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COMMUNITY-CENTERED SUSTAINABLE CONSERVATION AND ECOTOURISM
PLANNING IN THE BOSSOU FOREST RESERVE, GUINEA, WEST AFRICA

By

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Professional Paper

presented in partial fulfillment of the requirements
for the degree of

Master of Science
in Resource Conservation, International Conservation and Development

The University of Montana
Missoula, MT

May 2019

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COMMUNITY-CENTERED SUSTAINABLE CONSERVATION AND ECOTOURISM
PLANNING IN BOSSOU FOREST RESERVE, GUINEA, WEST AFRICA

Chairperson: Dr. Keith Bosak

Ecotourism management has evolved over the years towards responsible conservation of the natural environment, sustaining the well-being of local people, enriching personal experiences and increasing environmental awareness. The development of a forest reserve is characteristic of the management–visitor–host community interface and the attendant competing interests in the face of new challenges, ideas and theories. In particular, host community participation in the conservation of the forest space tends to breakdown under weak ecotourism management, partly evident by the imbalanced exploitation of ecosystem services resulting in wildlife and society's inability to cope effectively with the changes (Walker et al., 2016).

The Bossou Forest Reserve in Guinea, West Africa, has deteriorated considerably due to the fragmentation of the reserve and the inexorable decline in chimpanzee populations from about twenty-seven in the 1970s to seven in present times. The situation is largely attributable to the fractured relationship between management of the reserve and the host communities and the inadequacies of established and workable socio-ecological support systems, reflected in the low level of community participation in the Bossou Forest Reserve planning.

Against this background, the paper explores a community-centered and participatory approach towards sustainable conservation and ecotourism planning of the Bossou Forest Reserve, using the Limits of Acceptable Change (LAC) framework. The paper provides base knowledge for developing a robust ecosystem management plan capable of coping with the changing internal and external stressors.

Keywords: Ecotourism, Conservation, Chimpanzees, Limits of Acceptable Change (LAC) framework, Participatory Mapping, Nimba Biosphere Reserve, Bossou, Guinea

ACKNOWLEDGEMENTS

I am pleased to acknowledge all identifiable individuals and organizations that have been of support to me towards developing the professional paper and the undertaking the broader academic program. I am grateful for the academic supervision and guidance of my Academic Advisor, Dr. Keith Bosak. I appreciate your support towards the academic project, the field supervision, and the writing process. Similarly, I am grateful to the other Committee members: Dr. Jennifer Thomsen and Dr. Sarah J. Halvorson for your continued inputs and guidance throughout the project process.

I acknowledge the contribution of the United States Forest Service, International Programs Office for funding and facilitating my enrollment in the University of Montana's W. A. Franke College of Forestry & Conservation (FCFC). I value your commitment to the career development of your personnel. Several other individuals supported the fieldwork and other related exercises. I am thankful to Sophie DeMartine, a fellow graduate student and project colleague at the University of Montana and Coordinator, USFS International Seminar on Protected Area Management. Sophie, your contributions to the field activities, particularly, the concept mapping exercise, is indeed appreciated. Similar thanks go to UM-Geography undergraduate intern, Sydney Qualls and FCFC Lecturer Kevin McManigal for their technical support towards the fieldwork and particularly the community participatory resource maps development process. The unwavering cooperation of the Bossou Environmental Research Institute (IREB) and AUDER, the local implementing partners of the US Forest Service in Guinea, was commendable. Dr. Ali Gaspard Soumah, the Director of IREB has been of immense support in the fieldwork – his involvement in the community workshops, including his role as host, is appreciated. I am also thankful to Al Hassane Lavillé Koivogui of IREB for his support during the fieldwork. I acknowledge the efforts of Gamy Kelvin Moriba, the Administration and Finance Manager of AUDER, for assisting with the coordination of the field trips and logistics. I am also thankful to Joseph Beavogui and Vassy Haba, both of AUDER for their facilitation, community mobilization, and management of all community activities. Other personnel of AUDER provided critical support to the Project Team during the fieldwork, especially Kekoura Beavogui, the team driver during the field exercises. I am immensely grateful to Pascal Goumi (of Bossou community) and Anthony Gbouomy (of Serengbara community) for assisting with language translation during the community workshops. I acknowledge the extra-field activities of the IREB Hostels janitor, Dagouka Samy who assisted the resident members of the Project Team with water and cleaning services. Similarly, Naby Soumah, the IREB driver turned cook, supported the Project Team with tasty meals and ancillary services.

In conclusion, I acknowledge the encouragement given to me by my USFS-IP colleagues, especially Matthew Steil, who occasionally checked in to see how we were faring and provided some valuable ideas and inputs. This was truly encouraging and much appreciated. By extension, I also thank all USFS-IP and partner staff who contributed in diverse ways to help me come this far.

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CHAPTER 1: INTRODUCTION

1.1 Background

In 2002, the International Union for Conservation of Nature (IUCN) recognized the Nimba Mountains as one of six top priority sites for chimpanzee conservation in West Africa. The area extends across three national borders (Guinea, Côte d'Ivoire and Liberia) and comprises surrounding forest areas, including Bossou and Déré in Guinea, and Tiapleu in Côte d'Ivoire. The area, including the Bossou and Nimba Mountains, is noted for the distribution of the common chimpanzees (*Pan troglodytes*), which extends across equatorial Africa. The hills of Bossou constitute a core area of the Nimba Mountains, a UNESCO World Heritage Site also listed as Biosphere Reserve (MAB/UNESCO Program). The Biosphere Reserve of the Nimba Mountains, comprising Bossou, the Nimba Mountains and Déré Forest, is known for harboring many endemic species, notably the *Pan troglodytes* species of chimpanzees. The broader Nimba area holds a wide range of habitats, with its numerous niches provide shelters to more than 317 vertebrate species, 107 estimated to be mammals and to more than 2,500 invertebrate species with a strong endemism level (whc.unesco.org, 2019). In 2003, global chimpanzee population size was estimated to range from 172,700 to 299,700 (Butynski, 2003). The population of the *Pan troglodytes* subspecies is estimated to be 140,000 (Strindberg et al. in prep) and to range from 18,000 to 65,000 for *Pan troglodytes verus* (Sop et al. in prep).

Bossou Forest Reserve is located in Guinea, a recovering fragile State, further strained by the Ebola crisis in 2014. Characteristic of fragile States, there is substantial institutional inadequacies, particularly in so-called non-essential aspects of the economy like ecology, conservation and tourism. Over the period of my professional activities with the USFS in the

Bossou area, I have observed that the apparent weakness of the State delivery systems is reflected in the management of Bossou Forest Reserve and the adjoining ecotourism area. Partly, as a consequence, it is no surprise that Bossou was first established as a long-term chimpanzee field site in 1976 by Sugiyama from the Kyoto University Primate Research Institute (KUPRI) from Japan. Since 1976, a wide range of research has been conducted in the area. According to KUPRI, this has focused predominantly on chimpanzee tool use and cultural behaviors, population dynamics and life history. Currently, the conservation area is managed through a State-Private sector collaborative arrangement involving the Bossou Environmental Research Institute (translated into French as, Institut de Recherche Environnementale de Bossou, IREB); the Directorate General of Scientific Research, Innovation and Technology (translated into French as, Direction Generale de la Recherche Scientifique et de l'Innovation Technologique, DGRSIT) and KUPRI (the private partner). IREB, in collaboration with DGRSIT, have been in a scientific cooperation with KUPRI since 2001. KUPRI and IREB work closely, sharing staff and facilities at the Bossou Research Station. Another organization that seeks to protect the Nimba Biosphere Reserve is the Nimba Mountains Environmental Management Centre (translated into French as, Centre de Gestion de l'Environnement des Monts Nimba, CEGEN). CEGEN is a public organization, established to coordinate and promote activities aimed at protecting the conservation area and the rational use of the biological resources of the Nimba Mountain range and its area of influence.

Notwithstanding, the layered supervision and management of the Bossou Forest Reserve, the current management of the area is widely considered by the local communities as unsatisfactory. There are indigenous communities like Nyon, Serengbara, Thuo, Thiassu including Bossou. There is observed mistrust between local communities and the Managers of

the Bossou Forest Reserve, partly due to the lack of community involvement in the planning and management. Firsthand observations backed by literature (Yamakoshi and Leblan, 2013), provide evidence of clear and obvious lack of community-centeredness in the Bossou protected area planning. The call for meaningful community participation is informed by the need to overcome the human-induced threats to the area and secure the long-term viability and sustainability. Over the past decades, the Bossou Forest Reserve has suffered from a decline in chimpanzee population due to a combination of anthropogenic and environmental factors. These have partly resulted in the fragmentation of the forest reserve and the loss of forest cover. According to KUPRI, at the end of 2018, there were seven chimpanzees from an estimated twenty-five in the 1970s, affirming the Critically Endangered Species label on the IUCN Red List (IUCN, 2008). There are also issues of urbanization, forest fires, cultivation and indiscriminate poaching, life-threatening chimpanzee diseases, mining (iron ore) in neighboring communities, increasing human and non-human primate interface and potential visitor pressures.

The paper investigates the application of community-centered sustainable conservation and ecotourism planning in the Bossou Forest Reserve using the Limits of Acceptable Change (LAC) framework in three primary catchment communities of Bossou, Nyon and Serengbara.

1.2 Conceptualization: Project Goal and Questions

The goal of the paper is to implement a community-centered and participatory approach towards Bossou conservation area planning based on the LAC framework. This was carried out using Participatory Geographic Information Systems (PGIS). In addition, Concept Mapping is applied, as part of the applied frameworks. Specifically, the paper employs the first two steps of

the LAC framework. The choice of two out of nine steps became necessary due to limited resources and time to apply the full LAC framework. However, the first two steps are sufficient to raise the following questions central to the paper:

- What are the resources of value within the Bossou Forest Reserve?
- What are the existing issues/concerns of stakeholders (catchment communities, management and interest groups/organizations) regarding the operation of the Bossou Forest Reserve?

1.3 Structure of the Paper

To allow for easy reading and analysis, a summary of the chapters have been provided below. The paper opens in Chapter One a quick review of the state of the Bossou Forest Reserve and the resulting justification for the project. It also explores the project intent and the questions that have driven the project approach.

Chapter Two explores the contextual analysis of the existing and historical socio-cultural, economic, institutional and regulatory aspects of the Bossou forest reserve. In particular, it emphasizes the spiritual connection between the people of Bossou (and other catchment communities) on one hand and the chimpanzees on the other.

Chapter Three is two-fold. It opens with a detailed description of the project methodology, including the approaches for data gathering, analyses and reporting, largely driven by the LAC framework. The concluding part of the paper examines the field work (primarily, in-situ at Bossou forest reserve and surrounding areas), supplemented by discussions with supervising Ministries of State and organizations.

Chapter Four is dedicated to reporting the findings of the project. It combines the results of the two major workshops on participatory mapping and concept mapping. In addition, the chapter provides recommendations for achieving community-centered conservation and ecotourism management in the Bossou Forest Reserve.

Overall, the paper provides evidence of more sustainable conservation and ecotourism planning in the Bossou Forest Reserve using a community-centered approach. It combines methodical fieldwork with reliable foundation data from academics, practitioners and residents of the participating communities.

CHAPTER 2: CONTEXTUAL ANALYSES

2.1 Background on Bossou Forest Reserve

The Republic of Guinea lies on the west coast of Africa, covering an area of 245,857 km². Guinea shares borders with Guinea Bissau, Senegal, Mali, Ivory Coast, Liberia and Sierra Leone. Guinea can be divided into four main regions: coastal, flat, high and forest. The village of Bossou is situated in the forest region in the south-eastern part of the country (latitude 7° 38'71.7 N; and longitude 8° 29'38.9' W), approximately 10 km from the Nimba Mountain range, in the Prefecture of Lola. The village of Bossou is located at 550 m above sea level. It is surrounded by small hills 70-150 m high that are covered in primary and secondary forests. At the foot of these hills, cultivated or abandoned fields, and secondary, riverine and scrub forests form a patchy mosaic. The climate at Bossou is classified as tropical wet seasonal (Richards, 1996). Bossou has a clear wet season, from March to October; and dry season, from November to February (Yamakoshi, 1998; Takemoto, 2002; Humle, 2003b). The hills of Bossou constitute a core area of the Nimba Mountains, a UNESCO World Heritage site also listed as Biosphere Reserve (MAB/UNESCO Program). The Biosphere Reserve of the Nimba Mountains, comprising Bossou, the Nimba mountains and Déré forest, harbor many endemic species of flora and fauna and is therefore extremely important because of the biological diversity. There are areas of the forest closed to human activity. Some trees like oil palms (*Elaeis guineensis*) which are left uncut in these areas make good foraging grounds for chimpanzees (Yamakoshi, 2011b).

The main body of the forest is mostly characterized by secondary and scrub forest due to abandoned cultivation. There is a noticeable occurrence of certain tree species within the secondary forest including the umbrella tree (*Musanga cecropioides*), the oil palm tree (*Elaeis*

guineensis) and the bush pineapple (*Myrianthus arboreus*). The forests provide habitat for relatively few large mammals, as many such animals have been hunted in the past. Although chimpanzees are not hunted, mammalian species that are directly targeted include the red-flanked duiker (*Cephalophus rufilatus*) and the cane rat (*Thrynomys swinderianus*).

