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Impact of Agricultural investment and Trans- boundary human wildlife  
conflict in Gambella National Park, Southwest Ethiopia

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## 1. Introduction

Increasing in human population and escalating per capita impacts over the last century have greatly intensified the threats to Earth's life-support systems (UN, 2016). In the face of human transformation of much of Earth's surface through a combination of direct exploitation, habitat change, loss of wild nature and the introduction of alien species has become deteriorated to overcome this get worse protected areas play a vital role in protecting biodiversity from such pressures (Delany, 2014).

In the early 1870s protected areas expanded and concerns of environmental conservation was enhanced with the emergence of the concept of managing protected areas (Pimbert and Pretty, 1995). According to Gashaw (2015), protected areas were created to protect the major biodiversity throughout the world. Thus; these areas have a significant role in conserving biodiversity. However, it is a unhappy fact that these ecologically fundamental resources are usually undervalued and are under threat from population growth and the ever-increasing human need (Zerga, 2015).

Ethiopia is one of the few countries in the world that possesses several protected areas with a unique and characteristic biota with high level of endemism (Scholes, 2004).

Ethiopia gives attention to expand protected areas and a number of protected areas are established and will plan to establish in the future throughout the country. But, originally the protected area system of Ethiopia had not been designed with scientific concepts of biodiversity and its optimal representation protected areas in mind. Like in most countries, it had developed over the years on the basis of educated guesses by wildlife managers, as to where diversity (mainly large mammal diversity) was located and where tracts of land were still available for

protection that would not conflict too much with other land uses(Daan Vreugdenhil et al, 2012). However the issues how much the protected areas expanded in country previously contribute to conserve wildlife is unknown and Ethiopia's ecosystems and special concerned species are not adequately represented within the protected areas network. Gambella national park is one of the national park in Ethiopian that needs special concern to save the hidden treasures within it.

## 1.2. Statement of the problem

Gambella national park is one of the national park found in southwest of Ethiopia where intensive agricultural investments are currently expanding near by the park. These investment activities take in conversion of virgin lands to cultivation fields, in which most the sites are concentrated around the Gambella National Park (GNP). As a result, recent observations indicate that extensive wildlife poaching, human and livestock population pressure, wild animal crime and inappropriate land use policy accompanied by extensive investments have resulted in massive destruction of wildlife habitat and severe wildlife population decline in the national park (Biodiversity Indicators Development National Task Force [BIDNTF], 2010).

Furthermore Gambella national park is the home of key wildlife species of them Nile Lechwe (*Kobus megaceros*), which is uniquely adapted to the wetland habits, including, swamps and marshes. In the National Park, Lechwes inhabit is almost exclusively the flood plains of Alwero wetlands. The source of this swamp is the Alwero river which is also highly utilized by the large-scale rice cultivation in the area (Rolkier, 2015). This unregulated river water diversion lead to decline in the extent and productivity of the wetland ecosystem, ultimately escalates migration of wild animal species affecting their the ecosystem that they inhabit.. Besides, human and livestock encroachment in the park has been increasing, which is due to weak enforcement of existing wildlife policies (Hill et al., 2002).. Therefore, improved understanding on the effects of such anthropogenic disturbance to wildlife is needed to guide decision making and mitigate both the threats and their ecological impacts. Hence, this study will focus in evaluating impact of agricultural investment human wildlife conflict with special emphasis of Gambella-Boma Trans-boundary Landscape.

### **1.3. Rational of the study**

According to allusion, given by several researches out puts originally, the national park management system of the country had not been designed with scientific concepts of biodiversity and its optimal representation national park in mind. Like in most national park of the , it had developed over the years on the basis of educated guesses by wildlife managers, as to where diversity (mainly large mammal diversity) was located and where tracts of land were still available for protection that would not conflict too much with other land uses. This has led to a situation where even though a large portion of areas of high biodiversity was covered, obvious gaps nonetheless occur according to scientific criteria. The investment policy intervention towards of the core habitat of the species contributed to this situation. There is now a need to systematically fill the gaps in knowledge about anthropogenic and identify resulting areas of special value and interest.

