

The Tonkolili Chimpanzee Project in Sierra Leone: Implications for Chimpanzee Conservation Strategies in Anthropogenic Landscapes

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Abstract: In 2012, we observed a small group of chimpanzees (*Pan troglodytes verus*) living in close proximity to two villages in Central Sierra Leone. At the time of our visit, the population of chimpanzees had been heavily hunted. As we studied the group, we ascertained from the villages that the main reason for the active hunting was resource competition. The chimpanzees were raiding oil palm crops, which were the sole source of economy for the village at that time. The palms had replaced bee keeping and livestock management, neither of which presented a source of competition with the chimpanzees, and both of which had been destroyed during the Sierra Leone Civil War. In order to protect this population of chimpanzees, we established a partnership between the two villages, a local NGO, and ourselves in order to enact a moratorium on chimpanzee killing in the area. In return, we would provide the funds to restore pre-war economic practices. This partnership has led to further initiatives and the establishment of the Tonkolili Chimpanzee Project. The project has implications for the conservation strategies for chimpanzees, a species universally facing threats from anthropogenic effects.

Key words: chimpanzee, anthropogenic landscapes, conservation, Sierra Leone, community-based conservation.

INTRODUCTION

Wild chimpanzees (*Pan troglodytes verus*) in Sierra Leone face unique conservation challenges, as a greater proportion of the population lives outside of protected areas than inside (Brncic *et al.* 2010). As a result, the majority of chimpanzees in the region live alongside human populations. Understanding the ecology and conflicts of chimpanzees at the human-primate interface is therefore critical to chimpanzee conservation in Sierra Leone. We have developed the Tonkolili Chimpanzee Project to study such a situation involving a small population of chimpanzees (estimated through a standing crop nest count at 14 individuals) living within two

human villages (Figure 1). It is the goal of this project and the aim of this paper to explore this particular microcosm of an ecological predicament facing chimpanzees, as well as to offer possible solutions through current initiatives.

As interactions with humans increase throughout chimpanzee habitats, understanding the ecology of the human-primate interface becomes crucial to the survival of chimpanzees. Chimpanzees in Sierra Leone and elsewhere in West Africa face an ever-increasing reality where forest fragmentation is expanding, along with the frequency and severity of human-chimpanzee interactions. Often, these



Figure 1. A chimpanzee at the Tonkolili Site. Photograph courtesy Tonkolili Chimpanzee Project (camera trap).

interactions lead to a situation where chimpanzees are killed in anthropogenic landscapes, stemming predominantly from either real or perceived resource competition in a heavily fragmented landscape.

In the years prior to the Sierra Leone civil war, surveys showed chimpanzees to be primarily concentrated in the protected and semi-protected areas of Sierra Leone: specifically Outamba-Kilimi National Park (Teleki 1989). Chimpanzees were also shown to be less densely scattered throughout the country in non-protected areas. Counts were estimated at 2,000 (Hanson-Alp *et al.* 2003).

Deforestation increased exponentially during and after the civil war (Lindsell *et al.*, 2011). Between the years 1990 and 2010, Sierra Leone lost an average of 0.63% of its forest annually, totaling 12.6% of its forests during the twenty year period. Currently, 38.1% of Sierra Leone is forested. However, only 4.1% of that is classified as primary forest (FAO 2010).

Despite massive deforestation, Sierra Leone still hosts a large population of chimpanzees. In 2010, chimpanzee numbers in Sierra Leone were estimated

at 5500; double that of pre-war estimates (Brncic *et al.* 2010). The same survey, however, pointed to the fact that over half of the nation's chimpanzees were now living outside protected areas.

Because this relatively large population of chimpanzees must survive in dwindling and increasingly fragmented forest, the rates of interactions with humans have increased. Fluctuations in availability of preferred fruits lead primates to routinely crop raid local resources (Salafsky 1993, Hill 1997, Saj *et al.* 2001, Humle 2003, Reynolds 2005, Hockings *et al.* 2007). In 2011, a Population and Habitat Viability Assessment (PHVA) for chimpanzees in Sierra Leone concluded that the fragmentation of local forests has indeed led to increased resource competition between humans and chimpanzees. This competition has likely compelled chimpanzees to crop raid, due to lack of naturally occurring resources (Carlsen 2012).

