

We continued riding along the path towards what I hoped was a different species of snake than we had already collected. As we traveled along, several other folks joined us to see the snake. After about 30 minutes of riding, we came upon a field where the soil had been freshly tilled and the bicycles bogged down, so we stashed the bikes behind some bushes and continued on foot. We did not have far to go. The children who were leading us were very excited. They couldn’t believe that “Bwana Nyoka” (snake man) was actually going to catch a snake right in front of their very eyes.

I was wondering if Kibonye and Vicheko would want to catch the snake. I thought if it were nonvenomous, maybe they would. I let on that I was going to let them catch the snake when we found it. They both looked apprehensive, Kibonye more so than Vicheko. We finally came to the shamba where the snake was located. The area was dry. The rains had not yet come. The field was studded with weeds and little pieces of dried maize stalks from last season’s crop.

I asked, “Where is the snake?” and repeated the question in Kitaita, “Choka yeko hao?”
The kids said, “It’s in a hole.”

I couldn’t believe it. “It’s in a hole?” I said dejected. “If a snake is in a hole,” I told the children, “the chances of getting it out are very, very small.”

One of the children replied, “No, no, it’s in a hole where you can see the snake.”

Very much relieved, hoping I would get the chance to at least get one good grab before it retreated deeper into the hole, I said, “Oh good. Now do you remember where it is?” I also added, “Please be very, very careful where you step.” Most of the children in Kasigau went barefoot or wore flip-flops, and all the kids in this particular group were barefoot. I was very uncomfortable with barefoot children helping me find a snake and concerned for their safety. So I said, “Just point me in the direction of where you think the hole is. When I get close, holler.” One of the older children perhaps 15 years of age, said, “No, it’s okay. I know.” I looked at Kibonye for confirmation that this was okay with him. Kibonye asked the young man, “Are you sure you know where it is?” He shook his head yes and led the way, taking us straight to a hole. When we got to the hole, I looked inside, and sure enough there was a Puff Adder coiled at the bottom: a beautiful, fat specimen, a little over a meter in length. It was a fairly shallow hole, about 8 or 10 inches deep with a large opening, but I knew that this hole was probably connected to a series of burrows created by some sort of rodent. I told Kibonye and Vicheko that I would get it out of the hole, and then if they wanted, they could try to catch it with the snake sticks and the snake tongs.

Using the tongs, I grabbed the snake behind the neck. It wriggled violently as I pulled it out of the hole. I moved a few feet away from the hole and set it down. The Puff
Adder just coiled up and lay very still. I handed Kibonye my tongs. Vicheko already had a snake stick. I asked them, “Do you want to help me bag it?” They both looked at me as if to say, “What, are you nuts?” The look in their eyes spoke volumes. I could tell that they thought I should kill this snake; that it was an enemy that deserved to die. I could also see from the way that Kibonye kept backing up that he was sure the Puff Adder might manifest its supernatural ability to spring and fly through the air and attack us at any time. And even though their reason for being here, so close to a snake, was to assist in the snake’s capture for educational purposes, their previous community appropriate relationship with snakes called for them to kill it.

Kibonye looked at Vicheko. Vicheko looked at Kibonye. They both looked at the snake. Then they looked at me. All the kids looked at the three of us. Kibonye and Vicheko’s gaze fell back on the snake. They both shook their heads and without taking their eyes off the snake said, “No, we do not want to catch that snake.”

So I said, “Okay, I’ll do it.” I was fairly sure when I asked them that they would decline my invitation to catch the snake. Even if they had said yes, I would not have allowed them to do so. In my opinion, they were not yet ready to handle a “hot” (venomous) snake. So I went over to the snake and after taking a few photographs, caught it behind the head with the snake tongs. Grabbing it behind the head with my left hand, I picked it up, supporting the rest of the body with my right hand. I showed the kids the snake’s fangs when it opened its mouth, the venom dripping from the end of its hypodermic needle-like fangs. Vicheko and Kibonye were visibly nervous.
Kibonye said, “Are you sure that’s safe?” I said, “Yes, I’ve been handling snakes all my life but one must be very careful. Please bring me the bucket; handling venomous snakes still makes me nervous, though.”

Vicheko brought the plastic bucket that we had taken along with us and placed it on the ground about six feet from where I stood holding the Puff Adder. I could tell from his face that he wanted to kill the snake but was also fascinated by what he was seeing. The bucket had a top that would close securely. I carefully dropped the snake into the bucket, and letting go of its neck, quickly put the lid on top. We tied the lid down and then put duct tape around the edges to make sure that the snake could not come out.

I asked Kibonye, “Do you want to carry the bucket?”

Taking the bucket into his trembling hands, Kibonye said, “This gives me a very creepy, creepy feeling to carry this bucket. I am not comfortable.”

I said, “You don’t have to carry it if you don’t want to. I’ll be more than happy to carry it.” Kibonye seemed quite content to relinquish the bucket. I asked Kibonye, “Even though you know the Puff Adder is safely in the bucket, you still don’t want to carry it?”

He said, “No, it just gave me an awful feeling all through my body.” He was obviously very uncomfortable knowing that there was a snake inside the bucket that he was carrying with his own hands.

I asked Vicheko if he wanted to carry it. Vicheko declined, smiling nervously while shaking his head no. We made it back to the village, and I added the Puff Adder to our growing collection of snakes.
During this incident, I could see from Kibonye’s reaction that he thought the Puff Adder would spring at me. He kept his distance. Vicheko looked as if he would come out of his skin when I was holding the Puff Adder with my bare hands. I asked Vicheko later what he thought about the whole ordeal, and he told me all he wanted to do was take a *panga* and cut the snake into pieces.

We continued with our plan to bicycle to Rukinga Hill. (I was very grateful when we picked up Tama’s bicycle for me to ride.) For the most part, the trip was uneventful; we did not run into any elephants, or lions for that matter. We found no tortoises, nor did we spot any snakes. We did see many lizards, a kudu, several dik-diks, and a few impala. The scariest thing we came across was a recently abandoned charcoal camp. Kibonye and Vicheko told me they both frequently wandered around the area looking for signs of illegal charcoal burning or poaching that they then report to the TDC or the Kenya Wildlife Service. The people of Bungule claim the Rukinga Hill area as part of their community property and do not tolerate outsiders that poach animals or cut down trees on their land.

*Religious Influence*

The next two stories are used to exemplify how “joint action” can influence one’s ideas about snakes. According to Blumer (1969), joint action is the collective acceptable lines of behavior that participants do which define an event and constitute the appropriate interactions of humans within a society. The participants who shared conceptions of snakes as they were associated with their religious beliefs and affiliations could be viewed as aligning their comments with what they consider acceptable practices. Looked
at from a psychological perspective, core beliefs, such as deep-seated religious beliefs, are not readily alterable, can be extremely difficult to change, and rarely allow for other possibilities (Ajzen, 2005; Bandura, 1986; Beck, 1976). This is best illustrated by Tumai’s refusal to associate with snakes based on her beliefs that snakes are evil creatures cursed by God. However, the purpose of this study was not to change anyone’s beliefs about snakes, but to document whether or not participants might act differently towards snakes if exposed to an alternative scientific perspective.

In Kasigau, as in most of Kenya, about 80% of the people are Christians (Fedders & Salvadori, 1989; Salminen, in Pellikka, Ylhäisa, & Clark, 2004) with the majority attending the Anglican Church of Kenya (D. Msafiri, personal communication, September 26, 2005). Several other Christian denominations are represented such as Pentecostal and Seventh Day Adventist. There is only one mosque in the Kasigau area located in Bungule and few practicing Muslims. A very small percentage of local Kitaita remain adherents to the traditional religion called Wutasi, which has been to a large extent assimilated by Christian believers (Bravman, 1998). The elders I spoke with felt there was not any real conflict with Wutasi beliefs and Christian beliefs but were concerned about the passing of traditional healers. Members of the younger generation, having been educated in “modern” ways, are not interested in following traditional cultural practices. However, many of the traditional customs such as naming of children, circumcision in boys, and funeral ceremonies are also accepted rituals in Christianity. According to several elder community members with whom I spoke, other Christian teachings similar to Wutasi beliefs are respect for older people and parents, a strong work
ethic, and community cooperation. In Kenya, the concept of *harambee*, the Swahili word meaning “pulling together,” is an important value within the *Wutasi* belief system (Bravman, 1998).

The following tale involves a story told by Tumai, a preschool teacher in Bungule and Kibonye’s spouse, which illustrates the connection between religious beliefs and cultural practices in relation to a neighbor who knowingly allowed a snake to live in his *shamba*. This story also hints at the possible mixing of Christian beliefs and Wutasi beliefs that Bravman (1998) described. I have included some background information about the setting to give readers more of a feel for the Bungule community.

*Tumai’s Story*

In the short time I had been in Bungule, I had already fallen into a routine, and this night would be no exception. I normally started my day at 7:00 a.m. with a short walk from the *banda* to the main Kiosk located just past the *majii* (water) house in the center of the village.

*Majii* house is the local name used for the small buildings that house water spigots in Kasigau. The Bungule spigot runs continuously during the day, piped in from a catch basin just above my *banda*. Each village has a similar system. Not all of the villages are blessed with such a reliable source of water with some spigots running dry, especially the nearest village of Jora, which has a catchment area much smaller than that of Bungule. During drought conditions, Jora’s *majii* house often provides no water at all. In fact, just before I arrived, a group of men led by Kibonye had to disassemble a pipe, which had been constructed by the people of Jora, tapping into the Bungule catchment and piping...
water to the Jora side of Mt. Kasigau. This was considered intolerable by the elder council of Bungule since water is a precious resource. However, many people of Bungule have relatives living in Jora, and plans to pipe water to some sort of holding tank for use by Jora villagers during drought conditions were being discussed.

There is a constant flow of women and children carrying five-gallon plastic containers to fetch water. Full buckets are carried by women and girls balanced expertly on their heads as they make the daily pilgrimage to and from the *maji*. Occasionally, men can also be seen fetching water. The men normally carry the water strapped to the side of their bicycles (bicycles are a fairly recent and welcomed addition to the standard mode of transportation in the area: walking).

I made my way down to the Main *Kiosk* (small store or restaurant) where I usually order my *chapatti mayai* (flatbread with egg) from Joseph, the waiter, who is also the cook, dishwasher, and cashier for this establishment, although sometimes I just have a chocolate chip granola bar for breakfast. After breakfast, I hung out with the Bungule teachers in the teachers’ lounge making idle chitchat, catching up on the local gossip and asking them, “And what do you think about snakes?” When classes began, I observed teachers in their classrooms, sometimes traveling to other village schools in order to eventually interview all the teachers around Mt. Kasigau and ask my proverbial question, “And what do you think about snakes?”

Around 4:00 p.m., Kibonye made his customary invitation for dinner, which I usually accepted. We then visited another kiosk, usually Vicheko’s, and I purchased food for the evening meal. After we purchased our food, I usually parted ways with Kibonye,
who walked up the dirt road to his house next to the only mosque in Kasigau, and I made my way back to the banda for a shower before returning to Kibonye’s for dinner. Eventually, it was understood that I would have dinner every night at his house.

True to my routine, after finishing my afternoon shower, I headed over to Kibonye and Tumai’s house for dinner. As I walked past the chickens and two goats nibbling in the front yard, I yelled out, “Hodi!” (May I come in?). Tumai greeted me as I approached the front door. “Karibu (welcome), David.” “Asante sana (thank you very much).” I replied. Ben, their 3-year-old son, was seated on Kibonye’s lap in the main room of their two-room house. Kibonye motioned for me to have a seat.

I took a seat on the couch with very thin cushions. Tumai returned to her short three-legged wooden stool propped in the far corner of the house where she continued to stir the ugali (stiff porridge) bubbling in the pot before her. Whenever I visited for dinner, Tumai was always seated in front of the jiko (a charcoal stove similar to a hibachi) cooking something. When the meal was ready, she served the meal to the main table and then returned to her stool, where she ate in silence. Unless addressed directly, she added nothing to the conversation. She did talk to her 3-year-old son Ben in quiet tones when necessary or when asking us if we would like more food or chai (tea). After several days of this, I asked Tumai to join us at the table one particular evening. I could tell that Kibonye was somewhat uneasy with my invitation, but Tumai looked at Kibonye and he nodded to her, signaling that it would be all right. This was the only time that Tumai joined Kibonye and me at the dinner table, the only table in the sparsely furnished house.
Tumai is a teacher at the Bungule Preschool, so I took the opportunity this particular night to ask her what she thought about snakes. “Tumai, Kibonye, and I have been hanging out together for a couple of weeks now and you have been kind enough to include me in your evening meals. I would like to know what you think about snakes,” I asked.

She replied, “I believe snakes to be very dangerous, even if tamed they don’t have the understanding to see that kindness. I know of a certain man who was a farmer, a very hard-working man. In his farm, there lived a Red Spitting Cobra in a hole. It was very beautiful, and he vowed never to kill it. He said so long as it stays in a hole and never disturbs me, I will be kind to it. Villagers advised him to kill it, but the man refused. He cultivated grapes, and with the presence of that Red Cobra in his farm, no thief could tamper with his grapes. During the harvest period, he noticed some grapes eaten half way and had some holes in the grapes, or in other words, they had some cracks. He suspected the snake but did nothing about it. The quantity and value of his grapes reduced drastically because of those ones which were destroyed. One day as he was harvesting, he bent down to have some grapes which had fallen. But before he could reach the ground something spat directly in his eyes. He ran a distance away and before he could lose his eyesight looked under the tree painfully and saw it was the large red creature creeping away. He cried painfully as he crept back home and by the time he reached home his eyesight was completely gone.”

Tumai continued, “Relatives, friends, and neighbors refused to attend to him saying he disobeyed. After being bedridden for about six months, with a lot of pain and
most of the days without food, he decided to commit suicide. So we might be good and kind to snakes, but one day, one time, they will have to act as it was written in the Bible, in the Book of Genesis 3:15: [which says in reference to serpents, ’And I will put enmity between thee and the woman, and between thy seed and her seed; it shall bruise thy head, and thou shalt bruise his heel’]

I was somewhat surprised by the eloquent delivery of the story because up until this time, I had only exchanged pleasantries with Tumai. This was the most I had heard her speak since I had met her nearly three weeks ago. Most women in Kasigau are not outspoken, and it was nice to hear Tumai relate her story with such conviction. I knew that both Kibonye and Tumai were Seventh Day Adventists and believed strongly in the teachings of the Bible. I was also aware that many Christians associate serpents with evil and believe snakes are Satan’s symbol and represent sin. The lack of assistance by the community as described by Tumai may have been due to a lingering and/or assimilated belief originally held by the traditional Taita Wutasi religion and manifested within various Christian beliefs adopted by the Taita of Kasigau over the last 100 years (Harris, 1986). Tumai insinuated that the failing of the grape crop was caused by the snake and was an omen of worse things to come. Tumai made it plain that what the man was doing was bad and not acceptable behavior. Believing another’s misfortune is retribution for doing something evil, bad, or against acceptable or recommended community practices is a basic belief of Wutasi. The idea of metaphysical causation of potential courses of action is not altogether different from views shared by many “religious” persons in Western societies (Harris).
Although forgiveness and charity are considered tenets of Christianity, these tenets seem to have been ignored during the ostracization of the man blinded by the snake who ultimately took his own life. If viewed as sensitizing concepts, ideals such as forgiveness and charity are examples of tenets that can be ignored by those who practice Christianity (or any religion) worldwide depending on circumstances. This is an extreme example of how Tumai insisted that he received his just reward, and Kibonye explained later that the community’s treatment of the man was the acceptable practice since he did not adhere to what the majority of the members thought was best for everyone. This aligns with the religious practices of Wutasi as reported by Harris (1986) and Kidabida, the traditional “Taita ways” studied by Bravman (1998). This idea of not aiding or comforting a person who harbors an enemy, which follows the theme that snakes are enemies of humans, is a practice that the banda askari (watchmen) explained to me as being part of the old traditional ways that are still followed by the community today. Both banda askari who I met and talked with daily going to and from the banda sit on the Bungule Elder Counsel.

I said, “Thank you for sharing such an interesting and tragic story.” I offered an alternative perspective, a scientific explanation, and told her that the man was only guilty of surprising the snake that spat in his eyes in self-defense. Tumai was convinced that this story was proof that one should not befriend snakes and the man deserved what he got. In her story, she made reference to the grapes failing because of the snake and that the man did nothing about it. I asked Tumai if she thought a cobra would eat a grape, and she said that she did not know for sure, but thought they could suck the grape juice out with their
fangs. I told her that snakes are strict carnivores and that their fangs could only deliver venom and are incapable of sucking in fluid. She then asked me how the cracks and holes got into the grapes and why some were partially eaten. I explained that there could be many different causes—too much rain can cause splitting and insects and birds can make holes and partially eat grapes on the vine—but that she could definitely rule out the cobra as the culprit.

I then asked Tumai and Kibonye, “Are you aware that in the Bible, the serpent is also used as a symbol of healing? I remember one story about how the Lord asked Moses to make a snake and put it on a pole, and that if someone is bitten, they can look upon the snake and be healed, or something like that.”

Kibonye reached for his Bible and said, “I have discussed this at Church with some other members of my congregation.” Then, flipping pages furiously and finding what he was looking for, read aloud, “In Numbers 21:8, 9, it reads, And the Lord said unto Moses, ‘Make a fiery serpent and set it up on a pole: and it shall come to pass, that everyone who is bitten, when he looketh upon it, shall live.’ And Moses made a serpent of brass and put it upon a pole, and it came to pass, that if a serpent had bitten any man, when he beheld the serpent of brass, he lived.”

“Well that sort of complicates things,” Tumai said. “I had forgotten that passage.”

Kibonye then said, “And what about the symbol for medicine that doctors use?”

“Yeah, the caduceus,” I offered. “I think humans just use symbols in whatever way works best for them at the time. I don’t believe snakes are good or bad. They are just animals. As far as snakes are concerned, it would seem that humans have the ability to
decide whether certain snakes are dangerous and should be killed or beneficial and allowed to live. I think being able to tell the difference is an important distinction that children should learn in school. My own opinion on whether or not people should kill snakes is that people have a right to protect their families from venomous snakes. If a snake is determined to be a danger, humans should have the right to capture and move the snake to a different location, or if this cannot be done safely, then killing a dangerous snake living in an area with lots of people would be condoned. That is why having the ability to identify whether a snake is dangerous or harmless would be advantageous.”

“Perhaps,” Tumai said, “but I do not think you will ever convince me to like snakes.”

I said, “My purpose here is not to convince you of anything, only to afford you opportunities to learn about snakes so you can come to a more informed decision in reference to your actions toward snakes. The main focus of my project is to see if learning about snakes and spending time with others who have a different perspective about snakes has any influence on your ideas about snakes and your actions toward snakes.”

“I can appreciate that,” Tumai said.

“Me, too,” Kibonye agreed. “Now, no more talk of snakes or we will not get a moment of sleep in this house. They still give me a creepy, creepy feeling!”

This ended our discussion, and after a couple more cups of *chai* (I always felt dehydrated while in Kenya), I donned my headlamp, picked up my snake tongs and *panga* (machete), and headed back to the *banda*. 
By the time this project had come to a close, Tumai was the only teacher who refused to hold a snake. Several weeks later at the Bungule Primary School, while Bustani, Farahifu, and Chanua were handling a Kenyan Sand Boa and telling their students about the ecology of this particular type of snake, Tumai quietly left the area, not to return until the snakes were safely inside their containers back in the car. When she returned, she said, “David, I cannot overcome my fear and I still feel that snakes are dangerous creatures.” I apologized to Tumai for putting her in a situation where she felt unduly pressured to do something she did not want to do. I felt like I had done something wrong, but Bustani, her close friend and colleague, assured me that she had confessed to her earlier that she would leave while the snakes were being handled and not to worry about it. I was comforted by Bustani’s words, and from what I could tell; there was no ill will between Tumai and me for bringing snakes to the school.

*Meneja’s Story*

The next story involves a school administrator’s negative perspective toward snakes based on religious beliefs and reinforced by personal tragic experiences.

I met Meneja, the Education Administrator for the Kasigau School District, while having my flat tire fixed in the village of Rukanga. Rukanga is about a two-hour walk from Bungule on the other side of Mt. Kasigau. Meneja was also the owner of the bicycle shop in Rukanga, the only village in or around Kasigau with a shop outfitted with the tools and manpower needed to repair the occasional flat tire on my car. Because of the long thorns of the acacia trees and other sharp objects discarded in the road, like the piece of barbed-wire fence that I had encountered while driving back from Voi, I had
frequented this repair shop before. This was my third flat in three weeks. I was getting to know the staff at the bicycle shop quite well but had not run into Meneja until this particular day.

Meneja sauntered up to me and introducing himself, stated, “I have heard of you and of your project. Are you interested in my opinion?” he said with what seemed like to me an air of superiority that I had not yet detected in Kasigau, not even from the Chief. “I would appreciate anything you have to say on the subject of snakes,” I assured him.

Meneja was not a shy man and began in earnest with theatrical flare, “Snakes, yes the crawling reptiles have ever been there from time immemorial. Yeah, they are pleasant to look at, but the appearance of one ignites great fire of fear and danger in my system. I have always regarded snakes as a threat and/or a danger to any human or animal life on earth. I read in biology that there are poisonous and nonpoisonous snakes on earth. But which is which? The red one, the green one, the brown, the black or the short one? To me, God knows. It’s a great mystery. Most snakes do not eat humans, except maybe the big pythons, so why do they bite us?”

Meneja continued with this story about his father’s beloved dog, “I remember very clearly when I was a young boy, about 15 years of age, my dad had a big, beautiful, lovely hunting dog, Kalinga, that was his name. One evening, the deadly and the dreadful Puff Adder had crawled into our compound. Kalinga, the unbeatable hunting dog, made a brief chase. The reptile just struck our dog once, and the next half an hour the dog was not only dead but also decomposing. You could easily pull off the hair from the dog’s body. I cried and sobbed. I could not believe our beautiful dog was dead. I wished I had
powers and snakes would cease to exist on earth. Why for goodness sake did God have to bring such creatures onto earth?”