## 1.2. General Objective

The overall objective of the study is to assess the impact of agricultural investment and trans-boundary human wildlife conflict in Gambella National Park, Ethiopia.

### 1.2.1. Specific Objectives

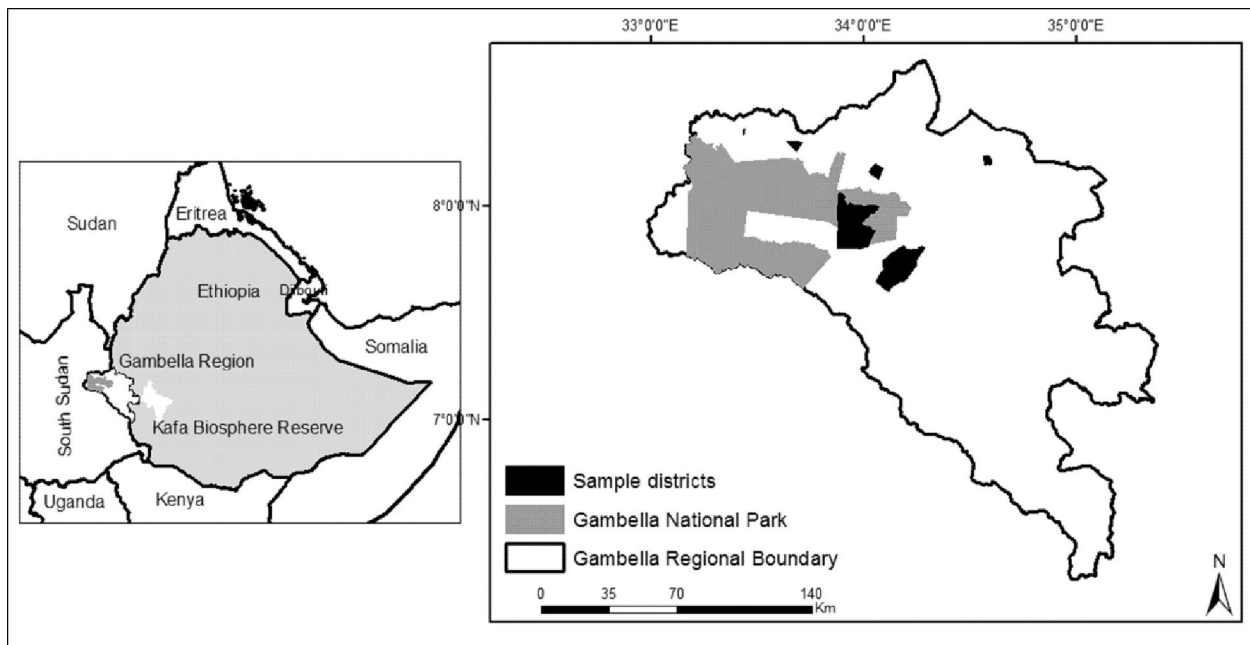
- To identify type of investment /human activities and its impacts in the wildlife habitat and its population.
- To investigate misuse of diplomatic invulnerabilities in disobeying the national wildlife law and policy with exceptional emphasis of the transboundary part of the national park.
- To identify type and level wildlife crime along the trans-boundary part the national park.
- To investigate driving factors of human wildlife conflict in the study site with special emphasis of the transboundary part of the national park.
- To understand attitude of local peoples to wards of ecosystem (wild animals) conservation in the case of Gambella National Park.