The Nimba Range was designated as a Strict Nature Reserve in 1944. As for the Bossou forest, it was not designated as a reserve by the Guinean state or international institutions until it was added in 1991 to the “core area” of the UNESCO Biosphere Reserve (designated in 1981), which itself overlaps with the 1944 Mt. Nimba Strict Nature Reserve (Wilson, 1992). The designation, presented restrictions on the exploitation of the catchment for agricultural purposes, hunting and related environment degradation effects. The entire area is known as prime habitat for chimpanzees. The chimpanzee is one of the great apes, a group of primates that also includes gorillas and orangutans. Two species of chimpanzee are distinguished: the bonobo (or pygmy chimpanzee, *Pan paniscus*), and the common chimpanzee (*Pan troglodytes*), which is further divided into four sub-species. The *Pan troglodytes verus* has already disappeared in two or three West African countries (Lee et al., 1988; Teleki 1989).

Chimpanzees of Bossou are well-known for their incredible tool-use: they use a stone hammer and anvil to crack open the nuts of the oil palm tree (Ohashi, 2006, 2005). Chimpanzees use tools to reach and access foods, to defend themselves, to communicate, to explore their environment, and to care for their hygiene (Humble and Matsuzawa, 2001). Additionally, they use tools in an exclusive range of behaviors including pestle-pounding and algae scooping (Ohashi, 2006). The Bossou chimpanzees regularly engage in ant-dipping, some characteristics of which appear to be unique to the Bossou community (Humble, 1999, 2003b, 2003c, 2006; Humle and Matsuzawa, 2001). In addition, the Bossou chimpanzees have been observed dismantling traps

that are found in their home range; it is conceivable that their knowledge of how to detect and dismantle these traps is passed on to younger members of the community (Ohashi, 2005).

According to KUPRI, the Bossou Forest Reserve inhabits seven chimpanzees (3 males and 4 females). The Bossou chimpanzee community remains semi-isolated from neighboring groups of chimpanzees in the wider Nimba Reserve due to the fragmentation of the area. Three out of the four females in the Bossou community are estimated to be over 50 years old (the life expectancy of chimpanzees in the wild, IUCN) and discussions with IREB revealed that only one chimpanzee is assessed to be reproductive. According to KUPRI, in November 2003, members of the Bossou community suffered from an outbreak of a respiratory disease which resulted in the confirmed death of four individuals (2 infants, 1 adolescent male and 1 old adult female) and the presumed death of 1 old adult female. The only other confirmed respiratory disease outbreak at Bossou since 1976, occurred in 1992 and resulted in the death of an infant (Grubb et al., 2003; Matsuzawa, 2006). Discussions with IREB revealed that this situation was peculiar to the Bossou Forest Reserve.

The Bossou chimpanzees are of the Western sub-species (Grubb et al., 2003; Matsuzawa, 2006; Oates, 2006). Matsuzawa (2006) defines the following age-categories: infants (0 to less than 4 years old), juveniles (4 to less than 8 years old), adolescents (8 to less than 12 years old), adults (12 to less than 36 years old), and elders (greater than 36 years old). The age category may be slightly different between the sexes and among different communities (Matsuzawa, 2006).

Table 2.1: Existing chimpanzees of the Bossou Forest Reserve

No.	Name	Description	Sex	Birth Date
1.	Jire	Birthed Jeje	F	1985 (est.)
2	Jeje	Jire's son	M	1997
3	Yo	Status Unknown	F	1961
4	Fana	Birthed Fana	F	1956
5	Foaf	Fana's son	M	1980
6	Fanle	Fana's daughter	F	1997
7	Fanwaa	Status Unknown	F	2011

Source: KUPRI, 2018

2.2 Human & Non-human Primate Interactions

The village of Bossou is home to the Manon people. It inhabits about 2,500 people made up of five clans. Bossou and the surrounding villages provide a rare example of a site where wild chimpanzees and local people have been living side by side in relative harmony for many generations, sharing the resources of the same forest. The locals rely heavily on rice and cassava for carbohydrate intake, but also produce a wide variety of fruits including pineapple, papaya, orange and mandarin, mango and avocado for their own consumption and retail. The people hold the chimpanzees as the reincarnation of their ancestors and believe that their ancestors' souls rest on the sacred hill of Gban (Kortlandt, 1986; Yamakoshi, 2005). Pockets of primates may be

offered protection by such beliefs, and some authors suggest that it is within these attitudes that conservation efforts have the greatest chance of being successful (Lee and Priston, 2005).

Increasingly, there are several nodes of interaction between the chimpanzees and humans – both friendly and confrontational across several aspects of everyday life. Both humans and chimpanzees rely heavily on oil-palm. Illegal hunting and poaching occur within the forests of Bossou; gunshots are often heard and traps are frequently confiscated by forest guards. The chimpanzees regularly crop-raid and are known to occasionally attack villagers (Yamakoshi, 2005). Residents' reactions to crop raiding vary in the communities; some tolerate it as they believe the chimpanzees have a right to feed off a small number of their crops, whilst others actively chase and throw stones at any chimpanzees seen near farms. Although there is lack of detailed information on the causes, extent and frequency of attacks, the communities attribute the increase the likelihood of chimpanzee attacks on humans to the presence of papaya trees in close proximity to people's houses. This has resulted in some people cutting down papaya trees located near the forest edge in an attempt to reduce human-chimpanzee contact. Pineapple raiding is rarely tolerated and humans heavily guard these cultivated areas with the use of dogs.

Notably, there are anti-chimpanzee sentiments from human and non-human primate confrontations. For instance, in March 1998, an 8-year-old boy and a 6-year-old girl circulating along a small path on the forest edge sustained severe injuries as they were bitten by an excited chimpanzee that they happened to encounter (Hockings et al., 2010). Attacks by chimpanzees on local people were not systematically recorded until 1995. From 1995 to 2009, ten out of eleven attacks were recorded indirectly by second-hand reports from the victim or the victim's family to KUPRI and IREB (Hockings et al., 2010). In such cases, victims and/or the family have expressed anger or even moved to a nearby village to get away from the chimpanzees. Hockings

et al. (2010) report that victims have sometimes approached KUPRI and IREB for compensation to cover medical expenses. It could not be established whether compensation was paid or not.

Figure 2.2: Young victim of chimpanzee attack



Source: Hockings et al., 2010

2.3 Management of Bossou Forest Reserve

Zoologist M. Lamotte was the first to announce Bossou as a valuable chimpanzee field site, in 1942 (Kortlandt, 1986). Following this, Kortlandt visited on several occasions during the early 1960s, conducting research on the Bossou chimpanzee community (Kortlandt, 1962). Bossou was first established as a long-term chimpanzee field site in 1976 by Sugiyama from the Primate Research Institute, Kyoto University, Japan, and research has continued ever since. A wide range of research has been conducted at Bossou; which has focused predominantly on chimpanzee tool use and cultural behaviors, population dynamics and life history. The nearest

neighboring chimpanzee community lives in the Nimba Mountains, where habituation and research are at a preliminary stage (Koops et al., 2006). Firsthand discussions with IREB indicates that the extent of research in the area has not intensified markedly in present times.

The Bossou Reserve serves as a laboratory for the research and conservation of wild chimpanzees living in Bossou and Nimba. This reflects a broader approach by the Republic of Japan towards primates and primate study. The Kumamoto Sanctuary is the first and only sanctuary for chimpanzees and bonobos in Japan, part of the Wildlife Research Centre at Kyoto University, hence a sister institute of KUPRI. In Japan, no chimpanzees whatsoever are used in laboratory research and all the chimpanzees used in biomedical research have been retired. Scientists from the Kyoto University Primate Research Institute (KUPRI) focus on field research on chimpanzees at Bossou, Nimba and surrounding areas such as Diécké and Ziama. Yukimaru Sugiyama began the study of Bossou chimpanzees in 1976. He and his colleagues, an international team of students and researchers, have continued their long-term research ever since, in close collaboration with Guinean counterparts. KUPRI plays an important role in the training of Guinean students, in promoting environmental education, conservation activities, and sustainable development initiatives in the locality. It provides technical supervision and a study site for primate research. As such, KUPRI receives academics and students from many parts of the world, including Europe and New Zealand. There is a functional team of international academics and partners called the KUPRI International Team, headed by the Director, Professor Tetsuro Matsuzawa.

In October 2001, IREB was established under the Ministry of Higher Education and Research to promote environmental conservation and scientific research there as well as in the neighboring Nimba range and the surrounding area. The stationing of State employees began earlier, in 1999.

The establishment of IREB and subsequent appropriation of indigenous lands for conservation purposes contributed to open resistance and conflict between the local people and the organization. In addition, there were disagreements over the unsatisfactory farming practices of the local people; which among other concerns, contributed to forest fires in the conservation area. IREB is headed by Dr. Ali Gaspard Soumah, the National Director (since 2009). Incidentally, his Ph.D. (in Primatology) was earned from the University of Kyoto, Japan. IREB manages the reserve, together with KUPRI.

IREB is observed to provide conservation security and reserve protection functions, through the deployment of field officers to check the activities of humans in the area. They also coordinate responses and the management of wildfires in/around the reserve. In addition, IREB is in charge of developing the tourism potential of the place, particularly for recreational tourism. As part of that, the organization runs paid-for chimpanzee tracking expeditions, which employs local tour guides. The Bossou Forest Reserve has six tour guides who assist visitors, primarily, guiding them to locate and safely view the chimpanzees in the area.

Table 2.2: Visitor statistics, Bossou Forest Reserve

	VISITOR POPULATION PER YEAR		
VISITOR CATEGORY	2017	2018	2019 (Up to July End)
Researchers	16	12	14
Recreational Tourists	14	46	58

Source: IREB, 2019

According to IREB, it allocates half of the revenue accrued from visitor fees to the Bossou community; 15 percent to the tour guides; 5 percent to the management committee and 30 percent allocated for the corridor restoration activities by IREB. KUPRI is observed to focus more on chimpanzee research and related scientific activities. IREB coordinates with KUPRI to prescribe the rules of engagement and conduct for visitors to the reserve with no inputs from the tourism Ministry. The rules of engagement and conduct for visitors mainly cover chimpanzee viewing, feeding and general forest sanitation protocols.

There are also Non-Governmental Organizations (NGOs) operating in the region. These include UVODIZ and AUDER local NGOs with operations in Bossou. AUDER is the local implementing partner of the United States Forest Service - International Programs (USFS-IP) in Guinea. These organizations largely provide technical support and perform advocacy functions regarding the management of the Bossou forest reserve. In particular, the USFS supports communities with alternative livelihood (rice, fish farming, gardening), training on best practices in agriculture, capacity building on fire management, forest restorations, financial safety nets through the village savings and loans Association, with AUDER as the implementing partner. There are also international bodies like the IUCN, with an active interest in the management of the Nimba landscape and the biodiversity. The organization helps to shape discussions concerning species' survival, environmental law and particularly, drawing attention to the decline of chimpanzees in the area.

2.4 The Bossou Chimpanzee Corridor

In spite of this long-term protection, the Bossou chimpanzees have increasingly become isolated from neighboring communities in the Nimba Mountains – thus creating a serious viability problem for the future of this community, given the current lack of gene flow. The existing challenge of Bossou Reserve is attributable to the fragmentation of the forest, which is critical for sustainable chimpanzee management. A corridor of deforested land, spanning 250 metres wide and 4 kilometres in length has effectively isolated the Bossou chimpanzees from neighbouring chimpanzee communities in the Nimba Mountains. The isolation of the habitat and the associated insufficiency of genetic interaction with neighboring populations (Sugiyama, 1999; Matsuzawa and Kourouma, 2008, Shimada, 2011) is a serious conservation problem. This has created a serious viability problem for the future of this chimpanzee community, given the current lack of gene flow

Figure 2.3: Participating Communities and Chimpanzee Corridor



Source: Adapted from Digital Globe, 2005

2.4 Bossou Protected Area Planning Issues

The protected area is facing major threats to the ecology. These are mainly human-induced factors either directly emanating within or outside the boundaries of the protected area and occasionally illegally within the protected area. This is characterized by chimpanzee crop-raiding owing to the loss of natural habitat (Hockings, 2009). There is testimony from local people that, sometimes, people, particularly non-natives feel threatened by wildlife due to fears about crop loss and also personal safety (Hill, 1998; Lee and Priston, 2005). Consequently, in an attempt to curtail such commercially threatening activities, farmers may attack (shoot) primates feeding off agricultural land in order to protect their crops, irrespective of their protected status. A leading cause of rapid and global biodiversity loss in developing countries is the habitat destruction, much of which is due to widespread agricultural development and commercial exploitation of the forest through logging (Global Forest Watch, 2016). In Guinea, habitat destruction has been identified as one of the top factors affecting the chimpanzee survival, by leading to the fragmentation of forest block and therefore isolation of the populations (Kormos and al., 2003). Two main factors have been identified as responsible for environmental degradation. The main agricultural method used in the area is the slash and burn culture of mono-cropping. Slash and burn agricultural exploitation have a strong impact on the environment: parts of the forest are cleared and burned yearly leaving vast surfaces of fallowed land.