In addition, often despite evidence to the contrary, chimpanzees may be blamed for all crop damage. A review by Hockings and McLennan (2012) examined crop raiding tendencies and the variation, similarity,

and abundance of species to species consumption. This review qualitatively measured the pattern of crop selection, establishing high- and low-conflict crops, and suggested that some crop damage may be wrongly attributed to chimpanzees. Other studies have corroborated these findings. In the Nimba Mountains, Guinea, it was found that although the chimpanzees were widely perceived as destroying oil palm crops, they were, in fact, not consuming them at all (Humle & Matsuzawa 2004).

These human-chimpanzee interactions highlight the importance of an ethnoprimateological approach to understanding primates living at the human/primate interface. They also illustrate the importance of acknowledging and changing negative perceptions by local communities. In recent years, this integrative, ethnoprimateological approach has been used to understand the economic and sociological realities for human communities of primate conservation, and has helped shape land management policies in nonhuman primate habitats (Estrada 2013). These studies have also provided guidelines for the prevention of human-primate conflict (Hockings & Humle 2009). Perhaps most importantly, ethnoprimateology acknowledges the views of the local communities, who view chimpanzees as threats to their safety and livelihood (Fuentes 2012; McLennan & Hill 2012). In this way, conservationists can adopt a more realistic approach when attempting to incorporate local communities as partners in conservation.

As forest fragmentation continues to expand at an exponential rate, human encounters will continue to increase. Understanding human-primate conflicts, and developing an integrative approach to researching future conflicts, remains a realistic hope for the conservation of chimpanzees in the Anthropocene. It is from this framework that the Tonkolili Chimpanzee Project proceeds.

The Tonkolili Chimpanzee Project

In 2012, we observed previously unreported chimpanzees in the southern Tonkolili District of Sierra Leone (Halloran *et al.* 2013). The habitat consisted of forest fragments and open savannah along the Pampana River. The chimpanzees shared this area with villagers and were frequently observed by the community. The two villages, Marocki and Manoni, reported repeated instances of crop raiding by the chimpanzees; in particular, they voiced concern about the destruction of their oil palm crops (*Elaeis guineensis*) due to chimpanzees feeding on the petiole and the heart of the palms. This

perception of intense resource competition resulted in the chimpanzees being actively hunted.

During our initial two-week stay at the site, we gathered information from community members regarding their interaction with the chimpanzees; we found an almost universally negative perception toward them at the site. As in other published community surveys (Hockings *et al.* 2010; McLennan & Hill 2012), chimpanzees were feared, and stories were recounted of recent violent attacks on several members of the human community. Chimpanzees were also described as “thieves” who stole the villages’ crops, which included palms, mangoes, pineapples, cassava and bananas. It was from these initial community interviews that we learned that the primary crop being raided by chimpanzees was oil palm. It is important to note that the local people made distinctions between chimpanzees and the other primates in the forest, thereby ensuring proper identification of the species.

Since the Sierra Leone civil war (1991-2002), both Marocki and Manoni have relied on cultivating palm crops as their main source of economy. Prior to the war, the villages had engaged in honey production and livestock management as their chief source of income. Neither of these practices have been reported to present any competition with the chimpanzees at this site. It should be noted, however, that there have been reports of chimpanzees taking honey and livestock at sites in East Africa (McLennan & Hill 2012, Reynolds 2005). However, during the war, bee-keeping boxes were destroyed and all of the livestock was killed. Without the means to rebuild pre-war economic practices, the villagers report that they have had to obtain loans to purchase palm seeds from lenders in the nearby town of Mile 91.

At the conclusion of this initial visit, we worked with our partners at the Conservation Society of Sierra Leone to hold a meeting with representatives from Marocki, Manoni, and the two chiefdoms controlling the land that the chimpanzees habitually utilize. During this meeting, we expressed our intent to return to the site with funds to rebuild pre-war economic practices, provided a moratorium on chimpanzee hunting was observed. All parties agreed to the arrangement, and the Conservation Society of Sierra Leone arranged to monitor the site to ensure that human-brokered chimpanzee deaths had ceased.