## 2. Methodology

### 2.1. Study site

Gambella National park (GNP) is located 850 km west of Addis Ababa. It was established as a protected area in 1973 to conserve a diverse group of wildlife and their unique habitats. The park is located on the Baro Akobo river system it hosts several wildlife not found elsewhere in Ethiopia. These include the Nile lechwe and White- eared Kob (Rolkier et al., 2015). The park has the total area of 5,061 Km<sup>2</sup>, after having been re-delineated, thereby reducing the total area of the park from 5061 km<sup>2</sup> to 4575 km<sup>2</sup>. if it is the largest protected area in the country. Its northern boundary is formed by the Baro River.

GNP is a vast collection of savannahs, flood plains, riverine forests, lazily flowing rivers and grasslands. The general landscape is flat but it has area of raised ground that supports deciduous woodlands and grasslands. Major wildlife conserved includes white-eared Kob (*K. kob leucotis*), Nile Lechwe,( *Kobus megaceros*) Roan Antelope(*Hippotragus equinus*) and African Elephant(*Loxodonta Africana*). The near threatened Shoebill(*Balaeniceps rex*) and Basra Reed Warbler(*Acrocephalus griseldis*) birds have been recorded from here back in the 1960s (Rolkier et al., 2015)





## **2.2. Sample Size and Sampling Techniques**

Stratified random sampling technique will be employed. Sampling frame will be divided into sub-sections comprising groups that are relatively homogeneous with respect to wealth status (rich, poor and medium) and 5% of households from each stratum will be selected randomly.

## **2.3. Data Sources and Collecting Tools**

### **2.3.1. Document analysis**

Document analysis is an important research tool mostly used in social research method and is an invaluable part of most schemes of triangulation. The documentary work might involve reading of journal articles, books and other unpublished materials such as plans, reports, official records, research papers, and letters etc. (Heffernan, 2001).

### **2.3.2. Preliminary surveys**

The preliminary survey will be conducted for three sequential weeks through informal interview with residents (elders), scouts, experts and managers. Its purpose is not only to bring together the researchers with the study area and some responsible bodies, but also to obtain general background information on the course of Gembella National Park establishment; its management and interconnection between place alongside community and the national park.

### **2.3.4. Pilot Survey**

The pilot survey will be carried out before the actual data collection. The major use of the pilot survey is to assess the questionnaire against its clarity to respondents; its applicability and suitability for the particular study. Based on the feedback of the pilot survey, the questionnaire will be revised and developed.

### 2.3.5. Sample size determination:

This study will applied the simplified formula developed by Yamane, (1967) and reviewed by Israel, (2012);

$$n = \frac{N}{1 + N(e)^2} = 247 \dots \dots \dots \text{Equestion 1}$$

Where ‘n’ is the sample households size, ‘N’ is the total household’s size and ‘e’ is level of precision. The above formula was widely applied in several survey researchers and up to ±10% precision level (e) is acceptable (Pongprayoon, 2006).

### 2.3.6. Questionnaire Survey

In order to elicit human-wildlife conflict data, questionnaires will be designed for local community members. A series of questions that are easy and convenient to answer but can describe the intended objectives and answer the research questions will be formulated into a questionnaire. The questions aim to elicit local perspectives on the type of investment activities occurring within with the national park and impact experienced. Local views on conflict management techniques will also be solicited. Finally, any ideas about additional measures that could complement currently used techniques to reduce future conflicts will seek from community members. Therefore a questionnaire comprising series of both structured and semi-structured questions will be administered to randomly selected households. Key informants interview, focus group discussions (FGD), and direct Observations will be employed. To measure the attitudes of the local communities’ likert scale statements will be prepared.

### 2.3.7. Description of Variables and Respective Hypothesis

**Dependent Variable:** The respondents’ most positive and most negative experiences (perception and attitude) related to the investment Activities and transboundary crime in the study area..

