Detailed Research Proposal

Promote giraffe conservation by studying their nursing strategy and wildlife–human relationships around the Katavi National Park

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1. Introduction

This proposal intends to clarify the contribution of my study about ecological and behavioral study of giraffe, to our research project "Behavioral, Ecological and Conservation Studies of Chimpanzees and Other Larger Mammals in the Greater Mahale Area."

In the Mahale Mountains National Park of Tanzania, many researchers from Kyoto University carried out limited investigation about wild chimpanzees, fauna and flora for the last few decades. However, there are a few studies of other larger mammals or ecosystem in other area. Now, environmental change is tremendous and the demand for conservation of animals is escalating. It is therefore urgent matters for us to survey larger mammals in Mahale as well as fauna and flora in the other areas of Tanzania. According to these backgrounds, I will conduct research on the giraffe in the Katavi National Park and other two National Parks (Nyerere and Arusha) which should serve as a barometer for conservation. To clarify the giraffe nursing strategy and wildlife–human relationships, I am sure this study will contribute to conservation of wildlife, especially giraffe, and the habitat.

2. Statement of the problem and justification

Overall aim of this project is to have better understanding of ecosystem surrounding chimpanzees at the Mahale Mountains National Park and adjacent areas in Tanzania. This is essential to have better knowledge of behaviors and societies of chimpanzees, one of the endangered species and closest living species to us humans, and to have sufficient information for the park management on the wildlife. In order to achieve this overall goal, this project includes various approaches from different disciplines including ecology, behavioral ecology,

primatology, anthropology, molecular ecology, etc.

Specific topics of this year will be: 1) ecological influences of chimpanzee ranging and behaviors; 2) social behaviors and social relationships among chimpanzees and other large mammals; 3) feeding behaviors and techniques; 4) hunting and meat-eating; 5) genetic analysis of chimpanzees and other mammals; 6) cultural behaviors of chimpanzees; 7) mammalian fauna and microbes; 8) inter-group relationships; 9) development of chimpanzees; and 10) wildlife conservation in and outside of national parks.

Among the research topics above, I will take part in; 2) social behaviors and social relationships among giraffes, 3) feeding behaviors and techniques; and 10) wildlife conservation in and outside of national parks, to promote conservation of giraffe which is currently facing the "silent extinction".

3. Literature review

The Katavi National Park, which is located in south western Tanzania, most of the area is at a low elevation and is characterized by a flat and undulating terrain, sandy solids and consists largely of miombo woodland, a dry deciduous forest characterized by trees in the genera *Markhamia, Grewia, Terminalia, Syzygium, Acacia* and *Combretum* (Banda *et al*., 2018). Hence, its vegetation type is very different from the vegetation type of northern Tanzania, such as Serengeti where most of the area are covered by grassland, not by miombo woodland. It also encompasses seasonally inundated floodplains (Caro, 1999). A number of larger mammals including browsers such as giraffe, elephants and carnivorous like lions and hyenas are recorded in the Katavi National Park (Caro, 2011). However, only few researches were conducted research regarding Katavi's fauna and flora until now. Moreover, previous studies conducted in the Katavi were focused on a survey of mammal densities, but not on an ecological behavioural study of specific animal species (Caro, 1999; Caro, 2002; Caro, 2011). Previous studies pointed out that the animal adjusts their behavior and ecology according to the different vegetation types. However, it is still unknown how mammals adapt to its environment in the Katavi National Park. Hence, it is necessary to survey the behavior and ecology of mammals which habituate in Katavi National Park, i.e. miombo woodland, for future conservation.

Giraffe live in fission-fusion society in which the group membership changes frequently. Calf resides in a crèche at a month old (Langman, 1977; Pratt, 1982). The crèche consists of several female and offspring pairs. The advantage of forming crèche is as follows: reduce calf predation by way of sharing calf care responsibilities while also enabling females to browse at remote locations which is also the case in elk (*Cervus elaphus*) (Paquet and Brook, 2004). The study from northern Tanzania reveals that crèche tended to be found closer to traditional pastoralist homesteads (bomas) where behaviours of predators are disrupted, but avoided towns

which had high human populations, agriculture, and poaching risk (Bond *et al*., 2019). This suggests that giraffe mothers might identify the differences of human types from ecological information such as density of predators.

Giraffe is currently categorized as endangered species in IUCN Red List (Muller et al., 2018). Therefore, to understand how giraffe adjust their nursing strategy and feeding ecology in different types of environments is important for conserve area which is suitable for their reproduction, i.e. to prevent giraffe from the extinction.