I just shook my head.

Meneja continued, “And then if as if that was not enough, I had come for holiday from college. My uncle was missing in the family. This was the year of 1980. I learned that my uncle had been hospitalized because of a Red Cobra snakebite. I went to see him. It was pitiful. Very few could bear the look of the snakebite’s wound at the ankle of the left leg. Thank God the leg was not cut off at that point. But even to date, the scar still aches and even worse, renews itself into an ugly wound. What are snakes then to me, only a collection of deadly and frightening reptiles on earth and indeed unworthy of their lives. After all, snakes were cursed by God, it is therefore un-Godly to keep snakes unless one was a wizard” [eyeing me suspiciously].

I returned his accusatory look with one of sympathy, for the moment speechless, taken aback by his sincerity and the emotionally charged stories that came so easily to his lips. I nodded and after digesting what he had just told me, I said, “Meneja, you have very good reason to dislike snakes. Those are very intense stories.” Noting the sincerity in my tone, Meneja nodded his head and stopped looking at me like I was a wizard.

After hearing his tales explaining his unfavorable attitude toward snakes, I hoped he would come to the herpetofauna workshop I was planning. “Will you be coming to the teacher workshop on reptiles and amphibians we are having at the Amy Nicholls’ Center?” I asked. “I would like to attend. When is it?” he said. “October 22,” I replied
and added, “I would value your opinion, especially since you work with all the schools around Mt. Kasigau.” “I’ll be there,” he said.

He then asked me if my flat was being taken care of satisfactorily, and I told him that the staff at his shop was very friendly and helpful. Jumping on his motorcycle, Meneja waved goodbye and took off in a cloud of dust and fumes. I paid the gentleman who fixed my flat 100 Ksh (about $1.40), thanked him for the third time and headed back to Bungule.

I thought to myself that this was a good example of how having little knowledge of snake identification, coupled with tragic personal experiences and negative religious beliefs, can have a very profound effect on one’s perspective toward snakes.

Meneja’s stories dramatized the need for more information in schools about snake identification. Meneja’s narratives illustrated that knowledge that there are venomous and nonvenomous snakes is useless information unless one can identify which is which. His testimony that snakes are “only a collection of deadly and frightening reptiles on earth and indeed unworthy of their lives” is a belief that if shared with other members of the Kasigau teaching community could influence others who may not hold such strong convictions. This belief supports the saying “a snake is a snake” and continues the perception that all snakes deserve death.

Meneja’s confessions of overt hostility toward snakes based on the Christian belief that snakes are evil and exacerbated by two emotionally charged events, the death of his dad’s beloved dog and his uncle’s snakebite, exemplify the close connection between the vague concepts of beliefs and attitudes. These vague concepts, although not
predictors of action by any means, can develop a context in which an individual must take into account the expectations, commands, solicitations and intentions of others when fashioning their own acts through self-indication (Blumer, 1969). As head administrator of schools in Kasigau and the person responsible for teacher professional development opportunities, Meneja’s conception of snakes could have a bearing on how teachers interacted with snakes in his presence. I was curious and a little concerned as to how Meneja would react during the upcoming herpetofauna workshop.

As far as teaching is concerned, one view is that holding an erroneous conception, in this case that all snakes are evil or dangerous creatures that deserve to die, makes it nearly impossible to teach about snakes in any way other than unfavorably (Brookfield, 1995). One does not have to love snakes to teach scientific concepts of ecology involving snakes but educators are more apt to teach about snakes in an unbiased or objective way if they do not hate snakes or believe all snakes are dangerous, evil, and deserve death (W. Gibbons, 1983; Greene, 1997).

**Snakes Possess Supernatural Abilities**

Many of the conceptions of snakes shared by the Kasigau villagers involved beliefs that snakes had extraordinary or supernatural abilities. The narratives I share below are just a few examples of stories consistent with others I heard in every village, with minor variations. These anecdotal accounts are stories passed down from elders, family and friends, or participants’ first-hand recollections of experiences with snakes. I have also included stories where I was involved and observed other interesting practices
involving snakes. The first story is one told to me by Vicheko who explained that in order to make sure a snake is dead one must crush the head of the snake.

_Crush the Head_

“There’s a belief, I think it’s like a myth, people believe when you kill a snake and don’t crush the head, it will stay and then get its senses and crawl away,” Vicheko started. “There is the belief, I think it’s another myth, people here believe that when you don’t crush the head, another snake will bring a leaf—I don’t know what it will do to the other snake—but I believe it will bring a leaf of a certain tree, I don’t know which tree is that, then the injured snake will come to its senses and then crawl away.

Vicheko and Kibonye were looking a bit anxious to me, and I wanted to let them know that my purpose here was not to judge them but to understand and make sense of the stories and myths they were sharing with me and then offer a plausible scientific explanation if possible for them to contemplate. They asked me if there could be any truth to the story of a snake coming to the aid of an injured snake. Even though both Vicheko and Kibonye taught all subjects, they considered themselves science teachers, Vicheko even more so then Kibonye. Vicheko was often asked to do science lessons with other teachers on occasion.

From the information I knew from working with snakes for over 20 years and the information memorized from the book _Reptiles of East Africa_ (Spawls et al., 2004), I offered, “One possible explanation might be that cannibalistic snakes are attracted to an injured snake, which would be easy prey. There are several species of snakes that specialize in eating other snakes, not to mention that many other snakes are generalists
and will include smaller snakes, especially an injured one, in their diet. One snake that is common to this area and known to eat other snakes is the Cape File Snake (*Mehelya capensis*). This snake will even eat Puff Adders, Black Mambas, and cobras. File snakes hunt by smell, and an injured snake that is bleeding or oozing entrails from a wound would be easy to locate by smell. One could just imagine seeing an injured snake, spotting another snake near the injured one (which may have a small bit of debris in its mouth—say a small bit of leaf wedged in its gum or stuck on its teeth from an earlier encounter with another prey item), and then leaving the scene only to return to find the injured snake gone. It would seem as if the injured snake was helped by the other snake and had crawled away when in actuality, the other snake, which was seen earlier near the injured snake, has dragged the injured snake away into thick underbrush or down a hole to be eaten in private or swallowed the injured snake and crawled away with the injured snake in its belly.”

My goal here was to offer possible scientific explanations to these stories’ origins as an alternative way of viewing snakes. My thinking on this was that as teachers become more familiar with a scientific perspective, perhaps they would be more inclined to learn more and not needlessly kill all snakes, especially harmless species that are beneficial to the community, that is, snake species that feed on rodents and nonvenomous snake species that prey on venomous species. I felt it important to find scientific explanations that could explain their indigenous knowledge in such a way that it could be viewed as supporting knowledge they already have but from a different viewpoint, that of a herpetologist. I continued, “As far as crushing the head goes most snakes will not eat
dead animals\textsuperscript{14}. If a snake is wounded, it will usually thrash around for a long time, even if the injury is fatal, drawing attention to itself and making it vulnerable to attack. However, if a snake’s head is thoroughly crushed, this will certainly kill it, rendering the carcass unpalatable to most cannibalistic snakes. I heard a medicine man in Makwasinyi tell a similar story; only the snake brings a root instead of a leaf.”

“I don’t know how true that one is, but I conclude it is just myth to make sure that people kill the snake completely, completely kill the snake and crushing the head,” he countered.

“Your explanation of the injured snake being eaten by another snake does sound possible to me, but I just know one should crush the head to make sure you kill it completely and burn it, if possible. A big snake you have to burn it,” Vicheko said with conviction.

“And why is that?” I said.

Vicheko explained further, “I think we believe even the bones are poisonous. If you don’t burn the snake and somebody steps on it, or after it rots over, and then somebody steps on it, there could be tiny bones remaining, that is, if the corpse has not rotted completely. And then somebody could step on the bones and be pierced through the foot, then he will be poisoned. So we believe you have to burn a big snake.”

“I think it could happen,” I began; “for example, the fangs of venomous snakes look similar to snake rib bones in size and shape. Even after a snake has been killed, with

\textsuperscript{14} Snakes are not considered scavengers. (See DeVault & Krochmal, 2002).
the head crushed as Vicheko so vehemently described,” I said with a smile as nervous
laughter erupted from Vicheko, “some venom could remain in a fang. If a fang were to be
dislodged and mixed with the rest of the corpse’s rib bones during the ritualistic
mutilation of a dead snake, and then stepped on by an unwary person, there is a chance,
albeit a small one, that the residual venom could cause a reaction in the unfortunate
individual who happened to step on the fang of a recently killed venomous snake (Griffen
& Donovan, 1986). Another, perhaps more plausible scenario, is the possibility that
during the violent crushing of the snake’s head, the venom is squirited from the venom
glands located on each side of the upper jaw, spraying out over the rest of the corpse.
This could give the sharp bones of a snake’s carcass that have been splashed with snake
venom the ability to transmit venom into the foot of a person who stepped on the carcass
or stray rib bone so anointed. The burning of the snake carcass would evaporate the
venom, rendering the corpse safe from causing envenomation but not bacterial infection,
which could be another reason explaining this story’s origin.

Vicheko and Kibonye seemed to accept this alternative explanation. Vicheko and
Kibonye both took pride in their knowledge of science and consider themselves science
teachers. They openly expressed their desire and appreciation for any scientific
explanations that I shared. Even though Vicheko presents the stories as myths, much of
folklore is based on factual information and personal experiences interpreted within a
particular cultural setting as illustrated above (Campbell & Moyers, 1988). Although the
origins of most myths are lost in obscurity, they still belong to the community.
While listening intently to their stories from my own scientific perspective, I could not help but attempt to find what might be explanations to the origins of their stories about snakes. My first thought as a researcher was that I should suppress the teacher in me, which harbors my ever-present need to share my knowledge, opinions, expertise, and past experiences with students, teachers, friends, customers, family members, or even strangers. But after further reflection, I thought that by not sharing my scientific perspective, I would not have been true to myself. By sharing my thoughts about their stories and discussing possible reasons for the origins of their stories, a mutual respect began to forge between us. Kibonye and Vicheko could tell that I did care what they had to say and was also deeply concerned about environmental education and (even though they thought it very strange in the beginning) snake conservation. Vicheko and Kibonye told me that they wanted to teach a scientifically-based curriculum and were very interested in learning another way of thinking about snakes. They both told me that they were environmentalists and even though they did not like snakes understood that snakes did play a role in the environment. Time and time again, Vicheko would exclaim, “David, just tell us what you think, we do not want to wait for the herpetologists!” I did not need much goading since talking about snakes is one of my favorite pastimes. However, I did curtail sharing my opinions with others (Vicheko and Kibonye were the exception) until after the herpetofauna workshop. As time progressed, not only were Vicheko and Kibonye interested in learning more about snakes and other reptiles and amphibians, but also other teachers would approach me and ask when the workshop was scheduled.
I was curious and asked Kibonye, “So why else do you have to burn a large snake? Are there any other stories you can share with me as to what might happen if you don’t burn one after it is killed?”

“Specifically, for the Puff Adders, people around Mt. Kasigau believe if you don’t burn the carcass, it will explode into newborns, hundreds of newborns,” Kibonye said. “So you have to make sure that, specifically, the Puff Adder is burned completely.”

“And what’s the Kitaita name for the Puff Adder?” I asked.

“Kili,” he said. “The name comes from the English word “kill” because the venom is so strong, and this snake is responsible for many deaths and disfigurements in this area. For the minor snakes, you can just throw them in a pit latrine. But with the Puff Adder, you must ensure that you have burned the carcass. To make sure you don’t have a bunch of baby Puff Adders.”

At first I found Kibonye’s story implausible, but after having practically memorized *Reptiles of East Africa* (Spawls et al., 2004) in order to avoid picking up the wrong snake thereby ending my study prematurely, I remembered the relevant passage, and paraphrasing told them, “Puff Adders are viviparous, live-bearing, and are known in exceptional cases to give birth to very large litters, with litters of over 100 having been recorded in East Africa. Therefore, if one were to kill a pregnant Puff Adder that was soon to give birth, the babies would be viable and come crawling out of the mother if she were to be smashed open by someone hitting her with a stick or cut open by someone wielding a panga”.

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I also added from a Western scientific perspective, “The Kenyan sand boa, a common burrowing species of snake found while tilling the soil, also gives birth to live young.” Kibonye and Vicheko were amused by my obvious delight at being able to practically quote the book, *Reptiles of East Africa* (Spawls et al., 2004), that I toted around with me constantly. After the workshop, both Kibonye and Vicheko borrowed the book for a couple of weeks as well as *Their Blood Runs Cold* (W. Gibbons, 1983), a book about reptile/amphibian conservation.  

They both responded to my scientific explanation with a deep sigh and told me that they thought it very interesting that Kibonye’s story had a factual basis. They told me that they thought all reptiles laid eggs. Even though it may seem that giving a scientific explanation to the teachers’ stories lacks a certain sensitivity to their indigenous knowledge about snakes, I felt it was necessary as one of the purposes of this study was to expose Kenyan teachers to a scientific perspective toward snakes. I found sharing my interpretations of their stories an important component of my study. Without this reciprocity, I do not believe our relationships would have supported the growth of trust fostered during the first few crucial weeks prior to the workshop and subsequent field outings. The sharing of stories, their perspectives and mine, not only about snakes, but

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15 A few days later, I learned that the Kenyan Sand Boa is usually killed on-site whenever found in the Kasigau area because it is often misidentified as a Puff Adder. Those who do recognize it as a different type of snake, referred to it as *Kivuu* in the local Kitaita language, and believe the venom to be more potent than that of the Puff Adder, even though it is a harmless species that uses constriction to subdue its prey.
about pedagogy, learning styles of students, politics and our personal lives opened up a channel of communication that grew as time passed.

*Springing Puff Adder*

The next story involves an extraordinary ability of the Puff Adder: its ability to spring, that is, fly through the air. There are no species of flying snakes in Africa even though there are three known species of snakes found in southeast Asia that have the ability to glide through the air. It is possible that Kibonye’s folktale could have been handed down from someone who heard about *Chrysopelea ornata*, the flying snake of Borneo (Laman, 2000), or some other such species, but this is not consistent with his particular tales. His other stories come from first-hand accounts told to him by friends. I will share another more plausible explanation at the end of the following story told to me during this interview with Vicheko and Kibonye at Vicheko’s house:

“You mentioned snakes dive at you,” I queried. “What do you mean by that?” “A snake like a Puff Adder might spring at you,” Kibonye exclaimed excitedly. “If you irritate it, and it becomes too aggressive, it will spring at you. So I don’t think anyone would be safe with a snake flying through the air,” he said while holding his hands in front of his face as if to ward off an imaginary snake flying in his direction.

“So you believe large snakes, like a Puff Adders, can spring; lifting their bodies completely of the ground, flying through the air,” I said. “Yes,” Kibonye replied. “I have two stories that prove this is true.” “Okay,” I said. “Please tell me the stories.”

Kibonye began, “There is another story about a certain old man, Bernard’s father, he is called Tama [whom I had already met on the path to my banda—I caught a small
Wolf Snake inside his son’s house a few days later after hearing this story]. He is going to the *shamba* at night. The sky was clear because of the month, and the maize plants were about four or five feet high. While walking in the *shamba*, he thinks his shade attracted the Puff Adder. His shade fell on a Puff Adder as he went by. We believe that there are certain birds that are attracted to and eat the Puff Adder.

I asked him if by shade he meant shadow.

Kibonye continued the story after his explanation of why Puff Adders spring, explaining, “Now this old man, when he went by the Puff Adder his shade . . . Sorry, I keep forgetting—his *shadow* fell on the Puff Adder as he moved because of the moon, you know.”

“Oh, okay, the moon shadow,” I said, beginning to get the picture. Kibonye repeated, “The moon shadow.”

“The Puff Adder sprung from its position, and lucky enough, it didn’t reach him!” Kibonye exclaimed. “It bit the maize stalk near his shoulder. When he looked at the Puff Adder, he got a really funny, funny feeling and felt he could not spend the night in the *shamba*. So he went back home.”

Someone not familiar with farming in east Africa may wonder why anyone would spend the night in his or her *shamba*. Villagers spend many nights in the *mashamba* (plural form of *shamba*) to guard their crops against marauding elephants, baboons, vervet monkeys, and other hungry animals. Some *mashamba* have small dwellings where people stay while keeping watch. These small outbuildings keep them dry during rain showers and somewhat protected from wild animals. Occasionally, sons and daughters
will be assigned sentry duty in a family’s *shamba*. To protect them from visiting elephants at night, they stay high up in a Baobab, or other large tree. Sometimes the children stay all night in the *shamba*, not fully asleep, perched in a tree listening for the sounds of giant pachyderms eating their precious crops. When the young sentries hear the elephants, the children will shout for help while pelting the elephants with rocks they have carried up the tree, or if they have forgotten their stone projectiles, they throw the gourdlike fruit hanging from the Baobab. I have been told this is sometimes not the best idea since the elephants like to eat the Baobab fruit.

Kibonye ended his story of the springing Puff Adder that tried to bite Tama, commenting, “That was a near miss. Yeah.”

“Wow, that was a close one,” I said excitedly. “Yeah, that’s a near miss all right.” I repeated.

“The other story is about, somebody told me this, a true experience again,” Kibonye emphasized. “There was bush fire. So a few men went to try and put out the fire. The fire was out of control, and they were running away from the fire because, you know, wildfire just has no bounds. The wildfire is pushed by big winds, heats up. They saw an object springing in the air towards them. With closer observation, they discovered it was a snake, which was just near them, all to discover it was a Puff Adder!”

“Oh, my goodness,” I said, wondering how a fat Puff Adder ever managed to spring into the air and get its entire body off the ground.

He continued, “They killed it instantly with their pangas. So that sort of made me believe that a Puff Adder can actually spring if it wants to attack. In the first story, the
Puff Adder sprung because of self-defense. The second one was also a form of self-defense because the Puff Adder was running away from the fire. So you see, there is no way I cannot believe that a Puff Adder cannot spring.”

Over the next few days I shared the following possible scientific explanations for the springing Puff Adder. One explanation of Puff Adders springing defensively to meet avian predators could be their ability to strike up to two-thirds of their body length from a coiled position, which would resemble a spring-like movement. Witnessing this behavior is quite possible as there are many species of birds that prey on snakes in this corner of the world. If someone were to view a snake striking upwards toward a bird of prey swooping down on it, it would look like the snake had sprung. Also, some snakes do have the ability to spring away from danger, such as fire or a predator. As yet, according to herpetologists and western science, the Puff Adder (Bitis arietans) is not known to spring, but other smaller viper species such as the Saw-scale Viper (Echis pyramidum), juvenile Snouted Night Adders (Causus defilippi), and juvenile Rhombic Night Adders (Causus rhombeatus), all native to Kenya, have been known to “leap,” putting so much effort into a strike that they actually leave the ground—forward and up (Spawls et al., 2004). There is also a Central American species of snake, Bothrops nummifer, the Jumping Viper, that is probably the best example of a viper species known to have the ability to strike for a distance longer than its body length (Ricciuti, 2001). These are examples of vipers that can leap, which opens up the possibility of a young, small Puff

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16 One example of a springing snake would be the Wolf Snake, Lycophidion capense. I witnessed this snake spring while catching one in Tama’s son’s house.
Adder “springing” or a large Puff Adder, coiled on an elevated area, springing forward and leaving the ground (caused by the momentum of the strike) while escaping a fire or lunging toward prey or foe. Or, since the teachers and other Kasigau community members freely admit that they do not know how to identify most species of snakes, it would not be out of line to conjecture that perhaps the snakes that the villagers of Kasigau saw leaping may have been one of the other pit viper species mentioned, or perhaps herpetologists should take a closer look at the Puff Adders of Kasigau.

Another interesting story involving birds and snakes was told to me by Farahifu. During an interview with Farahifu and Chanua, both teachers at the Bungule Primary School, I had the pleasure of hearing several stories about snakes. Farahifu was by far the more talkative of the two with Chanua mostly acknowledging what Farahifu said and substantiating the stories told to me by Farahifu with nods of approval or short comments agreeing with her sentiments. Both ladies have taught in Bungule for many years and have seen many snakes around the school grounds. This conversation took place in Farahifu’s classroom.

**Birds and Snakes**

I asked Farahifu, “Do you know any stories about snakes?” “There are lots of myths,” she stated. “My mother told me that big snakes are never alone. There are normally birds that take care of them. According to people, it is believed to be certain birds. I was made to know the sound of the birds. I was told if you hear the sound of the birds a certain way, you will know that there is a very big snake nearby. And I believe
this because one time I heard the bird’s voice like that and saw clearly, with my own eyes, there was a very big snake. So I really believe in that.”

I responded by saying, “It is known in the scientific community as mobbing. Birds are known to mob snakes for various reasons. Birds, in general, are adverse to snakes in their territory. So that’s why the birds are next to the snake—they’re trying to make the snake leave the area where they live because most snakes would eat their babies or their eggs. And some large snakes will eat adult birds. Mobbing makes it difficult for a snake to pick out just one or take one by surprise and can also drive away snakes trying to raid a bird’s nest.”

“Oh, that’s why,” she said.

“Well, at least that is the scientific explanation that most herpetologists accept. They are protecting their offspring or potential offspring in their territory,” I said.

“Oh, that much we didn’t know,” Chanua said shaking her head and asked, “Why do birds just mob big snakes?”

“That is an excellent question,” I replied. “As far as I know, birds will mob smaller snakes, like the little sand snake I saw being mobbed at Amboseli, but small snakes are hard to see. They’re harder to see due to their smaller size, and most snakes are well camouflaged by pattern or coloration or mimic sticks or branches like two species you have right here in Bungule, the Savanna Vine Snake, which is also known as the Twig Snake and the Link-marked Sand Snake. Both of these snakes hold perfectly still if you spot them in a bush or tree, keeping their bodies rigid, which makes them look just like a stick. But if one bird finds a snake, especially in a nesting area, the bird will
make a distress call, alerting other birds that there is a predator close by. Soon, many birds will come and mob the snake and try to make it leave.”