The Tonkolili Site

The chimpanzees at the Tonkolili Site live in a seven km² riverine forest fragment located on the

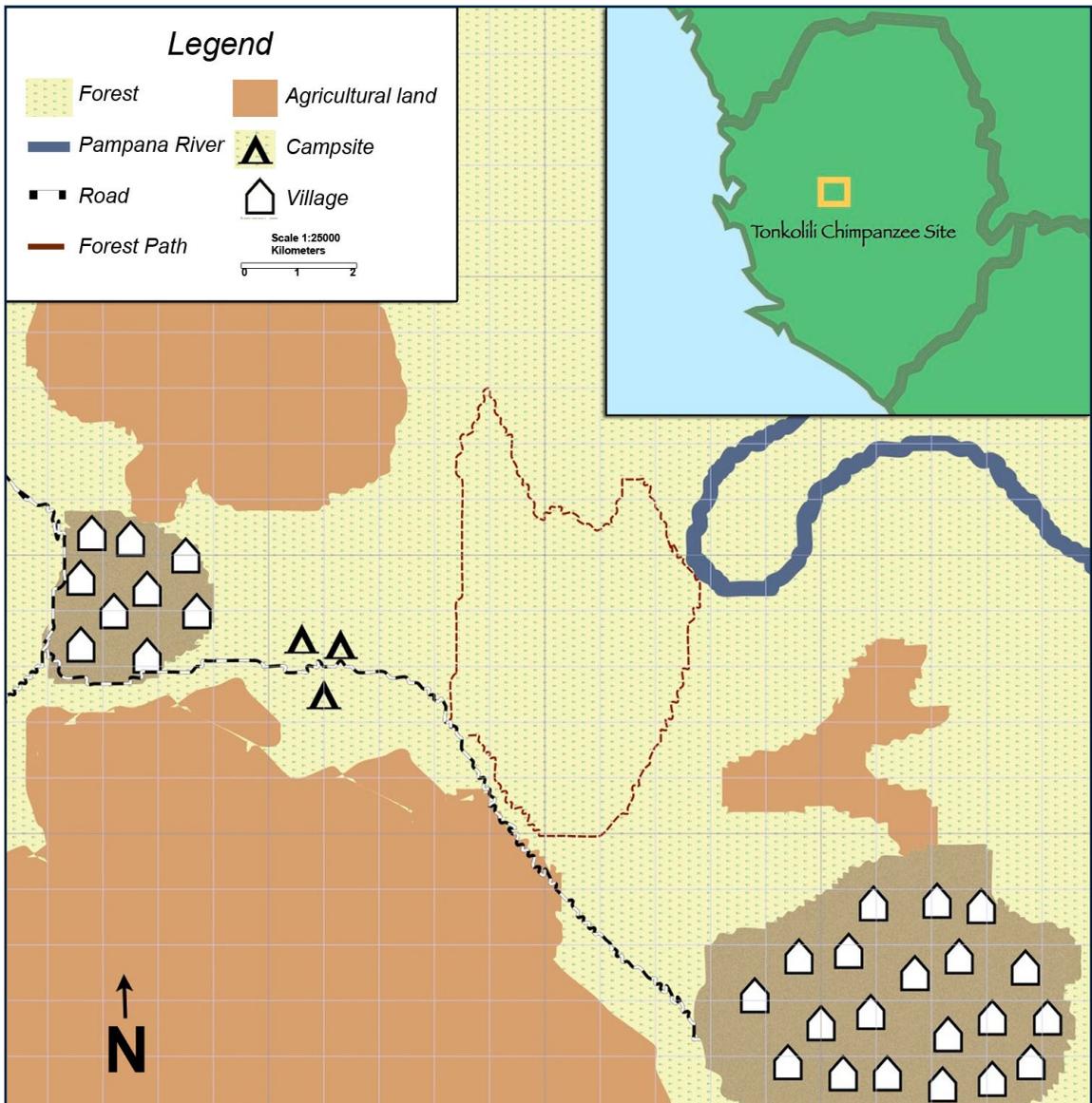


Figure 2. Map of the Tonkolili Site.

banks of the Pampana River (see Figure 2). Here, the Pampana is wide and impassible during the rainy season, though the villagers report that chimpanzees occasionally cross the river during the dry season. On the opposite end of the Pampana, the forest fragment is bordered by open savanna and cultivated land containing oil palms, cassava and ground nuts. Marocki and Manoni are located within the site and flank the southern edges of the forest. A research campsite, established in the summer of 2013, is located between the two villages. It also borders the southern edge of the forest.

