



ISSN 2278 – 0211 (Online)

Planning for Core Wildlife Conservation Area of Gambella National Park

Gatluak Gatkoth Rolkier

Ph.D. Candidate, Ethiopian Institute of Architecture, Building Construction and City,
Addis Ababa University, Addis Ababa, Ethiopia

Abstract:

The planning for core area for wildlife conservation of the Gambella National Park was initiated to fulfill the knowledge gap for the lack of planning on core wildlife conservation in the previous management plan. The objectives of this research were to determine the abundance, distribution and diversity of key wild animal species of the Park, investigate the migration corridors of White eared kob and the African elephant and develop plan for core wildlife conservation of the Park. The methods used for planning were diversity, abundance, distribution and sensitive habitat types used by key wild animal species and migration routes for migratory species. The GIS version 10.1 was used for analyzing and planning the core conservation areas. Therefore, the Park areas were divided into five zones such as core wildlife conservation area, visitors use zone, low use zone, migration corridors and buffer zone. The results had indicated that, the core wildlife conservation has the highest diversity of wild animal species in the Park. The management objective of this zone is proposed to be aimed at protection and conservation of habitat, so that the resources in the Park remain undisturbed for survival of wild animal in general and endangered species in particular. The visitors use zone serve as dry season refugee areas for large number of White eared kob and also represented more abundance and distribution of key wild animal species next to the core wildlife conservation areas in the Park. The low use zone is part of the Park, where some human impact is expected. The recreation and administrative objective is proposed to be exceeding the protection of nature. The migration corridor is proposed to be managed by transboundary agreement and joint management cooperation which is also supposed to be agreed by the Ethiopian Wildlife Conservation Authority and South Sudan Wildlife Services. The buffer zone is proposed to be managed by the Gambella National Park office based on agreement between the surrounding community and the Park office.

Keywords: Planing, core wildlife conservation, diversity, abundance, distribution, zones and species

1. Introduction

Planning for conservation and management of wildlife zonation of the Gambella National Park was found to be crucial to determine the Core wildlife conservation areas of regional endangered wild animal species of the park. These species were African elephant, Nile lechwe and Shoe bill stork. They were used as the first criteria for assigning the core conservation area which was mainly the wetlands habitat of the Park. The other four zones were also found to be very important for the conservation and management of the Park. The visitor use zone is proposed to be used by the visitors but with restriction to be used for development of infrastructure, however, in the low use zone the recreation and administrative objective is proposed to be exceeding the protection of nature, however, the impact of infrastructures development must be kept to the minimum. The area covered by buffer zone has to be negotiated by the local community and the Park office. The migration corridor was proposed to be managed by the transboundary and conservation agreement between Ethiopian Wildlife Conservation Authority and South Sudan Wildlife Services.

The Baro-Akobo Basin master plan study of water and land resources of the Gambella region (Selkhozpomexport, 1989) described the dominant land cover type of the park and identified 111 species of fish from region. The Ethiopia-compendium of wildlife conservation information (Hillman, 1993) had described 41 species of mammal and 154 species of bird from Gambella National Park. Tesfaye Awas (1997) described the Ethnobotany of non-cultivated food plants and wild relatives of cultivated crops in Gambella region including the Gambella National Park. Gambella National Park management plan (GNPM, 2004) had described the status of 8 species of mammal and 4 species of birds and proposed boundary modification, optimal protection and conservation of wildlife of the park; however, nothing has been done in terms of planning, the core area for wildlife conservation of the National Park. This research was initiated to fulfil the knowledge gap for the lack of planning on core wildlife conservation of the Park.

2. Objective

The objectives of this research are:

To determine the abundance, distribution and diversity of key wild animal species of the Park
 To investigate the migration corridors of White eared kob and African elephant
 To develop plan for core wildlife conservation area of the park

3. Materials and Methods

3.1. Description of Study Area

Gambella National Park is located in the lowland plain of the Gambella People's National Regional State. According to EWCO (1993), the park is situated within latitude of 8°N and longitude of 34°15'E (Figure, 1). It is situated between eight administrative districts namely Jikawo, Lare, Wantawo in the north, Akobo in the west, Itang and Abobo in the east, Gog and Jor in the south. It was established in 1973 with newly, redemarcated area covered of 4,575km².