“Okay,” both Farahifu and Chanua said in unison.

“In fact, I was at Amboseli National Park with Mwana Tembo Syansi and...,” I started.

Farahifu and Chanua both exclaimed, “We know Tembo!”

(Dr. Mwana Tembo Syansi is an elephant researcher), “. . . and Dr. Cushner, who I know you both know.”

They both nodded in agreement.

I continued, “Well, when we were in Amboseli, while watching some hippos, Tembo told me to look at a bush not to far from where we were standing that had a bunch of birds in it making a big racket. He told me that he was sure there was a snake in that bush. I told Tembo that birds mob snakes in the United States, too. I was fairly excited and told Dr. Cushner that there was most likely a snake in the bush being mobbed by the birds. He gave me the go ahead to see if I could find the snake but warned me to be careful. So, Tembo and I went over to the bush, scaring away the birds, and sure enough, we found a Link-marked Sand Snake just inside the bush.”

“How big was it?” Chanua asked.

“Not so big,” I said. “About three feet long.”

“So that is a very true story,” said Farahifu.

Based on other conversations we shared, I would interpret her choice of words, “So that is a very true story,” as a reference to her acceptance of an alternative scientific
perspective of why birds are found around snakes. As teacher participants listened to my scientific explanations, it did seem as if they were accepting that there are other ways to view the behaviors of snakes other than the stories they were brought up to believe. I am not claiming Chanua and Farahifu had an entirely new belief about the relationships between birds and snakes after hearing my short explanation of this particular phenomenon, but that scientific alternative perspectives were plausible. As teachers, both ladies insisted that they would rather share information about snakes that agreed with the scientific community and were recommended by the educational system, rather than continuing to explain the behaviors of snakes based on folklore.

*Snakes Act With Intention*

Milungo, a medicine man, also told us the story about how another snake will come to the aid of an injured snake. According to local legend, if a snake is injured, another snake will bring a certain type of leaf or a piece of root to the injured snake. The injured snake then eats it or licks the root or the leaf that the other snake has brought and is then cured and crawls away. Two teachers told me similar stories, and it seems that most of the people in the area have heard this story, or a version of it, and believe it to be true. According to a story told to Farahifu by her mother, “when a snake discovers that another one is injured, it will search for certain leaves to nurse the injured snake.” Farahifu shared the following stories with Chanua and me.

*Fighting Snakes*

“Can the leaf be from any kind of tree?” Chanua asked Farahifu. “No, it has to be from a certain kind of tree,” Farahifu answered. She continued, “I also heard my mom
telling me this. I heard that the other snake will make sure the injured snake is nursed until it is well. As a learned person, I could compare it to mouth-to-mouth resuscitation. My mother tells me that sometimes the other snake will go on top of the injured snake and do some funny, funny things.”

“Another story that Mom was telling us,” she continued. “When we were also still young, mother used to tell us lots of stories about snakes. She was telling us how dangerous it can be if you see two snakes mating.” Pausing for dramatic effect, Farahifu leaned toward the two of us and whispered, “My mother would say, ‘If you see two snakes mating you are likely to die.’ It was really instilled in me,” she said confidentially. “And so, I could not be so much interested, or my curiosity drawn too much to looking at two snakes mating,” she finished laughing. Chanua and I joined in, having a good laugh at Farahifu’s apparent embarrassment from talking about a serpentine sexual scenario.

In reference to a snake coming to the aid of an injured snake, I found Farahifu’s comment, “As a learned person I could compare it to mouth-to-mouth resuscitation,” one of the most intriguing statements that I heard during my conversations with teachers. In this case, Farahifu compared something she learned that humans do to explain a myth about snakes. Anthropomorphism is commonly used to make the unfamiliar more familiar (Mitchell, Thompson, & Miles, 1997). In this instance, as well as the stories about snakes bringing medicinal leaves and roots to an injured snake, the people of Kasigau tend to anthropomorphize many animal behaviors, not just snakes. This is a common practice in many cultures worldwide (Kellert, 1996; Rowan, 1988)—just like the stories about snakes common in the United States: for example, that milk snakes
drink milk from the udders of cows, or that the hoop snake will take its tail in its mouth and roll down a hill to escape predators. Many western ethologists argue that anthropomorphism is unavoidable, due to a lack of terminology to explain animal behaviors without sounding mechanistic, leading to mechanomorphism, or lacking any metaphorical descriptions, leading to amorphism (Spada, in Mitchell et al., 1997).

Anatomically, mouth-to-mouth resuscitation by snakes would be virtually impossible due to the structure of the head and mouth and position of the opening of the larynx. Morphology aside, many snakes, if given the opportunity, will eat another injured snake as mentioned earlier, and to my knowledge, there are no documented instances of a snake assisting another injured serpent (not that this is an impossibility). Females of some species of pythons and the King Cobra (*Ophiophagus hannah*) care for their eggs until hatching, offering protection from predators. However, since most cannibalistic snakes do consume their prey headfirst (even the mother King Cobra leaves her nest before the hatchlings emerge to avoid cannibalizing her own offspring), anyone observing a snake beginning to eat another snake would see two snakes with their mouths conjoined. Later, the injured snake would be out of sight, having been consumed by the other snake. After Farahifu heard about the cannibalistic tendencies of many species of snakes found in the area, she told me that that must have been where she got the idea that snakes could perform mouth-to-mouth resuscitation. Until our discussion, she said she was not aware that snakes ate one another and found it hard to believe, partly because of the prevalent stories about snakes told by elders coming to the aid of injured snakes. And if one believes that snakes help one another, as most of the other vertebrate animals in the
community are apt to do, then the thought of cannibalism by snakes is a hard concept to swallow. This statement underscores the influence of teleological tales of snakes told by medicine men as discussed previously.

A few weeks later, I told Farahifu about the harmless Cape File Snake (*Mehelya capensis*) that specializes in eating other snakes, especially venomous ones like the Black Mamba, Boomslang, and Puff Adder, the venom of which they are immune (Spawls et al., 2004). After hearing that assertion, she said she wished there were more of those around. Unfortunately, we did not find this particular species during my project. I would speculate that because this is a large, slow-moving species, any individual snakes found in or near the village would be killed easily, thus making it very difficult to find. This is unfortunate since this snake would diminish the population of dangerous, fast-moving diurnal snakes like the Black Mamba and Boomslang, which the Cape File Snake hunts by smell at night, and the Puff Adder, which is an ambush predator and moves even more slowly than the Cape File Snake.

There are other instances in which snakes can be viewed with their heads very close together or even touching. According to Farahifu, “Another myth is that sometimes, big snakes fight. Big snakes will fight each other.” This observation is far from mythological. During the mating season, males of several species of snakes indulge in combat. Two rival male snakes will rise upwards entwined, wrestling one another, trying to push the other down. Both Black Mambas and Puff Adders exhibit this behavior. This is often misidentified as courtship. If one were to surprise or antagonize two large male snakes in the heat of combat, especially Black Mambas, this would definitely give rise to
the saying told to Farahifu by her mother that, “If you see two snakes mating, you are likely to die.” Very often, if two male snakes are seen wrestling, there is a good chance there is a third snake, female and of the same species, close by. This would compound the chances of someone being bitten, as his or her attention would most likely be on the two male snakes exhibiting what looks like mating behavior while possibly stumbling upon a female waiting patiently in the wings to mate with the victorious suitor.

*Relationships Between People and Snakes are Well-Defined*

Within the villages surrounding Mt. Kasigau, snakes are viewed as dangerous animals that deserve to die. Medicine men, an increasingly rare commodity in Kasigau, are the only local group of people who can search for snakes purposefully without any disdain or retribution. Medicine men are highly regarded and respected. Mchungaji, the Pastor of the Bungule Anglican Church of Kenya, told me this is true regardless of religious affiliation. Any other person—local or visitor—who seeks out snakes is said to be foolish or possess *juju* (magic). However, as the study progressed and teachers learned more about snakes, an alternative perspective began to emerge. I address this later.

*Role or Position-Appropriate Responses to Snakes*

The following three narratives are examples of the beliefs of many of the community members of Kasigau perpetuated by medicine men in relation to snakes. The first set of stories is from transcripts from conversations with elders from three villages around Mt. Kasigau.

Kibonye and I interviewed several medicine men or at least elders in the area who had some knowledge of snake names and/or snake medicine lore. The following are three
interviews conducted during the first week of October 2005 with elders who Kibonye felt were the most knowledgeable in reference to snakes. One of the first elders who we interviewed was Johanna from Kiteghe. This particular gentleman was not what Kibonye considered a snake medicine man, even though he professed to be a snake medicine man and knew many local names for snakes. However, Kibonye informed me that he was definitely considered a medicine man by the community and said that Johanna had performed surgery on him when he was a child.

The purpose of the following narratives is to relate the influence of elders, especially medicine men, on the perspectives of the people of Kasigau towards snakes. The beginning of this first narrative contains a description of a surgical procedure performed on Kibonye by Johanna and is included in the discussion Kibonye and I had with Johanna about snakes in order to offer a first-hand account on just how influential customary practices can be on community members’ actions.

A cure for sore throats. When Kibonye was 11 years old, he had a very bad sore throat, and his parents thought that they should do something about it. According to Kibonye, back when he was a child, it was a common belief that by removing the uvula, he or she would be cured permanently of sore throats. If a child suffered from chronic sore throats, a medicine man would recommend having the uvula removed. So, after receiving a recommendation from the local medicine man in Bungule, Kibonye went to Johanna’s shamba in Makwasinyi and asked to have his uvula removed. Over the last 40 years, Johanna has been the only person in the Kasigau area with the knowledge and the correct apparatus for this procedure.
During our visit, Kibonye asked Johanna to show me the very same apparatus that Johanna used to remove Kibonye’s uvula over 30 years ago. It was made from a thin stick about 10 centimeters in length carved with an eyelet at one end through which a very thin wire was looped.

Kibonye told me that Johanna, without the use of anesthesia, placed the wire loop around the base of his uvula, tightened the loop, and yanking very hard and fast, ripped Kibonye’s uvula right out of his throat. Kibonye said the back of his throat was quite sore for some time, but it eventually healed. And from what Kibonye can remember, he didn’t have a sore throat for several months following his surgery. Even though Kibonye thought that what he had done many years ago was the correct thing to do at the time, he now feels that since he has continued to have sore throats many times over the years, perhaps the surgery he endured as a child was not necessary.

Right after Johanna showed me the uvula removal apparatus, I asked Kibonye, “May I look inside your mouth?” Kibonye replied, “Okay.” And opened his mouth with an “Ahhh.” And sure enough, his uvula was not there.

When I returned home, after further research, I found that there is a widely-held belief in rural areas in Africa that the traditional practice of uvulectomy will cure or prevent sore throats and coughing (Prual, Gamatie, Djakounda, & Huguet, 1994), and that uvulectomies are still being performed in Kenya as a means of curing and preventing illness (Graham, Domoto, Lynch, & Egbert, 2000). This example illustrates the influence of the medicine men in this part of the world. Similar to the respect one gives doctors in the U.S., the people of Kasigau believe and respect the opinions of the medicine men. If a
medicine man declares that all snakes are venomous and there is no one to offer an alternative, why would anyone think differently? Just as Kibonye had no one to go to for a second opinion about having his uvula removed in order to cure his sore throat.

Johanna told us the names of several snakes, and I wrote down the names. (He told Kibonye in Kitaita and Kibonye translated to me what was said and how to spell the snake names.) Kibonye went through the book *Reptiles of East Africa* (Spawls et al., 2004) and systematically pointed to each photo of every snake known to be indigenous to the Kasigau region. Johanna then told us whether he knew a Kitaita name for that snake, whether or not he thought the snake was venomous, and whether or not the snake was dangerous to humans. He also volunteered what he thought the snake might eat. It was apparent that there was some confusion as to what name went with what snake. Also, according to Johanna, since exact identification was difficult, it behooved those who were bitten to be treated as if all snakes were venomous. Even though Johanna said he knew that some species of snakes were nonvenomous, he told everyone he met that all snakes were dangerous, and if one were bitten, he or she should be treated by a medicine man.

It would seem that perpetuating the myth that all snakes were dangerous increased the likelihood for more business. Johanna did identify several snakes correctly as to whether or not they were venomous. Johanna was one of the very few people Kibonye and I spoke with in Kasigau who could do this. Nearly everyone else I interviewed believed all snakes were venomous. This is not surprising, as all warm continents have venomous snakes capable of delivering a lethal bite (Ricciuti, 2001). Because of this, many cultures have developed a mindset that it is easier to avoid all snakes and assume
all are dangerous rather than attempt to learn which ones are venomous and which ones
are not (W. Gibbons, 1983). In the case of the Kitaita of Kasigau, rather than just practice
avoidance behavior, they systematically kill all snakes. This view is no doubt safer for
humans but hard on the harmless species of snakes inhabiting the area. The one exception
is the African Rock Python, which few individuals can differentiate from a venomous
Puff Adder or the nonvenomous Kenya Sand Boa that most Wakasigau (people of
Kasigau) believe are one of the most venomous snakes common to the region. However,
the knowledge that pythons are nonvenomous does not spare the creature from being
killed. This is understandable since pythons eat chickens, and large specimens eat goats
and have the ability to kill and eat babies and small children.

Kibonye agreed that having everyone believe that all snakes are dangerous
probably increased business for medicine men; however, he did not feel that Johanna or
other medicine men perpetuated the myth that all snakes were venomous out of greed but
because of their inability to identify snakes positively. At this point in time, Kibonye still
believed most snakes were venomous and assured me that most everyone he knew would
agree that one could not take chances with a snakebite and should get treatment from a
medicine man, especially if one could not get to a hospital. I asked Kibonye if he were
bitten by a snake and given a choice, would he go to a medicine man or a hospital?
Kibonye told me that he would of course go to a hospital located in the nearest town of
Voi, which is now accessible by matatu (mini bus taxi) about an hour’s drive away, but
many people still believe that medicine men can save them from a venomous snakebite
and felt that traditional treatment from a snake medicine man was better than no
treatment at all.

When I first arrived in Kenya, and long before starting my doctoral work at Kent
State, I had been an active advocate for snake conservation, believing snakes to be an
integral part of an ecosystem. However, I do understand the dangers that venomous
snakes possess and the value of livestock to people in rural areas, or any area for that
matter. Even though I do not condone killing any snakes, I can understand the reasons
why snakes are killed in areas inhabited by people and became even more sympathetic to
the Wakasigau conflict between humans and snakes the longer I stayed in Bungule.
Having grown up in Tucson, Arizona, I am accustomed to living in an area with many
snakes. Arizona is home to over 50 species of snakes, and 14 of these species are
venomous. Although I spent much of my youth hunting snakes and caring for captive
snakes at home, it was still difficult for me to comprehend the number and diversity of
snakes that the people of Kasigau encounter on a day-to-day basis during the rainy
seasons.

*The snakestone.* The following day, we traveled to Jora to talk to Granton.
Granton is an older man, about the same age as Johanna, probably in his mid to late 80s.
He told us the story of the snakestone. The snakestone is a small black stone that is
supposed to have the peculiar property to absorb venom. If the stone is put directly on the
bite wound area, it is supposed to suck out the poison. I asked, “Please tell us about the
snakestone.”
Kibonye said, “Granton says, ‘The stone must be used instantly—when the blood is still spilling’ and that ‘he is not very comfortable with the stone but believes it can work.’ He says, ‘It is something that has been imported, brought in and that we normally did not use that traditionally from the old days.’

Then I asked, “Can the stone actually absorb the venom?”

After conferring with Granton, Kibonye said, “Exactly.”

“The blood has to be flowing out?” I said, half a question, half a statement.

“When it’s still really fresh, as soon as somebody has been bitten by a snake,” Kibonye translated.

Kibonye said something to Granton, which I could not understand. A short conversation ensued, and I wished I could have been a participant and not just an observer waiting for Kibonye’s translation. These instances reminded me that I was very much an outsider looking in and felt disadvantaged not knowing the native tongue or at least Kiswahili. During conversations in English, with teachers at the various schools around Mt. Kasigau, I would forget that I was different: a middle-class, middle-aged, privileged American White male. In the ensuing weeks, I made a point of learning the local Kitaita snake names and a few key phrases in Kiswahili and Kitaita. As I became more proficient using a few Kitaita and Kiswahili words and phrases, I seemed to garner more respect from the teachers and other villagers with whom I came in contact on a daily basis. Soon after speaking just a little Kitaita and Kiswahili, I was no longer referred to as the “Mzungu” (White man) but addressed as Dawdi (David), Bwana Nyoka (Snakeman), or David.
I waited for a lull in their conversation and asked, “What are you talking about?” Kibonye said, “I asked Granton if the stone can be used more than once.” “Oh, well, what did he say?” I replied with a slight amount of irritation directed more at myself then to anyone in particular. Kibonye responded, noting the frustration in my tone. “What Granton said was, ‘It cannot be reused instantly. It has to be cleaned. You can reuse it after you have cleaned it and rinsed it with water.’” I asked Kibonye, “Do you remember the part about soaking it in milk to neutralize the poison that has been absorbed by the stone that Pikipiki (motorcycle) Ben told us about? Ask Granton about that.”

_Pikipiki_ Ben works as the TDC banda visitor liaison and also delivers mail to all the villages around Mt. Kasigau on his Honda 250cc motorcycle, hence the name _Pikipiki_ Ben. He owns one of only three motorcycles ridden on a regular basis in the region. A teacher in Bungule (who died recently in a tragic fire accident) owned the second, and Meneja, the Kasigau District Education Administrator, owns the third motorcycle. _Pikipiki_ Ben has a snakestone that he keeps in his house in Rukanga. A couple of days earlier, he had confided to Kibonye and me that he wasn’t sure it worked but told us that something is better than nothing when it comes to snakebite. We discussed the possible ramifications of the snakestone and agreed that if a person believed the snakestone would be beneficial, this would probably help to calm the victim. The calming effect of the stone would help to keep the venom localized by slowing down the heartbeat and in turn the flow of blood, thereby giving the victim more time to reach a hospital where he or she could get modern medical attention and hopefully antivenin. Kibonye said, “According to Granton, he has never heard about soaking it in milk to neutralize the poison, but like he
said, if you rinse it off with water and let it dry, it can be used again. Granton also said, ‘In the old days before the stones came in, there were some other types of medicine, roots. You were supposed to chew the roots after you had been bitten. You chew the root and then swallow. That is the first aid for medication.’ So, what happens, they believe that as soon as you are bitten, you can use a razor blade or a knife and cut marks around the area. He says, ‘Some snakes leave their tooth in the bitten area. So they pick out the tooth and then chew the roots.’”

I said, “Also cutting allows more blood to come out, allows more venom to come out. Is that right?” Kibonye answered, “Granton says, ‘Yeah, sure.’” Granton then said something to Kibonye. I asked, “What did he say?” “He tells me that he is not a practicing medicine man but remembers the teachings from a former medicine man,” Kibonye explained. I asked, “Was Granton’s father the snake medicine man?” “Granton says, ‘That it wasn’t his father but it was a relative,’ probably an uncle,” Kibonye offered. “And if somebody is bitten, there’s a call that you’re supposed to make to get everybody to come rushing to help.” I asked, “What is the call?” “He said, ‘The call is,’ you know it’s, ‘mwanandungu.’ And he said, ‘That is the call that you yell out if someone gets bitten.’”

Then I asked, “What is the container that’s used to hold the medicine?” “It’s called a dungu. It’s made from a calabash gourd.” Kibonye knew most of this information already and volunteered information as he spoke. “It’s a storage container for the medicine,” Granton nodded. I asked, “What is the medicine made from?”

After a fairly lengthy conversation with Granton, Kibonye turned to me and said,
“He told me, ‘Roasted roots from trees which were used. It’s a certain type of tree. The snake’s head is roasted and ground and then mixed with other herbs to make a proper concoction for snakebite.’ He said, ‘There were three men that he used to know of that would make the concoction, but they’ve passed away.’”

“How do you spell the word ‘mwanandungu,’ and what does it mean?” I asked. Kibonye spelled the word for me, a word he was familiar with.

He then said, “Mwanandungu just means that someone has been bitten by a snake.”

“So, if someone is bitten, that’s the word that you yell out,” I repeated, wanting to get this right.

Both Kibonye and Granton shook their heads in agreement. Kibonye added, “Absolutely.”

I found out later that Granton could speak some English, and Kibonye said he probably understood most of what I had said but was uncomfortable speaking English around mzungus (Caucasians).

I then asked, “When you yell ‘mwanandungu,’ does that mean specifically for a snake medicine man to come?”

Kibonye looked at Granton and then back at me. “Granton says, ‘Exactly. So whoever hears that warning, that call, that call will be reverberated.’”

I said, “If I yelled that today, people would come rushing?”
Kibonye said, “Yeah, sure,” and informed me that Granton said, “But you don’t say this just for fun, no you don’t, or the word ‘kidonga.’ You don’t use the words mwanaandungu or kidonga. No way, unless you’re making drama.”

Searching for clarification about the two words, I asked, “Are the two words different? Do they mean the same thing?”

Kibonye explained, “Kidonga is some medicine, this medicine you rub against a stone and then you lick the stone.” Kibonye mimed this process using his hand and tongue as if he were licking a stone being held in his hand. Granton looked on and nodded in agreement with Kibonye’s explanation.

Once again repeating what was being said and demonstrated, I said, “You rub the root against the stone and then lick the stone?”

Kibonye said, “Of course” as if this was the most obvious thing in the world.

I replied, “Kibonye, you say ‘of course’ like I should know this stuff.”

Laughing, Kibonye said, “That’s okay, I’m taking things for granted. That’s the bad part of it.”