Within their core area, the chimpanzees have been observed consuming black velvet tamarind (*Dialium indium*), rubber tree fruit (*Funtumia*

sp), and tamarind (*Tamarindus indica*). In the agricultural areas, the chimpanzees reportedly consume oil palm (both fruits and petiole), as well as the non-native mango (*Mangifera indica*) and pineapple (*Ananas comosus*).

The interior of the forest is used by Marocki and Manoni for game hunting during the dry season and — because the Pampana River floods much of the forest floor for several months a year — fish trapping during the rainy season. Despite these activities, humans rarely use the forest interior. However, there was an existing rudimentary trail system within the forest. This trail system, created prior to our arrival, was recently marked by researchers as part of the Tonkolili Chimpanzee Project.

Human-Chimpanzee Interactions at the Site

After our initial visit, the Conservation Society of Sierra Leone conducted an informal community survey in order to further understand the history of human-chimpanzee interactions within the two villages. According to this survey, neither village actively hunted chimpanzees prior to the Sierra Leone civil war. At the time, the economy of both villages was dependent on the sale of honey and livestock. At the onset of the war most village residents fled, leaving the area occupied by soldiers. We learned from these informal surveys that the bee-keeping boxes had been destroyed and the livestock had been killed by soldiers, which left the village with no economic means.

In the years since the war, both Marocki and Manoni have relied heavily on the cultivation of oil palms. The villages report that, in order to obtain palm seeds, they receive loans from brokers in the nearby town of Mile 91. Once the trees are fully-grown, they are harvested for oil and kernels. These goods are then sold. The income initially goes to repaying to loans, which leaves the villages with what little remains afterward.

As the palms grow, the villagers report that chimpanzees often destroy the trees by consuming petiole and heart of palm. Thus, there is a perceived struggle to keep chimpanzees from destroying these resources. Community members indicate that they attempt to keep the primates from destroying the palms by guarding the crops, but are often unsuccessful; the chimpanzees reportedly raid palms that are out of sight of the guards. The result is that the village yields very little from the trees, which leaves the people unable to repay their loans. This, of course, means that they are left with virtually no economic means to survive. The situation propagates a deeply negative perception of chimpanzees, which leads to their being hunted.

During informal interviews with community members, we learned that neither Marocki nor Manoni typically consume chimpanzee meat. Instead, it is sold in the town of Mile 91, along with other game meat or crops. During these conversations, we also learned that juvenile chimpanzees had occasionally been captured. In some instances, members of the community had attempted to care for them, but were unsuccessful. In other cases, orphaned infants were also sold for profit.

Initiatives

There are obvious concerns at this site with a history of human-chimpanzee conflicts and

chimpanzee hunting. These factors force us to proceed with extreme caution in a situation where chimpanzee research could lead to habituation and put the chimpanzees at exponentially greater risk (Gruen *et al.* 2013). We are also mindful of the risk to human community members to habituated chimpanzees (McLennan & Hill 2010). Therefore, the paramount goals of the Tonkolili Chimpanzee Project are to eradicate chimpanzee hunting and minimize human-chimpanzee conflicts. In addition, the project will monitor the status of these goals and work alongside the community as partners.

The nucleus of the Tonkolili Chimpanzee Project was formed when we proposed a partnership between primate researchers (Halloran and Cloutier), the Conservation Society of Sierra Leone, and the Marocki and Manoni villages. In turn, we sought approval of this partnership from the two chiefdoms governing the respective villages.

The Tonkolili Chimpanzee Project partnership currently rests on an oral agreement between all parties that the killing of chimpanzees shall cease and that the forest is to be used for primate research. In return, we obtained funds to begin rebuilding pre-war economic practices. It is our intent that restoring these economic practices will reduce the reliance on palm crops and, likewise, will reduce resource competition with chimpanzees.

Upon our initial return from Sierra Leone, we also contacted a domestic nonprofit organization, The Maderas Rainforest Conservancy [MRC]. MRC routinely offers students the opportunity to attend primate field courses in Nicaragua and Costa Rica. We proposed to offer a field course for the conservancy at the Tonkolili site in Sierra Leone. The conservancy agreed to facilitate an initial six-student field course in chimpanzee ecology. The funds generated from the tuition enabled us to build livestock pens and holding areas, and purchase goats for both villages.