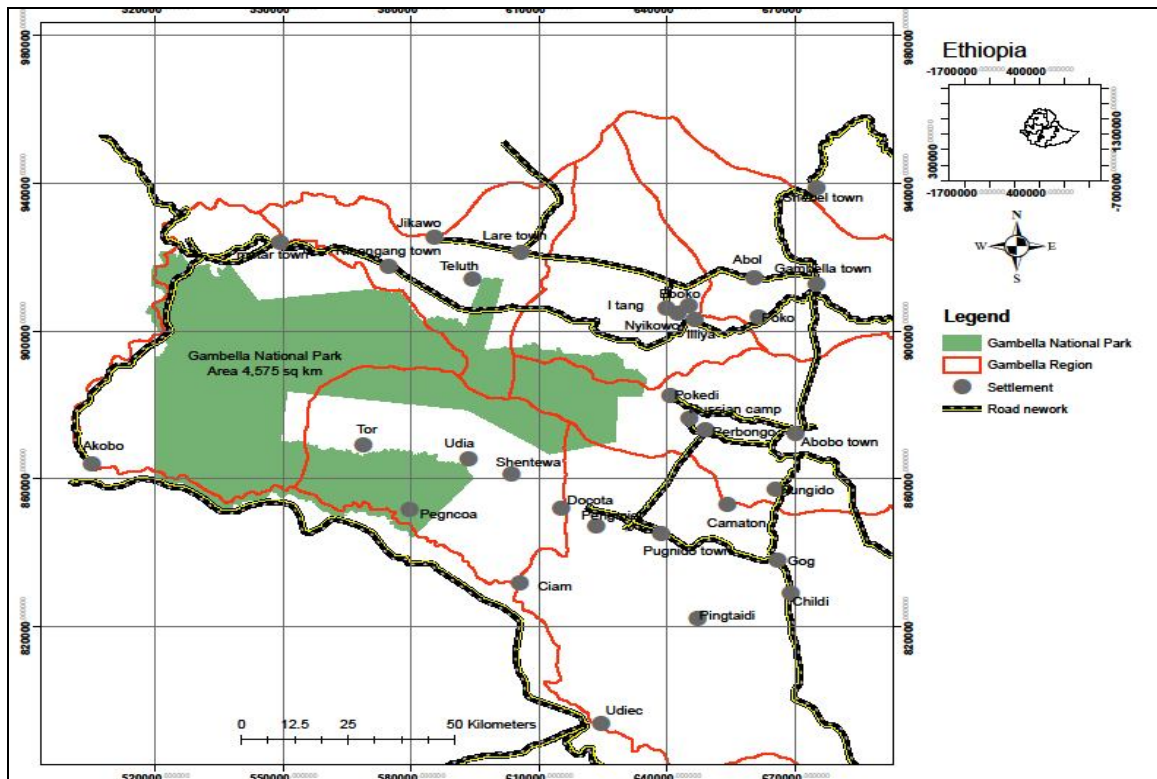


Figure 1: Location of Gambella National Park within Gambella Regional State

3.2. Climate

As part of Gambella region, Gambella National Park is characterized by unimodal rainfall brought by tropical monsoon blowing from South Atlantic and Indian oceans. It is also characterized by heavy rainfall during the wet season (May to October) and very little precipitation during the dry season (November to April). The mean annual rainfall of the park is 1400mm. The mean annual temperature is 27°C but the mean monthly temperature varies significantly. The absolute maximum temperature of 45°C has been recorded in mid March while the absolute minimum temperature of 10.3°C has been recorded in December (CSG, 2000).

3.3. Topography

The region in general comprises contrasting topographic features with altitude varying from 394 m.a.s.l in western lowland areas to 2300m a.s.l. in eastern highlands. The land mass of the region is extensive flat plain that is surrounded by chains of mountains, which form drainage system in the North and South eastern part of the region. The park is located in the flat plain with average altitude of 500 m.a.s.l (Selkhozpomexport, 1989).

3.4. Vegetation

The vegetation communities of Gambella National Park comprise Combretum-Terminalia woodland, Terminalia woodland, Tamarindus-Terminalia woodland located in the eastern part of the Park and the Balanites-Acacia woodland, Acacia woodland, Ziziphus-Acacia wooded grassland, Orzya-Ziziphus savannah grassland and Hyparrhenia-Orzya open grassland situated in the west, northwest and central part of the Park (Gatluak, 2014). The Cyperus-Perpymuo-Orzya seasonal swamp, Orzya-Hyparrhenia permanent swamp and Orzya permanent swamps are also other major vegetation community types found in wetlands habitats of the Park.

3.5. *Wildlife*

The Park has diversity of wildlife resources with 69 species of mammals, 327 species of birds, 7 species of reptile, 493 species of plants and 92 species of fish (Hillman, 1993, Selkhozpomexport, 1989 and EWNHS, 1996). Wild animals such as White-eared kob (*Kobus kob*), Nile lechwe (*Kobus megaceros*), Africa elephant (*Loxodonta africana*), Buffalo (*Syncerus caffer*), Lion (*Panthera leo*), Leopard (*Panthera pardus*), Roan antelope (*Hippotragus equinus*), Giraffe (*Giraffacamelopardalis reticulate*), Lelwel hartebeest (*Alcelaphus bucelaphus*) and Tiang (*damaliscus lunatus*) are important species of the park. Some of these species such as Nile lechwe (*Kobus megaceros*) and White eared kob (*Kobus kob*) are regionally endemic. Rare bird species such as Shoe-billed stork (*Balaeniceps rex*), Black-winged pratincole (*Glareola nordmanni*) and Basra reed warbler (*Acrocephalus griseldis*) are unique feature of the avian fauna of the area.