Kibonye was still laughing and Granton joined in after Kibonye whispered something to him. I was glad my ignorance of Kasigau snake lore could provide some amusement for both of them.

Getting serious once again, Kibonye continued, “According to Granton, the medicine is very effective. This is before there were hospitals, and even when there was a hospital in Voi, we had no transportation to get to the hospital. When someone got very sick, we had to carry that person from here to Voi.”
I asked, “Was this before Kenya became an independent nation?”

Kibonye answered, “Granton says, ‘Yes, about the same time, in the early ‘60s. That’s when the first cars were introduced, and even then there were no cars in Kasigau, mostly just Nairobi.’”

Kibonye said, “I was not born until 1963 and do not remember those times.”

“I was born in ‘61,” I said, not realizing until this moment that I was actually older than Kibonye. Kibonye said, “That makes us age mates. I thought we might be.” “Yeah,” I agreed. “I guess we were both too young back then to remember much from the ‘60s. I do remember a few songs, news about the Vietnam ‘conflict’ on television every day, including the terrible incident at Kent State University and the first walk on the moon in 1969. I think I was in third grade when that happened.”

Kibonye said, “I must have been in kindergarten or grade one.” Granton said something to Kibonye, and Kibonye translated, “Granton wants you to know that he remembers all of the ‘60s, but without a TV or radio, he did not know much about the rest of the world back then, just what happened around his shamba and news that filtered in from Nairobi. He also said, ‘The people of Kenya had their own conflict to worry about during those times with the Mau Mau uprising and gaining independence from England.’”

We thanked Granton for sharing with us his knowledge of snakes and snake medicine lore and moved on to the village of Kiteghe.

The narrative above illustrates that the influence of elders on the pervasive belief that all snakes are dangerous is still in effect. The recent use of a new type of “medicine”
in the form of a snakestone is also an indicator that traditional medicine is still respected and used by the villagers in the communities around Mt. Kasigau. However, the snakestones are not sold at markets or used in hospitals. According to Piki Piki Ben, the stones are sold by traveling merchants who know that people will buy anything if they think it will save them from snakebite. This particular remedy has caught on during the last 10 years or so and the majority of teachers I spoke with believed the snakestone was capable of absorbing “poison” from a snakebite wound. Each village elder was aware of the snakestone; however, two elders Kibonye and I interviewed were not confident about the stone’s ability to cure a snakebite victim and believed a more traditional potion would be more effective. Most everyone said they would go to a traditional hospital for treatment but would not refuse a snakestone or more traditional older remedies if they were available and transportation to the hospital was not.

The following story is an example of a traditional medicine for snakebites that the people of Kasigau used in the past. This medicine is rarely used, however, because there are very few medicine men that can concoct a proper snake-healing potion.

*A proper potent potion.* The last interview with the snake medicine men occurred in Kiteghe with a gentleman named Milungo. I believe Milungo might be the oldest elder that we talked to. He must have been in his late 80s or even early 90s. Milungo is an extremely lively man, gray-haired, short, thin, but full of energy and quite talkative. He explained several different snake medicine charms to us and also described some different ways to cure people who have been bitten by snakes.
Since Kibonye was familiar with the kinds of questions I wanted to ask and Milungo could not speak any English, Kibonye asked if he could just ask the questions and then tell me what he had said. I did not see a problem with this suggestion, and it allowed Milungo to be more expressive and to relate his thoughts more easily. Kibonye told me that he was very old, and if I kept interrupting in English with my questions, Milungo may very well lose his train of thought and we could be there all day. Kibonye told me that he used to practice snake medicine many years ago but has not administered any medicine recently.

I watched as Kibonye questioned Milungo for about 30 minutes while Milungo relayed his answers in a melodramatic way. The potion Milungo described was similar to what Granton had described briefly in the previous narrative, but Milungo provided much more detail. The following narrative is taken from the recorded session with Kibonye and Milungo in front of Milungo’s house in Jora. Kibonye translated Milungo’s story as follows: “He told us that if you are bitten by a snake, you must get a potion that has been prepared very carefully. He described how to make the potion properly. First you must find a snake in the morning at sunrise and kill it, preferably a Puff Adder, and then you cut off its head and you keep the head. Next, you have to kill another snake at midday, noon. Cut off the head and save that head. Then you have to find another Puff Adder, hopefully a Puff Adder, but any snake will do. But a Puff Adder makes for a stronger potion—one that has been killed at sundown. Then you have to roast all three heads. After roasting the heads thoroughly, you crush the skeleton that remains into a powder. You mix that powder with certain herbs and leaves and then you add enough water to
make a paste. Then you would put this paste on a root and then in order to cure the person who has been bitten, the person must crawl along the ground snake-like, licking the root that has been pasted with this potion. And this is supposed to cure the person who’s been bitten by the snake. He also said that the paste can also be put directly on the wounded area.”

This is similar to other Kenyan indigenous remedies reported in literature that are plant- or root-derived (Kokwaro, 1994), specifically the Luo of southwestern Kenya, who in some treatments, mix crushed snake teeth into the concoction (Owuor & Kisangau, 2006). According to Spawls et al. (2004), one should not “bother with poultices, herbs, snakestones, etc. They are all useless. Never rub anything into the wound” (p. 509). However, there is still a tug of war in Kasigau between that of cultural education (traditional) and present academic education. But because of the overwhelming influence of elders, coupled with the inaccessibility of healthcare and lack of availability of antivenin, snake folklore has persisted in this part of the world. In addition, there is some indication that medicinal herbs used by indigenous tribes in East Africa to treat snakebites may have medicinal qualities (Owuor & Kisangau, 2006).

Most of the snakes in the area are nonvenomous, and it is highly likely that many bites treated by medicine men would not result in death regardless of treatment. However, each time someone bitten by a snake survived after receiving treatment from a snake medicine man, it would increase the likelihood that people would believe the medicine works. A highly plausible explanation as to why most people treated by medicine men are “cured” is because some bites are most likely inflicted by mildly
venomous snakes. Many species of mildly venomous snakes found in East Africa cause snakebite symptoms similar to venomous snakes without the threat of death. Even some venomous snakes, such as the commonly found Red Spitting Cobra (*Naja pallida*), which has venom that can cause cytotoxic (leakage of fluid causing swelling) effects and necrosis (destroyed tissue) is generally regarded as having a nonlethal bite. In Somalia, where this species is also common, many bites have been reported, but no fatalities have been recorded (Spawls et al., 2004, p. 459).

During this study, I heard of a case in Bungule where someone had been bitten by Red Spitting Cobra and survived. That survivor was Majani, one of the Bungule banda askari (watchmen). Majani was bitten on the top of the head and suffered no symptoms. It was likely a dry bite (no venom injected). Snakes can regulate the amount of venom when they bite and do not always inject venom when making a defensive strike (Ricciuti, 2001). In addition, there are at least three other non-deadly red snakes found in the area that could be confused with the Red Spitting Cobra. Two are nonvenomous—the red form of the Rufous Egg-eater (*Dasypeltis medici*) and the red form of the Hook-nosed Snake (*Scaphiophis albopunctatus*), which has an impressive threat display that resembles that of the Red Spitting Cobra (see Spawls et al., 2004, p. 369 for a description of the threat display). The third is mildly venomous, the Red-spotted Beaked Snake (*Rhamphiophis rubropunctatus*). Smith’s Racer (*Coluber smithii*) is another snake that is confused with the Red Spitting Cobra. The only similarity between both snakes is a black bar on the neck. The Red Spitting Cobra is called *Nguluku* in Kitaita and according to Kibonye, all red-colored snakes or snakes with a black band around the neck are called
Nguluku and are believed to be dangerous. Kijani, the other Bungule askari, when presented with a Smith’s Racer identified the snake as an Nguluku and told me it was very dangerous, even though Smith’s Racer is a docile nonvenomous snake. The one specimen that I encountered during the project never tried to bite me (or anyone else) while being handled.

There are Gender-Appropriate Responses to Snakes

I was fortunate to have the opportunity to interview snake medicine men in the area. I also interviewed women elders, even though Kibonye assured me that, traditionally, women of Kasigau do not practice snake medicine and would not know much about snakes. We did speak with many women, young and old, in all five villages to corroborate Kibonye’s claim, and except for one lady in Bungule, who did know a few snake names, Kibonye was correct. However, this could be due to the cultural bias against women speaking their minds or knowing about something that might get them accused of practicing witchcraft.

Within the framework of gender-appropriate responses to snakes is the idea that those who take an interest in snakes are supernatural themselves and have juju (magic) or practice sorcery or witchcraft. Kibonye and Vicheko explained to me that having juju meant that the person had probably been anointed with some sort of herb or spell and had a talisman that would ward off a snake’s ability to bite the handler or counteract the “poison” of the snake if the handler was bitten. They also told me that one could possess juju from within which would constitute wizardry, a specific kind of sorcery that came from within a person. This is the term Meneja, the regional school administrator, used to
refer to people who handled snakes. The possession of *juju* by a person outside of the community was regarded with suspicion. However, males within the Kasigau community are still expected to practice sorcery when deemed appropriate by the Elder counsel; conversely, if one is a Taita female and is suspected of having *juju*, or practicing magic, she runs the risk of being accused of witchcraft.

The seriousness of an accusation of witchcraft cannot be overstated. Kibonye’s brother is now in a jail cell in Voi awaiting trial, along with three other attackers, for allegedly killing an elderly woman accused of being a witch. According to Kibonye, the victim was beaten and dragged through the street by her assailants and died the following morning from injuries sustained during the attack. Kibonye told me that the four men do not deny that they beat her, but claim that the woman’s death was not related to their attack.

The information about the attack on the woman is not normally shared with visitors but, according to Kibonye, he shared this with me because he felt that I needed to know that the majority of Wakasigau still believe that a woman can be a witch (as illustrated by the story above), and that men are capable of practicing sorcery. However, the practice of witchcraft is not tolerated within any village, yet sorcery, performed by a man sanctioned by a village Elder counsel, is not only tolerated but also expected in certain circumstances (Harris, 1986; Smith, 2005). Kibonye told me that the woman who suffered the attack was told to move away or suffer the consequences. He went on to explain that the men who allegedly attacked her did not mean to kill her but wanted to make plain that she should leave the village. Peter, the herpetologist from Nairobi, was
present during the discussion of the attack on the women and stated, “if she was indeed a
witch, they had every right to do what they had done” and that he had “no sympathy for a
witch.” I asked how one could prove that a woman was a witch, and Kibonye answered
that it was done by the consensus of the village Elders but that the four men who
allegedly killed the woman had acted without the permission of the Elder Counsel.

Being accused of witchcraft is a real and present possibility for a woman of the
Taita Hills (Smith, 2005), and according to Vicheko and Kibonye, Kasigau is not an
exception. If a woman is believed to act in what is considered strange or unacceptable
ways or go beyond what is traditionally considered a male’s field of expertise (for
example, dealing with snakes and snake medicine), a woman can be accused of being a
witch. Following the first daylong herpetofauna workshop held at the Amy Nicholls’
Center in Bungule and facilitated by Ruby, a graduate student in herpetology who works
as a research assistant at the National Museums of Kenya’s (NMK) Herpetology
Department, Vicheko, Kibonye, and I shared the following conversation.

I asked Vicheko and Kibonye, “So, please tell me why you held the snakes
today.”

Kibonye said, “Because Ruby is a woman. I felt challenged and had no choice but
to overcome my fear. A woman holding a snake—that is too much!” he laughed.

Vicheko chimed in, “If it were a man, I might have just said no, but because it
was a lady, I also had no choice but to hold the snake. Plus, Kibonye had already done
it.”
He added this as if to say, “Anything Kibonye can do, I can do better.” Vicheko is very competitive, and I have a strong feeling that he would not tolerate being upstaged by Kibonye.

I asked them, “If you two had not learned about snakes beforehand, would you have still held the snake?”

They both responded, “No way!” Kibonye, finishing their unified answer, said, “There is no way I would have come that close to any snake.”

“Would it matter who the person was that was holding the snake when it was offered to you?” I asked, trying to get more information from the two of them.

Kibonye said, “Yes, like we said before, because it was a woman, we had to meet the challenge.”

“I understand that,” I said. “But let’s say you had learned about snakes previously from reading the books I gave you and were then approached by a woman you did not know who asked you to hold a snake. Would you do it?”

Kibonye and Vicheko looked at one another for a moment, and Vicheko replied in all seriousness, “No, the woman could be a witch and could not be trusted. It would be too strange to have a woman holding a snake.”

Kibonye agreed. “That’s right. I could hold the snake that Ruby offered me because I trusted her as an expert. If you asked me to hold a snake and told me that it would not cause me harm, I would take the snake, because I trust you,” Kibonye said to me. Vicheko nodded in agreement.
This was significant. It was apparent to me that the trust factor was more important to these two men in influencing their decision to change their actions toward snakes than information, positive modeling, or being challenged by a woman doing something they would not have done on their own (Halloran, 1967). However, it would seem that all of these factors played an important part in the alternative perspective they were exhibiting towards snakes within this particular context. The decisive factor that convinced them that holding the snake would be safe and acceptable was trust in the facilitator coupled with the competence and expertise of the handler offering the snake for them to hold. This is not to downplay the apparent influence that Ruby’s gender had on these two men. Up until this point, I had refrained from asking anyone to hold a snake with their bare hands, wanting first to see if they would hold a snake offered to them by a fellow Kenyan to minimize any influence I may have had if I were the one to ask. The fact that she was a woman, however, definitely had a significant effect on the motivational reasons for holding the snake barehanded for the first time.

For clarification I asked them, “Why do you trust Ruby, and why do you trust me when it comes to snakes.”

“Well, I did not hold the snake just because Ruby is a woman,” Kibonye said simply. “Like Vicheko said, ‘a witch or a crazy woman could hold a snake.’ I would not take a snake from a woman or anyone that I did not trust.”

“I see,” I said, encouraging him to continue.

Kibonye said, “I also wanted to overcome my fear, because I do not like to fear anything if there is no just cause. I trusted Ruby because I had watched her presentation
and noticed that she is very knowledgeable in this subject. Also, the way she held the snake, you know, with no hesitation, made me believe that that snake would not bite me. And when she said that this snake would not bite, I believed her.”

This was a logical explanation. The fact that the model was knowledgeable of the subject matter and exhibited positive modeling in a confident manner gave them the trust needed to challenge their prior perspective, allowing an alternative perspective toward the nonvenomous snakes on display and subsequent change in action. Also my presence was surely a factor, as he knew that I would be pleased if he held the snake. I could tell by Kibonye’s unsteady hands and sweating palms, which were quite visible to me, as I was standing very close by, that he was nervous, but his determination to overcome his fear won out.

*Farahifu’s viewpoint.* The next exchange involves a conversation between myself and Farahifu, a female primary school teacher in Bungule.

“This is an interesting point I want you to make if you would,” I said. “Are there certain people in the village that you would call to kill a snake and are there other people in the village that would just run from a snake?” I asked.

“Oh course, in most cases we find a man or boys who are really courageous in killing snakes,” she stated matter-of-factly. “So in most cases, a boy will not run away from a snake, yeah, yeah.”

I asked, “How about women in the village?”
After a few moments of deep thought, she replied, “Women, just a few. A few women are courageous, but not all. Many women are the ones who also really fear snakes.”

Farahifu’s assessment agrees with most psychological studies of snake phobia that I have read (such as a study by Hoff & Maple, 1982), but I also think that cultural norms have a huge influence on exhibited behavior toward snakes (Ajzen & Fishbein, 1980; Herzog & Burghardt, as cited in Rowan, 1988). However, I must remind the reader that I am not agreeing with these studies but merely pointing out that there are psychological studies that due show this correlation. In spite of these studies, even the most snake “phobic” teacher, Tumai, stood her ground and chased away a very large snake while protecting her young son Ben. This supports Blumer’s (1969) contention that the tendency to act does not determine how people act. I address this further in the section on people’s relationship to snakes at the end of this chapter.

I asked her, “Can you give an example of a courageous woman in Bungule? How would she handle a snake if she was one of the courageous women that you’re describing?”

“Like for example my mom, my mom is very courageous,” she answered proudly. “Even if she sees a big snake, she can fight that snake alone.”

“Really!” I exclaimed. “And what does she use to fight the snake?”

“She, just a stick.”

“Just a stick.” I repeated.
“If she thinks there’s nobody near who can assist in the killing, she, according to what I know, will . . .” Farahifu paused, looking straight at me and finished emphatically, “My mom can fight a snake.”

“And if there are other people nearby, what would she do?” I asked, wondering if there were other options, would her mother still attempt to kill the snake herself?

“Maybe she can ask for assistance. Yeah.”

My gaze fell on the switch leaning on the wall that Farahifu uses to threaten the children to keep them quiet and asked, “Is that stick I’m looking at (which is almost a meter in length), is that long enough for killing most snakes?”

She picked up the switch, looking at its length, and told me, “Well, this one is too short. Because, when in most cases, women don’t like going near the snake, so they prefer a long stick to hit from afar.”

“Yeah, that seems prudent,” I agreed.

Farahifu’s story about her mother is typical of the stories shared with me about women and snakes. If a female is alone and a snake is coming into the house, she may try to kill it herself, especially if she has a child nearby. As mentioned above, Tumai, the preschool teacher and wife of Kibonye, is a good example of a woman who is extremely afraid of snakes; however, when a large serpent came slithering through the bushes toward the window of her house while she was doing laundry, she told me she had no option but to stand her ground and try to scare the snake away. She explained to me that the reason she did not run away was because her 3-year-old son was napping in the house, and there were no men nearby at the time to call for assistance. Tumai explained,
“The snake was just there, so close and so menacing, I could not let it come into the house and harm my son.” From her description, it sounded like it may have been a very large Black Mamba, which she was able to stop from coming any closer to the house by throwing large stones at it and eventually frighten it away by thrashing the bush in which it was hiding with a very long branch.

Vicheko’s viewpoint. Most of the men I spoke with had a very different perspective on how women deal with snakes if there are no men around. Vicheko shared his opinion of how females would react to a snake found while working in a shamba. The following excerpt is taken from one of our taped conversations:

So if that happens, the person will at least try to move away from the portion they are digging in, especially ladies if you tell them you’ve seen a snake, or if they see one themselves, and they are in the middle of a portion that you have cut, or want to dig, they’ll drop their jembes (hoes) right there and run for their lives. So if there is a man around, he’ll rescue the situation, but if all of them are ladies, even if they have not run for their lives, I think they still have to come back home without food. During rainy season, we’ve got many funny things happening with snakes.

Although it is clear from other stories told to me that there are women in Kasigau willing to defend their homes against snakes and capable of killing a snake on their own, the narrative above contains typical statements that indicate a chauvinistic male perspective in Kasigau in reference to women’s abilities to deal with snakes.
Summary

The examples and stories in this chapter illustrate some of the perspectives toward snakes shared by the people of Kasigau that I noted based on participant observation, structured and open-ended interviews, and impromptu conversations. Ideas of snakes varied depending on several criteria: (a) the role or position of the person within the community; (b) the gender of the person; (c) the context in which the person is speaking and/or interacting with a snake; and (d) the types of experiences the person has had (or knowledge of others’ experiences within the community) in dealing with snakes. Ideas that snakes are enemies of humans, act with intention, and possess supernatural abilities were common.

Taking into account the contextual components that influence a person’s perspective, there was still an overall negative perception associated with snakes regardless of the situation best summed up by the statement, “a snake is a snake.” This statement, meaning that any creature that is legless and resembles a snake is a dangerous animal deserving death, was pervasive in the Kasigau community. I heard “a snake is a snake” from teachers, elders, medicine men, and the many children who came to watch as we attempted to catch snakes in and around the various villages. The Wakasigau idea of “snake” was associated with death, disfigurement, and the loss of pets and livestock. From talking with every teacher in Kasigau, the headmasters, and the regional education administrator, it would seem that the teachers had only been exposed to a negative perspective about snakes. Their ideas of snakes were based on their own unpleasant personal experiences interacting with snakes, stories about snakes heard from friends and
family, which were often tragic, and misinformation perpetuated by elders and medicine men (such as the notion that all snakes are poisonous).

Gender bias toward women’s ability to deal with snakes (and the possibility of being accused of witchcraft) is another perspective that came up frequently. When speaking with women when there were no other men around, a few women would admit to being brave enough to kill a snake or tell stories of women they knew who were brave enough to confront a snake; however, if we were in mixed company with males present, the female teachers would refrain from sharing stories involving women brave enough to kill or scare away a snake or admitting to having done it themselves.

The issue of women handling a snake was considered taboo when I first arrived. Later, after learning about the possibility of women being accused of witchcraft if they were seen handling snakes, I understood why the very idea was so ridiculous to the female teachers with whom I spoke. As discussed earlier in the section on gender-appropriate responses to snakes, the fact that the first visiting herpetologist who came to Kasigau was a woman made a significant impact on the teachers, and other community members, who witnessed her handling a snake. Also, because the herpetologist leading the workshop was a woman, this had implications for how teachers, more specifically female teachers, could potentially be viewed as having a position-appropriate status in reference to interaction with snakes, offering an alternative perspective to the pervasive chauvinistic views regarding women’s ability to handle snakes.
Research Question #2

The previous section dealt with existing conceptions, ideas, and perspectives toward snakes of rural Kenyan teachers and other prominent members of the Kasigau community when I first arrived in Kasigau. This section focuses on research question #2: How might Kasigau teachers’ conceptual relationship with snakes change following exposure to scientific perspectives and experiences?