IREB reports of illegal hunting and poaching occurrence within the forests of Bossou; gunshots are often heard and traps are frequently confiscated by guides. Several motivations can lead a local person to hunt a chimpanzee. It is mainly for their meat which is appreciated by many people in Guinée Forestière, although some individuals of specific ethnical groups like the

Manon people have cultural and traditional taboos against eating or killing the chimpanzee. In a period of fruit scarcity (at the end of the dry season), it is difficult for the chimpanzees to find enough food resources in the forest to feed on. As a consequence, it accelerates the occurrence of crop raids. Reduction and fragmentation of the natural habitat are also making this situation worse, pushing chimpanzees towards the human plantations and fields.

2.5 Historical Approaches at Addressing the Issues of Bossou Area Planning

Recent interventions in the region have focused on reforesting the deforested region, cutting off Bossou forest from the Nimba Reserve. The KUPRI-International researchers, in collaboration with IREB, the villagers, and local NGOs, initiated a reforestation program called the Green Corridor Project in 1997. This project has the aim of planting trees to enlarge the forests of Bossou and create a corridor over the savanna that separates the hills of Bossou from the Nimba Mountains. Since 1997, researchers from KUPRI have been working in co-operation with IREB and local villagers, and with the support of the Japanese Embassy in Guinea, the Guinean government and various international organizations, toward the creation of a "green passage". The aim is to plant trees along a 250 metres wide and 4 kilometres long stretch of savanna extending between Bossou and the Nimba Mountains in the hope of re-establishing a flow of migration between the Bossou chimpanzee community and the neighboring Nimba populations.

The participating villages are Bossou, Serengbara, Thuo and Nyon. (KURPI, n.d). According to KUPRI, the project is planting saplings, at a density of 400 young trees per hectare. Priority is usually given to savanna adapted species such as *Uapaca guineensis*, *Parkia bicolor*, and *Parinari excelsa*. A new technique involving Hexatubes (tree-shelters produced by Phytoculture Control, Japan) is being used to protect young trees against grassland invasion,

herbivores, and dehydration. These hexagonal plastic tubes are placed around the young saplings and remain there until the stem reaches 10 cm in diameter. It is apparent from firsthand checks and activities of the US Forest Service that progress of the Green Corridor Project has been sub-optimal, partly because of the destruction of the transplanted and young trees by wildfires over the period (KUPRI, n.d). There is a clear and obvious lack of community interest in the Green Corridor Project. Interactions with IREB, corroborated from the community indicate that the community feels excluded, to the extent that they are noted for demanding financial compensation for attending meetings convened by IREB and the Green Corridor Team. This is believed to stem from the apparent disaffection of the village headmen and council of elders in the planning process. As such, they largely view themselves as invited guests and not partners.

In addition, USFS is undertaking a Corridor Restoration Project in Partnership with IREB, AUDER and communities to regenerate the corridor. The program involves empowering local communities to lead the process of replanting and protection of young trees. AUDER and IREB are also carrying out USFS-supported programs towards the institution and operation of fire management brigades to control wildfires in the area. According to IREB, the initiative had successfully stopped two big wildfires already in 2019. There have also been alternative livelihood programs (rice and fish farming) and creating financial safety nets using the village savings and loans association. As of the second quarter of 2019, the Corridor Restoration Project had trained and facilitated the local communities to undertake the out planting of about 5,000 native plant nurseries in the corridor, covering five acres of land size. Meanwhile, another 10,000 native plant seedlings and 10,000 agro forestry nurseries have been established by the communities for the corridor restoration and buffer zone respectively.

Figure 2.4: Images of plant nurseries



Figure 2.5: Field monitoring session (myself and the community leads)



2.7 Investigating the LAC Framework

The need to build a cooperative relationship with local inhabitants in order to achieve substantive results in reserves has become widely recognized (GSM Andrade, 2012). In designing a reserve, planners are reconsidering the traditional approach of demarcating the reserve with a single borderline leading to integrative approaches. A variety of approaches are used, including employing local people as reserve employees for their “traditional ecological knowledge”, and/or having them participate as local representatives in organizations which make decisions regarding reserve management issues (Western and Wright, 1994).

However, in many of these “participative” projects, inhabitants participate peripherally in a pre-existing reserve scheme under which administrations and NGOs simply make attempts to enlist local citizens—historically regarded as a “menace”—by presenting them with the carrot of economic profit. Additionally, this mechanism of “participation” still leaves much open space for

issues of land dispossession (case study in northwest Guinea (Leblan, 2007)). There are several frameworks to control human-induced pressures, especially to limit excessive land use. These include Recreational Opportunity Spectrum (ROS), Limits of Acceptable Change (LAC), Visitor Experience and Resource Protection (VERP), Visitor Impact Management (VIM), and Benefits-Based Management (BBM).

The Limits of Acceptable Change planning system was initially designed to address visitor management issues in the US National Wilderness Preservation System (Stankey and et al, 1985) and was a product of the spreading realization that carrying capacity was inadequate in achieving its objectives. While there are many reasons why the carrying capacity paradigm failed, the most fundamental was that it impelled managers toward the wrong question: "How many is too many?" Carrying capacity is intrinsically a quantitative term, yet, research was showing that many problems of recreational use were a function not so much of numbers of people, but their behavior. The LAC framework, on the other hand, deals with a significantly different question: "What resource and social conditions are appropriate (or acceptable), and how do we attain those conditions?" (GHSDN Cole, 19854). This question represents a substantially different approach to thinking about recreational use questions, yet was actually more closely aligned with the principal job of recreation managers – protecting the values for which an area was established – than the carrying capacity paradigm.

Historically, the LAC framework has been implemented in conjunction with other complementary systems/models. For instance, the early-day implementation of the LAC by the USFS in the 1980s was combined with Friedmann's (1973) theory of transactive planning (Stokes, 1990). This was to among others, deepen the public participation component of the process. That process took about five years to complete but set the standard for wilderness

management in the USA because the combination of public participation and LAC was so successful (Ashor 1985; McCool and Ashor 1984). The LAC represents a framework within which decisions can be made about the kinds of conditions that will be permitted to occur in an area (Stankey and et al, 1985). The LAC integrates with the local communities. The basic premise of the LAC framework is that change is a natural, inevitable consequence of recreation use. It directs attention from use level as the key management concern to the environmental and social conditions desired in the wilderness, the link between use level and conditions is complex; the previous focus on use level only partially explained and helped manage human-induced change.

At the heart of this is the carrying capacity question of the reserve: how much use is too much? Or how much change is acceptable? The LAC framework recognizes the inevitable impacts that occur as a result of human use. It seeks to address the conflicting positions between the Reserve Managers and the user behavior of patrons and local communities. LAC approach is applied to limit how much an area can tolerate a change due to a variety of tourist activity and development. This approach is used to manage the human-induced changed area. The LAC concern is how much change is acceptable and what strategy should be taken to avoid an unacceptable impact. The LAC offers a framework for a broader spectrum of the public participation in nature-based regional planning. This is important for sustainable planning, given the integrated nature of the communities and the Reserve; especially with the easement provided for local communities in the use of ecosystem services like farming. The LAC framework by design can be updated as new or more information becomes available to ensure they accurately reflect the natural variability (or normal range for artificial sites) around the time of listing of critical components, processes and benefits or services of the conservation area. If a site has

improved or has been restored and is being managed to maintain an improved baseline, it may be appropriate to review and update the limits of acceptable change to ensure they reflect the new baseline.

The LAC framework with its wide applications has some limitations. It is quite resource intensive. Completing and implementing the process takes considerable time, personnel and financial support. The transactive planning requires many occasions for small working groups to meet and share information and work towards a consensus. The LAC framework combined with transactive planning takes special training and skills to conduct interactive public meetings, skills often new to wilderness managers (Ashor, 1985). In practice, it has proven difficult to make the process work unless all groups involved perceive the person(s) leading the process to be impartial and completely open to everyone's ideas. Likewise, members of the citizen taskforce must be individuals who are willing to listen to opposing viewpoints, to work towards mutual understanding to make compromises and to work towards a consensus (Krumpe and McCoy, 1992). A critical challenge is that managers have insufficient baseline data to help in selecting indicators and standards (Krumpe et al. 1994).

The LAC Framework is made up of nine (9) complementary steps. These are largely based on the seminal work of Stankey et al (1984). The summary is outlined below:

1. Identify area issues and concerns: The first step involves identifying the public issues and managerial concerns. This involves recognizing distinctive features and characteristics of the area, the use of the area by people, the relationship of the area to other similar units and to other local areas. This step demands collective decision-making by the community members on what special features or qualities within the areas require attention, what management problems or concerns have to be dealt with, what issues the public considers important in the Bossou forest

reserve and surrounding areas. The dialogue among scientists, managers and the public helps unify agreement about important values and issues. The deliberative processes tend to pit individuals/groups against one another. As such, it is important to build upon people's positive values and open up for differing (and silent) voices. It is critical to choose consensus-building ahead of voting which may pit losers against winners and polarise the stakeholders (Krumpe, 1997).

2. Define and describe the opportunity classes: Opportunity classes describe the ecotourism and tourism zones where different resource, social and managerial conditions are maintained. These classes represent a means of defining the range of diverse conditions within the Bossou forest area. The step establishes the desired future conditions. It defines the physical attributes to be maintained, define key social and managerial attributes. Opportunity classes describe subdivisions or zones of the natural resource where different social, resources or managerial conditions will be maintained. The classes that are developed represent a way of defining a range of diverse conditions within the Bossou forest. The conditions identified are aligned to the objectives laid out in the prevailing legislation. As such, the number of classes is also defined as well as their general resource, social and managerial conditions (Krumpe, 1997).

3. Select indicators of resource and social conditions: The indicators refer to the elements of the resource and social setting selected to represent the conditions considered appropriate and acceptable in each opportunity class. The process employs specific indicators as a measure of the overall state of the area (Krumpe, 1997).

4. Inventory of existing resource and social condition: An inventory is conducted, based on indicators selected in the preceding step, 3. The inventory can be expanded to include man-made

features like base camps and bridges among others. The inventory data are mapped so that both the condition and location of the indicators are known (Krumpe, 1997).

5. Specify standards for resource and social conditions in each opportunity class: The step involves the determination of measurable and defined conditions for establishing a distinctive, diverse range of opportunities at the Bossou forest reserve. Overall, they are the maximum permissible conditions that will be allowed in a specific opportunity class (Krumpe, 1997).

6. Identify alternative opportunity class allocations reflecting area-wide issues and concerns and existing resource and social conditions: The step identifies examines how different opportunity class allocations satisfy varying interests, concerns and values. It asserts that multiplicity of approaches in Bossou area management (Krumpe, 1997).

7. Identify management actions for each alternative: The step requires an analysis of the costs, broadly defined, that will be imposed by each alternative. The step involves weighing all aspects of the alternative, in order to attain a balanced option that satisfies the desired management goals (Krumpe, 1997).

8. Evaluation and selection of a preferred alternative: The step enables Management of the Bossou forest reserve and surrounding resources to identify the preferred alternative, based on the evaluation of the various options. The selection process considers the responsiveness of each alternative to the issues and concerns identified in step 1 and management requirements in step 7 (Krumpe, 1997).

9. Implement actions and monitor conditions: The step effectively concludes the LAC Framework. It is expected that, once an alternative is finally selected, the necessary actions (if

any) are put into effect and a monitoring program instituted. Overall, the LAC Framework provides a targeted and data-driven approach to Bossou ecotourism planning (Krumpe, 1997).

2.8 Participatory Geographic Information Systems (PGIS)

Participatory mapping, also known as community-based mapping is a term that describes the use of a combination of cartographic processes together with participatory methods to effectively represent spatial knowledge as held by local communities (IDS, 2015). PGIS is founded on participatory mapping, using Geographic Information Systems (GIS). It is a more accommodative form of GIS that addresses the needs of the community in relation to access to data and technology while promoting capacity building and bringing together different stakeholders through participatory approaches (Jankowski, 2009). By combining modern cartographic principles and indigenous knowledge held by local communities, PGIS empowers minority groups and sectors of the society who are traditionally disenfranchised giving them an opportunity to be a part of the decision-making process (Jankowski, 2009). Alternative references to the PGIS process include, Public Participation GIS (PPGIS), Volunteered Geographic Information (VGI) and Community-Integrated GIS (CIGIS) among others (Ban et al., 2013). Although there is no uniform nomenclature, for the purposes of this paper, Participatory GIS (PGIS) is used.

Sieber, 2006 argues that PGIS relates to the use of GIS to broaden public involvement in policy-making as well as the value of GIS to promote the goals of non-governmental organizations, grassroots groups and community-based organizations. It harnesses tools to create, assemble and disseminate geographic/spatial data provided voluntarily by the participating communities, groups and individuals. The project employed ArcMap software in collating

information and designing the respective maps. This covers environmental and sustainability problems, characterized by high scientific uncertainties, multiple interrelationships, non-linear dynamics, large scale consequences and irreversible damages. These problems call for a highly participatory approach from stakeholders, particularly local communities to ensure sustainable policy planning (Lopes and Videria, 2015). Participatory system mapping provides a community-centered pathway to assess the complexity of the system. The utilization of the Participatory Geographic Information System (PGIS) for the community resource mapping engenders transparency, greater participation and inclusion; empowerment and ownership of the local spatial information, and also gives the public a meaningful stake in the decision-making processes (McCall, 2005). Ultimately, the final participatory community resource map is designed to reflect the local people's spatial knowledge (Wang et al., 2008)

CHAPTER 3: METHODOLOGY

3.1 Introduction

Central to the paper's methodology is a community-centered approach to determine the state of conservation and ecotourism planning and management in the Bossou Forest Reserve. Background studies indicate wide gaps in conservation and tourism planning and management trends from the Management of the Bossou Forest Reserve. This challenge, combined with the need to discuss the community-centered approach informed the methodology design.

