CONSERVATION OF LARGE CARNIVORES IN ETHIOPIA

Field Report from Large Carnivore Survey in Tama Community Conservation Area

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Introduction

Large carnivore play essential roles in ecosystem structuring and stabilizing through both indirect and direct trophic effects (Estes, 2011; Dickman, C.R. et al. 2019). However their roles are disrupting by human through habitat distraction and direct killing of carnivore. Currently, large carnivore are declining in number and in their geographic ranges worldwide due to habitat fragmentation and prey depletion(Ripple et al., 2014). The conservation of large carnivore is therefore challenging because of the continued loss of suitable habitat due to an ever expanding human population. Thus the issue of conservation and protection of large carnivores is ecologically important and it has placed as a top environmental priority given the severity of the threats they face. In dealing with carnivore conservation answering questions like: where the animals are, how many are there, and what are the threats and is the population trend? are very important and also first step of conservation. Large Carnivore Survey of Ethiopia(LCSE) therefore working different research on Ethiopian large carnivore distribution to answer those and some other questions.

Ethiopia is located within tropical latitudes and it has about 25 protected area registered in different parts of the country (EWNHS, 1996). Its geographical location and broad latitudinal and altitudinal ranges have resulted Ethiopia to have various kinds of ecosystems that support a rich variety of flora and fauna species (EIBC, 2005). The country harbors more than 320 species of terrestrial mammals (32 are endemic) (Yalden et al., 1996), of which the country support six large carnivores. Large carnivores in Ethiopia are patchily distributed, and often found at low density (Yirga et al., 2021); their prey populations are declining, leading to relatively small and declining populations, except for spotted hyaenas *(Crocuta Crocuta)* which have adapted well to anthropogenic landscapes (Yirga et al., 2015). Ethiopia's wildlife, by and large, is declining in numbers and range, due to human population pressure, fragmentation, urbanization and habitat loss, compounded by low political interest for wildlife conservation (Gebresenbet et al., 2009, 2013). Thus, to mitigate these threats there is increasing concern to understand about the status and distribution of large carnivore populations throughout the country. Studies have been carried out in various protected and unprotected area to understand the distribution and density of large carnivore of the country. However, no previous studies on wildlife conducted in Tama Community Conservation Area (TCCA) and no baseline information on how the ecosystems function in the area. Thus the primary objective of this field trip was to understand the factors affecting the distribution of large carnivore in TCCA. However here we also aim to report the list

of large and medium sized mammalian species in TCCA using bycatch data from the existing camera trap datasets.