In order to create an opportunity for teachers to learn about, experience, and witness scientific perspectives toward snakes, I had organized a teacher professional development institute on reptiles and amphibians led by herpetologists from the National Museums of Kenya. According to Kibonye, Vicheko, and Leland, this was the first workshop of its kind in Kasigau. Because of Kasigau’s importance as a biodiversity hotspot, many Kenyan scientists have conducted studies and surveys in the area; however, none of the previous Kenyan scientists have ever shared their particular expertise with the teachers of Kasigau. Although many visiting professors from around the globe come to Kasigau and work with the teachers in the villages, according to the gentlemen mentioned above and anyone else I asked, no workshop or institute about herpetofauna has ever been conducted in Kasigau facilitated by scientists, domestic or foreign. Also, most Kasigau teachers have very limited exposure to science classes during their formal training to obtain a Primary Teacher’s Certificate (P1) and can fail the science portion of the exam and still obtain the certificate, as indicated by several certificates that I examined. In addition, there are no televisions in Kasigau, so there is no exposure to Animal Planet or other such networks that routinely televise reptile
conservation shows like “The Jeff Corwin Experience” or the late Steve Irwin’s “The Crocodile Hunter.” This means that the teachers of Kasigau would have few, if any, opportunities to experience an alternative scientific perspective toward snakes and gained most of their information about snakes through cultural influences such as parents, family, and other community members (Ogbu, 1992). Thus, the Kasigau teachers’ knowledge of snakes most likely mirrors the worldview they have learned from their local communities and families (as illustrated by narratives in the previous section), which could be considered a subset of what Jegede (1997) called a “conceptual ecocultural paradigm.”

The stories in this section are used to illustrate how participants who previously exhibited only actions indicating fear and hatred of snakes changed their practices to reflect curiosity and respect after exposure to an alternative scientific perspective toward snakes. This new view of snakes was ascertained by observing teachers during and after a herpetofauna (reptile and amphibian) institute and by subsequent classroom visits and interviews with teachers and other community members. During the institute, teachers were “challenged” by the scientific perspectives shared by the visiting herpetologists. The observed actions of the participants would indicate that the teachers’ concept of “snake” had been broadened and their perspectives changed, or at least an alternative perspective was now available to them, leading to a more sophisticated perception of what constitutes “snake.” This is similar to what Mezirow (1991) called “transformative” learning. For those teachers who attended the herpetofauna workshop, and especially the eight teachers who had extended experiences with the herpetologists and me, the common expression “a
snake is a snake” was no longer an adequate way to describe such a complex group of
animals. The following is a list of factors that changed for the teachers that, according to
the teachers themselves and based on my own observations, led to the transformation of
their concept of snake:

1. The knowledge that there are nonvenomous (harmless), mildly venomous (not
dangerous), and venomous (including dangerous but not deadly and deadly)
   snakes
2. The ability to identify snakes and differentiate which snakes belong to the
   above categories
3. The ability to ask different questions about snakes
4. The willingness to accept and define a new positive-appropriate response to
   snakes dependent upon:
   a. views of science
   b. trust (in facilitator, message, etc.)
   c. pride (displayed in bearing and conduct pertaining to social pressure,
      gender issues, etc.)

The narratives in the previous section exemplified the negative traditional stories
shared about snakes and included the supernatural abilities attributed to snakes (e.g.,
religion, snake medicine, springing Puff Adders); unfavorable perspectives toward snakes
due to traumatic unfortunate personal events (e.g., loss of a family member, favorite pet
being killed); influences by tragic vicarious learning experiences (e.g., death of a
neighbor, amputated leg due to snakebite); and subsequent actions toward snakes (e.g.,
killing all snakes and negative portrayals of all snakes during science lessons). This section illustrates the transformation of perspectives or the use of alternative perspectives about snakes by teachers in the Kasigau community during and after their exposure to scientific perspectives toward snakes and opportunities for positive personal experiences with snakes while learning about snake taxonomy and ecology. In my concluding remarks, I discuss the implications that this change in perspective toward snakes may have for future environmental education curricula dealing with snakes and other conservation education endeavors.

By closely observing the actions of teachers as they interacted with herpetologists and snakes during the course of this study, I was able to document the use of an alternative perspective toward snakes by teachers and other community members, rather than the ones exhibited when I first arrived. The most pronounced change was noticeable in Kibonye and Vicheko who spent considerably more time with the herpetologist mentors (and me) and learned more about snakes through independent research than the other teachers involved in the project. Some examples of positive-appropriate responses to snakes, from a conservation education/scientific perspective, are exemplified by the tales that follow and include assisting with the capture of snakes, handling snakes gently rather than killing them forcefully, and portraying snakes more positively (as controllers of rodent pests within the ecosystem) during science lessons shared with their students. Their experiences with the visiting herpetologists afforded the teachers a completely different idea of snakes then they previously held, giving them the opportunity to explore new ways of interacting with their students while teaching about snakes and an
alternative to killing all snakes that they encountered in their homes and shambas or on the school grounds.

The Workshop

The time had come. The reptile and amphibian workshop was finally going to take place. I was pleased that Ruby had decided to come lead the workshop. Ruby is a graduate student in herpetology and works as a research assistant at the National Museums of Kenya’s (NMK) Herpetology Department. Victor, Ruby’s supervisor, had promised to conduct the workshop, but because of his administrative duties as Acting Head of the NMK’s Herpetology Department (due to Peter’s absence), he had decided to send Ruby instead. Peter was still in Germany working on his doctoral studies at the University of Bonn and would not return to Kenya for another week. (Peter Mataka is the Director of NMK’s Herpetology Department but recently began spending a substantial amount of his time at a university in Germany where he is studying for his Ph.D. and in the Taita Hills where his doctoral research fieldwork takes place.)

It was a beautiful morning. I was quite excited as I drove my rented Toyota Corolla station wagon down from my banda to the Amy Nicholls’ Center. Leland, the manager of the Taita Discovery Centre (TDC), authorized transport for some of the teachers to Bungule. He had Shujaa, one of the naturalists working at the TDC and assisting Dr. Patterson with the lions of Tsavo project, pick up teachers from Kiteghe, Rukanga, and Jora on his way to the Amy Nicholls’ Center. I loaned Pikipiki Ben my car, and he was gracious enough not only to pick up teachers at Makwasinyi but also make several additional runs to other villages to pick up more teachers who could not fit into
Shujaa’s TDC vehicle. We had a very good turnout—24 teachers attended along with many other community members and several people from the Taita Discovery Centre, including Leland and his new wife, Mary (they had just returned from their honeymoon in Ethiopia). Unfortunately, Gary, the new TDC Education Coordinator, could not come. He had a school group coming to TDC that day and could not get away. However, later that week, Gary came by to visit my banda to learn firsthand about the snakes we had collected.

Ruby started the workshop with a PowerPoint overview of what constitutes an amphibian and a reptile. (We used a portable generator to run the laptop and projector.) We supplemented Ruby’s PowerPoint slides of various reptile and amphibian species with live animals. She gave some basic facts about herps (a slang term meaning “reptiles and amphibians” used by herpetologists and people interested in reptiles and amphibians) and listed some of the common species found in Southeast Kenya. By the time the workshop took place, we had collected several species of snakes, lizards, frogs, and turtles, all of which Kibonye and sometimes Vicheko had watched me catch and at times helped me catch, usually by pointing me in the right direction. They were still extremely apprehensive about coming anywhere near a snake. At the start of the workshop, neither of them had handled a snake, and both had told me that they were still very uncomfortable around snakes.

However, both Kibonye and Vicheko (as well as Tumai, Farahifu, Chanua, Kilabu, Mwaza, and Busara) had been doing a lot of homework during the first month that I was there. Additionally, Kibonye, and sometimes Vicheko, helped me interview
elders and snake medicine men about snakes, and working as orthographers, determined through consensus what the proper Kitaita names for the few species they could identify should be. They had also read two books, one by Whit Gibbons (1983) called *Their Blood Runs Cold*, which is about reptile and amphibian conservation, and *Reptiles of East Africa* (Spawls et al., 2004), the definitive field guide for reptiles found around Kasigau. I had asked them to focus on the chapters about snakes in the book, *Their Blood Runs Cold*. I loaned the other book, *Reptiles of East Africa*, to both Kibonye and Vicheko so they could study the different species, learn some basic facts about snakes and their biology, and become better at identifying the different types of snakes using the excellent photographs found in that book. In addition to the above two books, I had given them and the other five key teacher participants a large three-ring binder (the curriculum guide for the herpetofauna institute) that I had put together during the preceding year that included the following: an identification chart of all the species of snakes that could be found in the area; several scientific journal articles about snakes and other reptiles and amphibians; *Guidelines for the Use of Live Amphibians and Reptiles in Field Research* (1987); articles on biodiversity conservation including the article, “Root Causes: An Interview with Wangari Maathai,” a Kenyan environmentalist and the first African woman to be awarded the Nobel Peace Prize; and “Biological Backbone,” an article by Kenyan President Mwai Kibaki describing the challenges of managing protected areas in Kenya and the importance of protecting biodiversity.

During the workshop, Ruby used the live specimens we had collected to show the participants examples of nonvenomous snakes, mildly venomous snakes (like the type
that Kibonye had witnessed biting me) and deadly, venomous snakes. During her talk, I walked around the room displaying live specimens and passing out containers holding additional live specimens for the audience to view up close if they were comfortable doing so. She also explained that there are some venomous snakes that are not considered deadly but can cause blindness, like the Red-Spitting Cobra. Ruby explained that although the venom of the red spitter is quite toxic, usually making the victim extremely sick with excruciating pain around the location of the bite, there are no documented cases of death resulting from the bite of a Red-Spitting Cobra.

After the presentation, Ruby invited Kibonye and Vicheko to look more closely at the snakes. At this point, I was just standing in the background observing Vicheko and Kibonye as Ruby showed them the critters on display. Ruby took a Cape Wolf Snake (*Lycophidion capense*) out of the container and handled it confidently, knowing that this was a nonvenomous, nonaggressive species. Ruby asked Kibonye if he would like to hold the snake, saying, “Don’t worry, the chance of getting bit is very, very small, and if it did bite you, it wouldn’t hurt much.” Kibonye said nervously, “I think I should have a go.”

As Kibonye reached for the snake, I walked over to better see his reactions. I watched as various emotions played across his face—first fear, then apprehension, then a look of determination. He reached out purposefully as the snake slid from Ruby’s outstretched hand onto his, and overriding his fear of all legless creatures, his hand trembling, he touched the snake. Then, I saw a different blend of emotions cross his face—those of fascination and accomplishment.
I had witnessed Kibonye overcome his previous conception that all snakes were
dangerous. Kibonye held the snake, allowing it to crawl through his fingers. Granted, it
was a small snake (less than two feet in length), but still, I did not think Kibonye would
ever hold a snake after listening to what he had told me and observing his revulsion and
fear of snakes in the field. (Both Kibonye and Vichcko were with me when we found this
wolf snake and several others, but prior to this time, neither man showed an interest in
touching a snake, let alone holding one.) Vichcko also looked on, clearly surprised that
Kibonye was able to hold the snake. After Kibonye had held the snake for just a few
moments, Vichcko held out his hand next to Kibonye’s and let the snake slither between
his fingers. They both held the snake, allowing it to wrap itself around their hands
simultaneously. Kibonye and Vichcko were beaming and looking very proud that they
too were able to hold the snake.

After their initiation handling the Cape Wolf Snake, they wanted to hold all the
different snakes in the collection that were harmless. Ruby obliged and took out several
more specimens for Kibonye and Vichcko to handle. Kibonye and Vichcko, after coming
to the realization that some snakes were harmless, could now handle snakes.

The fact that these two men were handling snakes was quite surprising to me.
When we first met, Kibonye and Vichcko were adamant that they would never do such a
thing, laughing at the mere suggestion, and assured me that they would kill any snake on
sight. At this point, and under these particular circumstances, however, Kibonye and
Vichcko held snakes as explained in the previous section.
Immersion and Marvelous Mentors

The next few narratives follow Peter and James as they mentored Kibonye and Vicheko on the finer points of being a herpetologist. The enthusiasm that Vicheko and Kibonye displayed while working with the two herpetologists was inspiring to me as a teacher professional development specialist and gave me a sense of relief as the researcher responsible for setting this whole project in motion. Everywhere we went, community members and colleagues could see the rapt attention the two teachers paid to the herpetologists as they soaked up information about ecology, taxonomy, and museum specimen preparation techniques. This “immersion into the world of scientists” had a profound effect on both Kibonye and Vicheko (Loucks-Horsley et al., 2003, p. 199). Both Kibonye and Vicheko explained to me that as upper-level elementary teachers, they specialized in teaching science. And as assistants in Peter’s scientific study of herpetofauna, they were able to strengthen their knowledge base in a content area in which they both felt they were previously deficient.

Kilabu, the high school biology teacher, told me that he would have liked to have spent more time with the herpetologists, but did not have the time since in addition to being a full-time teacher, he also ran a business in Rukanga, which took up most of his remaining time at night and on the weekends. We were only able to lure Kilabu away from his other responsibilities a couple of times to study snakes and go snake hunting. Kibonye and I did go by the high school a few times with the snakes so that Kilabu could have the opportunity to see the snakes up close and share them with his classes. He also
kept the cobra eggs (found in Bungule by one of Vicheko’s students) and an embryo that I extracted from one of the eggs and preserved in alcohol.

Included in the following stories is one about amphisbaenians (a type of fossorial legless reptile) and caecilians (a type of legless fossorial amphibian) in order to show how a herpetologist’s enthusiasm for certain group of herps can have an effect on how teachers view the importance of a particular kind of animal and also, how the scientific community does not always value indigenous knowledge. James was very ill during his first week in Bungule, but when he got the news that an amphisbaenian had been found, he made the effort to go out and find more. James’s passion for fossorial herps was infectious, as the next story illustrates.

About a week after the workshop, Peter and James arrived in order to set up their herpetofauna survey of Kasigau. They are both Co-PI’s on a Critical Ecosystem Partnership Fund grant which is funding Peter’s dissertation project. Peter is doing a comparison study of herpetofauna diversity and abundance between areas of land disturbed by agriculture and relatively undisturbed natural areas. This was an important aspect of my study. Peter and James’s funding allowing them to come to Kasigau for their own study was an extremely fortunate bit of serendipity for me since otherwise, getting the herpetologists to come to Kasigau more than once may not have been possible nor would they have been able to stay for such long periods of time (as long as two weeks during their first trip following Ruby’s workshop).

James is a tall (around 6’2”), slim British scientist who knows what he wants and is very demanding. He also sits on Peter’s doctoral committee. Peter is a native Kenyan,
not so tall, about the same height as Vicheko (5’7” or so), but carries himself as though he is much taller. He has worked for the National Museums of Kenya’s Herpetology Department for over six years, and at the time of our study in Kasigau, had served as Director for just under a year. Peter can identify most reptiles and amphibians in Kenya at a glance using either the scientific name or the common name. I found his knowledge intimidating but very helpful in the field.

Peter and James taught Kibonye and Vicheko about collecting methods in herpetology, such as how to set up drift fences and use cover boards. They also showed them how to label and prepare specimens for museum collections. Peter and James did a lot of fieldwork during their visit, giving Kibonye and Vicheko the opportunity to see snakes and other herps being caught and held by someone other than me.

One of the ways that herpetologists look for reptiles and amphibians is called a “visual encounter survey” (VES), where an area or habitat is searched systematically for individual specimens in a prescribed time period. After trying this method over the course of several days, we found a few species of snakes. The time spent searching for herps gave Kibonye and Vicheko many opportunities to ask questions concerning snakes. As they assisted with VES and gained additional knowledge from reading the books and articles I had given them, their questions became more and more sophisticated. They asked questions concerning the ecological niche of snakes, the physiological reactions to certain snake venoms, the morphological configuration of snake fangs in cobras compared to those of vipers, and some questions that even Peter was unable to answer, like why some snakes are venomous and others are not.
At the time, James was quite ill, suffering from some sort of intestinal parasite. James has traveled all over the globe researching reptiles and amphibians. But even this tough, seasoned field worker could not hide his obvious discomfort and frequent bouts of diarrhea, nausea, and vomiting. Returning from an unsuccessful VES one hot afternoon, James rushed off into the bush while walking past Kijani’s house and, while trying to find some privacy, found a green snake instead.

The snake was hiding underneath some aloe vera plants. He called us over, and Peter caught the pugnacious little snake with my tongs, identifying it as a Spotted Bush Snake (*Philothamnus semivariegatus*). Peter also explained that in addition to the Spotted Bush Snake, there is another species of harmless green snake that live in this area, the Speckled Green-snake (*Philothamnus punctatus*). He also mentioned a third species, Battersby’s Green-snake (*Philothamnus battersbyi*), whose known range comes very close to Kasigau. However, no specimens had been collected this far east in Kenya. (Several weeks later, one night while photographing frogs with Kibonye and Fred, we did find a Battersby’s Green-snake asleep in a bush near the banda in which I was staying.)

Peter cautioned us that the male Boomslang (*Dispholidus typus*), a deadly species, can also sport a completely green color morph that resembles the last two green snakes mentioned above and may also reveal a green/black phase that has a similar color pattern to that of the Spotted Bush Snake. He quickly pointed out that the Boomslang is easy to distinguish from species in the genus Philothamnus by the difference in the shape of the head, eyes, and pupils. Boomslangs have short oval heads, large eyes in proportion to the
head and keyhole-shaped pupils, whereas green snakes in the genus Philothamnus have longer heads, smaller eyes in proportion to the head and round pupils.

Fred mentioned that he would determine the snake’s genus by surveying the shape of the head because he was not going to get close enough to look at the pupils before handling any green snake. Kibonye asked Peter about the color of the Black Mamba since he remembered reading that most mambas were a greenish color. Peter told him that Mambas in this area were usually an olive drab and that the green color of the Black Mamba was very distinct from the bright green of the Philothamnus group of harmless snakes, adding that the Mamba’s head was shaped like a coffin—very long and narrow with small eyes in proportion to the head. Kibonye asked about the Green Mamba, and Peter told him that that species, for the most part, only lives on the coast in Kenya although there are two disjunct populations found inland, the closest of which is probably too far from Kasigau to worry about.

Peter then demonstrated for Kibonye and Vicheko the proper way to handle a snake to avoid being bitten. After watching Peter handle the snake, Kibonye and Vicheko both handled the snake without getting nipped.

The next day, we traveled out to Joseph’s shamba. Joseph, a retired teacher from Bungule, had told us that we could look for snakes on his property anytime. Actually, we were going to his shamba not to look for snakes but because he was plowing. The rains had arrived, and many people had begun plowing their fields in preparation for planting. James wanted us to help him look for amphisbaenians, a fossorial, legless, snakelike reptile called a worm lizard that is neither a worm nor a lizard.
A few days before Peter and James arrived, the Reverend Mechungaji told me that two ladies had found a very strange-looking animal while digging around the church. He said it looked like a small snake, but more like a big worm with scales. He told me that one of the ladies had kept it in hopes that I would want it and give her a reward. Kibonye and I visited the lady that evening and asked to see it. When she brought out the tin can and poured out the contents, I was ecstatic. Wriggling right in front of me was a Voi Wedge-snouted Worm Lizard (*Geocalamus acutus*).

Kibonye said, “David, this is the strange creature you wanted to find last time you came here. We told you they were around.”

Kibonye had remembered that during my visit during the summer of 2004, while going through the book *Reptiles of East Africa* (Spawls et al., 2004) with him and a few other teachers, I had pointed to a photo of a Voi Wedge-snouted Worm Lizard in the book and asked them if they had ever seen this animal before. Busara, one of the teachers who showed great interest in learning about reptiles, told me that they saw them commonly during the two rainy seasons (October through December and April through June) while plowing in their *shambas*. My chance of seeing one during the summer months was slim. In the Kasigau area, “summertime” is relatively cool and very dry. Most reptiles and amphibians aestivate during this period.

During my visit to Kenya in 2004 the head naturalist from TDC had told me the last time worm lizards had been found in the area was six years ago near the town of Voi over 37 miles (60 km.) away, and that several herpetologists had come looking for them in the interim with no luck. None had ever been found (by herpetologists) around
Kasigau. I found out later that James and Peter had found a few near Voi about two years ago, but neither one had found them around Kasigau, not for lack of trying.

I asked Kibonye, “What do you usually do with these critters when you find them?”

Kibonye said, “Because they have no legs, we treat them like snakes and kill them. We usually only see them after a rain when we plow.”

When I showed James the worm lizard, he acted like a kid on Christmas morning opening his favorite present. He whipped out his camera, took several photos and asked where it was found. James specializes in fossorial herpetofauna. His favorite group of herps is the caecilians, a mostly fossorial group of legless and tailless amphibians, with one subfamily, Typhlonectinae, being totally aquatic. We were planning a trip to the top of Mt. Kasigau to set up a drift fence and do a VES to look for any herps we could find, but we were especially interested in finding *Boulengerula taitana*, a caecilian endemic to the Taita Hills and Kasigau. Only two specimens from Kasigau had ever been collected (those by James just within the last year), and he needed several more to do genetic comparisons with specimens he and Peter had collected from different populations they were studying from the Taita Hills. In May of 2005, James, Peter, and other scientists described a new species of caecilian, *Boulengerula niedeni*, from the nearby Sagalla Hill located between Mt. Kasigau and Voi. James speculated that there could be another species of caecilian on Kasigau new to science due to Kasigau’s isolation from other mountain blocks within the Taita Hills. Kibonye and Vicheko told me that the interest and enthusiasm that James and Peter had toward the expectation of finding more worm
lizards gave them a new appreciation for the little snakelike creatures that they had routinely dug up and killed each season as they plowed their fields.

The first trip up Mt. Kasigau that we all took together (Peter, James, Kibonye, and I) to construct three drift fences lasted only one day and resulted in no caecilians. However, Kibonye and I, on a separate excursion lasting four nights and five days, landed us the third specimen ever found on Mt. Kasigau and the first documentation of frogs near the peak. During another visit by Peter without James, Vicheko, Kibonye, and Peter found four additional *B. taitana* during a day hike up the Bungule side of the mountain. I had to skip this particular trip after accidentally breathing too much formalin while preserving specimens; having no ventilated hood in the *banda*, I made the mistake of leaning over the preservation containers a little too long. This ended up being advantageous, however, since it allowed Vicheko and Kibonye to bond with Peter without me looking over their shoulders.