3.6. *Population*

The population census conducted in 2007 revealed that there are over 18 ethnic groups living in Gambella Region (CSA, 2007). The major indigenous nationalities in Gambella are of Nilotic origin and include: Nuer, Anuak, Majanger and minority populations of Komo and Opuo. They are characteristically jet black with a proud majestic bearing. The same population census indicated that out of the total population of 306,916 about 143,189 (46.65%) are Nuer, 64,959 (21.17%) are Anuak and 12,277 (4%) are Majanger (CSA, 2007).

4. **Methods**

4.1. *The Abundance, Distribution and Diversity of Key Wild Animal Species of the Park*

The total area was divided up into transects, known as sample units. A selection of these transects were based on seasonal and natural variation of the study area. Therefore, two seasons survey programs were conducted (Figure, 2). The first survey was conducted at dry season started from major road toward the central part of the Park. This survey had covered large part of north, west and east of Gambella National Park. The second survey was conducted at wet season of the year. This survey had covered small part of southeast, east and northern part of the Park. Within each survey program, the transect lines were used. Six men in a queue were involved in each survey. The front man was used a compass to lead the team in a straight line along the transects and measure the bearing of track of animals, two men were positioned at the middle and one was observed on the right side of the transect while the other observed on the left side of transects and the rear man was used GPS receiver and keep recordings of information of observed wild animals species.

Relevant attributed information of key observed wild animal species both for dry and wet seasons were added in the attribute tables and ArcGIS desktop as shape file. The shape files for recorded wild animals were overlaid on the habitat maps. Therefore, distribution and density of each recorded wild animals were analyzed and presented on habitats map.

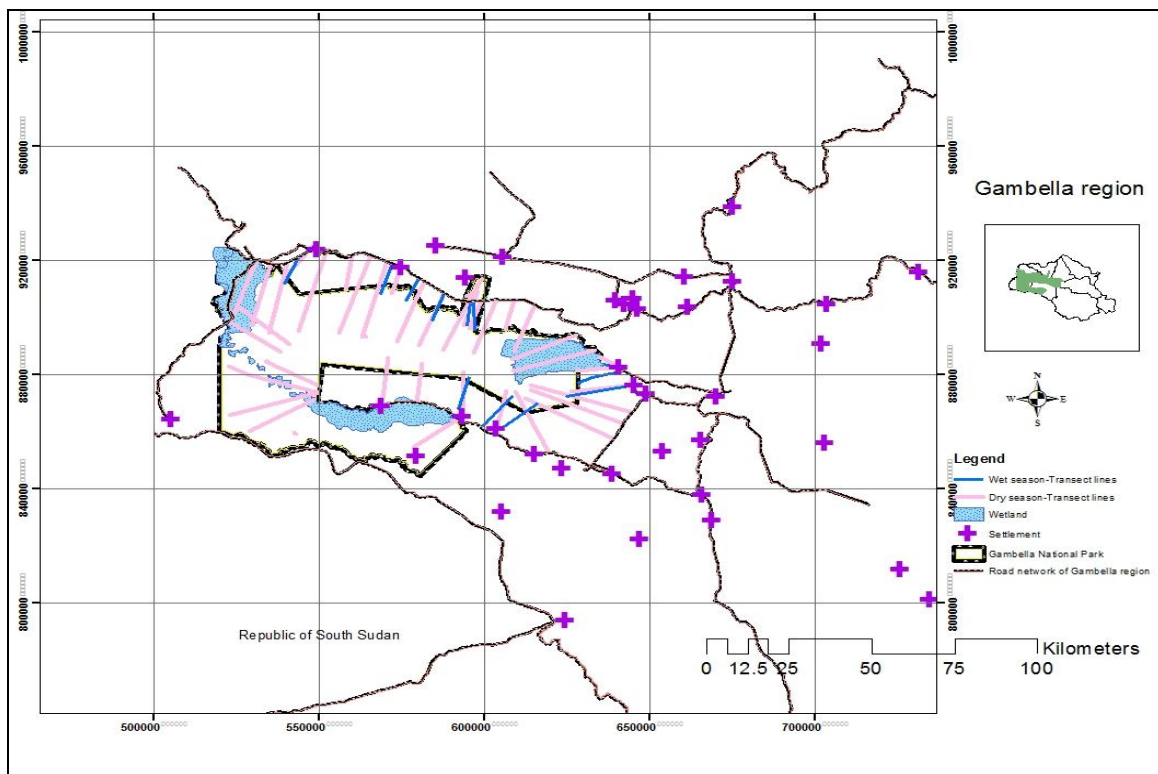


Figure 2: Survey transect lines for studied key wild animal species of Gambella National Park

4.2. Migration of White Eared Kob and African Elephant

This research was designed based on satellite collars for collection animal tracking data that help to understand how individuals or studied animals population move within the Gambella National park and migrate across international boundary to South Sudan. This information is being used to plan for the migration corridor of migratory species. Therefore, in April 2013, the satellite collars deployment was conducted by Ethiopian Wildlife Conservation Authority (EWCA) and Horn of Africa regional environment network centre team. Total samples of 47 satellite collars: 43 White eared kob and 4 Elephant were systematically, deployed to different sites of Gambella National park and South of Gambella region.