## **Independent Variable**

### ***Social Factors***

- Gender
- Age Group
- Marital Status
- Educational Qualification
- Family Size
- Occupation
- Community involvement in decision-making

### ***Economic Factors***

- Land Size
- Annual gross income
- Income from sales of firewood
- Understanding about the aim of livelihood diversification programme
- Involvement in livelihood diversification programme
- Demand for fuel wood in the nearby markets
- Expansion of agricultural land
- Compensation (direct, indirect)

### ***Respondents' awareness and perception***

- Awareness
- Information Source
- Acceptability of Rules
- Rules affecting Livelihood

- Ways Rules Affect Livelihood
- Rules need Adjustment
- Rules to be Adjusted
- Rules Effectiveness

### **2.3.8. Focus group discussion**

Using focus group discussion as data collecting method is advantageous in allowing for in-depth discussion and probing on an issue of interest, providing a tremendous amount of information at a reasonable cost (THCU, 2012). In the context of this study, focus group discussion will be conducted with selected households and youth group. Open-ended questions will be used to gather information on how local communities think and feel about this national park in general and wildlife particularly. Snowball method will be employed to select focus group discussion participants.

### **2.3.9. Key informant interview**

Key informant interview is in-depth interview with people who know what is going on in the community. It is appropriate to get information about a pressing issue or problem in the community from a limited number of well-connected and informed community experts. Moreover, it helps to understand the motivation and beliefs of residents on a particular issue and get information from people with diverse backgrounds and opinions (USAID, 2004). In this study, the researchers will use key informant interview to collect information from elders and wildlife experts about history of the area and its current relationship with the juxtapose community. Generally, this qualitative data collecting tool is expected to answer the question “what is going on in and around the national park” Both focus group discussion and key informants interview will be supported by checklist containing leading questions.

### 2.3.10. Field Observation

Field observation is a qualitative method whose objective is to help researchers learn the perspectives held by study populations. According to Leta *et al.*, (2016) field observation is advantageous in identifying important variables and gathering fresh-hand data (observation is not dependent on the subjects' ability or willingness to report the behavior or action); inexpensiveness; and providing data rich in details and sensitivity. In the context of this study, field observation will be used to collect direct information concerning routine local community impacts/activities (grazing, fuel wood collection, settlement, farmland expansion, timber production) in relation with the national park.

### 2.3.11. Analyzing Likert Response Items

The attitudinal data will contain 16 alternative likert scale statements. Each respondent will be respond to the 16 statements based on the five-point likert scale methods ranging from strongly agree to strongly disagree (weightings 1 to 5) will be assigned to the response categories. The SPSS new version will be used to compute (mean and standard deviation) to differentiate and classify respondents according to their level of attitude. Respondents will be classified according to their attitude as Positive, Neutral, and Negative according to the procedure followed by Gebrelibanos *et al.*, (2013) the mean and standard deviation of the average marks score of the 16 statements for each respondent were used to classify respondents based on their attitude.

A = Positive:  $\text{Mean} + \text{Std. deviation} \leq A \leq \text{Max}$

B = Neutral:  $\text{Mean} \leq B < \text{Mean} + \text{Std. deviation}$

C = Negative:  $\text{Mean} - \text{Std. deviation} \leq C < \text{Mean}$

The internal consistency of the Likert scale statements will be checked by calculating Cranach's alpha reliability coefficient ranges between 0 and 1 (Gliem and Gliem, 2003). The closer the Cranach's alpha reliability coefficient is to 1, the greater the reliability of the items in the scale. For more illustration, the following rule of thumb will be provided (Gliem and Gliem, 2003).

Rule of thumb; Cranach's alpha

> 0.9 → Excellent

> 0.8 → Good

> 0.7 → Acceptable

> 0.6 → Questionable

> 0.5 → Poor

< 0.5 → Unacceptable

## 2.4. Data Analysis:

Statistical package (software) SPSS version16 will be used to analyze the data. Each question will be coded to run SPSS 20 (Ki-square and Cross sectional descriptive statistics will be carried out to calculate frequencies, and to allow cross-tabulations (Field, 2000). Result of FGD will be analyzed by content analysis method and narrative fashion.