James and I were both interested in how the locals regarded all scaled legless creatures as snakes and whether they differentiated worms from caecilians. Kibonye told us that unless people had a reason to learn the difference, they just didn’t care. Until James’s arrival, I doubt that Kibonye (or I, for that matter) would have ever seen a caecilian. If he had encountered one, he would have killed it thinking it was snakelike and could not be trusted since that was how he and nearly everyone he knew treated worm lizards. Kibonye and I saw our first caecilian on a field trip to the Taita Hills (Kasigau is considered a geologic outlier of the Taita Hills) while assisting Peter and James with the installation of drift fences at their other research sites.
During our visit to Joseph’s *shamba* to collect amphisbaenians (we found several, to James’s delight), we came upon a little snake. Peter, James, Kibonye, and I surrounded the snake that had taken refuge under a pile of leaves. We all stood very quietly and still as Joseph and three other young men who were helping with the plowing looked on. As soon as the snake poked its head out from the pile of leaves, Peter snatched it up. He identified it as a Speckled Sand Snake (*Psammophis punctulatus*), the same species that had bitten me a few weeks earlier. Peter held the snake, and it calmed down right away. We noticed that this particular snake was not biting and seemed quite at ease being held. Kibonye said he was feeling brave and wanted to hold the snake. Peter handed the mildly venomous species to Kibonye, and he handled the Speckled Sand Snake expertly, seemingly quite at ease.

A few days later, I spied a Link-marked Sand Snake in a bush, the one called *Kisikiria Maza* (listens to stories). This particular *Kisikiria Maza* was located in a hedge right in front of the kiosk where Peter and James (who were staying with me in the *banda*) and I were meeting Vicheko and Kibonye for breakfast. This time, when I went to catch the snake, instead of Vicheko and Kibonye standing way, way back, they were right in the hedge with me attempting to catch the snake. They both had snake sticks and I had the snake tongs, and we finally managed to get close to the snake. I had given the tongs to Kibonye who was having trouble getting the tongs on the snake. This particular snake is one of the fastest, most quickly moving snakes in this part of East Africa. I didn’t want this snake to get away. We had tried to catch this species several times before to no avail.
This time I was determined to get this snake. So, throwing all caution to the wind, I grabbed the snake mid-body. At that point, although Kibonye and Vicheko were attempting to keep its head away from my hand with the tongs and snake sticks, the bush was so large they weren’t able to get the snake’s head under control and the snake managed to bite me several times on the hand before I secured it behind the neck. Since we were right in the middle of the village, a large group of approximately 30 to 40 people had gathered. Traditionally, as soon as someone hollered, “snake!” everybody came running, usually to kill it. But lately, the people of Bungule had not been coming to kill a snake, but congregated instead to watch me attempt to catch it, a spectacle they seemed to find greatly entertaining.

We did manage to catch the snake. I would not have been able to do it without the help of Kibonye and Vicheko. They told me that they were no longer frightened since they could now identify snakes and now also knew that some snakes were nonvenomous or only mildly venomous and were familiar with the use of snake sticks and snake tongs. Even though the Link-marked Sand Snake was much larger than the Speckled Sand Snake that bit me previously, from what I could tell, this snake never did get a really good hold on me and wasn’t able to sink its fangs in very deeply or inject much venom. After we caught the snake and bagged it successfully, I did feel some mild reaction to the venom but nothing close to the physical effects I experienced following the Speckled Sand Snake’s bite.

Instead of Peter, James, or me giving a lecture to the crowd about the snake, Kibonye deftly took the snake out of my hand, and carefully holding the snake behind the
head, explained to the crowd that this snake was harmless and did not need to die. He showed them how to identify it, handling the snake like a pro. I could tell Kibonye really enjoyed being the center of attention. I also noticed the absence of the words *juju* and *mzungu* being uttered by the crowd while catching this snake. When the project first began I was accustomed to hearing these two words from the crowd whenever I caught a snake within the villages. However, these terms had now been replaced with questions like, “Is that snake dangerous?” “What does that snake eat?” and “What is the name of that snake?”

The people of Bungule were now asking different questions about snakes, as were community members from the other villages surrounding Kasigau. This was a big difference from when I first arrived when practically everyone I spoke with would tell me “a snake is a snake” and attempt to kill any snake or snake-like animal found.

I held the snake bag out for Kibonye, and he slipped the snake into the bag. James and Peter had just watched the events while calmly sipping their *chai* (tea) and waiting for breakfast. They congratulated us on our successful capture.

I asked Peter, “Hey, why didn’t you come help us?”

He replied, “David, we have plenty of that species in our collection at the museum from this area, plus I was curious if you would be able to catch it without my assistance. Don’t worry, if we spot something the museum needs, I’ll help you catch it.”

Peter examined the bite marks on my hand and determined that they were indeed superficial and not to worry, that is, unless I had an allergic reaction to this particular species’ venom, which he assured me was very rare.
Kibonye and I had already captured several reptile specimens that Peter wanted for the museum. We found a few species of herps that were range extensions, for example, the Desert Black-headed Snake (*Micrelaps boettgeri*) and the Speckled-lipped Skink (*Mabuya maculilabris*), documented the first frogs to be found on the top of Mt. Kasigau, *Ptychadena anchietae* and *Phrynobatrachus sp.*, and found what might be a new species of dwarf gecko with a beautiful, bright-yellow belly in the genus *Lygodactylus*. This “new” species may just be a color morph of a *L. picturatus* or *L. luteopicturatus*, but this is an unlikely possibility according to Peter. We also kept one of six gravid Kenyan Pygmy Chameleons (*Rieppeleon kerstenii*) that we found until she laid her eggs. This was the first documented account of clutch size for this species. After I left Kasigau, Vicheko took care of the eggs until they hatched.

I asked Kibonye, “How did you feel while talking to the crowd and holding the Link-marked Sand Snake?”

Kibonye explained, “I felt excited. I’m getting used to handling snakes. The experience holding the Spotted Bush Snake by Kijani’s house and the Speckled Sand Snake at Joseph’s *shamba* has been a real boost to my confidence. What Peter showed me to keep the Spotted Bush Snake from biting was helpful while handling the Link-marked Sand Snake.”

This story exemplifies the change in perspective that Kibonye was experiencing. The positive feedback he was getting from the herpetologists and the extra attention from the community were reinforcing the recent shift in his conception of snakes. His former conception that all snakes were dangerous and deserve to die had been replaced with one
of respect, fascination, and an understanding of the diversity of snakes. Learning specific handling techniques from Peter through mentoring and watching Ruby’s positive modeling, plus having the chance to practice with various species over several weeks, boosted Kibonye’s confidence level. This gave Kibonye an alternative perspective—a pro-environmental view toward snakes needed to overcome potential negative social pressures and his own fear of snakes (Hungerford & Volk, 1990). I also think that the project as a whole (including all teachers involved in at least some aspect of the institute, elders, school administrators, clergy, and TDC staff, in addition to the key teacher participants) allowed for a more accepting environment toward snake conservation education through the inclusion of the Kasigau community as a group as they explored this aspect of environmental education (Ballantyne & Parker, 1996).

Watch Your Step

One other story worth mentioning highlights Kibonye’s newfound confidence concerning snakes. Kibonye and I spent several days on the top of Mt. Kasigau setting and checking drift fences for Peter’s study. On the way down the mountain, after five days and four nights, exhausted and hungry, I walked right past a Savannah Vine Snake. Kibonye was following directly behind me, and I was afraid he might step on it and get bit. This is an extremely deadly snake, one of the very few for which no antivenin is produced. As I turned around to warn him, I realized that if I said anything, he might stop and in doing so, position his feet to step on the snake for sure (we were both carrying heavy packs). So instead, I watched (in what seemed like slow motion) as Kibonye stepped within one inch of the outstretched serpent lying twig like on the path, taking one
step, then two and finally on the third step, clearing the snake’s striking distance. I breathed a sigh of relief and, after Kibonye had taken a couple more steps, asked Kibonye to stop and turn around slowly. Kibonye obliged. I told him to look a few paces back on the path. Kibonye uttered an explicative and, turning back towards me asked, “That’s a Savannah Vine Snake, isn’t it?” I said yes. Kibonye then asked me calmly if I wanted to catch it. This suggestion was from the same man who just a few weeks ago would not hold a bucket containing a snake. Since I had already captured one of this species, we decided to let it go. I asked Kibonye if he wanted to kill it, but he said no—since it was not near any dwellings, he thought we should just let it live. I then asked him how he felt about almost stepping on a deadly species of snake.

He replied, “If this had happened before learning about snakes and becoming comfortable around them, I would have gone weak in the knees and would have nearly lost my composure completely. But now, since I know that this species is nonaggressive, I did not feel nervous at all.”

He then proceeded to chase it into the brush with his snakestick.

Similarly, Vicheko shared an experience that happened while he was proctoring the high school end-of-year exam in Makwasinyi shortly before I returned to the United States. During a teacher break, Vicheko noticed a disturbance outside one of the classrooms. He went over to investigate and found several students and a few teachers harassing a small snake in the grass. Vicheko hollered out to them, asking if they knew what type of snake it was. The small group of teachers stopped for a moment and told Vicheko that they did not know. Vicheko cautiously approached the snake and told the
teachers that it was a harmless Olive Sand Snake (*Psammophis mossambicus*). The teachers were still not sure and wanted to kill the snake, but Vicheko convinced the teachers to come to the office where he was keeping his three-ring binder with the snake identification guide (one teacher stayed behind to keep the students from stoning the snake to death and keep an eye on its whereabouts) and showed them the photo of an Olive Sand Snake. The teachers were persuaded of the snake’s harmless nature, and they returned to the snake, dispersed the growing number of children, and explained that this snake was not dangerous and should be left alone.

These two stories are good examples of how the ability to identify snakes contributed to the development of an expanded conception of snakes and an alternative perspective towards snakes. I cannot say that Kibonye would have acted differently if I had not been present, but I was not present when Vicheko saved the Olive Sand Snake. From subsequent, self-reporting email messages sent to me over the past year since returning to the United States, I have been assured that Kibonye’s and Vicheko’s actions toward snakes have remained positive.

*Pastor Lends a Hand*

Even the Reverend Mchungaji, who had lost a sister to a venomous snakebite when he was a child and had been frightened out of a tree by a snake, showed a surprising change in his perspective toward snakes. One particularly hot day in Bungule, while Kibonye and I were reading the newspaper at the Amy Nicholls’ Center, a student came running in to tell us a snake had been spotted “just here.” The snake was very close,
only about 20 yards from the entrance to the Amy Nicholls’ Center and near the upper elementary building of the Bungule Primary School.

During my first attempt to catch the snake, it slithered right through my legs, escaping down a hole. By the time I arrived, nearly every student and teacher from the upper primary school were gathered around the area where the snake had just shot past me and slithered down the hole. I asked for a shovel. One of the students raced over to the parsonage to borrow a shovel, and Mchungaji, the Reverend of the ACK (Anglican Church of Kenya), brought it to me personally. I eventually caught the snake, which turned out to be a mildly venomous Rufous Beaked Snake (*Rhamphiophis rostratus*).

Later, after learning more about snakes and about my project and viewing nonvenomous snakes, mildly venomous snakes, and so forth, the Reverend’s perspective began to change. Mchungaji told me that he was surprised, maybe even more so than I, that his idea of snakes had changed. He also volunteered over dinner one evening that although he thought venomous snakes should be killed anytime they’re found around the dwellings of people, he also felt that if one could identify positively that a snake was nonvenomous, or even mildly venomous, there was no reason to kill it. As long as the snake did not pose a threat to humans, he felt that it was okay to let nondeadly species of snakes live side-by-side with the people of Bungule. He also said that he understood that there is really no need to kill any snake as long as it was well away from human habitation, but because his sister had died from a snakebite while collecting wood, he would never be comfortable allowing a venomous snake to survive.
**Kibonye Leads Classroom Visits**

The last set of stories below detail the use of an alternative scientific perspective toward snakes while using live snake specimens to teach about snakes with their students.

Kibonye and I made several visits to the schools of Kasigau, and the teachers were very gracious in allowing us to bring snakes into their classrooms where Kibonye led the presentations. In every instance, teachers were grateful for the knowledge that Kibonye shared and took part in handling the snakes. During each presentation, Kibonye stressed that unless a trusted, knowledgeable person establishes positive identification, all snakes should be treated as potentially deadly and cautioned that under no circumstance should children play with or attempt to catch a snake. He even added that killing a snake is more dangerous than just letting the snake go, unless it was found inside the house.

**New View**

At the urgings of two teachers from Kiteghe Primary School, Kibonye and I decided to have a workshop for a select number of teachers who were very interested in learning more about snakes. The total number of people we could fit in the car decided the number of participants for this workshop. We wanted to make an early start, hoping we could do a few visual encounter surveys before it got too hot for snakes (I explained to the teachers that most diurnal snakes in this area are crepuscular [coming out in the morning or late afternoon] to avoid overheating during the hottest part of the day), but by the time Kibonye, Vicheko, and I had picked up Mwaza and Busara from Kiteghe Primary School and Kilabu, the biology teacher from Moi High School in Rukanga, drove back to Bungule and finished breakfast, it was already over 90° F. At this
temperature the only snakes that we might have encountered would probably have been sand snakes, which have adapted to hunting lizards that are active even during the hottest part of the day. Kibonye led the workshop and was pleased that his colleagues were able to join us for a day of snake hunting. Since Kibonye was unemployed at the time, Peter hired Kibonye to be the field assistant for the Kasigau region of their study. Kibonye showed the other teachers how a drift fence catches herps while checking the three disturbed agricultural sites where Kibonye, Peter, and James had constructed the drift fences for Peter’s herpetofauna survey project. Kibonye also explained how to do a visual encounter survey.

After we checked the drift fences and identified the frogs, toads, and lizards that were trapped in the buckets, we went snake hunting. However, after two hours of searching we didn’t find any snakes, not even a sand snake. Vicheko and Kibonye both thought it was just too hot for snakes and that they were probably holed up underground. We did find a couple of snake sheddings that Kibonye identified. One was from a six-foot Boomslang. Kibonye pointed out the keeled scales, disproportionately large eye in relation to the head and short snout to the group. We also found a piece of shedding sticking out of a hole belonging to a large Black-necked Spitting Cobra. The broad head and large labial scales helped to identify this shedding, but the most significant clue that it belonged to a cobra was the extra amount of skin in the area where the hood is spread.

After the workshop, we went to the banda, and the teachers all had the opportunity to look at and handle snakes in our collection. For three of the teachers, this was the very first time they had touched a snake. Busara and Mwaza were very intrigued by the Brown
House Snake, with its bulging eyes and quiet disposition. They couldn’t believe that it was a harmless snake. But after Kibonye held the snake, showed them the photo in the book, *Reptiles of East Africa* (Spawls et al., 2004), and encouraged the teachers to read the text, they believed it was indeed a harmless snake.

Busara said, “I have a snake that looks just like that in my house and have been trying to kill for about six months.”

I asked Busara, “Have you seen any mice in your house?”

He answered, “No, I haven’t seen any for quite some time.”

I asked Kibonye, “Are there any snakes living in your house?”

Kibonye said, “No. No snakes in my house.”

I then asked Kibonye, “Do you have any rats or mice in your house?”

Kibonye responded with a resounding, “Yes, I have lots of rats and mice in my house.”

Busara inquired, “Do you think that snake is eating my mice?”

I replied, “No doubt. A Brown House Snake is a very good mouser, better than any cat. They can go after mice where cats can’t, like in a hole or through a crack in the wall. They can also climb into the roof. Pretty much, wherever a mouse can go a snake can follow.”

Kibonye remarked, “Even a small Brown House Snake can eat a full-grown mouse. I saw that very same snake you are holding eat one just a few days ago.”

I pointed to the lump still visible in the snake’s midsection.
Busara concluded, “Well, now that I can identify the snake, and I can see by holding it and the fact that it has no fangs, that it is harmless and easy to identify because of those bulging eyes and the two white strips that run along side of the head. I will just leave that snake be and let him continue eating the mice in my house.”

Mwaza also expressed a desire not to kill snakes anymore as long as he could identify them and knew for sure that they were harmless. And Kilabu, the biology teacher from the high school, said, “I’m going to include more information about snakes in my classes next term.”

Kibonye asked me if he could try catching the Red Spitting Cobra with the new snake tongs he had made. Kibonye had watched me handle the cobra several times before while helping clean the buckets and had practiced using the tongs with several nonvenomous species. I felt Kibonye was ready. Vicheko said he wanted to try it, too. I handed my tongs to Vicheko and made sure they were both wearing glasses to protect them from the snake in case it spat at them. I took out the snake and released it from the bucket into the open area beside the banda.

That evening, Kibonye wrote in his journal:

We had a very tense moment when a big Red Spitting Cobra was let loose for us to try to catch. I tried the new homemade tongs, which held up surprisingly well. I surprised myself with the courage that I had when handling it. Never in my life had I imagined that I could play with a snake as I did rather than strike to kill it instantly.
We saw many types of snakes, which were a feast to the eyes. All of us willingly handled the Wolf Snake, Sand Snake, Blind Snake, Kenyan Sand Boa, Green Speckled Snake, Brown House Snake, caecilian, and amphisbaenian. I took the opportunity to handle and release the African Rock Python to the wild.

We learned much about the snakes and ourselves. I heard different sentiments by my co-teachers. All of us felt that we could actually leave alone a nonvenomous or mildly venomous [snake] when positively identified. There was a positive attitude already developed.

I could tell from Kibonye’s journal and by talking to him during interviews and late-night conversations over dinner that his conceptions of snakes had broadened. He showed a real interest in learning the different species of snakes. His ability to identify similar species was impressive. He could tell a Sand Boa from a Puff Adder and a Python, even though all three have a superficial resemblance to one another. Before the start of this project, he said he would have killed all three indiscriminately, but now his powers of observation were much more sophisticated, so he would let a Sand Boa live and only kill a Python if it was near his house where it might eat his chicken or one of his brother’s goats. He was definitely uncomfortable thinking that a very large Python could eat one of his nieces or nephews or his own son, Ben. He added that he would not kill a Puff Adder only if it was spotted on the Tsavo National Park property, and stated that he would not spare a Puff Adder that was in his shamba or near the village. Kibonye could also distinguish the harmless Link-marked Sand Snake from the dangerous Savannah Vine Snake. He knew the difference between a Green Mamba, a Speckled Green Snake, and a
Boomslang, all of which are bright green. The only way to tell them apart is by head morphology, subtle differences in scalation and, in the case of the Boomslang, differently shaped pupils. Kibonye was now handling snakes comfortably. Vicheko was also handling snakes and professed to enjoy it. The other teachers also seemed to have a much more favorable perception toward snakes than when I spoke with them before the workshop at the Amy Nicholls’ Center and especially after our day handling snakes at the banda.

When I think back to Vicheko and Kibonye’s extremely negative ideas about snakes and how they would kill any snake they saw, and how they developed an appreciation for snakes’ ecological niches (especially in Bungule where the benefits of having harmless snakes to consume the large quantity of rodents is apparent) I marveled at the significant change.

Another good example depicting Kibonye’s new view of snakes happened one evening while we were having supper together at his house. The house was pretty dark, the only light coming from a kerosene lantern sitting in the middle of the table buzzing with insects. We were eating our dinner, and just as I was removing a moth from my delicious goat stew that Tumai had prepared, we heard a scampering in the rafters above our heads. Kibonye instinctively reached down next to his chair, grabbed his catapult (his term for a slingshot), and picking up a stone from the dirt floor, fired it into the ceiling. The stone ricocheted off the corrugated aluminum roof.

Kibonye exclaimed, “Damn, missed again! You know . . . if we had a couple of Brown House Snakes around here, we wouldn’t have so many damn rats.”
I said to Kibonye, “Would you have said that before I came?”

He looked at me for a moment, realizing the impact of what he had just said. “No, I would not have said anything close to that. I would have killed any snake that I saw no matter the number of rats we had living in our house eating up our food.”

Kibonye’s observation illustrates how conceptions about snakes can change and highlights the importance of conservation/environmental education for someone motivated to learn about snakes. Now that Kibonye was comfortable around snakes and could distinguish dangerous snakes from harmless and beneficial snakes, he now appreciates the positive role snakes can play within his community. Kibonye enjoyed sharing this information, and he and I were invited to all the schools around Kasigau to do snake talks. We took our snake collection to the nearby villages of Makwasinyi, Kiteghe, Bungule, Rukanga, and Jora. Kibonye had a great time sharing his newly acquired knowledge of snakes with his friends, colleagues, and former students.

During each visit, the teachers were intrigued by the fact that the snakes we brought were indeed harmless. Kibonye told the students and teachers how snakes eat rats and mice and the different ways to identify harmless snakes from dangerous snakes. At each school, he emphasized that if one is not absolutely positive that a snake is harmless, it should be left alone and that all snakes should be treated as if they are potentially dangerous. After watching Kibonye handle the harmless snakes for a short while, most of the teachers wanted to try holding the snakes, too. Our last school to visit was in Bungule. Not only did Vicheko and Kibonye handle snakes in front of the classrooms, but several other teachers handled the snakes as well.
Even Farahifu and Chanua, who during their first interview made it very plain that the idea of either of them touching a snake was ridiculous, held the snakes. I did not expect these two particular teachers to handle the snakes, even though they had watched Kibonye, Vicheko, and me handle snakes over the last couple of months. After speaking to the sixth and seventh graders with Vicheko and Kibonye, Farahifu along with Chanua took the Kenyan Sand Boa to their kindergarten classrooms and talked about the snake. Tumai and Bustani stood outside with both classes of students swarming around them. While holding the snake, they told the students that this particular species was a good one to have in the shamba because it ate lots of mice and that mice ate maize, finger millet, and other crops that they worked so hard to grow.