The pilot course was held during the summer of 2013, when advanced primatology students from the United States worked on several research objectives at the site. These included camera trapping, dietary surveys, fecal sample collection, and community interviews. Students performed no direct observational studies of the chimpanzees. We were also able to hire several of the community members to serve as guides, cooks, and watchmen.

In addition, the Environmental Studies program at Lynn University in the United States contributed to conservation initiatives at the Tonkolili Chimpanzee Project. Students spent the spring semester of 2013 manufacturing bee-keeping boxes (Figure 3). This



Figure 3. Newly constructed bee-keeping box at the Tonkolili Site. Photograph by P. Bai Sesay.

was done as part of a course in “Science Serving Humanity” and provided a hands-on educational opportunity for the students. Likewise, Lynn University donated all manufacturing supplies and the shipment costs to the project. Currently, hive boxes, starter wax, protective outfits, supplementary supplies and 10 bee-keeping boxes are in Marocki and Manoni. For each village, the boxes are expected to yield an average of 150 kg of honey per semiannual harvest.

Since our most recent departure in 2013, the Tonkolili Chimpanzee Project has included additional members of the Marocki and Manoni communities. We have hired a former hunter from Manoni to act as a forest patrol. We have enlisted the aid of the Marocki village chief to monitor camera traps set up within the trail system. When we are not present at the site, we are in regular telephone contact with the villages. In addition, The Conservation Society of Sierra Leone regularly visits the site to monitor progress.

Future Initiatives

As the Tonkolili Chimpanzee Project progresses, we intend to continue to rebuild sustainable

agricultural/economic practices within the two communities. Livestock herds will be restored to their pre-war level and crops that are unfavored by chimpanzees will be cultivated in existing fields; for example, cassava has been shown to be a ‘low’ conflict crop (Hockings & McLennan 2012) and is a sellable crop for the villages. We are currently assessing additional community needs, such as: wells for clean water, clothing, and housing supplies.

Also, we intend to fund opportunistic visits to the village by healthcare and education professionals. Halloran and Cloutier will conduct educational programs for the village regarding chimpanzee behavior, ecology, and conservation. We will also develop programs specifically for children. In this way, we ensure that the presence of primate researchers at the site carries a continued benefit to the local community.

DISCUSSION

As our closest living relatives, chimpanzees occupy a unique region of the anthropocene. The human-chimpanzee interface occurs when humans and chimpanzees occupy the same land

and compete for the same resources (Hockings *et al.* 2009). The Tonkolili site offers an extreme example of this reality, where wild chimpanzees keenly feel the impact of human presence across multiple facets of their ecology. Successful conservation initiatives must take the human-primate interface into account (Hockings & Humle 2009; Fuentes 2012; McLennan & Hill 2012).

A recent Population and Habitat Viability Assessment sponsored by the IUCN in 2011 attempted to assess the issues affecting chimpanzees in Sierra Leone and establish viable and effective conservation strategies for the nation's chimpanzee population. A key tenant of the workshop pointed to small-scale partnerships with local communities as potential solutions to reduce resource competition (Carlsen 2012). It is with the goals of this workshop in mind that the Tonkolili Chimpanzee Project operates.

In order for any initiative to survive, it is crucial that the conservation projects keep the needs of the local human populations as the foundation from which the initiative proceeds. In this, conservation initiatives may benefit both chimpanzee and human populations, and ensure local participation and resolve for the initiative. Thus, conservation is not achieved at the expense of community needs, but rather enhances the well-being of the human population while preserving the targeted fauna.

Understanding the behavior and ecology of chimpanzees at the human-primate interface is critical to understanding the methods by which chimpanzees adapt to human presence (Hockings & McLennan 2012). This understanding will enable us to create workable conservation strategies in an era where the human impact on wild chimpanzees is exponentially increasing. We believe that small, targeted community-based initiatives, such as the Tonkolili Chimpanzee Project, are crucial additions to far-reaching chimpanzee conservation strategies. These projects can work in tandem with larger strategies, such as protected game reserves (Oates 2005), conservation education programs (Karimu 2006), and regular population surveys (Kühl *et al.* 2007).

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