To help reverse the existing gaps, the LAC framework approach was adopted to facilitate a more inclusive planning and management of the Bossou Forest Reserve. The abiding premise of the LAC framework is that change is a natural, inevitable consequence of human-induced factors such as recreational use, farming practices among others. As such the question should be how much change an area can tolerate and what strategies should be taken to avoid unacceptable impact, in view of the pre-established tolerable impact thresholds for the conservation area. The implementation of the framework is evidence-based and drawn from the field studies in the three primary catchment communities. In addition, there are secondary data from past and ongoing programs, scientific papers, technical reports and other relevant information on the Bossou Forest Reserve. Further, PGIS and Concept Mapping are used in the field activities to achieve the desired outcomes.

3.2 Selection of Participants

At the preparatory stage of the field work, a project support team was constituted, drawn from the author's existing partner team (United States Forest Service) already working in the Nimba area, including local experts, supported by IREB Staff. The three participating communities are Bossou, Nyon and Serengbara. Bossou is the host community for the Reserve and the other two, serve as the connecting communities to Nimba Mountains, across from the deforested region. These communities have for generations shared the resources of the forest and coexisted with the chimpanzees in close proximity for generations. According to the 2017 Government of Guinea census, Bossou is estimated to have a population of 4,136 inhabitants; Serengbara, about 969 people and Nyon, about 956 people. They share a common Manon ancestry and speak the Manon language.

My prolonged work life with the USFS over the past years was very useful in the drive for community collaboration and representation. As part of the open call for public participation in the community engagements, specific calls were made to reflect all identifiable socio-economic groups. These covered farmers, traders, hunters, landowners, group, community leaders and Community Presidents (appointed local government representatives). AUDER, the local implementing partner of the US Forest Service in Guinea, facilitated the recruitment of local participants for the workshops. The field team deliberated and concluded on the specifics of the fieldwork: selection of local translators (French and the indigenous Manon language), facilitators; the design and execution of a (re)training exercise; and the simulation/scenario-modeling of community workshops using local materials anticipated to be used in the actual community workshops.

As part of the preparatory process, there were preliminary community engagements in all the three participating communities to engage the community leaders and to finalise preparations. The pre-workshop discussions allowed the Project Team to interact with the communities and shape expectations ahead of the main workshop activities.

3.3 Study Design, Data Collection & Analysis

The paper restricts the application of the LAC framework to the first two of the nine steps, namely, (1) Identify area concerns and issues (situational analysis) and (2) Define and describe opportunity classes. The LAC Framework was carried out using Concept Mapping and Participatory Geographic Information Systems techniques. The participating communities were taken through a series of brainstorming sessions to draw out the underlying concerns and the drivers of these existing challenges at the Bossou Forest Reserve. The community activities enabled participants to reach a consensus (largely through the rigorous constructive debate) on the important values that represent the Bossou Forest Reserve. The facilitators were guided by prior information shared by IREB (the National Director and field guards), US Forest Service representatives (the Principal Investigator), and secondary data by the KUPRI International Team, Government of Guinea policies, and non-profits like the IUCN.

3.4 Reporting the PGIS Process

Overall, the results included the reproduction of ground/dirt maps (not-to-scale) using simple local materials to ensure that community members collectively define the situation prevalent. The process made use of predominantly local materials like sticks, stones, soil among others to represent key features of the conservation area. Subsequently, the ground maps were

transferred onto plain sheets of paper with the assistance of a minimum of three lead participants that were identified to provide a fair sense of the participants. The community encounters resulted in diverse opportunity classes, involving conservation (ecological) and importantly cultural/spiritual resources that were earmarked for special consideration. Additionally, it uncovered areas of the Reserve considered to be off visitor use, owing to cultural and spiritual significance. Fundamentally, the community engagements were based on transparency in communication; trust, the need to foster cooperation and inclusiveness; to actively engage in the decision-making process, deepen awareness about the current situation hence empower the indigenous people to participate in the shared solution. Lead individuals from each community were picked out to participate in the process of transferring and transforming the hands-on representation into three specific community base maps.

Consequently, the natural resources of value were identified and categorized collectively through consensus, in the face of open disagreements. At times, individuals who held different opinions from the wider population were engaged separately by the project team to listen to reconcile the differences. The resulting baseline maps from each community were superimposed on standard base maps. The resulting map was shared with each community to validate the information expressed during the public community engagements. These helped to deepen the trust of the communities in the process and dispel unfavorable and unrepresentative perceptions.

3.5 Field Work: Application of LAC Framework

The restricted application of the LAC Framework focuses on Steps 1 and 2 of the nine steps. All the field activities were conducted in situ, in the three participating communities

(Bossou, Serengbara and Nyon); anchored in over five years of USFS-IP conservation work by the author, in the Bossou and Nimba Biosphere Reserve.

Overall, two separate field teams were constituted to coordinate the two broad aspects of the field work, namely, the PGIS and the Concept Mapping. The application of the two steps was carried out mainly using participatory mapping techniques, specifically Participatory Geographic Information Systems and Concept Mapping – open to all members of the communities.

Figure 3.1: Preliminary Community Consultations in Bossou



Source: D. Samani, January, 2019

3.6 First Community Workshop – Participatory GIS

A seven-member Project Team was constituted, comprising individuals from the University of Montana (Research Students), AUDER, IREB and the local communities. AUDER, is the local implementing partner of the US Forest Service in Guinea. The organization brought to bear a wealth of expert knowledge to the project, in particular, community-based organization and

mobilization for action. IREB was represented by the Director, Dr. Ali Gaspard Soumah. The team also included the Co-Principal Investigator, Sophie DeMartine from the University of Montana and two translators from Serengbara community. In effect, the Project Team represented a regulator-community-Civil Society Organization balance, led by the Principal Investigator (PI) and author, Destina Samani, also with the USFS-IP.

Independent workshops were organized in all three participating communities on separate days. The scheduling was done in the following order: Serengbara, Nyon and then Bossou. Wednesday was acknowledged as a '*market day*' for the region (including the three participating communities; in effect members of the communities, particularly the women and youth are busy with trade in the markets. Across all participating communities, the workshops drew a diverse audience comprising teachers, herders' groups, hunter groups, opinion leaders, youth groups, religious leaders and women for a total of altogether about 144 individual participants.

The processes and steps were consistent across all three participating communities, except for a few peculiarities in each community. To sustain the gains of the project, the Director of IREB facilitated two of the three community workshops (except Bossou) owing to his unavailability. The choice of the Director was meant to sow the seeds of enhanced cooperation between IREB and the communities. Also, it was expected to provide a good foundation for IREB to extend the application of the LAC framework.

Table 3.1: Summary of PGIS Workshop

Community	Estimated duration	Attendance & Representation
Serengbara	5 hours (forenoon)	54 men, women (representing about 30% of participation) and youth
Nyon	4hours (afternoon) (the forenoon meeting was rained out)	48 men, women (representing about 25% of participation) and youth
Bossou	4 hours, 15 minutes (forenoon)	43 men, women (representing about 20% of participation) and youth

Source: Field work (2019)

3.7 Categorization of PGIS

Overall the PGIS process was categorized into four broad segments: Community Mapping Workshops, Development of ArcMaps from the Base Maps, ArcMaps Validation Workshops and Development of Final ArcMaps.

3.7.1 Community Mapping Workshops

Step 1: Identification of Resources of Value

Individual participants were encouraged to list out all the natural resources of value (spiritual, commercial, cultural and touristic). Each of the identified resource considered, collectively to be of value was documented on a chit of paper and handed over to the individual as evidence of

effort. For instance, there was a conscious attempt to pick them out of the people and to provide the needed support in stating their positions.

Such groups were prioritised because of the following reasons:

- There are existing structures for women, characterised by women's groups and associations. As such, women were prioritised to fulfil an existing structural need.
- The involvement of women helped to obtain diverse opinions. For instance, in the Nyon and Serengbara community mapping the involvement of females helped to properly locate the female sacred shrine, after earlier mistakes had been made by the men.
- Embed the results into culture. Involving the women would help achieve this.

Step 2: Production of Participatory Map

Participants were guided to discuss and draw out the state of their communities' natural environment which forms part of the Bossou forest reserve through breakout community sessions. In all cases, the facilitator (supported by the wider team) worked cooperatively with each community to draw a baseline community boundary on the bare ground/dirt. One after the other, participants submitted the chits of paper to the facilitator for consensus on where exactly on the ground map to position the particular listed resource on the ground/ dirt map. Notably, local materials (sawdust, tomato powder, blue (dye); white powder chalk, a mix of materials (powdered) plant leaves and seeds, stones/rocks, river sand and others were used to represent specific resources on the map. This was key in identifying the resources of value to the entire communities. The workshop confirmed areas/features/artifacts of value (sacred areas, ecosystem services, developed and latent touristic features), including threatened areas (of existing or

potential significance). Using the actual natural landscape, each feature's position was collectively determined in reference to specific baseline features in the physical environment.

Overall, a map was formed on the bare ground by positioning and fixing the representative features on the ground. In all communities, particularly Serengbara, the process was characterized by a lot of open disputes, contestations and near confrontations with tactful interventions by the Project Team. In particular, reaching consensus on the resources of value was a major point of divergence. After positioning of all the listed valuable resources, the next step was to highlight the resources of value that were threatened considering historical information. Consequently, participants through discussed and consensually agreed on resources with potential for ecotourism within their respective community.



Figure 3.2:
Ground Mapping,
Nyon

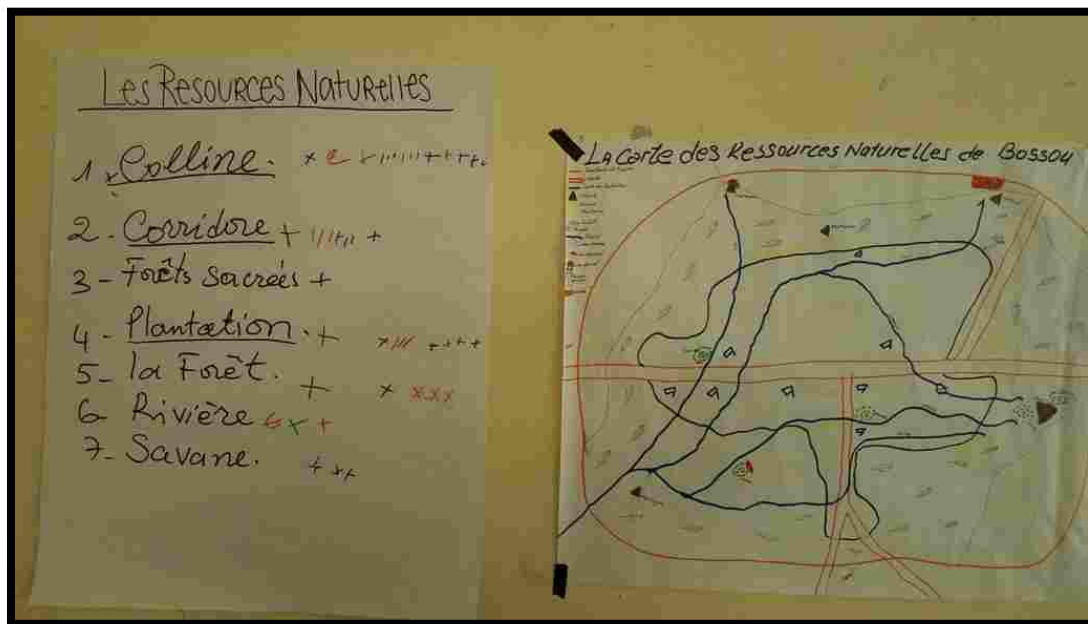
Source: S. DeMartine, January 2019

Figure 3.3: Ground Map, Serengbara



Source: S. DeMartine, January 2019

Figure 3.4: Ground Map, Bossou



Source: S. DeMartine, January 2019

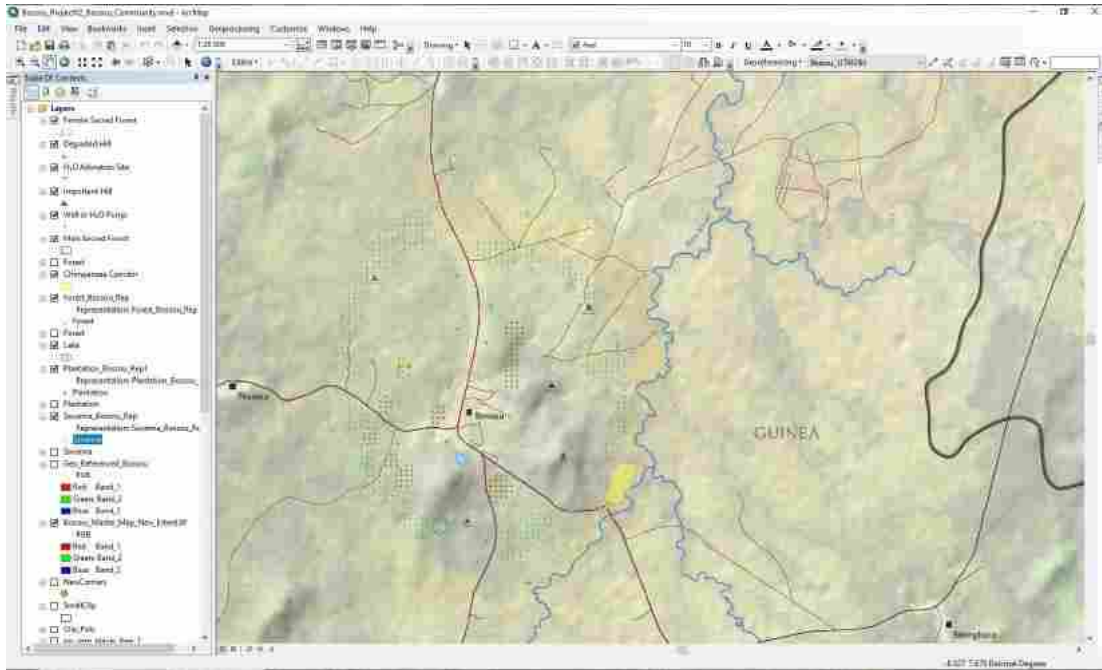
Step 3: Recap and knowledge sharing

At the end of the ground mapping exercise, a participant from each community (who demonstrated a fair understanding and involvement) was encouraged to volunteer to explain the output map in the Manon language to the hearing of all participants. These people were prequalified in a quick review exercise on the sidelines of the community workshops. These exercises were also used to gauge the extent of community participation and understanding of the process and the map. In all the communities, three lead participants, with a fair understanding of the mapping process were nominated to join a designated Project Team member in transferring the ground/dirt map onto a large-sized paper (flipchart); later to be superimposed on a pre-developed community base map. Again, this stage of the process ensured an unbroken chain of community involvement in the process.