All the teachers thanked Kibonye for bringing the snakes to share with them and their students. The headmaster also thanked us and said he had learned a lot. He also had held a snake for the very first time.

During each school visit, while sharing information about snakes and handling the snakes, the teachers always mentioned that they enjoyed learning more about science. They felt that by learning more about snakes, their identification, ecology, and the different ways they captured prey and used different types of venoms, they were expanding their knowledge of the natural world. One teacher told me that even though he was scared of snakes, he did not want to be ignorant of snakes and this was the first time he had ever met anyone who knew anything about snakes. Kibonye echoed the sentiments of most of the teachers when he said, “I had to see for myself to believe that not all snakes are venomous.”
One of the most eye-opening things that the herpetologists did while working with Kibonye and Vicheko was to show them the insides of various snake’s mouths while pointing out different tooth arrangements and types of fangs. I also did this when doing snake talks with teachers around Kasigau. As soon as the teachers saw that snakes could have different fang configurations, like curved hinged fangs located in the front of the upper jaw, front straight fixed fangs or fangs located in the middle of the upper jaw, or no fangs at all, they immediately were transfixed by this revelation. According to the teachers, one could make up a story that some snakes were nonvenomous, but after seeing the differences in snakes’ dentition and witnessing my speedy recovery from nonvenomous and mildly venomous snake bites, it became apparent to them that there are indeed some snakes that are not dangerous.

The other thing that made a big impression on the teachers of Kasigau was how a small snake like the Brown House Snake or Kenyan Sand Boa could eat a large mouse or rat. After a teacher handled one of these placid species and then observed it eating a rat, she or he showed a remarkable change in his or her attitude toward these two species. Many teachers claimed that they would welcome a Brown House Snake into their homes, and that if they saw a Kenyan Sand Boa in their shambas, they would let it live. The teachers also expressed how once they knew the difference between the Kenyan Sand Boa and the Puff Adder; they could not understand how they got them confused in the first place. (Superficially, they do have a somewhat similar color pattern, but after seeing these two snakes side-by-side, they really don’t look anything alike nor do they act the same.)
Unexpected Presentation

I had finished all my exit interviews and collected the post surveys from the teachers who had attended the workshop. The time had come for me to bid farewell to Bungule and head back to the TDC for a few days before traveling to Nairobi and then back to the States. But before I bid my final farewell, Kibonye had one more unexpected presentation to make. Fortunately, Kibonye and I had not released all the snakes just yet.

As I was preparing to leave for TDC, Jimmy, the assistant manager of TDC, called me on the radio. He told me that Dr. Bruce Patterson had requested a snake talk and asked me if I could come to TDC to make a presentation for Dr. Patterson’s Earth Watch group. Dr. Patterson is a leading expert on lions and has been studying the lion population on the Rukinga and Taita Ranches that border Tsavo National Park for many years. He is the author of the book, *The Lions of Tsavo: Exploring the Legacy of Africa’s Notorious Man-Eaters*. Every year, for the past several years, Dr. Patterson has brought people from around the world to experience what it’s like to study the lions of Tsavo. He normally stays at the Taita Discovery Centre and/or the Galla Camp located near TDC. I asked Jimmy if he would allow Kibonye to lead the presentation, if Kibonye was agreeable. Jimmy assured me that that would be fine with him, and Kibonye could come and stay a night free of charge. After checking with Kibonye, who was very excited about the chance to visit TDC (Vicheko had already been to TDC during a teacher workshop that Kibonye was unable to attend and expressed what an interesting and educational experience it had been), I radioed Jimmy back and told him that Kibonye would indeed present.
During the lesson, Kibonye showed the Earth Watch group all the different snakes we had left in our collection, including a Black Mamba, a Red Spitting Cobra, Kenyan Sand Boa, Brown House Snake, Link-marked Sand Snake, Speckled Green Snake, and a few others. During his presentation, Kibonye explained the difference between venomous, non-venomous, and mildly venomous snakes, handled a couple of the harmless snake species, and helped me corral the Black Mamba onto the dirt airplane strip outside the TDC compound when we took it out of the bucket to show the group.

Summary

Kibonye and Vicheko had gone through an amazing transformation, and to a lesser extent, so had Farahifu, Chanua, Busara, Mwaza, and Kilabu. These teachers’ ideas about snakes were expanded from complete negativity toward all snakes to one of respect, interest, and an increased understanding of the ecological niche that snakes inhabit in the ecosystem. However, all the teachers expressed concern about having venomous snakes near their houses or in their shambas and were not shy about expressing their conviction that they would probably kill a Puff Adder or other dangerous snake if they found it near areas they frequented or where children played. Other Kasigau teachers’ conceptions of snakes were also changed as a result of the herpetofauna institute. Most showed an increased interest in snakes and exhibited an alternative perspective while teaching about snakes during subsequent science lessons observed by me in all six schools within the five villages surrounding Kasigau.

Several important factors contributed to the teachers’ use of an alternative scientific perspective towards snakes, including their newly acquired ability to
differentiate between harmless and dangerous snakes, their ability to ask different questions about snakes, and their experience with a modeled scientific perspective response to snakes nonexclusive of gender. This new view was also dependent on myriad other factors, such as teachers’ views of science, trust in the facilitator, and pride within the community.
CHAPTER V

CONCLUSIONS AND IMPLICATIONS

“In the end we will conserve only what we love.

We love only what we understand.

We will understand only what we are taught.”

—Baba Dioum—Senegalese conservationist

This chapter starts with a summary of the project followed by reflective thoughts of my assumptions and growth as a researcher. I then share the implications of the current study ending with the conclusions. I thought by including the section on my reflections would give the reader some additional background to help frame the implications section.

Summary

The narrative inquiry research detailed in this study was designed to explore rural Kenyan teachers’ conceptions of snakes. The study was descriptive in nature with data gathered through field notes of school, classroom, and field participation, participant journal entries, conversations, and personal stories told from memory. The research conveys the conceptions of snakes as told to me or witnessed by me through narratives of teachers, administrators, village elders, and other Kasigau community members as well as autobiographical accounts.

Two research questions guided the inquiry of this study:

1. How do Kasigau teachers conceptually relate to snakes?
2. How might their conceptual relationship with snakes change following exposure to scientific perspectives and experiences?

Initially, during conversations with the people of Kasigau, several conceptions of snakes kept surfacing—the most profound being that a ‘snake is a snake.’ This remark, which most everyone in Kasigau seemed to utter during conversations about snakes, encompassed many of the themes that characterized the conceptions of ‘snake’ for the people of Kasigau. According to the teachers I spoke with the saying ‘a snake is a snake’ simply means that all snakes are evil dangerous creatures not worthy of differentiation and deserving death. Among the conceptions that I heard most often during conversations with teachers was that snakes are enemies of humans. Tethered to this conception was the idea that snakes act with intention and purpose. Many stories told to me involved snakes doing things that would normally be associated with human attributes such as a snake caring for another injured snake or snakes attacking people because they hate humans. Other conceptions of snakes involved semi-immortal or supernatural abilities. Stories of snake resurrection through the delivery of medicinal leaves or resuscitation by another benevolent snake were common. Other stories included snakes springing through the air to attack a person or exploding into hundreds of babies unless the carcass was burned thoroughly.

Another important conception of the Wakasigau was how people’s relationships to snakes were well defined. For example, anyone who took an interest in snakes were somehow suspect and thought to be supernatural themselves. For the first few weeks while collecting snakes in Kasigau I was thought to possess juju or magic, also
synonymous with witchcraft. Locals associate anything that cannot be explained with juju. Even though the teachers denounced the existence of juju when I first met them, they later confided that they still believed juju exists and could be used by people with good or evil intentions.

In relation to the supernatural aspect associated with people who handle snakes are role and gender-appropriate responses to snakes. Within Kasigau it is acceptable for medicine men to kill snakes in order to concoct a paste for the treatment of snakebite, however, if a woman were to do this she would be accused of witchcraft and face possible expulsion from the village or worse. In addition, men are the ones who are supposed to kill snakes when they are found and if a woman finds a snake she is expected to locate a man to dispatch the serpent. However, if a snake attempts to enter a home or threatens a woman’s children, and a man is not around, women will defend their homes and protect their children fiercely. This is considered an acceptable practice. Over time, I learned of numerous stories about women who had killed snakes when there was no man close by to help. One particular example was Tumai who single-handedly frightened away a large Black Mamba from her house as it attempted to crawl into the bedroom window where her young son Ben was napping.

Understanding how the community of Kasigau conceived of snakes was essential if I was going to create meaningful experiences for teachers to engage with snakes. Their conceptions formed over many generations of living and interacting with snakes, often with deadly species, which led to the notion that all snakes were deadly. Thus, my interest in snake conservation and experience within environmental education drove my
enthusiasm to investigate whether teachers with such strong convictions about snakes could entertain conceptions based on a western scientific perspective.

I employed the expertise of three herpetologists from the National Museums of Kenya (NMK) in an effort to expose participants to a western scientific perspective that included snake identification, behavior, ecological functions and handling. A key finding of this approach was that with increased participation in these formal snake experiences, participants became more inclined to engage in behavior not defined by their traditional conceptions. Furthermore, I argue that teachers began to adopt an alternative scientific perspective in educational settings, specifically while teaching lessons about snakes or when studying snakes during workshop opportunities. To this end, Kibonye, the unemployed teacher who had spent the most time with me and the visiting herpetologists conducted snake talks at all of the schools throughout the five villages. These snake education presentations were well received with all of the teachers participating. This included learning more about snake identification, snake ecology and even handling nonvenomous snakes.

Reflections

Problematizing My Assumptions

Before engaging in the broader implications this research has for the science education community, I feel it is essential to address the profound impact this effort has had on me. I first entered the Kasigau community with preconceived notions about the people whom I had yet had the privilege of knowing well. I was not prepared for the trials and tribulations that those living in Kasigau face daily. The reality of just how different
my life was in comparison to those of Kasigau took on a new light as I came to understand the difficulties and joys of living in a community more closely attuned to the natural environment than my own.

I assumed the teachers, specifically Vicheko and Kibonye, would be more or less similar to teachers I knew from the United States. By this I mean teachers who generally spend the majority of time indoors teaching children. I realize now that this was an over simplification for the complexity facing Kasigau teachers. By stark contrast, I was to learn that nearly every teacher in Kasigau were also accomplished farmers who tilled their own fields by hand or plowed by livestock. In addition, I was also to learn that whilst I was very uncomfortable in the bush while snake hunting with teachers, constantly looking over my shoulder for an elephant or lion, the teachers were quite at ease. In my narrow view of teachers I had not conceived that both Vicheko and Kibonye (and I suspect, many of the other teachers whom I met) would be competent trackers and woodsman. They were able to read animal sign and understood the movements of large herbivores and carnivores in relation to place and time. They also knew which tree produced what type of timber and what plants were safe to eat. I was humbled by their knowledge of the environment and jealous of their comfort in the field. Their abilities were far superior to mine and I learned many tracking tips from them and uses of the various trees and how to identify the native edible plants and fruits.

Kibonye and Vicheko also shared with me that the greatest danger was not the elephants or lions but the poachers and those that felled trees for the production of illegal charcoal. They were ever mindful of the possibility of stumbling upon one of their
makeshift camps but carried themselves with self-assurance, as this was there home turf. They protected it and patrolled it regularly, reporting any snares or evidence of illegal tree-cutting activity to the Kenya Wildlife Service, that is, if the offenders did not leave voluntarily when confronted. The fact that this surprised me caused me to take a closer look at myself. I am now much less likely to judge a person based upon their occupation, class, or education as defined solely in western cultural terms. Furthermore, understanding people and how they view the world must be done in context of their cultural and economic realities. Through this experience, I have an evolving and growing sense of respect for other ways of thinking and knowing.

**Thoughts on My Growth as a Researcher**

As previously mentioned in Chapter 3, I began my dissertation research in a positivistic frame of mind. Throughout my investigation I struggled with my evolving understanding of my research endeavor. I had envisioned this study as a pre-post study of teachers’ attitudes toward snakes involving an educational intervention. However, as I came to know the teachers and other community members of Kasigau and after transcribing the conversations with the participants, I realized the over simplification of this line of inquiry for understanding these nuanced conceptions.

I soon came to appreciate the need to delve deeper into the conceptual meanings of ‘snake’ shared with me by the people of Kasigau due to the complexities of human action in relation to meaning making (Blumer, 1969; Ryle, 2000). Narrative inquiry (Clandinin & Connelly, 2000) was a powerful tool for analyzing the data collected. Through narrative inquiry I was able to realize the influence of stories on each other, that
is, the intersection of the storied lives of the participants and myself, and the co-creation of understanding that our intermingling of experiences entailed. Clandinin and Connelly used the term “wakefulness” to describe the responsibility of researchers to be “alert and aware of the contexts for our work” and to be ever mindful from the “point of view of the three-dimensional narrative inquiry space” when constructing field and research texts (p. 182). This wakefulness facilitated my ability to appreciate the unique empirical instances in which I was immersed. Wakefulness also impressed upon me the necessity of including the setting, and actions, thoughts and feelings of the participants over time through in-depth narratives to illustrate the conceptual themes, which immerged from the data.

Implications

Science Education in Cross-Cultural Contexts

Trust

One question that intrigued me was why the teachers of Kasigau, more specifically Kibonye and Vicheko, were willing to take part in a project that included one of the most feared groups of animals in the region. Reasons why these two teachers, along with the other teachers and community members of Kasigau who participated, chose to work with the visiting herpetologists and me are complex.

Kibonye and Vicheko, with whom I spent the majority of time, told me that trust in the facilitator was the one thing they felt most important for any learning to occur. In this respect the relationships that we created had a substantial effect on the learning environment (McDermott, 1977). Kibonye, Vicheko, and myself had built a trusting
relationship based on numerous experiences where we trusted in one another’s knowledge of the environment. For example, while looking for snakes in the bush I had to trust their skill at tracking elephants and the knowledge of what plants were safe to eat and they had to trust my knowledge of snakes. It was a mutual sharing of knowledge.

The relationships between the teachers and myself were similar to what Costa and Kallick (1993) referred to as “critical friends.” Critical friendships begin by building trust. As we coached the teachers through the trials and tribulations of snake identification, snake hunting and snake handling the teachers had to trust that what we told them was true. Conversely, I had to trust the teachers any time I stepped outside the relative safety of the village relying on their knowledge of the area and the potentially deadly charismatic megafauna that was always near. All of the people involved with the current study were in the midst of building a community of learners based on trust (Showers & Joyce, 1996). It would seem that the collaboration between school administrators, teachers, and visiting scientists fostered an environment of trust, which led to the ability of the teachers, both men and women, to develop trusting relationships. The relationships that were forged, in turn, allowed the teachers the willingness and the space to take risks. This was no easy task and required patience and understanding between all parties involved. The trusting relationships were built upon the foundation laid by prior visits of Kent State University faculty. For over five years, Kent State faculty have traveled to Kasigau. During these visits faculty members provided teacher workshops using constructivist teacher practices as well as student-centered instruction. In addition, the Kent State University Office of International Affairs in cooperation with
the Gerald H. Read Center for International and Intercultural Education assisted with economic development issues in Kasigau. Without the previous visits by KSU and the relationships that were already in place my entrance into the community would have been more difficult or perhaps, not even possible, considering the strong aversions and suspicions related to the current study’s subject matter.

Establishing a trusting relationship with both Kibonye and Vicheko was key in my ability to further my investigation. Without their friendships I suspect I would not have been invited to schools or even welcomed as a visitor because of my relationship with snakes. In order to do this one has to be respectful of local customs. For example, I always took *chai* when invited and never turned down an invitation to dine with community members. I also helped with tilling the fields and clearing brush around the Church. These acts of working together and sharing food cemented our friendships allowing us to get to know each other far beyond a researcher/participant relationship.

Clandinin and Connelly (2000) stressed the importance of negotiating relationships while in the field but I do not think I appreciated this until I returned home and had the chance to reflect on how fortunate I was that Kibonye and Vicheko were still in Bungule when I arrived in September of 2005. Snake catching and handling, especially in a region where several venomous species of snake are commonly found and all snakes were hated, is a serious business and required an additional level of trust. I do not think the trust factor can be overemphasized in relation to teachers’ and other community members’ willingness to participate in the current study. Therefore, I believe that it is especially
important to develop long-term relationships in order to build a level of trust for cross-cultural research endeavors.

For those science educators interested in doing a similar study I would recommend starting small. Develop relationships and cultivate them over time. Learn about the communities and culture before introducing them to the science concepts you find important and wish to share based on what you have learned.

*Local Support*

Once you’ve created these relationships identify a local ally. My collaboration with the National Museums of Kenya lent me a level of credibility that the teachers of Kasigau expressed as very important. This collaborative venture not only added credibility but also showed my respect for the countries level of expertise in an area where I was admittedly deficient. In the eyes of the Kasigau community having a Kenyan herpetologist lead the seminar was significant. They understood the difficulties that I had to overcome to organize such an endeavor.

As mentioned before, without Kibonye I would not have had access to community members nor would I have known where to go or who to contact to obtain permission from Subchiefs located in the various villages. His help and knowledge of the area was critical to the success of this research project. Finding a local liaison and fostering a trusting relationship with that person to my mind may be one of the most important factors in cross-cultural teacher professional development practice.

When working in cross-cultural settings science educators should remember that a local liaison could be invaluable when navigating cultural rules, which may prove to
make or break your plans. Also, a local liaison can give access to community locations and key people that you may not be aware of or understand the significance of without their guidance. A local liaison can also help to find participants and act as an interpreter for those participants who do not speak your language or are uncomfortable speaking to an outsider.

Respecting Local Knowledge and Customs

Researchers and those facilitating professional development while in the midst of a cross-cultural situation should be mindful of the importance of listening. During my time in Kasigau I listened to the community members ideas and honored those ideas. This respect for local knowledge is paramount to building a trusting relationship mentioned earlier. Often local knowledge is not valued and perceived as incomplete, or treated as misconceptions that need to be changed.

In my opinion, one must respect where people are and it is a researchers’ or professional development facilitators’ responsibility to take the time to first find out how different communities’ conceptions may differ from your own. This respect will help to build a bridge between the local perceptions and the ideas that one wishes to share or investigate. Providing experiences that acknowledge and respect personal cultural traditions while simultaneously presenting Western science perspectives can allow participants the opportunity for cultural border crossing (see Jegede & Aikenhead, 1999). To smooth the transition into scientific perspectives facilitators can think of themselves as “travel agent culture brokers[s]” (p. 15). I found this analogy to be appropriate in my experience in Kasigau. However, one must remember that the cultural ‘bridge’ goes both
ways. When working with adult learners in Kasigau I found my impetus to learn about the host culture facilitated the willingness of the participants to learn about what I had to share.

Woven into respect for local knowledge is respect for local customs and values. In my experience with the Wakasigau I found it important to accept local cultural traditions/practices without judgment, while simultaneously not validating cultural norms that were opposed to my own values. I think one should still remain honest to one’s own cultural practices yet maintain respect for the host culture - if not, one runs the risk of losing credibility. The people of Kasigau could sense if I was disingenuous, and I did my best not to mask my proclivities about life. This honesty during cross-cultural sharing was also a component of the trust factor mentioned before.

It would behoove science educators in cross-cultural settings to remember to first listen to the participants. Finding out where the participants are is the best starting point for reciprocal learning experiences to occur. Western science educators can be successful ambassadors of an alternative way of knowing only if we understand and respect the landscape in which we, as visitors, are immersed.

*Time*

Time preparing logistics, time in the field, time spent getting to know your participants, time learning the customs, the list goes on. At times one may question if there is enough time to accomplish the objectives of the project? In respect to cross-cultural teaching and learning time is a significant factor.
Temporality is a fluid concept dependent on the place. Many times I had appointments to meet at a specific time and ended up waiting for hours to get to meet certain individuals. This was sometimes due to travel difficulties and often my meetings were not the first priority of the participants. For instance, most families’ first chore is to obtain water for their day’s activities. This and other essential chores must be completed before coming to any workshop or meeting. Science educators must be flexible in terms of time and create multiple plans to complete their goals.

Pre-planning and discussing overall goals and objectives of your project with a local liaison can help to ameliorate some of the timing issues. A local person who is privy to the situation at hand can explain specific scenarios that an outsider may find hard to understand or may not be aware of. For example, during the present study I had a meeting scheduled with the headmaster of a school in the village of Jora at 4:00 pm. When Kibonye and I arrived at the school promptly at 4:00 pm he was nowhere to be found. This did not turn out to be a problem since Kibonye knew where he lived. We went to his house and found him busy collecting and sorting eggs. He apologized but explained that he needed to have the eggs ready for transportation to Voi within the hour because there was a matatu driver who had agreed to carry his eggs into town for sale. While we helped the headmaster collect and sort the eggs we discussed the Kenyan science curriculum.

Some advice: If you must wait, do not let your frustrations get the best of you. Take the extra time while waiting to get to know the immediate surroundings to understand the environment that you have chosen to work. Think of it as an opportunity
and not as an inconvenience. This was a lesson I learned during my first few weeks in Kasigau.

**Access to Materials**

In Kenya access to science materials are limited or nonexistent (Kinyanjui, 1993). For example, in Kasigau there was no electricity, nor running water or flushing bathroom facilities. In addition, supplies that some western teachers take for granted such as reference books, textbooks, glassware, or Bunsen burners were not available.

When traveling abroad I suggest bringing what you need and be prepared to be creative if you do not. For instance, since there were no straws, which I assumed would be available on my first trip to Kasigau, one teacher offered an empty see-through ballpoint pen so I could demonstrate capillary action of water through soil. I learned a valuable lesson that day. Teachers of Kasigau must be innovative on a daily basis to contend with limited or nonexistent science supplies (Ndirangu, Kathuri, & Mungai, 2003).