It is urgent task to understand how wildlife change their ecology and behavior under the presence of human especially for endangered species. Therefore, my study aim is to reveal the nursing strategy and feeding ecology of Masai giraffe living in Katavi National Park under the presence of human to examine if they have the same tendency as giraffe in northern part of Tanzania as I have described before. I ensure that my study would useful information for planning the conservation action plan for Masai giraffe. Additionally, to promote conservation, it is also important to understand the wildlife–human relationships not only from the aspects of wildlife side but also from the side of local people living there. Hosaka *et al* (2018) reported that the frequency of childhood play in green spaces was correlated positively with that of nature-based activities. This result suggests that the life-history affects peoples' attitude towards nature. Therefore, I would like to conduct the same survey on park rangers to reveal the relationship between their knowledge of wildlife and life history because ranger is an important actor to promote the wildlife conservation.

4. Objectives and significance of the research

My study aim is consisted of two parts: (A) reveal the nursing strategy of giraffe under the human presence/in miombo woodland, (B) reveal the relationship between life-history and knowledge of wildlife among rangers. The results of these aspects will enable us to compare the result with the one from northern Tanzania and to understand how giraffe mother adjust nursing strategy in miombo woodland/under the human presence of the Katavi National Park. I am sure that the results of the present study will provide valuable information to the conservation of the giraffe and their natural habitat and for the promotion of our scientific understanding of the larger mammals in Tanzania. Additionally, my study results would be useful to understand the attribute of the person who tend to have more interest in and appreciation of nature. By revealing these points, we might be able to design useful wildlife conservation management plan including giraffe.

5. Hypotheses

(A) Reveal the nursing strategy of giraffe under the human presence/ in miombo woodland

I hypothesize that 1) giraffe mother select the location close to the park officer/rangers' settlements for nursing place, 2) crèche is rarely observed close to the park boundary or villagers' settlements, 3) the signs and tracks of predators will be observed more frequently the more the distance far from human settlements. Hence, the park officers/rangers' settlement have positive relationship with the location of giraffe nursing place. While villagers' settlements and predators' signs and tracks have negative relationships with the location of giraffe nursing place. Additionally, to reveal the nursing strategy of giraffe, I hypothesize that 4) lactating females consume or seek out high protein/mineral food items compared with non-lactating females.

(B) Reveal the relationship between life-history and knowledge of wildlife among rangers

I hypothesize that 1) the frequency of childhood experience in green spaces or interaction with wildlife will be correlated positively with the motivation for the wildlife conservation and gaining knowledge of wildlife.

6. Methodologies

(A) Methods to reveal the nursing strategy of giraffe under the human presence/in miombo woodland

To reveal the distance relationships between the location where crèche is formed and the human settlement such as park accommodations, park officers' house and villagers' house, I use Garmin GPS to record the coordination position data where I found crèche. To get the coordination position data of human settlements, I will use GIS data. Additionally, to clarify the location of predators, such as lions, hyenas, and leopards, signs and tracks locations, transect will be conducted to locate it. I will record the coordination position data on Garmin GPS when I find those and calculate the distances between the locations of predators and the human settlement by using GIS data. After the collection of these data, I will conduct focal animal sampling on giraffe mother to reveal in which vegetation types mother stays with her calf. To do so, I will record the presence of calf within 50 meters from the mother for each 10 min. I will also record the behavior of the mother for each 10 minutes. The target sample size is 10 different individuals (mothers) at least. Data analysis will be conducted in the Kyoto University, Japan.

Additionally, I will reveal the food items consumed by lactating females and non-lactating females. To accomplish this, I will observe females from each category for 100 hours and conduct focal animal sampling to record the tree species names that giraffes browse. I will conduct nutritional analysis on each food item and compare the results between the two groups of females to identify any differences.

(B) Methods to reveal the relationship between life-history and knowledge of wildlife among rangers

I will conduct two surveys for this part. Firstly, I will do interview survey and questionnaire survey with the help of 50 rangers to assess the relationship between the frequency of interaction with nature when they were young and the current motivation for wildlife conservation. Secondly, I will do walking safari with rangers to assess the knowledge level of wildlife of each ranger. By using multivariate analysis, I will try to reveal the relationship between life-history and their knowledge of wildlife. Data analysis will be conducted in the Kyoto University, Japan.

7. Expected outputs

Following are the expected outputs from my research.

1) Monitoring the habituated herd of giraffe to reveal the individual relationship, behavioral ecology, and feeding ecology during nursery period in the Katavi National Park and other two National Parks.
2) Estimation of giraffe and predator density of giraffe in the Katavi National Park and other two National Parks for better knowledge of wildlife management
3) Compilation of checklist of plants for better understanding of Katavi National Park and two other National Parks
4) Supply of information that is relevant to park management and giraffe conservation plan management
5) Education of Tanzanian students and villagers
6) Supply of information useful for education and contentment of visitors

8. Bibliographies/References

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