3.8.2 Development of ArcMaps from the Base Maps

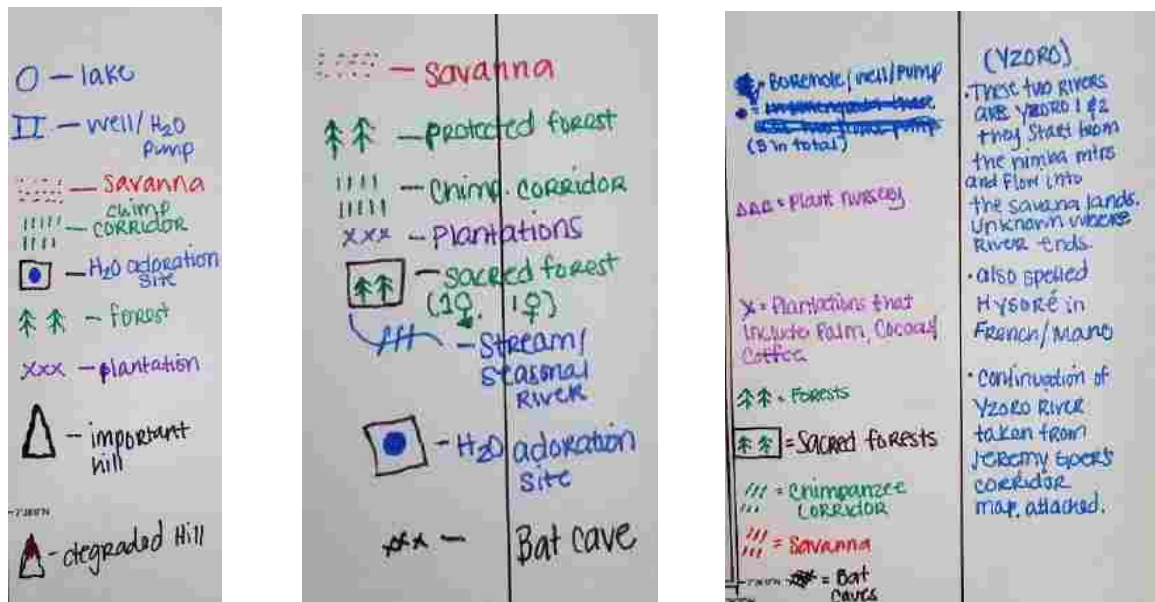
The dirt maps developed by the communities were then given to a GIS expert at the University of Montana (Department of Geography) to be transformed into digital base ArcMaps for the respective communities. These were transferred on paper by representatives of the project team and identified individuals in the community.

Figure 3.5: Interface of ArcMap



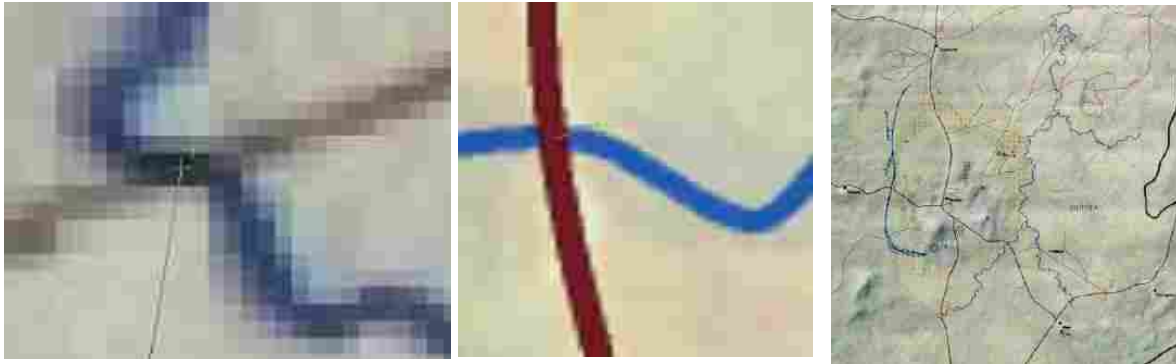
Source: S. Qualls, April 2019

Figure 3.6: Data Sources for ArcMap



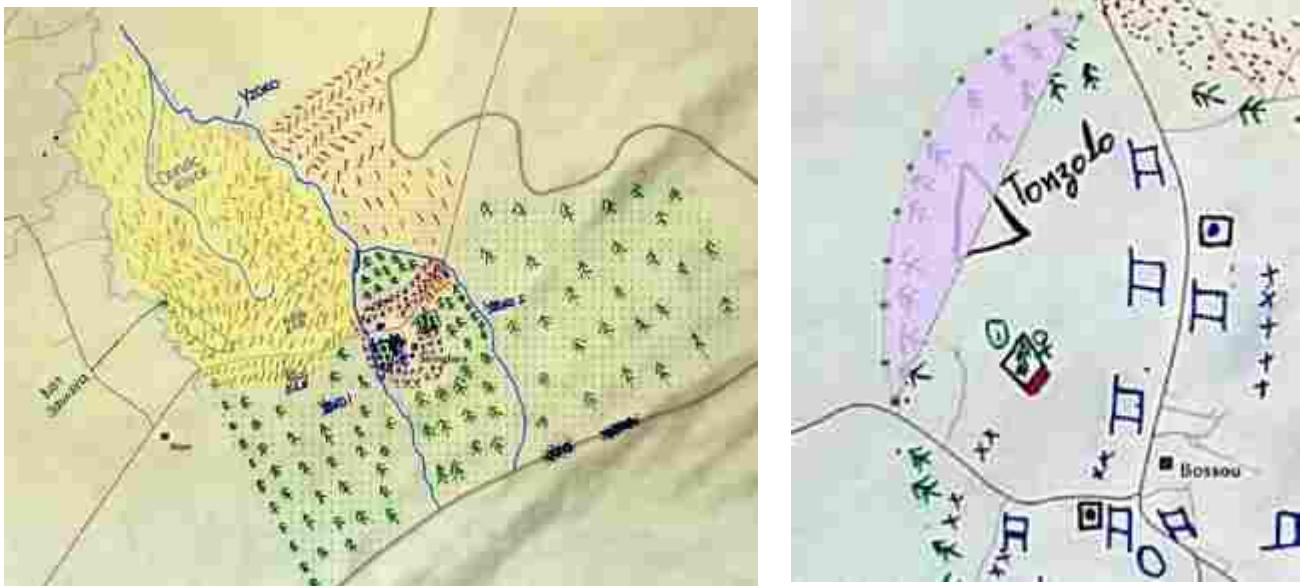
Source: S. Qualls, April 2019

Figure 3.7: ArcMap Geo-referencing using the computer



Source: S. Qualls, April, 2019

Figure 3.8: Digitizing and creating data using ArcGIS software



Source: S. Qualls, April 2019

3.8.3 ArcMaps Validation Workshops

The technical validation workshop of the Independent Community was carried out almost two months after the community mapping exercise. The workshop was carried out separately in all three participating communities. Generally, each validation workshop brought together, selected members of the communities (predominantly, opinion leaders native to the area and were present for the community mapping exercise), representatives of IREB and AUDER.

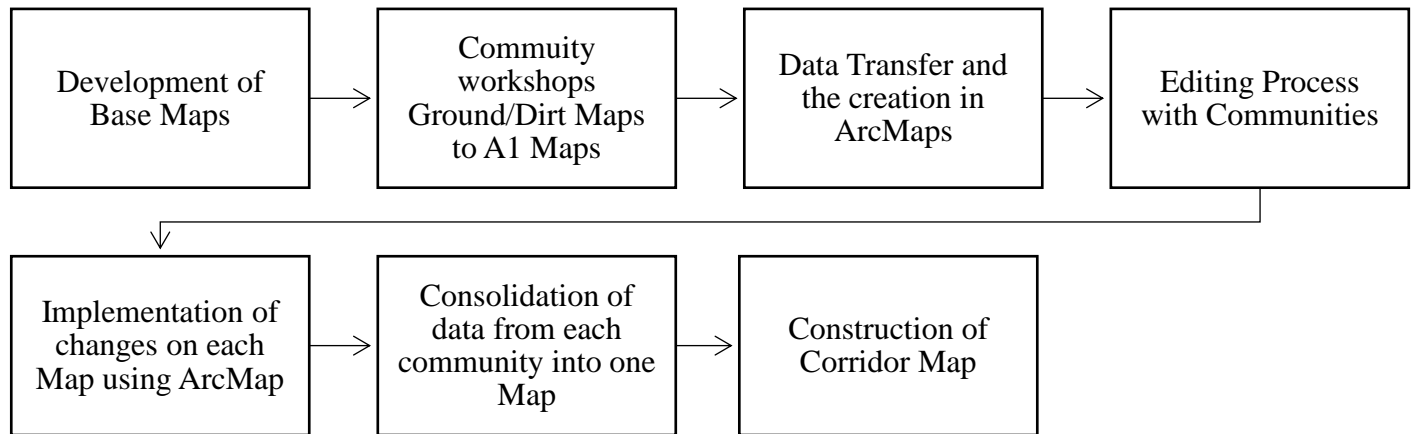
The main objective of the exercise was to conduct a thorough evaluation and technical validation of the independent community digital maps produced from the respective community ground maps. Participants were guided to assess their collective acceptance of the maps and to recommend them as working documents for community conservation activities and baseline for future assessments.

The proposed maps were presented to the respective communities on large format print-out banners (covering 3 feet by 3 feet). They were large enough to allow for clear viewing and editing by the participants. Participants were taken through the maps – the ensuing open debate was quite exhaustive and covered a broad range of areas. The area of serious contention was delineating the Reserve-Communities' boundaries, particularly in the case of the contiguous boundaries between Serengbara community and the Bossou forest reserve. According to the communities, the boundaries communicated by IREB were inconsistent with the understanding of the community, agreed between their forebears and the Government Officials at the time of land requisition. Overall, some recommendations (amendments) were collectively accepted for review and the maps were adopted by participants as a working document to guide future work.