### 2.4.1. Expectations (outputs/results)

- ✚ Investment /human activities and their impacts in the wildlife habitat and its population will be identified and scientific solutions will be applied.
- ✚ Misuse of diplomatic invulnerabilities in disobeying the national wildlife law and policy with exceptional emphasis of the transboundary part of the national park will be strengthening.
- ✚ Nature and level wildlife crime along the trans-boundary part the national park will be identified and elucidations will be established.
- ✚ Driving factors of human wildlife conflict in the study site with special emphasis of the transboundary part of the national park will be well-known and resolute.
- ✚ Attitude of local peoples to wards of ecosystem (wild animals) conservation in the case of Gambella National Park will be well briefed and awareness creation will be applied.
- ✚ Consequences of human wildlife conflict and traditional mitigation measures in the national park will be recognized and will be used as policy input.

### 2.4.1. Work Plan

No.	Activities	Research activities period											
		2021/2022				2022/23				2024/25			
		Se p	oct	N ov	De c	Ja n	Fe- Ma r	AP- May	Ju- Au	Sep- No	De -Fe	Ma- May	Jun
1	Proposal writing	✓	✓										
2	Sample site selection		✓										
3	Stakeholder consultation and contacts		✓										
4	Discussion with administration and experts		✓										
5	Questioner preparation for <b>objective I</b>	✓	✓										
6	Selecting enumerators and data collectors		✓										
7	Providing training for enumerators and data collectors												
8	Survey data collection <b>objective I</b>				✓								
9	Survey data collection objective <b>II</b>		✓		✓								
10	Survey data collection objective <b>III</b>		✓		✓								
11	Survey data collection objective <b>IV</b>		✓		✓								
12	Distributing solid waste bag				✓			✓					
13	Data analysis					✓	✓	✓	✓				
14	Starting research paper writing					✓	✓	✓	✓	✓			
15	Submitting first draft for supervisors						✓	✓	✓	✓	✓		
16	Correcting the comment							✓	✓	✓	✓		
17	Submitting second draft for supervisors									✓	✓		
18	Prepared research paper manuscript							✓	✓	✓			
19	Publication							✓	✓	✓	✓	✓	
20	Defense												✓



## 2.4.2. Budget breakdown

Table 2: The budget breakdown for the proposed study

<b>Stationery cost</b>					
<b>Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit cost(ETB )</b>		<b>Total cost</b>
Photocopy Paper	Reams	12	300		3600
Writing Pad	Number	100	25		2500
Pen	Pack	5	200		1000
Pencil	Pack	9	35		315
Eraser	Pcs	9	10		90
Staples	Pack	6	10		60
Stapler	Pcs	2	80		160
Marker	Pack	10	120		1200
Re-writable CD Disk	pack	50	450		22500
USB Flash disk	Number	50	520		26000
Printing guide books for trainee	number	500	300		150,000
<b>Sub-total</b>					<b>207425</b>
<b>Perdiem for researchers, drivers and assistant</b>					
<b>Item</b>	<b>Unit</b>	<b>Number</b>	<b>Duration (days)</b>	<b>Unit cost(ETB )</b>	<b>Total cost</b>
Perdiem for researcher	person	5	100	500	250,000
Perdiem for assistants	person	3	100	300	90,000
Perdiem for Drivers	person	1	100	300	30,000
Material preparation for trainings and workshop	person	3	10	500	15,000
Perdiem for trainee	person	50	10	300	150,000
Perdiem for participants in the workshop	person	60	2	500	60,000
<b>Sub-total</b>					<b>595, 000</b>
<b>Transportation and communication</b>					
Fuel	liter				50,000
Communication	Number				15000
<b>Sub-total</b>					<b>65,000</b>

## Budget Summary

No	Type of cost	Total	
1	<b>Stationery cost</b>	<b>207425</b>	
2	Perdiem for researchers, drivers and assistant	<b>595, 000</b>	
3	Transportation and communication	65,000	
	Sub total	867225 ETB	

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