GPS receiver with its own specific code was downloaded in the EWCA website. The researcher was allowed by Ethiopian wildlife Conservation Authority to have password for each animal species. The ideas were to investigate migration of White eared kob which was assumed to be existing migratory species and examined the other species such as Nile lechwe and African elephant.

GPS receiver with its own specific code was downloaded in the website internet. The researcher was allowed by Ethiopian wildlife Conservation Authority to have password for each animal species. The ideas were to investigate migration corridor of studied wild animal species. The movement of sampled animal species were monitored through GIS technology using daily and monthly GPS points as unit of analysis. ArcGIS version 10 was used for analyzing and mapping the monthly movement pattern.

4.3. The Planning Criteria Were

- i. Diversity and sensitive habitat types used by key wild animal species
- ii. Abundance and distribution of key wild animal species per habitat type
- iii. Migration route for key studied migratory species

Base on these criteria, the GIS version 10.1 was use for analyzing and planning the core conservation areas. Therefore, the Park areas was divided into five zones: The areas with the highest diversity and sensitive habitat types of studied wild animal and regional endangered species was delineated and digitized as core conservation area. The area with more distribution and abundance of studied wild animal in the park but lesser divers than the core area was delineated and digitized as visitor use zone. The area with the least abundance, distribution and diversity of wild animal species in the park was delineated and digitized as the Low use zone. The areas which indicated the migration routes for migratory species was delineated and digitized as studied wild animal migration corridors. The area between the National Park and development activities such as agricultural investment and human settlements was delineated and digitized as buffer zone.

5. Results and Discussions

5.1. Abundance and Distribution of White eared kob (Kobus Kob)

This study had shown the abundance and distribution of White eared kob across all location. The largest groups distributions of White eared kob (150-260) were observed at northern part of the Park followed by the groups of 90-150 individuals, which were observed at north of Gilo swamp. However, the groups which had 50-90 and 23-50 were observed in the central and southwestern part of the Park (Figure, 3). Therefore, it can be concluded that, the largest abundance of the White eared kob was observed in the north of Gambella National Park where as its least abundance was observed in the wetlands and the south of the National Park.

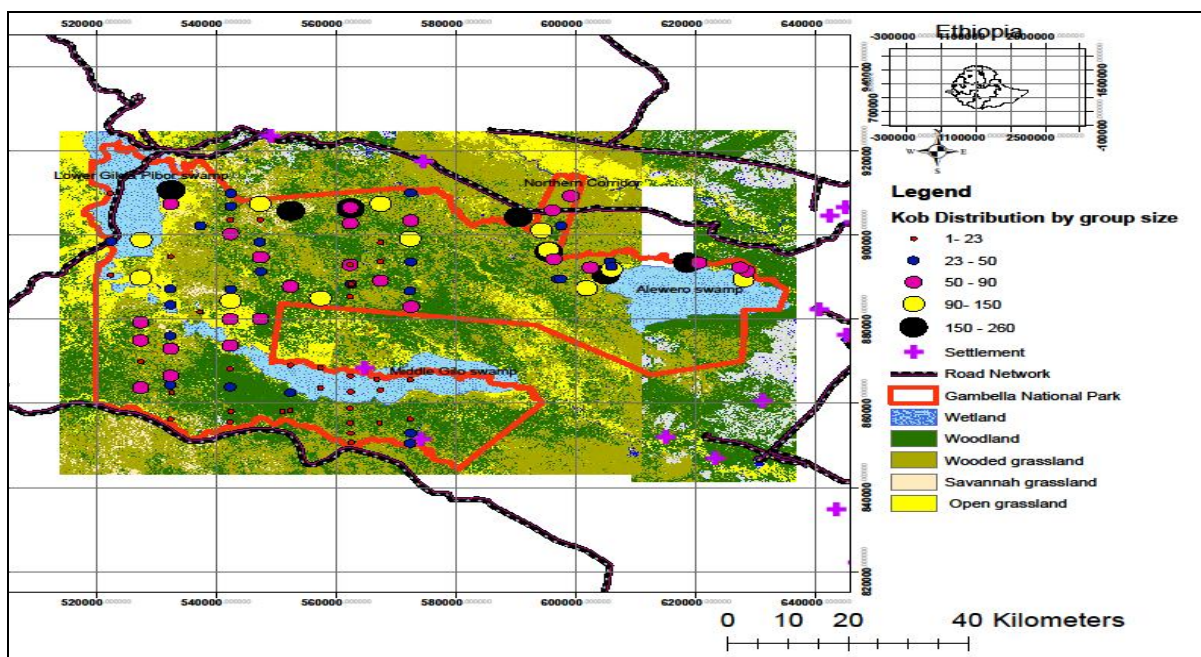


Figure 3: Dry season distribution of White eared kob in Gambella National Park

5.2. Diversity of Key Wild Animal Species of Gambella National Park

The diversity of key wild animal species was observed in the east and west to south west of the Gambella National Park. The east which is mainly Alewero swamp comprise the key wild animal species such as Buffalo, Tiang and Nile lechwe and Shoe bill stork which are regional endangered species of the Park (Figure, 4). These wild animal species are found in wetlands of the park which is considered to be sensitive habitat of the Park. The wild animal species which included African elephant, Nubian Giraffe, Roan antelope and few Buffalo were observed in the west and south of the Gambella National Park. This information of diversity of key wild animal species was used for planning for core wildlife conservation area of the Park.