3.8.4 Development of Final ArcMaps

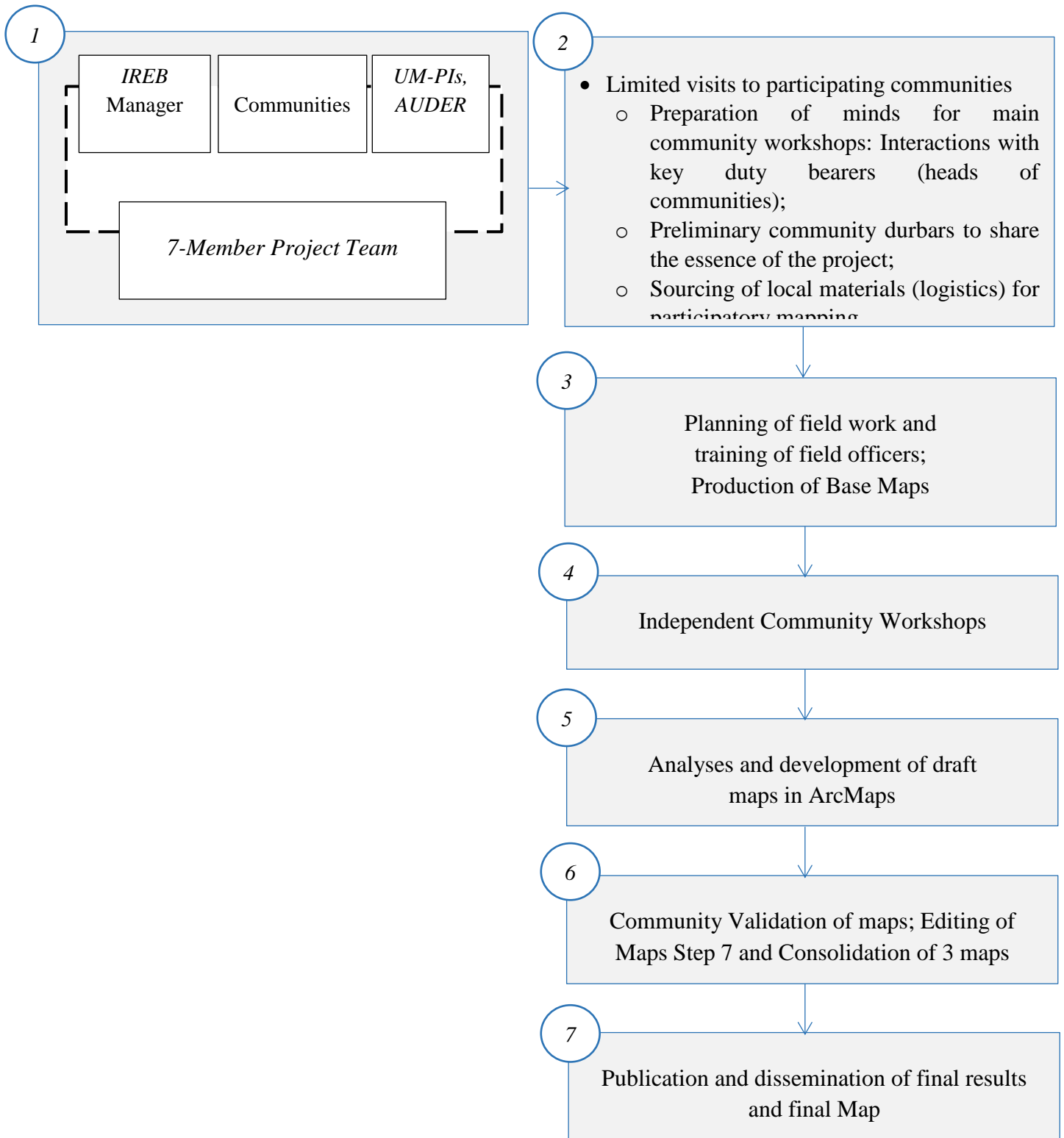
The ArcMaps were edited based on feedback from the community validation workshops and subsequent changes carried out using ArcGIS. The data from all three community maps were then consolidated into a single map. The resulting map is fairly representative of the collective thoughts of the participating communities and highlights, with a significant focus on the Corridor.