Methods

Study area description

The current study conducted in TCCA. TCCA used to be one of the country wildlife reserve area with no management intervention. Recently, Indigenous communities from the Lower Omo River Valley of southwestern Ethiopia have taken ownership and management responsibilities of the Tama Wildlife Reserve through the creation of the TCCA. The area covers a total of 1968 km^2 and become Ethiopia's largest community conservation area. It lies between the coordinates 35.530 – 36.290 E and 5.510 - 6.380 N (Fig 1.), in the Lower Omo Valley through to the west of the main Rift Valley and lie on the east sides of the Omo River. The area covered by savannah grassland, riparian forest and deciduous woodlands and also served as a vital corridor land between two national parks (Omo and Mago) in Ethiopia. The area known for its potential to support diverse wildlife and it is inhabited by the Mursi, Bodi, Northern Kwegu and Ari communities.
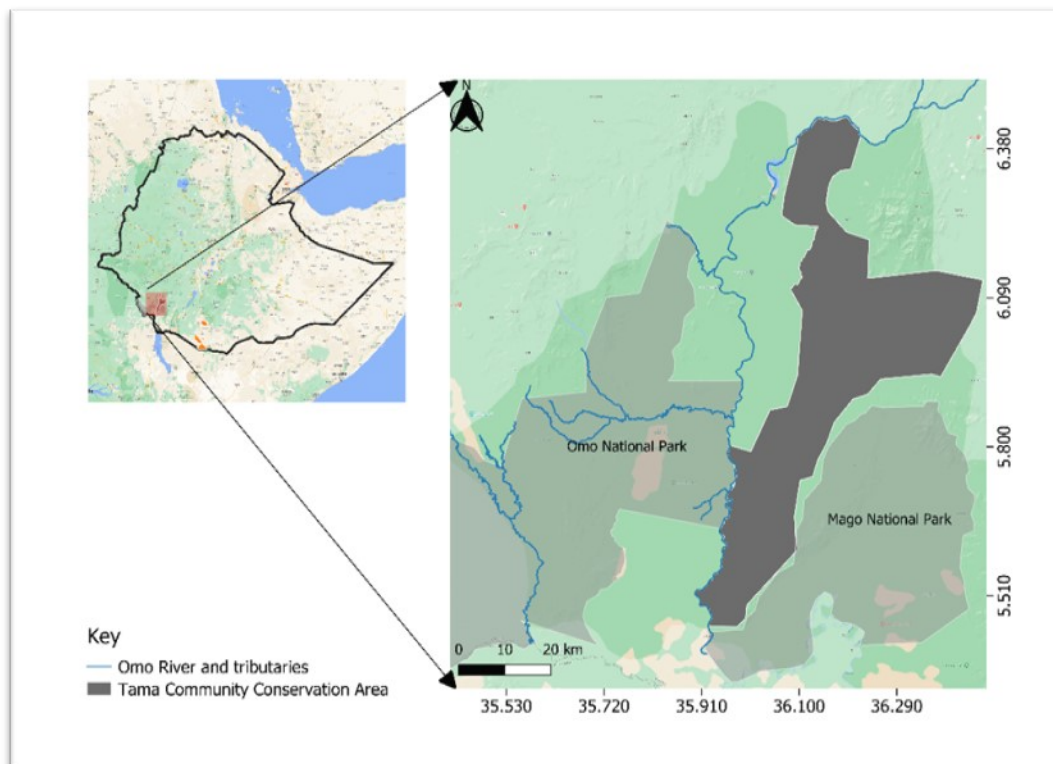

Figure 1: Study area location map

Camera trap survey

In October 2022 a team of LCSE deployed camera traps in TCCA following the least home range size of Leopard as a grid. To deploy the camera traps we engaged with indigenous people of Mursi and Bodi communities. We chose a grid of 5x5 km to place our camera traps, based on suspected minimum female leopard home range size in the area where prey density is very low. This is mainly because the home range size of large carnivores varies greatly between areas (Bauer & Iongh, 2005; Penjor et al., 2019), and nothing has been published on sizes in Ethiopia but it is understood that the density of medium and large-sized prey species in Ethiopia is very low (Bauer, 2016).

We installed one un-baited Bushnell camera trap in every grid cell, as much as possible in the centre and in a location with a feature that optimised detection (presence of water or wildlife spoor, absence of signs of anthropogenic activity) (Berkel, 2014). The camera trap units were left in the field for 60 continuous days. We discarded camera trap locations which are inaccessible and near to settlement to reduce risk from theft/vandalism. In total 53 camera traps were established in all over the area, excluding areas of high-density settlement, inaccessible areas and large rivers. Of these 46 camera traps has been effectively retrieved from the sites. All wildlife species images captured by the camera traps were then determined based on their unique pelage patterns using naked eyes. DigiKam software has been used for image tagging and images metadata extraction was made using exiftool software in R studio.

Results and discussion

A total of 35 mammalian species from seven orders and 15 families were recorded from 46 camera traps deployed in Tama community conservation area. Of these, 23% of the species are listed globally threatened in the IUCN red list status and 35.5% are belonging to order carnivora including three large carnivores namely: lion, leopard and spotted hyaena (Table 1). We have captured a very few detection of large carnivore in the area and it wasn't possible to estimate their occupancy for the site. We also failed to captured lion picture in our camera traps but the survey team directly observed one lion cub in one of the nights during our survey. From this survey we understand that while the area supporting high prey density of large and medium sized mammals species but very few large carnivores are roaming the area. Most abundant order was Artiodactyla (37.14%, 13 species) followed by Carnivora, while Pholidota, Perissodactyla and Tubulidentata were the rarest, represented by single species each.