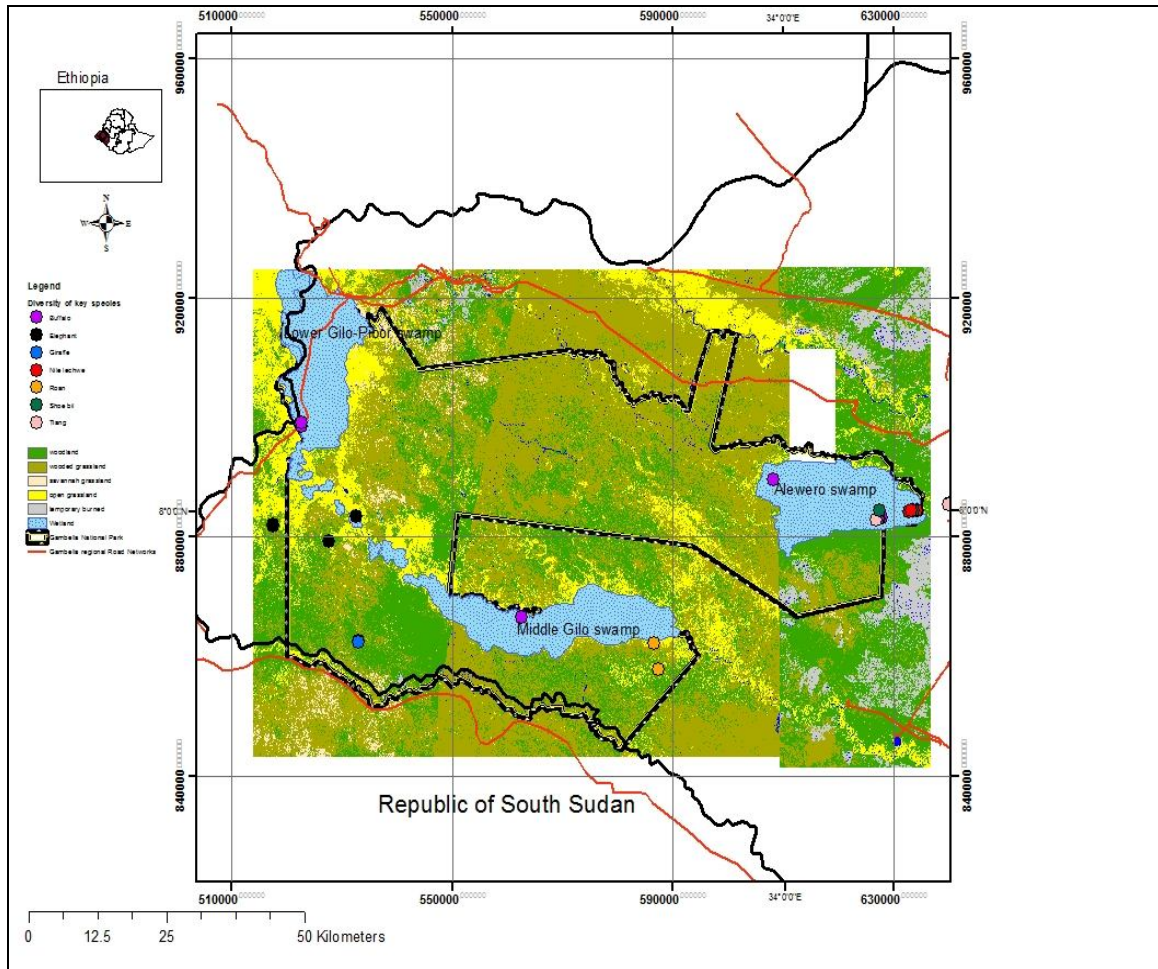


Figure 4: Diversity of key wild animal species of Gambella National Park

5.3. Migration Patterns of White Eared Kob

The satellite collars result had shown geographical and seasonal migration patterns of White eared kob. The patterns of migration indicated that, the majority of white eared kobs migrate to Republic of South Sudan. All the major wet season patterns observations were located in South Sudan (Figure, 5). May, June, July, August, September, October and November were the wet season of the year in Gambella region which represented the migration patterns of White eared kob on the map. The start of migration was observed in May across the north and south of Boma National Park of South Sudan. However, the presence of some migration patterns for the residents' population was also observed at Gambella National Park and this had confirmed that, the major population of White eared kob migrates to the Republic of South Sudan. There was no resident population observed in south of Gambella region (Figure, 5). The main reason may be due to the presence of Boma National Park border with South of Gambella region where the human pressure was less. Three White eared kob migration corridors were observed. One each was observed in the west and south of Gambella National Park. The other was observed in South of Gambella region (Figure, 5). August, September, October and November were the months the northwestern and southern migration trips match together. There may be special case why two migration trips joint together. This special case inside South Sudan may be due to presence of Conservation landscape in those areas where poaching and habitat disturbance are minimal.