Figure 3.9: Workflow of PGIS



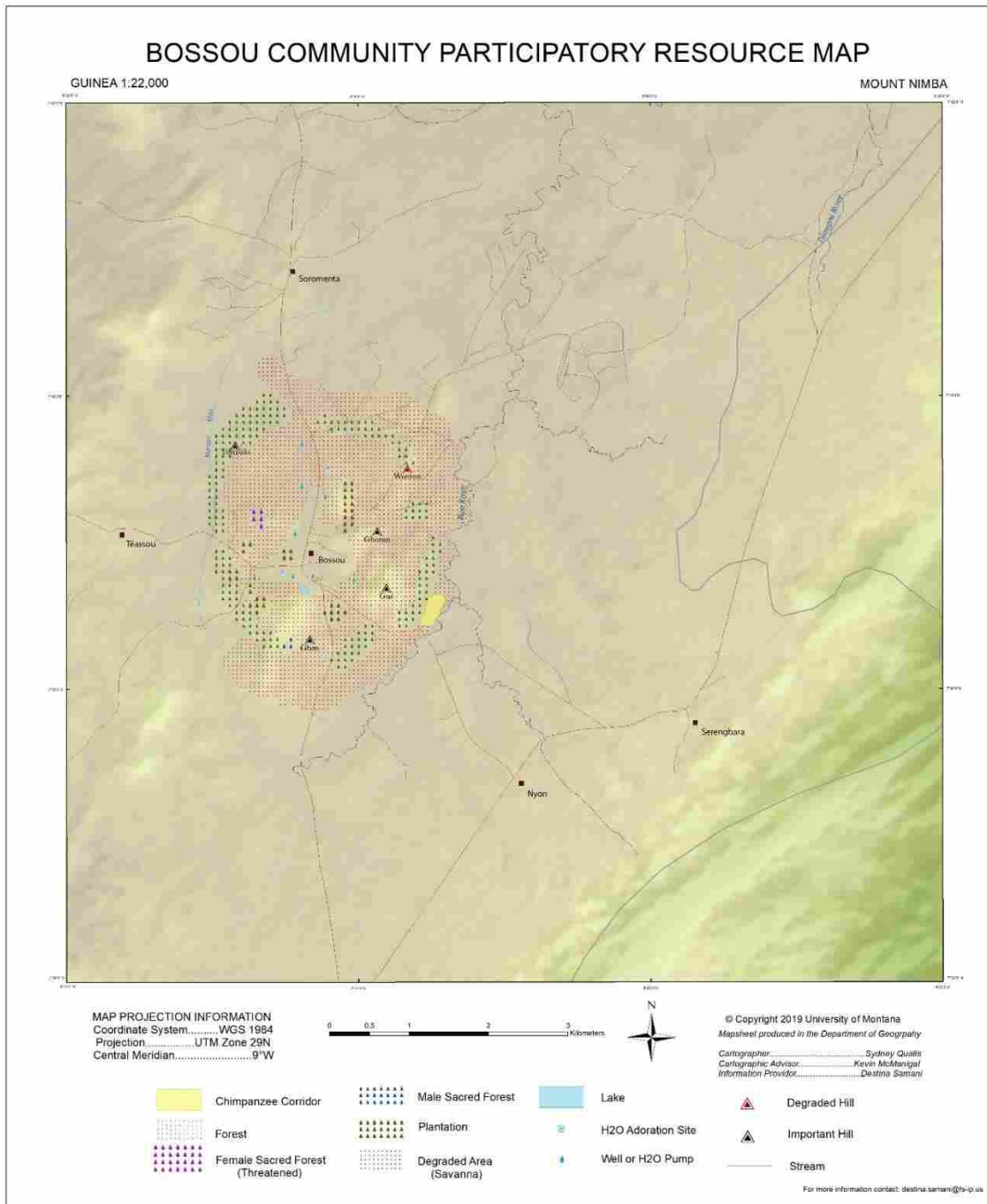
Source: D. Samani, April 2019

Figure 3.10: Framework for PGIS Workshop



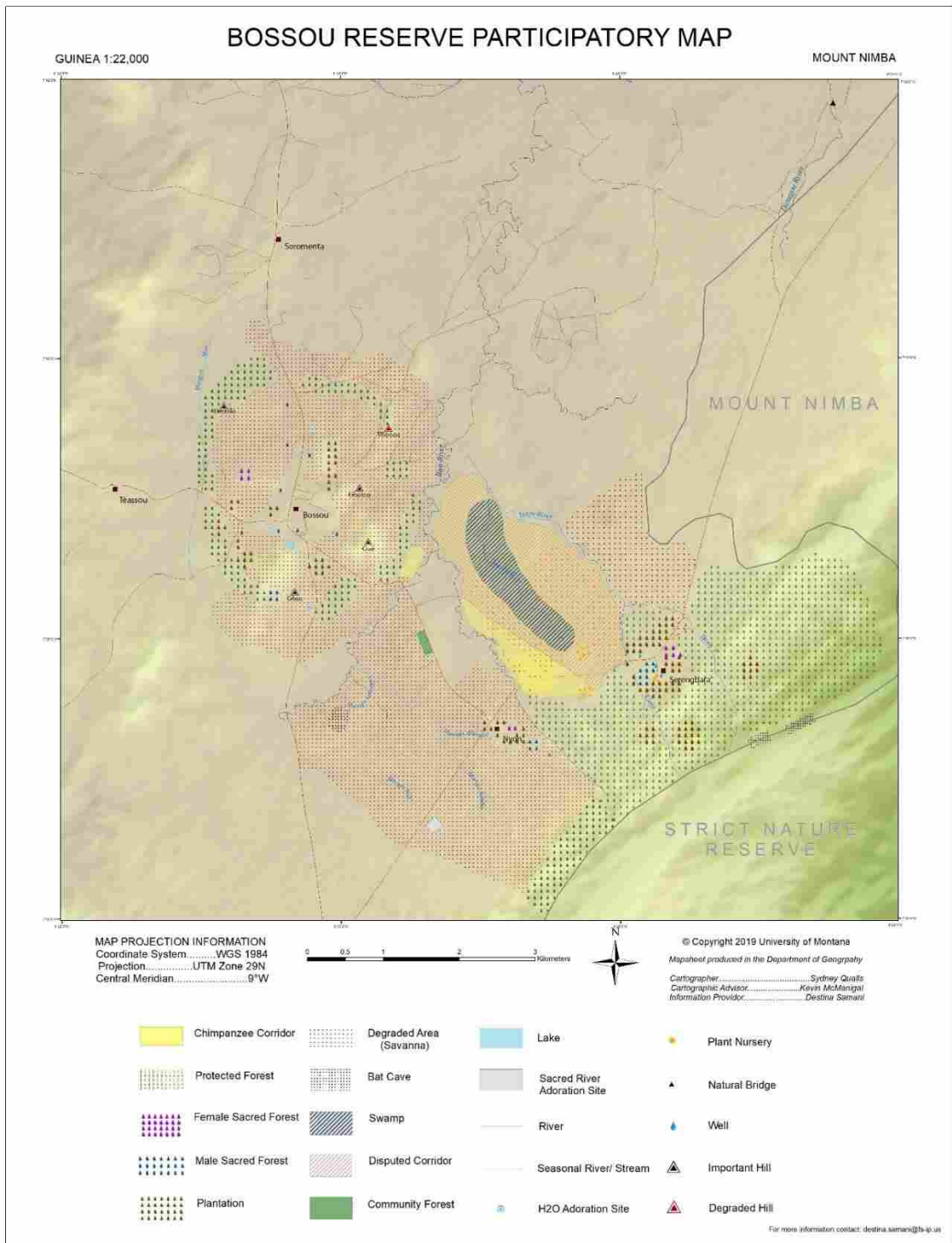
Source: D. Samani, April 2019

Figure 3.11: Bossou Community Participatory Resource Map



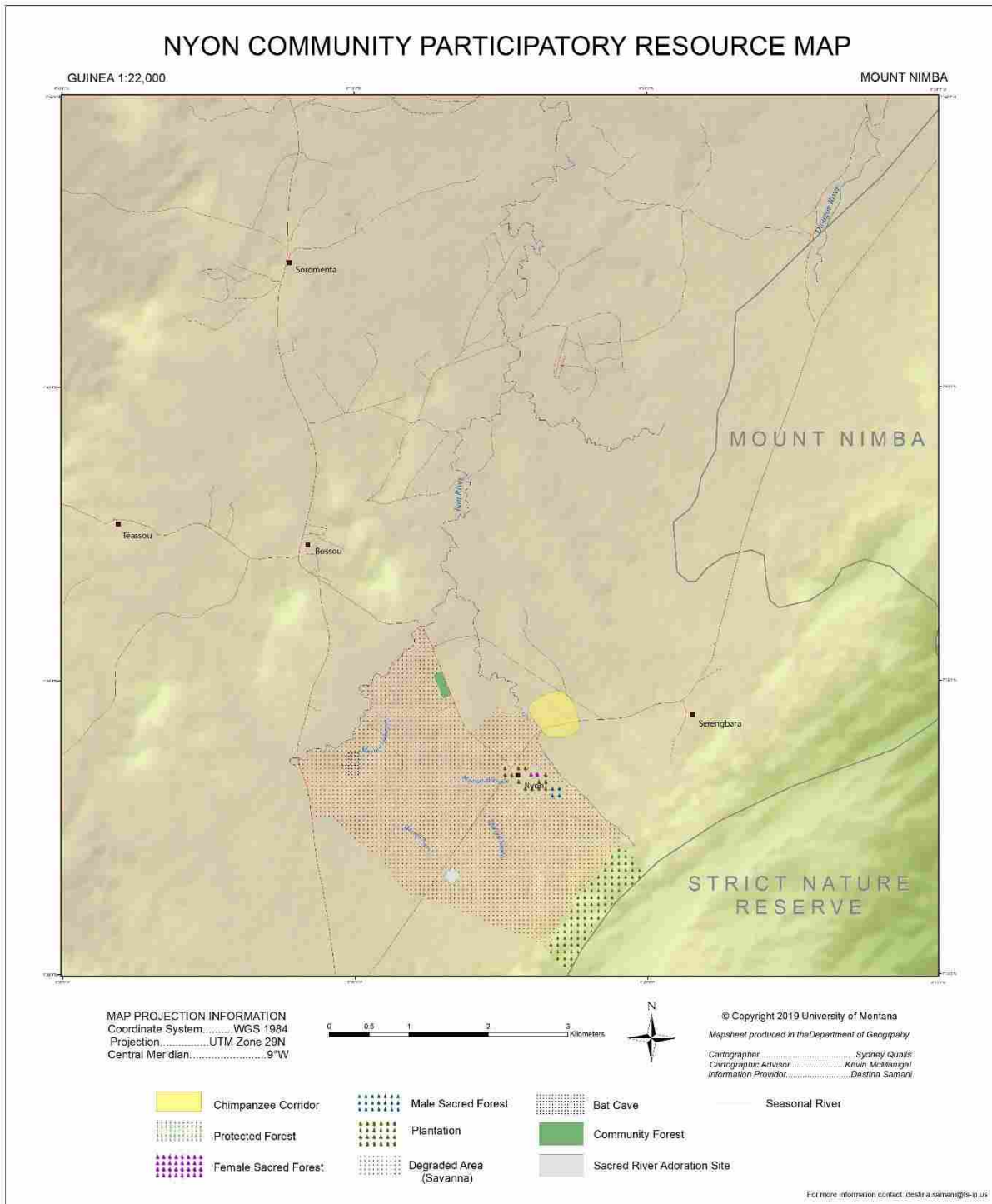
Source: S. Qualls, April 2019

Figure 3.12: Entire Bossou Reserve Participatory Map



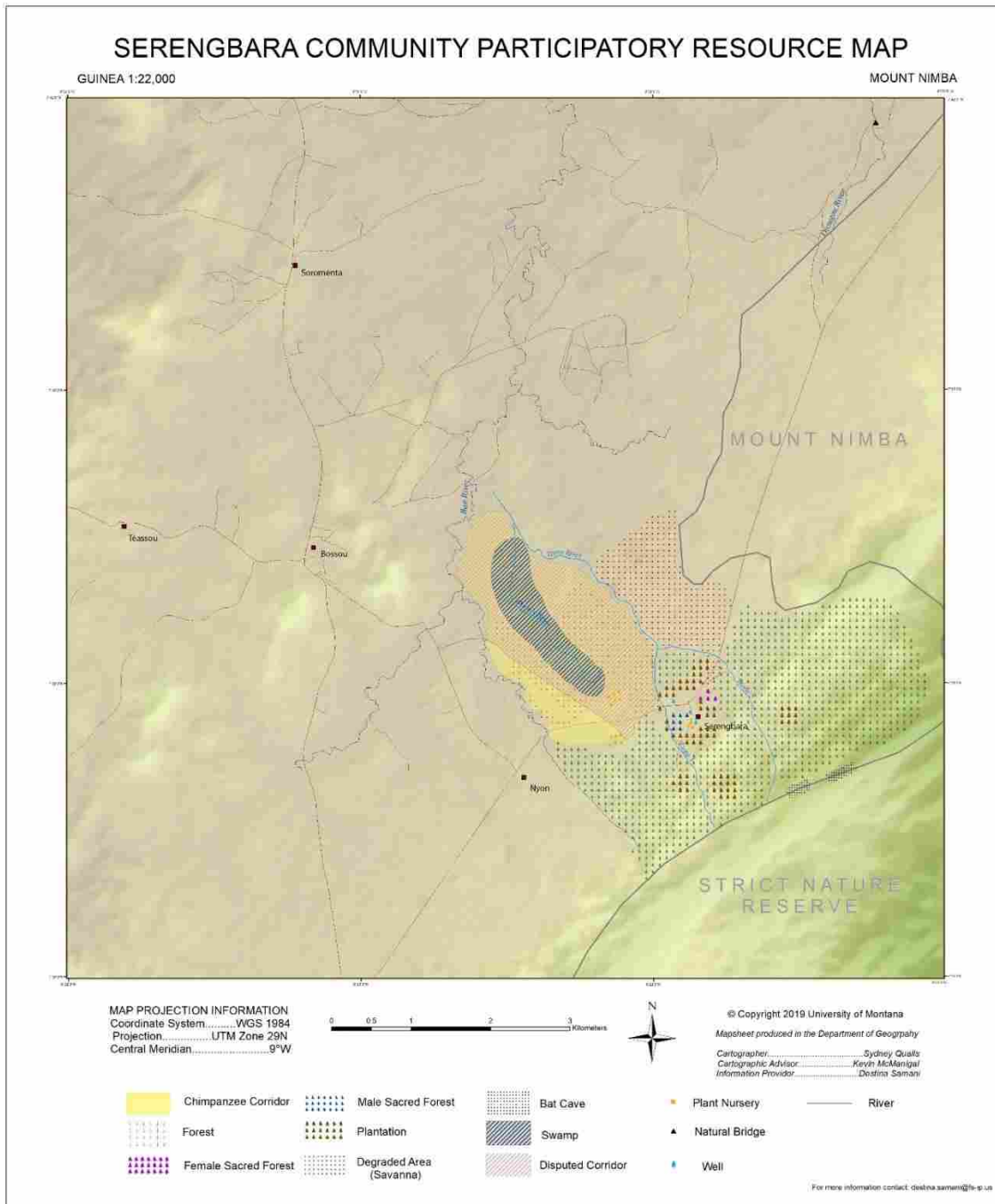
Source: S. Qualls, April 2019

Figure 3.13: Nyon Community Participatory Resource Map



Source: S. Qualls, April 2019

Figure 3.14: Serengbara Community Participatory Resource Map



Source: S. Qualls, April 2019

3.9 Second Community Workshop – Concept Mapping

Concept maps are node-linked, hierarchical representations of a set of concepts and the relationships between those concepts. Relationships are denoted by nodes and linking words, forming propositions. The process is used to analyze the knowledge structure and cognitive understanding of a person, as well as the link between prior knowledge and new information, adds to and incorporates into that prior knowledge (Novak, 2006). The concept mapping process was a collaborative exercise, led by Sophie DeMartine, a colleague research student at the University of Montana. Sophie directed the field activities and coordinated the activities with participants. The resulting concept maps drew up the relationship between the different variables, acting for/against the restoration of the Corridor and the development of the ecotourism potential of the Bossou forest reserve and its contiguous areas. Reporting of the process was done by establishing the linkages between identified causal factors, the impacts (effects), drivers and the resulting interventions.

The actual field workshop was preceded by a set of preparatory orientation/training exercises for workshop facilitators, separate from another for the combined team of workshop facilitators and translators. These sought to brainstorm on workable approaches and also acquaint themselves with the mapping content and process. Among others, concept mapping workshops were based on the output from the Participatory Mapping workshops prior, to serve as the base inputs complemented by perceived host perception of the participating communities.

Similar to the PGIS workshop, the Concept Mapping workshop was open to all members of the three communities who interact with the chimpanzee corridor. The ordering of community visits was varied from the Participatory GIS workshops. The team first engaged the Bossou community, followed by Nyon and Serengbara. Under the concept mapping process, each

community's output map of natural resources of value identified from the PGIS process was used as foundation material to "classify the opportunities". Participants were made to mark out or vote (using writing markers), the list of valuable resources to communities. The votes were tallied, ranked and three top priority resources selected for concept mapping exercise. The priority resources were selected based on consensus. The participants were categorized into breakout groups of three (2 males and a female) for each community workshop. In each case, the groups were guided to select one of the three valued resources, draw out and discuss the perceived/real disturbances and how those disturbances impact on their selected resource. Each group was given an A1-sized paper (from a flipchart), markers and post chits to create collective loop diagrams. A loop diagram was created to define the linkages, develop the networks, and identify the drivers of change positioned on the left using the light green posters and the effects/impacts on the right side of the mapping using yellow and pink posters and point posters to represent the resource. These highlighted the drivers of change: positive, negative or combined, including the consequences. At the plenary discussion, priority was given to the female group to share their findings, in view of their expected inclination to depart early for other household duties.

Further, participants were guided to compare and discuss all their three group maps: by identifying the commonalities, the different interconnected variables and plainly, how a change in one can affect others. The youth and the women were more interested – generally, they demonstrated a better understanding of the links and concept, discovered in the depth of their feedback during the sessions.

Figure 3.12: Male Breakout Groups



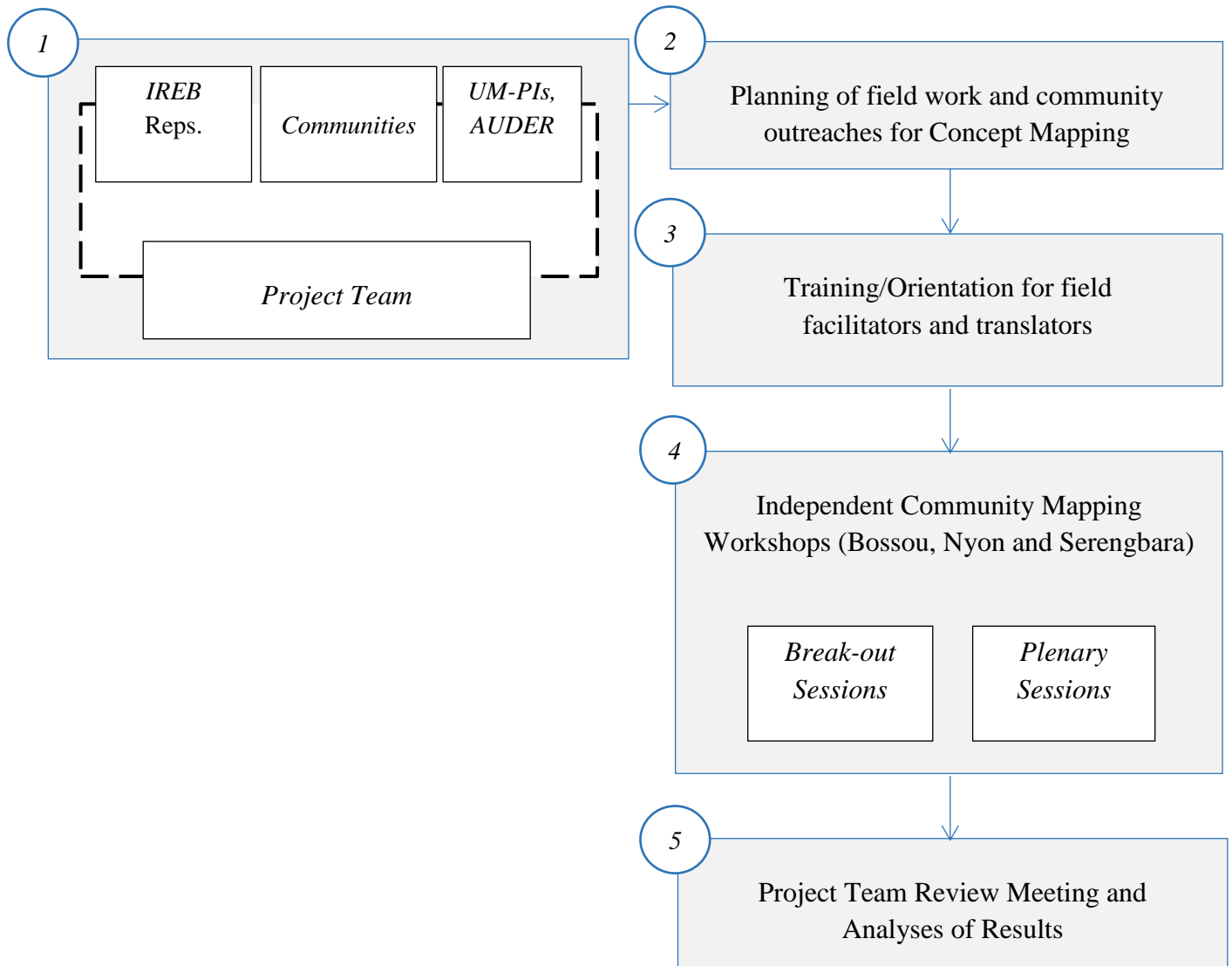
Source: S. DeMartine, January 2019

Figure 3.13: Female Breakout Groups



Source: S. DeMartine, January 2019

Figure 3.14: Concept Mapping Framework



Source: D. Samani, April 2019

Table 3.2: Summary of Concept Mapping Workshops

Community	Representation Summary	Priority Resource of Value
<i>Priority 1 represents highest ranked importance; Priority 3 –Lowest ranked importance</i>		
Bossou	Estimated 19 participants; Comprising of hunters, traditional healers, forest guides, plantation farmers (cultivators), people who work within the corridor (market women among others)	<i>Priority 1:</i> Hills <i>Priority 2:</i> Plantation <i>Priority 3:</i> Corridor <i>Others:</i> Sacred Forests, Rivers, Forest
Nyon	18 participants Comprising of hunters, traditional healers, forest guides, plantation farmers (cultivators), people who work within the corridor (market women among others)	<i>Priority 1:</i> Plantation <i>Priority 2:</i> Forest <i>Priority 2:</i> Corridor <i>Others:</i> Rivers, bat caves, sacred forest and water spots, savanna, natural bridge
Serengbara	18 participants Comprising of hunters, traditional healers, forest guides, plantation farmers (cultivators), people who work within the corridor (market women among others)	<i>Priority 1:</i> Plantation <i>Priority 2:</i> Forest <i>Priority3:</i> Corridor <i>Others:</i> Rivers, sacred forest, Nimba forest, bat cave, Natural bridge, nursery (corridor), savanna