This study indicated that the area supports comparable mammalian diversity with other protected areas of the country. For example, our previous studies which was conducted following similar protocol

Table 1: Large and medium- size mammalian species list recorded from TCCA survey and their conservation status in 2022-2023

Order	Family	Common name (Scientific name)	Sources	Conservation status
Primates	Cercopithecidae	Olive baboon (Papio anubis)	CT	LC
Primates	Cercopithecidae	Patas monkey (Erythrocebus patas)	CT	NT
Primates	Cercopithecidae	De Brazza's monkey (Cercopithecus neglectus)	CT	LC
Rodentia	Sciuridae	Striped ground squirrel (Xerus erythropus)	CT	LC
Rodentia	Sciuridae	Unstriped ground squirrel (Xerus rutilus)	CT	LC
Rodentia	Hystricidae	Crested porcupine (Hystrix cristata)	CT	LC
Carnivora	Canidae	Black-backed jackal (Canis mesomelas)	CT	LC
Carnivora	Mustelidae	Honey badger (Mellivora capensis)	CT	LC
Carnivora	Herpestidae	Common dwarf mongoose (Helogale parvula)	CT	LC
Carnivora	Herpestidae	Common slender mongoose (Herpestes sanguineus)	CT	LC
Carnivora	Herpestidae	White-tailed mongoose (Ichneumia albicauda)	CT	LC
Carnivora	Hyaenidae	Spotted hyaena (Crocuta Crocuta)	CT	LC
Carnivora	Viverridae	Common genet (Genetta genetta)	CT	LC
Carnivora	Viverridae	African civet (Civettictis civetta)	CT	LC
Carnivora	Felidae	Serval (Leptailurus serval)	CT	LC
Carnivora	Felidae	Caracal (Caracal caracal)	CT	LC
Carnivora	Felidae	Leopard (Panthera pardus)	CT	VU
Carnivora	Felidae	Lion (Panthera leo)	PO	VU
Pholidota	Manidae	Ground pangolin	CT	VU
Tubulidentata	Orycteropodidae	Aardvark (Orycteropus afer)	CT	LC
Perissodactyla	Equidae	Common zebraa (Equus quagga)	CT	LC
Artiodactyla	Suidae	Bushpig (Potamochoerus larvatus)	CT	LC
Artiodactyla	Suidae	Forest hog (Hylochoerus meinertzhageni)	CT	LC
Artiodactyla	Suidae	Common warthog (Phacochoerus africanus)	CT	LC
Artiodactyla	Giraffidae	Giraffe (Giraffa camelopardalis)	CT	VU
Artiodactyla	Bovidae	African buffalo (Syncerus caffer)	CT	NT

Artiodactyla	Bovidae	Lesser kudu *(Tragelaphus imberbis)*	CT	NT
Artiodactyla	Bovidae	Bushbuck *(Tragelaphus scriptus)*	CT	LC
Artiodactyla	Bovidae	Common duiker *(Sylvicapra grimmia)*	CT	LC
Artiodactyla	Bovidae	Kirk's dik-dik *(Madoqua kirkii)*	CT	LC
Artiodactyla	Bovidae	Guenther's dik-dik *(Madoqua guentheri)*	CT	LC
Artiodactyla	Bovidae	Oribi *(Ourebia ourebi)*	CT	LC
Artiodactyla	Bovidae	Waterbuck *(Kobus ellipsiprymnus)*	CT	LC
Artiodactyla	Bovidae	Lelwel *(Damaliscus lunatus)*	CT	EN

identified 21 species of mammals from Maze National Park, 29 from Chebera Churchrura National Park and 41 from Omo National Park (Asfaw et al., Unpublished). The existence of relatively higher numbers of vulnerable and endangered species in the area indicates that the landscape is an important area to conserve and maintain threatened species and given conservation priority. The few number of large carnivore detection while having high prey density indicated that there might be high level of human-large carnivore conflict in the area, that leads their population to low number and further study need to conduct to understand Human-large carnivore interaction. In general, the results of the study indicated high level of large and medium sized mammals diversity recorded in TCCA and calls for conservation attention.

Acknowledgment

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