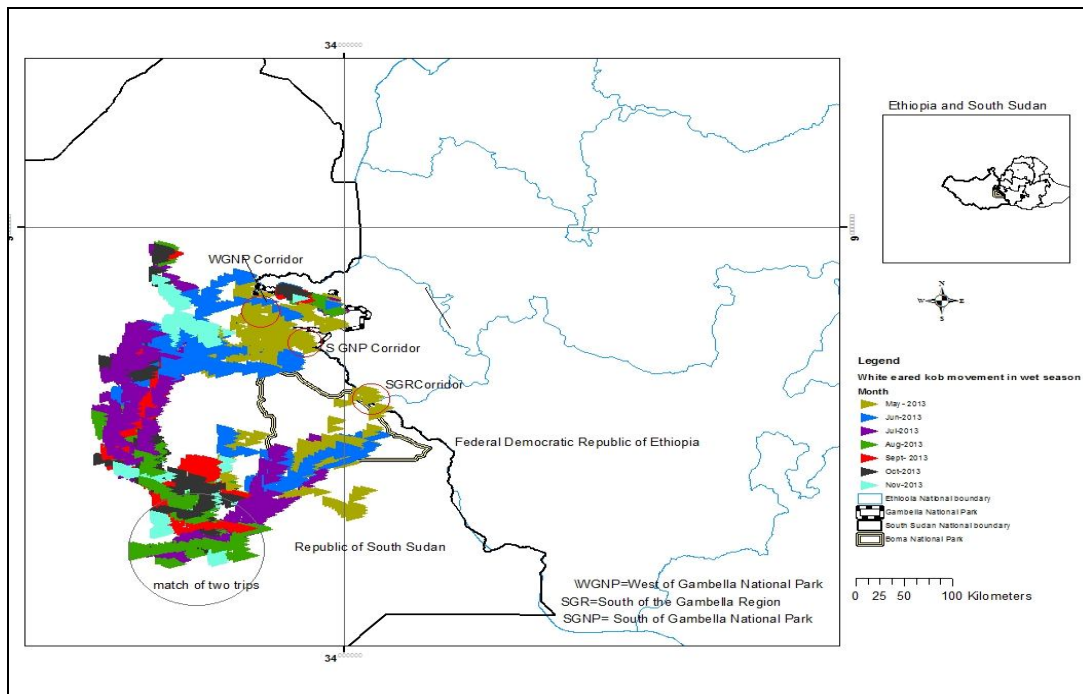


Figure 5: Migration Patterns of White eared kob between Gambella and South Sudan

5.4. Migration Pattern of African Elephant

The results of satellites collar on four African elephant had confirmed that, African elephant is one of the seasonal migratory species of Gambella National Park. Their wet season patterns migration were concentrated along the border of Gambella and South Sudan, which was marked by the Akobo basin. Their patterns of migration in May and June were observed from the west of Gambella National Park upwards across border of South Sudan and again into South of Gambella region (Figure, 6). However, in July, August and September their migration patterns were observed back toward Gambella National Park (Figure, 6). In October, they returned to South Sudan. In November, their migration patterns were observed back to Gambella National Park and west of Gambella region. Therefore, it can be concluded that, elephants’ population use to be in Gambella National Park and its surrounding areas in the both early and late wet season of the year and stay in South Sudan in the middle of the wet season of the year and their migration patterns followed the same path. Base on this studies two main elephant corridor has been recognized. The first one at the south of Gambella National Park and the other at the south of Gambella region