Source: D. Samani, April 2019

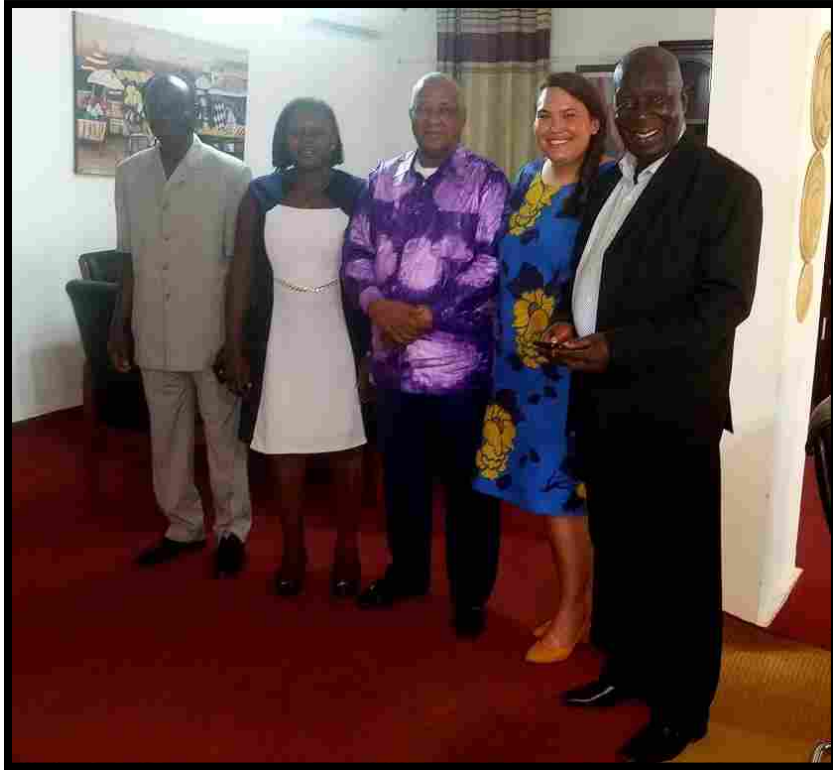
3.10 Dissemination of Preliminary Findings

In addition to the community validation workshops, the Project Team engaged identified stakeholders in the country. These included representatives of the supervisory governments: Ministry of Tourism, Hotels and Handicrafts and the Ministry of Higher Education and Scientific Research; officials of IREB and CEGEN. The interactions provided the opportunity to share the preliminary findings of the team and gather valuable feedback to aid the project.

3.10.1 Discussions with Policy Makers

In order to bring to the attention of the policymakers, the concerns and opportunities of the study area, the Director of IREB and the Project students organized a working visit to the Ministry of Tourism, Hotels and Handicrafts and the Ministry of Higher Education and Scientific Research. It also afforded us the opportunity to understand, firsthand, the Government of Guinea's vision and plans for developing tourism in the area. In both meetings, the team met with the Ministers, both of whom received our presentations with keen interest. The Tourism Minister indicated the vision of his Ministry to prioritize chimpanzee tourism in their drafted Tourism Strategic Plan. On his part, the Minister for Higher Education expressed his commitments to supporting the ongoing restoration efforts and research and called for partnership between the Ministries and the University of Montana for long-term.

Figure 3.14: Meeting with the Ministry of Tourism



Source: Ministry of Tourism, 2019

3.11.2 Presentation at the United States Embassy – Conakry, Guinea

I was granted the opportunity by the United States Embassy in Guinea to make a presentation on the project to a section of Guinea university students and youth at the Embassy in Conakry. It was an interactive session, which highlighted the existing threats to chimpanzee conservation efforts in the Bossou area and the role of participants in developing a sustainable

solution. Importantly, the session brought up the perspectives of the participants which informed the final position of the paper.

Figure 3.15: Presentation at U.S. Embassy, Guinea



Source: U.S. Embassy, Guinea, 2019

CHAPTER 4: FINDINGS OF PROJECT

4.1 Discussion of findings

The findings from the project are organized according to the applied steps of the LAC framework.

Step 1: Resources of value within the Bossou forest reserve

- **Ecology:** Resources of conservation, cultural, spiritual and sustenance values in the area: The Bossou forest reserve is a draw for researchers (academics and students) conducting scientific research into chimpanzee behaviors among others. It also attracts recreational tourists. Generally, the communities do not understand such categorization, but the tour guides have a sense of visitors' intent. Tourism is quite integrated into the local economy. It employs some people as tour guides (six formal personnel identified). In the broader value chain, the participating communities identified irregular job opportunities for translators, traders, night business (drinking bars), commercial transport operators (motorbikes and buses). The natural bridge in Serengbara is also a source of tourist attraction if developed well. The rivers that drain the communities are considered critical to their domestic and agricultural activities. The communities believe that the community's rivers are important and must be protected at all times. The plantations are a vital source of sustenance for the communities and a sustainable strategy for conserving the chimpanzee corridor against wildfires. It provides their food and nutritional needs and presents an opportunity to safeguard further degradation of the protected areas from annual farming practices. Participants easily identified international tourist to be more dominant than domestic visitors. Other attractions in the communities collectively agreed

by the people are the bat caves, rivers, natural bridges and impressive landforms that have the potential for development. These were found to be latent, and not so developed and coordinated like the chimpanzee tracking expedition organized by IREB. The Bossou chimpanzee corridor was also identified as a draw for visitors, particularly “white tourist,” confirmed by IREB to include academic researchers who are part of the KUPRI Internal Team. They are seen to congregate at the Bossou Research Station.

- **Spiritual:** All the participating communities have a spiritual attachment to the forest, and its resources the water bodies, and some specific hills. They are prepared to do anything in their power to keep them in their natural state. They believe their ancestors rest in some of the hills, like Gban. The old folks were on hand to provide the historical accounts, particularly with the chimpanzees. To date, the chimpanzees are believed to convey messages about the future of the inhabitants and the communities. For instance, the chimpanzees visit the community and cry incessantly to forewarn them of impending death.
- **Cultural:** The communities connect to the Manon ancestry and share the Manon language. The three communities share similar cultural values and systems, along with others in the area. They share the Manon language. There are similarities in their ways of life, like feeding, clothing, art and dance. They pass their traditions down to the younger generation orally, using folk tales and family/community socialization.
- **Sustenance:** The plantations are a vital source of sustenance for the communities and a sustainable strategy for conserving the chimpanzee corridor against wildfires. It provides their food and nutritional needs. The arable land, including parts of the reserve, was accepted to be parceled out for farming purposes. The workshop identified that farmers engage in crude farming practices like slash and burn, although the practice was

identified to be fading out slowly. Attention to wildfires was agreed to be a major factor and recorded destruction of the replanting efforts in the chimpanzee corridor were identified to account for the apparent change in practices. The taboo against hunting chimpanzees featured strongly in all the communities.

- The community interactions were observed to foster community cohesion, friendliness and enhanced awareness of their community through the exchange of ideas.
- The participatory workshop highlighted the distrust between communities and management of the Bossou Forest reserve.
- Further, it provided a unique experience of participatory mapping and planning to IREB and ignited a trust-building process between Management (IREB) and the participating communities and individuals.

4.1.1 Emerging issues/concerns

- The community-based mapping process identified a number of threats to the sustainability of the place. The fragmentation of the Bossou Forest Reserve and the loss of forest cover. The place deforested corridor separating the Bossou Forest Reserve from the wider Nimba Reserve was also established as a major threat to the communities. They realized the link between the existence of chimpanzees and the continued growth of tourism, and the related benefits to the community.
- The community mapping led resulted in open disagreement between the Management of the Bossou Forest Reserve and the Serengbara community on the exact boundaries of the Reserve. The community observed that the Reserve had covered more than the originally agreed parcel by their forebears.

4.1.2 Limitations of the Project

The project was mainly carried out in-situ, in Bossou, Nyon and Serengbara communities. Altogether, there were significant limitations to the project design and implementation. These are noteworthy and may provide guidance for further research:

- **Constraints in Community Mobilization**

The process of stimulating interest for the community workshops and guaranteeing participation was quite cumbersome. It involved coordinating activities with multiple Community-Based Groups/organisations, led by AUDER. In particular, the Project Team had to overcome the burden of substantial community apathy in certain quarters and to reassure potential participants of their critical role in building a sustainable ecology

- **Intensity of implementing the LAC framework**

The very design of the LAC framework is quite time, resources and personnel intensive. Although the project limited the application to the first two steps of the framework, it involved considerable efforts in following through to the desired end. There were multiple workshops with communities, capped with the validation workshops. In addition, there were more informal meetings with specific stakeholder groups to galvanize them for the community workshop. Although, majority of the Project Team members were used to the study area, there were a few members who were new to the community. As such, there were attendant acclimatization and integration challenges.

CHAPTER 5: CONCLUSION

5.1 Concluding Remarks

Community-centered ecotourism management is measured variously; among them the use of a graduated system of three steps by Arnstein (1969) ranging from non-participation, degrees of tokenism and degrees of citizen power. The paper examines how the application of the LAC framework, guided by the SES model can support the development of community-centered sustainable ecotourism planning in the Bossou forest reserve. Identifying the current level of community participation will provide insights into the success of the existing programs (Masud et al., 2017; Mayaka et al., 2016). The paper acknowledges the perception of host communities, specifically, Bossou, Serengbara and Nyon in the current management of the forest as not fully collaborative. To that extent, the interventions by the managers of the forest have not elicited the required public support and activism.

The application of the LAC framework responds to the central question of “what resource and social conditions are appropriate (or acceptable)”, and “how do we attain those conditions in the Bossou forest reserve?” The paper explored limited the study to the first two steps of the LAC framework and did not fully establish the social linkages using the concept mapping process. That said, the use of the Social-Ecological Systems model as a guiding framework enabled the Project Team to fairly establish the social connections that are woven into the ecological state of the area. As such, the SES model maintained linked systems of people (the communities) and nature (the reserve), emphasizing that humans must be seen as a part of, not apart from, nature (Berkes and Folke, 1998).

Overall, the frameworks were vital in redirecting the participating communities to focus on the resources of value (tangible and intangible) and the threats to the existence of such resources. These brought to bear past and present human-induced factors that had led to the degradation of the forests, fragmentation of the land and the destruction of viable chimpanzee habitats. This cause and effect relationship was introduced in the concept mapping stage of the project.

The entire project was conducted under the sponsorship of the USFS, involving USFS staff and supported organizations like AUDER and IREB. Already, through the current USFS support, there is evidence of enhanced community action in addressing the destruction of seedlings and young trees (in the corridor) and farmlands through wildfires. The USFS supported Fire Management Brigade was successful in stopping the spread of two big wildfires in the first quarter of 2019. These among others has spurred the establishment of a spinoff Women Fire Management *Brigade*, through the assistance of AUDER and IREB staff. The project provides a fair indication that host communities are best placed to lead the conservation efforts, particularly, when they can align their long-term existence to the survival and sustainability of the ecology.

Figure 5.1: Satellite Image of Controlled Wildfire



Source: University of Montana, 2019

Figure 5.2: Women Fire Management Brigade



Source: F. M Ouendeno, AUDER, 2019

5.2 Recommendations

Based on the findings, the paper recommends a set of future actions and projects. First, it is observed that the Bossou, Nyon and Serengbara are adjusting quite well to the steady growth of tourism in the communities and the opportunities thereof, particularly, revenue from economic activity and the existing value chain. This sub-sector presents a viable alternative to diversify the current dependence on agro-based revenue, mainly from farming and hunting practices). Going forward, it is only critical that the tourism potential of the place is explored fully and sustainably, within the limits of community acceptance. However, these will be accompanied by certain tradeoffs, such as restrictions to farming practices in a manner that significantly alters their way of life, yet sustains the gains of tourism in the communities. Ultimately it provides a means of mainstreaming the contributions of tourism to the local economy.

Second, the project recognized the inherent difficulties in the corridor restoration process. Previous approaches have been characterized by the communities as non-collaborative. This perception deviates from the finding of the community workshops, where the forests were identified as an important resource of value. The apparent response gap from the communities is deduced to be the result of perceived non-participatory management by the current management of the reserve. To mop up the growing real community interest, partly arising from the work of the USFS among others, we recommend the development of cash crop plantations around the (Green) Corridor – on the approaches to neighboring communities. These will be owned and managed by individual community members with their existing farms sharing boundaries with the corridor. It is anticipated that this will provide extra incentive to mitigate any wildlife destruction to the Corridor and lay out a simple WIN-WIN solution whereby the protection of the plantations against wildfires is

Third, the visits to the Ministry of Tourism, Hotels and Handicrafts, the Ministry of Environment and the Ministry of Higher Education and Scientific Research – the supervising Ministry for IREB affirmed the lack of inter-agency collaboration. This point to potential gaps in policy coordination and coherence in the conservation and tourism space. There is considerable room to develop this further to ensure the prudent management of already scarce national resources.

For future projects, the paper first proposes the extended application of the LAC framework, building on the work of this paper – in furtherance of a community-centered approach to eco-tourism development in the Bossou Management Area. The LAC framework is quite a time-consuming and exhaustive process, the paper open the door to a wealth of possibilities when the framework is fully explored in a manner that consider the social and ecological interactions as linked.

Second, proposes a time series study of wildfires in the area by a student from the University of Montana, particularly, the Corridor to establish a correlative relationship to existing and proposed interventions. The working hypothesis is that understanding the effect of the scope of wildfires and the associated responses provides an indication of the level of community interactions over time. This provides a baseline for measuring the depth of community participation in future projects/interventions.

Third, the paper's recommendation of establishing a buffer area should be studied for potential replication in other conservation areas, with comparable challenges.

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