**Possible Dangers**

Within the current study there were obvious inherent dangers. I was constantly aware of the possibility that one of the teachers would mistakenly pick up a venomous snake or that a child would handle a dangerous snake and that someone might get bitten. I had sleepless nights worrying about this very thing. I did my best to espouse the dangers of snakes while simultaneously teaching the value of snake conservation. Fortunately when I shared my concerns the teachers assured me that the culture of fear and caution that the people of Kasigau had in relation to snakes would keep others from handling
snakes. That left my main concerns for the teachers who also made it plain that they would not take any chances handling snakes. Other equally dangerous possibilities lurk within well-meaning cross-cultural interactions.

Clandinin and Connelly (2000) discussed many concerns that researchers face such as ethics, ownership and relational responsibilities, and issues of fact and fiction. These same concerns are compounded in cross-cultural situations and some of which apply to teacher professional development. I suggest sharing your findings with your principle participants and listen closely to their feedback. One does not want to misrepresent the experiences shared during cross-cultural experiences if it can be avoided. As Clandinin and Connelly cautioned, “we need to be thoughtful of our research participants as our first audience and, indeed, our most important audience, for it is to them that we owe our care to compose a text that does not rupture life stories that sustain them” (p. 174). Or in the case of professional development, facilitators need to schedule time to get immediate feedback about how appropriate participants felt about the information that was shared and possible ways to improve reciprocal understanding.

Final Thoughts on Cross-Cultural Teaching

For science educators working in cross-cultural situations respecting indigenous knowledge may be the first step. Learning what they know and becoming aware of the ways in which people already have made sense of their world will help when designing educational experiences. Also, science educators must be open to learning about the setting they are in from the people who know it best. The interchange of knowledge will
enhance learning and develop a mutual respect, which will facilitate future opportunities for all.

Another concern that needs to be addressed would be access to teachers. In Kasigau, without a respected community elder to guide me through the various levels of permission I needed I would not have been allowed to work with the teachers at all. I first had to have the permission of the Chief and Subchiefs, which in turn, facilitated the getting the green light from the Headmaster at each school (Wazare & Ward, 2000). This is especially significant since the topic at hand was not considered relevant to the national curriculum (see Peacock, 1995). However, because I was able to navigate the hierarchy of the community with the assistant of a local liaison the visiting herpetologists were welcomed and my project was allowed to proceed. This is an important aspect of any cross-cultural enterprise and one that should not be taken lightly.

**Implications for Environmental Educators**

Environmental education is concerned about increasing ecological awareness and learning to make wise choices (Ho, 1998). Environmental educators need to be especially attuned to the nuances of the local situation. Many western mainstream environmental educators espouse the need for preserving ecosystems, protecting biodiversity and changing the fundamental way in which science is taught (see Bowers, 1997; Kellert, 1996; Orr, 2004; Wilson, 2002). However, in Kenya the politics, administrative pressures and environmental uncertainties that teachers face, like those in Kasigau, can limit teachers abilities to implement ideas that may seem very important to the visitor but irrelevant or unwise to the community. Two examples come to mind: deforestation and
limited hunting opportunities. Deforestation is a nationwide concern in Kenya but without electricity or access to propane or other such fuels the people of Kasigau rely on charcoal made from felling mature local indigenous trees for heating and cooking. Consequently, these native trees are becoming harder to find and some of the indigenous trees are currently identified as threatened species. Also, the people of Kasigau historically hunted game in the surrounding countryside but now nearly all the traditional game lands are off limits to hunting due to the establishment of the Tsavo National Parks East and West. Therefore, it understandable why it is difficult for people in such a harsh climate with limited resources to appreciate a western perspective that espouses the protection of the environment at the expense of their livelihood. This is one reason why Kenya is using a sustainable development model for the teaching of environmental education (Ho, 1998; Otieno, 2007). For the present, Kenyan environmental education should be related to practical needs of the community and connect with the local environment. This may also be sound advice for other places around the globe.

Those who wish to teach environmental education in Kenya must navigate the national curriculum, which stresses a multidisciplinary approach to teaching environmental education. Teachers in Kasigau stressed that there was not enough time to include environmental education when there was so much pressure to get their students to pass the national exam. This is similar to what many teachers here in the United States say about NCLB Act and what Ho (1998) reported about Kenyan teachers. And although many teachers in Kenya agree with those in the United States that environmental education should be student-centered and should include outdoor educational
opportunities most teachers use a teacher-centered approach (Ho, 1998). This type of knowledge-based teaching of environmental concepts does not lead to community action (Toili, 1996), which is essential to the effective implementation of environmental education.

**Implications for Conservation Educators**

Conservation education mirrors a framework similar to that of environmental education; however, conservation educators walk a thin line between educating and prescribing. This is why respect for local knowledge is imperative for conservation educators to be successful. Those who wish to share their message to a community must realize that the very community they want to assist may not want to hear what they have to say, let alone do what they suggest.

Working at a grass-roots level may be the most productive way to get people to listen, but listening to the community is the first thing conservation educators must do. The importance of the current study is not so much that teachers learned about snakes and were willing and able to interact with snakes using an alternative scientific perspective, but that I was able to get across a conservation message that at first was considered illogical by the community involving an often dangerous subject.

This has implications far beyond the hills of Kasigau. The process in this research could be carried out in classrooms with students of any age and any locale. For instance, science educators could first find out how students conceive of snakes. Then if there are students who are uncomfortable around snakes, allow those students to share their reasons of discomfort. After learning the reasons for their discomfort, educators can
develop strategies to ease their discomfort. Some strategies that can be used, which this study illustrates as effective are; modeling and mentoring coupled with the use of informational means in the form of books and articles.

Conclusions: Wakasigau Conceptions of Snakes: Influences, Alternatives and Action

As outlined in the summary the people of Kasigau viewed all snakes as evil dangerous creatures deserving death. In Chapter 4, I shared several convincing reasons as to why the people of Kasigau have maintained this conception of snakes. However, there were many teachers who were interested in learning about a different way of viewing snakes and were willing to invest time away from working in their shambas, attending church services and their families in order to experience an alternative scientific viewpoint.

The three main themes that manifested and were observed as a consequence of exposure to scientific perspectives were: (a) the ability to differentiate snakes (i.e., identify harmless from dangerous), (b) a willingness to ask different questions about snakes, and (c) an enactment of differing conceptions concerning snakes based on scientific perspectives. The use of an alternative scientific conception was apparent when seven of the teachers began to handle snakes. What people do is an embodiment of their conceptions (Ryle, 2000) and the meanings of things are derived through a process of interpretation formed within a specific social interaction (Blumer, 1969). Thus, the act of handling a snake spoke volumes as to the conceptual relation that the handler exhibited while holding a snake. Snake handling for the teachers of Kasigau meant many things to them. The act of holding a particular snake meant that they could now identify that snake,
were aware that the snake in their hands was not dangerous, nor did it harbor any animosity toward humans and that the snake constituted an important part of the ecosystem in which they lived.

A few of the key influences on the teachers’ conceptions of snakes were the modeling and mentoring by the visiting herpetologists and myself and independent reading of books I supplied. Two books in particular were *A Field Guide to the Reptiles of East Africa: Kenya, Tanzania, Uganda, Rwanda and Burundi* (Spawls et al., 2004) and *Their Blood Runs Cold: Adventures With Reptiles and Amphibians* (Gibbons, 1983). The first book was extremely helpful in learning to identify snakes as the teachers compared live specimens we collected together with the descriptions of snakes and photos found in the book. The second book was influential in that the author, Whit Gibbons, shares stories of how important snakes are from a herpetofauna conservationists’ perspective. In this book he recounts his lifelong interest of reptiles and amphibians and why, from an ecological standpoint, snakes deserve respect and protection.

These experiences enabled the teachers to differentiate snakes and prompted questions about snakes, particularly about those species which were common in the Kasigau region. Together these two abilities, that of identifying snakes and asking specific questions concerning specific snake species, enabled the enactment of differing conceptions concerning snakes based on scientific perspectives. The principle participants were the teachers who took the time to read the articles and books that I made available. The two main participants spent the most time with the herpetologists and reading the aforementioned references. These two teachers gained the most
knowledge about snakes and consequently were the most proficient at snake identification and snake handling.

As to the myriad of possible reasons why the two main participants were so engrossed with the project I can only conjecture. However, by self-reporting I can say that both teachers, as well as the other six key participants, told me that they were the core teachers within the five villages that never missed an opportunity to learn something new from visitors to their community. I would say that the inquisitive nature of these particular teachers coupled with their interest in education had much to do with their willingness to entertain an alternative scientific perspective concerning snakes. This study demonstrated those teachers’ experiences through modeling and mentoring had a significant influence on their conceptions of snakes.
APPENDICES
APPENDIX A

SCIENTIFIC (FAMILY, GENUS, SPECIES), KITAITA (WITH TRANSLATIONS), AND ENGLISH NAMES FOR SNAKE SPECIES

INDIGENOUS TO THE KASIGAU REGION
Scientific (Family, genus, species), Kitaita (with translations), and English names for snake species indigenous to the Kasigau region

Class: Reptilia, Order: Squamata, Suborder: Serpentes

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Kitaita name</th>
<th>English name</th>
<th>EDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family: Typhlopidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. <em>Typhlops lineolatus</em></td>
<td>Ngomu = moves forwards and backwards</td>
<td>Lineolate Blind Snake</td>
<td>Y</td>
</tr>
<tr>
<td>2. <em>Rhinotyphlops unitaeniatus</em></td>
<td>Ngomu = moves forwards and backwards</td>
<td>Yellow Striped Blind Snake</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Family: Leptotyphlopidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. <em>Leptotyphlops scutifrons</em></td>
<td>Ngomu = moves forwards and backwards</td>
<td>Peter’s Worm Snake</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Family: Boidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. <em>Eryx colubrinus</em></td>
<td>Kivuvu = serpentine movement</td>
<td>Kenya Sand Boa</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Family: Colubridae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. <em>Lycophidion capense</em></td>
<td></td>
<td>Cape Wolf Snake</td>
<td>Y</td>
</tr>
<tr>
<td>8. <em>Mehelya capensis</em></td>
<td></td>
<td>Cape File Snake</td>
<td>N</td>
</tr>
<tr>
<td>9. <em>Mehelya nyassae</em></td>
<td></td>
<td>Dwarf File Snake</td>
<td>N</td>
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<thead>
<tr>
<th>Scientific name</th>
<th>Kitaita name</th>
<th>English name</th>
<th>EDS</th>
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</thead>
<tbody>
<tr>
<td>10. <em>Coluber smithii</em></td>
<td>Nguluku = red</td>
<td>Smith’s Racer</td>
<td>Y</td>
</tr>
<tr>
<td>11. <em>Prosymna stuhlmanni</em></td>
<td></td>
<td>East African Shovel Snout</td>
<td>N</td>
</tr>
<tr>
<td>12. <em>Hemirhagerrhis kelleri</em></td>
<td>Zagho</td>
<td>Striped Bark Snake</td>
<td>Y</td>
</tr>
<tr>
<td>13. <em>Hemirhagerrhis nototaenia</em></td>
<td></td>
<td>Bark Snake</td>
<td>N</td>
</tr>
<tr>
<td>14. <em>Rhamphiophis rostratus</em>†</td>
<td>Choka Ya Nganga Nganga = snake that resembles a guinea fowl</td>
<td>Rufous Beaked Snake</td>
<td>Y</td>
</tr>
<tr>
<td>15. <em>Rhamphiophis rubropunctatus</em>†</td>
<td>Nguluku = red</td>
<td>Red-spotted Beaked Snake</td>
<td>N</td>
</tr>
<tr>
<td>16. <em>Psammophis sudanensis</em>†</td>
<td>Zagho</td>
<td>Northern Striped-bellied Snake</td>
<td>Y</td>
</tr>
<tr>
<td>17. <em>Psammophis mossambicus</em>†</td>
<td>Zagho</td>
<td>Olive Sand Snake</td>
<td>Y</td>
</tr>
<tr>
<td>18. <em>Psammophis punctulatus</em>†</td>
<td>ndezi ya ng’ombe = walks among cattle</td>
<td>Specked Sand Snake</td>
<td>Y</td>
</tr>
<tr>
<td>19. <em>Psammophis biseriatus</em>†</td>
<td>Kisikiria Maza = listens to stories</td>
<td>Linked-marked Sand Snake</td>
<td>Y</td>
</tr>
<tr>
<td>20. <em>Psammophis tansanicus</em>†</td>
<td>Kisikiria Maza = listens to stories</td>
<td>Tanganyika Sand Snake</td>
<td>N</td>
</tr>
<tr>
<td>21. <em>Atractaspis microlepidota</em>*</td>
<td></td>
<td>Small-scaled Burrowing Asp</td>
<td>Y</td>
</tr>
<tr>
<td>22. <em>Aparallactus jacksoni</em>†</td>
<td></td>
<td>Jackson’s Centipede-eater</td>
<td>N</td>
</tr>
<tr>
<td>23. <em>Aparallactus guentheri</em>†</td>
<td></td>
<td>Black Centipede-eater</td>
<td>N</td>
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<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Kitaita name</th>
<th>English name</th>
<th>EDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. <em>Aparallactus lunulatus</em> †</td>
<td></td>
<td>Plumbeous Centipede-eater</td>
<td>N</td>
</tr>
<tr>
<td>25. <em>Micrelaps boettgeri</em> †</td>
<td></td>
<td>Desert Black-headed Snake</td>
<td>Y</td>
</tr>
<tr>
<td>26. <em>Micrelaps bicoloratus</em> †</td>
<td>Zagho</td>
<td>Two-coloured Snake</td>
<td>N</td>
</tr>
<tr>
<td>27. <em>Meizodon semiornatus</em></td>
<td></td>
<td>Semi-ornate Snake</td>
<td>N</td>
</tr>
<tr>
<td>29. <em>Philothamnus punctatus</em></td>
<td>Ikumbo = green</td>
<td>Speckled Green-snake</td>
<td>Y</td>
</tr>
<tr>
<td>30. <em>Philothamnus semivariegatus</em></td>
<td>Ikumbo = green</td>
<td>Spotted Bush Snake</td>
<td>Y</td>
</tr>
<tr>
<td>31. <em>Dasypeltis medici</em></td>
<td>Nguluku = red (red phase only)</td>
<td>Rufous/East African Egg-eater</td>
<td>N</td>
</tr>
<tr>
<td>32. <em>Dasypeltis scabra</em></td>
<td></td>
<td>Common/Rhombic Egg-eater</td>
<td>N</td>
</tr>
<tr>
<td>33. <em>Crotaphopeltis hotamboeia</em></td>
<td></td>
<td>White-lipped Snake</td>
<td>N</td>
</tr>
<tr>
<td>34. <em>Telescopus semiannulatus</em> †</td>
<td>Nguluku = red (reddish or pink phases only)</td>
<td>Large-eyed Snake</td>
<td>N</td>
</tr>
<tr>
<td>35. <em>Dispholidus typus</em> *</td>
<td>Vunjarere (green/black “kivuensis” phase) Bafwe (black phase)</td>
<td>Boomslang</td>
<td>N</td>
</tr>
<tr>
<td>36. <em>Thelotornis capensis</em> *</td>
<td>Ifurudi</td>
<td>Savannah Vine Snake</td>
<td>Y</td>
</tr>
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</table>

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<thead>
<tr>
<th>Scientific name</th>
<th>Kitaita name</th>
<th>English name</th>
<th>EDS</th>
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</thead>
<tbody>
<tr>
<td>Family: Elapidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. Naja nigricollis*</td>
<td>Bafwe (black phase)</td>
<td>Black-necked Spitting Cobra</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Ilimanjighu = eats hyrax (brown phase)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Naja pallida*</td>
<td>Nguluku = red</td>
<td>Red Spitting Cobra</td>
<td>Y</td>
</tr>
<tr>
<td>39. Naja Haje*</td>
<td>Egyptian Cobra</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>40. Dendroaspis polylepis*</td>
<td>Ilimanjighu = eats hyrax</td>
<td>Black Mamba</td>
<td>Y</td>
</tr>
<tr>
<td>Family: Viperidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Causus rhombeatus*</td>
<td>Kili = (from English “kills”)</td>
<td>Rhombic Night Adder</td>
<td>N</td>
</tr>
<tr>
<td>41. Bitis arietans*</td>
<td>Kili = (from English “kills”)</td>
<td>Puff Adder</td>
<td>Y</td>
</tr>
</tbody>
</table>

The list presented is a synthesis from regional maps from Spawls et al. (2004) and the Taita Discovery Center’s unpublished Reptile Checklist assembled by E. Selempo (2002). EDS = Encountered During Study: Y = Yes / N = No *Venomous snakes. †Mildly venomous snakes.
APPENDIX B

ATTITUDES TOWARD SNAKES
ATTITUDES TOWARDS SNAKES

DIRECTIONS: Please read each adjective pair and place a check mark (✓) at a spot on the line which best indicates your feelings toward snakes. There are no right or wrong answers, so please be honest.

Snakes are:

<table>
<thead>
<tr>
<th>Good (Nzuri)</th>
<th>extremely</th>
<th>kind of</th>
<th>neither</th>
<th>kind of</th>
<th>extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>very</td>
<td>slightly</td>
<td>slightly</td>
<td></td>
<td>very</td>
</tr>
<tr>
<td>Bad (Mbaya)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Pleasant (Tazamikâ) | extremely | kind of | neither | kind of | extremely |
|                     | very      | slightly| slightly|         | very      |
| Unpleasant (Mbwadu) |           |         |         |         |           |

| Dirty (Chatu) | extremely | kind of | neither | kind of | extremely |
|              | very      | slightly| slightly|         | very      |
| Clean (Safi)  |           |         |         |         |           |

| Wonderful (Ibura) | extremely | kind of | neither | kind of | extremely |
|                   | very      | slightly| slightly|         | very      |
| Frightening (Kicho) |         |         |         |         |           |

| Disturbing (Makeruhi) | extremely | kind of | neither | kind of | extremely |
|                       | very      | slightly| slightly|         | very      |
| Interesting (Yenye kupandeza) |         |         |         |         |           |

| Safe (Salama) | extremely | kind of | neither | kind of | extremely |
|              | very      | slightly| slightly|         | very      |
| Dangerous (Hatari) |         |         |         |         |           |

(Survey adapted from Morpae and Gramann, 1999)
APPENDIX C
INTERVIEW QUESTIONS
Interview questions for David Wojnowski’s dissertation project

First interview:

1. Tell me what you think of snakes.
2. Have you ever had any experiences with snakes? If so, could you tell me about them?
3. What would you do if you met a snake on your path?
4. If you know a traditional story that includes a snake, please tell or write it down.

Second interview:

1. Tell me what you think of snakes?
2. Please share with me any experiences you have had with snakes, so far, during this project.
3. What would you do if you met a snake on your path?
3. Tell me about the herpetologists you have met.

Third interview:

1. Tell me what you think of snakes.
2. Please share with me any experiences you have had with snakes during this project.
3. What would you do if you met a snake on your path?
4. What are the influences, if any, that has formed your attitude toward snakes?
5. Please share any other thoughts you may have about snakes or the project in general.
APPENDIX D

SPECIFIC INFORMATION ABOUT ENCOUNTERS WITH SNAKES
Specific Information About Encounters With Snakes

<table>
<thead>
<tr>
<th>Name of Snake</th>
<th>Dangerous/Harmless/Mildly Venomous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitaita</td>
<td></td>
</tr>
<tr>
<td>Kiswahili</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

Habitat: (please provide information for each time you have seen it).
- House
- shamba/boma
- on rocks
- in the grass in a tree/bush
- in a river
- other (describe)

When did you see it (them): Year(s): 2005 (recently) 2001-2004 before 2001

Season(s): dry season short rains long rains

Time of day: morning afternoon night

Do you know what the snake eats?

(This portion of survey adapted from Thomson, 2003)
Consent Form: Project SAVE (Saving Africa’s Vital Ecosystems)

I am enrolled in my dissertation phase of my doctoral program at Kent State University. I am conducting a research project on how field research experiences may contribute to teachers’ understanding of science content / biodiversity conservation, and the possible effects this may have on teaching practices and curriculum development. I would like you to take part in this project. If you decide to do this, you will be asked to participate in an amphibian and reptile study of the Taita Hills/Mt. Kasigau area. You will also be asked to contribute to the development of a conservation educational activity guide in cooperation with the Taita Discovery Centre. You will also be asked to participate in three interviews each lasting about one hour. You will also be asked to allow your class to be observed by me once a month for one lesson each visit (one to two hours depending on length of the lesson) during the 2005-2006 academic year. I will also be asking you questions during all aspects of the project and hope that you will cooperate by answering honestly and candidly about your experiences.

During the three formal interviews our conversation will be audiotaped and transcriptions will be made from the audiotapes. During informal questioning and field experiences, your comments may be documented by field notes, audiotaped and or videotaped. The tapes will be transcribed and stored. Only the researcher will have access to the tapes. The findings of this study will be used for my dissertation and may be presented at national education conferences. Your participation will remain confidential unless you sign an additional waiver allowing me to use portions of videotape or photographs at conferences to illustrate field research activities. Your confidentiality will be maintained by the use of pseudonyms.

Taking part in this project is entirely up to you, and no one will hold it against you if you decide not to do it. If you take part, you may stop at any time.

If you want to know more about this research project, please call me at 330-672-2580. The project has been approved by Kent State University. You may also contact my advisor Dr. Wendy Sherman at: 330-672-0614 or wsherma1@kent.edu. If you have questions about Kent State University's rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.2704).

Sincerely,

David Wojnowski
Doctoral Student, Kent State University
CONSENT STATEMENT:

I agree to take part in this project. I know what I will have to do and that I can stop at any time.

_____________________________  ____________________
Signature                        Date

I understand that David Wojnowski will keep the tapes generated as part of this project.

_____________________________  ____________________
Signature                        Date

*English is the official language of Kenya, and Patrick Washira, KSU Doctoral Student and Kenyan National, has reviewed this form and found it to be satisfactory for use with the teachers of the Kasigau area of Kenya.
REFERENCES


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