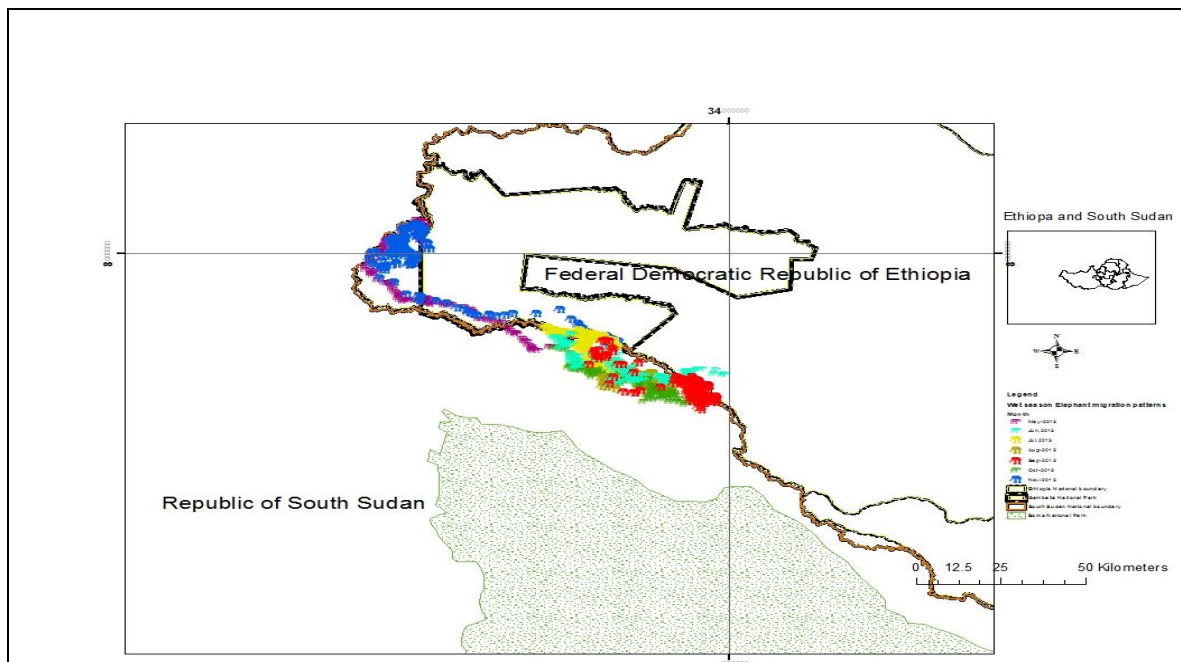


Figure 6: Migration patterns of African elephant between Ethiopia and South Sudan

5.5. Planning for Core area of Wildlife Conservation

5.5.1. Core Area of Wildlife Conservation

This is an area with sensitive habitat type in the Park, consisting mainly wetlands of Alewero, middle Gilo and some part of lower Gilo-Pibor swamp. The Alewero swamp and its surrounding areas was found to be the habitat of Nile lechwe, Shoe bill stork, Tiang and Buffalo where as the middle Gilo and lower Gilo-Pibor swamp were found to be habitats of African elephant, Giraffe, Roan antelope and White eared kob. Therefore, these habitats have the highest diversity of wild animal species in the Park. This zone covered an area of 1821km², comprise 32.04% of the Park area (Figure, 7). The management objective is proposed to be aimed at protection and conservation of habitat so that the resources remain undisturbed for survival of the wild animal in general and endangered species in particular. The recreation and economic activities in this area should not be allowed.

5.5.2. Visitors Use Zone

This zone serves as dry season refugee areas for large number of White eared kob. It also represented more abundance and distribution of studied wild animal species next to the core wildlife conservation areas in the Park. The management of this zone must be concerned to provide the visitors with an optimum view of nature. The impact of infrastructures development must be kept to the minimum and natural aspect should be maintained. However, traditional uses of resources such as medicine plant, fruit and use of some indigenous plant species as religious function may be allowed provide that they do not hinder the objective of conservation. In other words, traditional extraction of resources use may be permitted based on sustainable basis. It covers a total area of about 1,921km² and consist 33.80% of the Park area (Figure, 7).

5.5.3. Low Use Zone

This is part of the Park where some human impact is expected. The recreation and administrative objective is proposed to be exceeding the protection of nature however, the impact of infrastructures development must be kept to the minimum. It is located in the southeast and north west of Gambella National Park. It had total area of 167km² and consist 2.94% of the Park area (Figure, 7).

Migration corridor

This zone is linkage routes of African elephant and White eared kob between the Gambella National Park and South Sudan. It is situated south of the Gambella National Park and covers area of 222km² comprise 3.91% of the Park area. The transboundary agreement and joint management cooperation of this zone is proposed to be agreed by Ethiopian Wildlife Conservation Authority and South Sudan Wildlife Services.

5.5.4. Buffer Zone

This area serves as buffer between the conservation and development activities such as human settlement and agricultural investment. It is situated 3km outside the Park boundary. The management of this zone is proposed to aim at reducing the conflict of land use or encroachment pressure from surrounding communities and it must be based on the binding agreement to be made between the Park office and local administrators together with local communities. This zone covers an area of 1552km² and comprises 27.31% of the Park area.

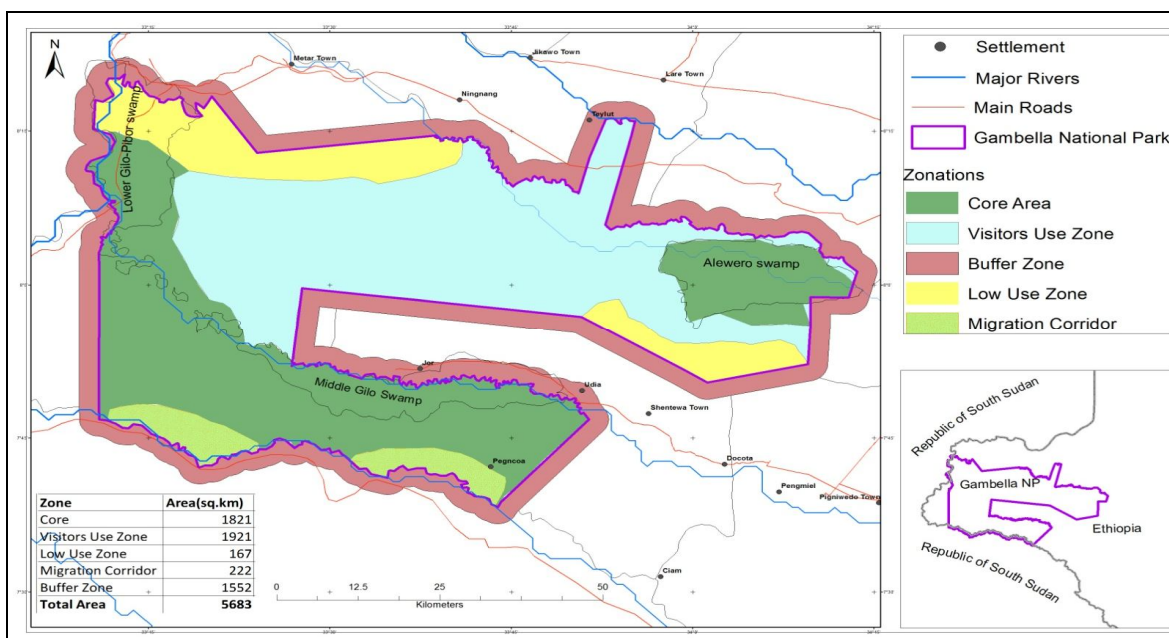


Figure 7: five proposed conservation zones of Gambella National Park

6. Conclusion

It can be concluded that, the abundance, distribution and diversity of key wild animal species of the Park were useful for planning the core wildlife conservation of the Park. Five zonation have been proposed for conservation and management of Gambella National Park. These zonation were core wildlife conservation area, visitors use zone, low use zone, migration corridor and buffer zone

7. Acknowledgements

I would like to thank the Gambella National Park Office for allowing me to use vehicle and providing field technical assistants during data collection. I would also like to thank Ato Ahmed Amdihun, GIS expert at the Ethiopian Institute of Architecture, Building Construction and City Development, Addis Ababa University for his GIS technical support. I am also very grateful to some individuals: Ato Argaw mekonnen, Lakew Birhanu and Dr Ludwig of Sustainable Development of Protected Areas System in Ethiopia for their encouraging and logistic support during data collection. I would like to thank also my supervisors: Dr. Kumilachew & Professor Ruediger for their technical support and advising me to work on this title.

8. References

- i. CSA- Central Statistical Authority 2008. The 2007 Population and Housing Census of Ethiopia: Result for Gambella region. Federal democratic Republic of Ethiopia, Office of Population and housing commission, Central Statistical Authority, Addis Ababa.
- ii. CSG- the conservation strategy of Gambella CSG, 2000. Volume I the resources base. The Gambella peoples' National Regional state. Bureau of planning and Economic Development unpublished report.
- iii. EWCO-Ethiopian Wildlife Conservation Organization, 1993. Unpublished Report. Ethiopian Wildlife Conservation Authority. Addis Ababa, Ethiopia
- iv. EWNHS-Ethiopian Wildlife Conservation and Natural History Society, 1996. Important Bird Areas of Ethiopia: A First Inventory. EWNHS, Addis Ababa, Ethiopia. 300 pp
- v. Gambella Survey. 2010. Unpublished Report for Systematic Survey of Gambella National Park.
- vi. Gambella Survey. 2013. Unpublished Report for Wildlife distribution and human activities of Gambella Region
- vii. Gatluak, G. 2014. Planning for Core areas of Wildlife Conservation at Gambella National Park Using Habitat Classification and Habitat Mapping. PhD dissertation in the Institute of Architecture Building Construction and City Development, Addis Ababa University
- viii. GNPM. P. 2004. Gambella National Park Management Plan Phase III. Unpublished document, Gambella People's National Regional State Bureau of Agriculture, SKAPE Consult, July, 2004. Addis Ababa
- ix. Hillman. C. 1993. Ethiopia: Compendium of Wildlife Conservation Information. Vol I. Ethiopian Wildlife Conservation Organization, Addis Ababa, Ethiopia
- x. Selkhozpromexpor. 1989. Baro-Akobo Basin Master plan Study of Water and Land Resources of Gambella Basin. Final Report. Draft Volume IX. USSR. Moscow.
- xi. Tesfaye Awas. 1997. A Study on the Ecology and Ethnobotany of Non-cultivated Food Plants and Wild Relatives of cultivated Crops in Gambella, South-western Ethiopia, M. Sc. Thesis, School of Graduate Studies, Addis Ababa University, Addis Ababa.