



بسم الله الرحمن الرحيم

Sudan University of Science and Technology
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**Impact of Some Wildlife Offenses on Wild Animals and
Their Habitats in Selected States in Sudan and Dinder
Biosphere Reserve during (2013 - 2017)**

أثر بعض جرائم الحياة البرية على الحيوانات البرية وموائلها في بعض ولايات
السودان ومحمية الدندر للمحيط الحيوي في الفترة (2013- 2017)

BY

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A dissertation submitted in partial fulfillment of the requirements for the
degree of master in wildlife management

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March 2019

DECLARATION

I declare that this research project is my original work .it is being submitted in partial fulfillment of the degree of Master of Science in Wildlife Management to the Sudan University of science and Technology. It has not been submitted for award of degree or for any similar purpose any other University.

Candidate: Samar Adam Mohamed Adam

Signature:

Date: 10. March 2019

DEDICATION

Verily, my prayer, my sacrifice, my living and dying are for Allah, the

Lord of the Worlds

To my beloved mother and father

To my Husband

Son and daughter

For their great efforts to help me complete this work, also I dedicate this humble work to my lovely brothers, sisters, friends and colleagues in the wildlife field for support and encouragements

ACKNOWLEDGEMENT

Thank the Almighty God for blessing me to complete this study without any hitch. Special thanks and appreciation go to my supervisor *Prof. Ali Saad Mohamed* for his patience, guidance, assistance and technical advice, for his incisive comments and suggestions have added considerably to the clarity and organization of this work.

I express my thanks to *Dr. Mohamed Slaman* and all the staff of the Wildlife Conservation General Administration for their contributions towards the success of this study.

My gratitude and thanks to *Dr. Abu baker Sayed Ali* for his great help in data analysis and special thanks to my colleague *Mr. Badreldin Adam Ahmed* for his contribution in thesis writing.

Finally my thankful to every person helped me to complete this Research.

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ABSTRACT

The present study was focused on shedding light of the affect Wildlife crimes in habitat and Wild animals population and habitat in the Sudan and special Dinder Biosphere Reserve (DBR) during (2013-2017). The world Wildlife is an important component of the natural system wildlife population and habitat suffer great threats that results in decreasing population sizes and damaging greater expanses of the natural habitat. In the Sudan wildlife threatened by many dangers of which we mention, poaching, trafficking, fire, over grazing.

Descriptive methods have been used for data collection from record annual report wildlife law violation and distribution questionnaire of 100 personnel (wildlife officers, rankers and game scouts) to evaluate affect wild life crimes in habitat and population. Data analysis which were manipulated by simple statistics such frequency and percent and histograms.

The results this study of the following data, wildlife crimes in the Sudan (poaching, bush meat, trafficking, fire wood collection, fire, leopard skin, hippopotamus skin, rhinoceros horns, spotted cat skin, crocodile skin, ivory elephant.

Highest wildlife crimes in the Sudan poaching represented 59.8%., lowest wildlife crimes in the Sudan Rhinoceros horns represented 0.9%.

The results of questionnaire shows 78% poaching; decline wildlife population ,shows 22% the poaching effect on environmental balance.

Wildlife crimes enter the DBR represented, honey collection, fish angling, fire wood collection, entrance care, weapons, mining, charcoal production, fire, over grazing by livestock, poaching, expanded agricultural.

The highest wildlife crimes in the DBR overgrazing by livestock 799 during five years (2013-2017), entrance by sheep represented 97316

(79%), lowest entrance by donkey represented 258 (0.4%) lowest wildlife crimes in the DBR fish angling, highest crimes in the DBR was in 2015, lowest crimes in the DBR in 2013.

The results explained trafficking in the Khartoum airport highest rate of trafficking was in 2017, represented 30% lowest rate of trafficking was in 2016 represented 13.3%.

The results explained wildlife crimes seized in the Khartoum markets, highest rate of leopard shoes and lowest rate of crocodile accessories.

ملخص الدراسة

ركزت الدراسة الحالية علي تسليط الضوء علي اثر جرائم الحياة البرية علي بيئة ومجموعات الحيوانات البرية في السودان ومحمية الدندر للمحيط الحيوى بصفة خاصة خلال الفترة 2013-2017م.

تعتبر الحياة البرية في العالم عنصرا هاما من مكونات النظام الطبيعي ،تعاني مجموعات الحياة البرية وبيئاتها من تهديدات كبيرة مما يؤدي الي انخفاض حجم مجموعات الحيوانات وتدمير البيئات الطبيعية. الحياة البرية في السودان مهددة بالعديد من المخاطر التي نذكر منها، الصيد الجائر، التهريب، الحرائق والرعي الجائر.

استخدمت الدراسة المنهج الوصفي لجمع البيانات، بالاطلاع علي السجلات السنوية لمخالفات قانون الحياة البرية وتوزيع استبيان علي مائة من الموظفين في ادارة الحياة البرية (ضباط، ضباط صف وجنود)، تم تحليل البيانات باستخدام التردد والنسب المئوية والمدرج التكراري.

اوضحت الدراسة ان جرائم الحياة البرية في السودان والصيد الجائر والحصول علي اللحم الجاف والتهريب وجمع حطب الوقود والحرائق وجلد النمر وجلد فرس النهر وجلد القطط المرقطة وقرن وحيد القرن وعاج الفيل. اعلي نسبة لجرائم الحياة البرية في السودان هي الصيد الجائر تمثل 59.8% اقل نسبة لجرائم الحياة البرية في السودان هي قرون وحيد القرن يمثل 0.9% نتائج الاستبيان تبين ان الصيد الجائر يتسبب في نقصان اعداد الحيوانات البرية بنسبة 78% وتبين ان الصيد الجائر يؤثر على التوازن البيئي بنسبة 22%

جرائم الحياة البرية في محمية الدندر للمحيط الحيوى تشمل ايضا جمع العسل وصيد الاسماك ودخول العربات والاسلحة النارية والتعدين وانتاج الفحم والحرائق والرعي الجائر والصيد الجائر والتوسع الزراعي وقطع الاشجار. اعلي معدل لجرائم الحياة البرية في محمية الدندر للمحيط الحيوى هي الرعي الجائر بتردد 799 خلال خمسة سنوات (2013 – 2017م) اعلي معدل لدخول لحيوانات الاليفة الضان يمثل 97316 (79%) اقل نسبة دخول هي الحمير تمثل 258 (0.4%) واقل نسبة لجرائم الحياة البرية في الدندر هي صيد الاسماك

اوضحت الدراسة ان اعلي نسبة تهريب في مطار الخرطوم في العام 2017م (30%) واقل نسبة كانت في العام 2016م (13%)

اوضحت الدراسة ان اعلي نسبة لجرائم الحياة البرية في اسواق الخرطوم هي احذية جلد النمر واقل نسبة هي مصنوعات جلد التمساح.

CHAPTER I

1. INTRODUCTION

The present study intended to throw light on crimes committed on wildlife in the Sudan with special reference to Dinder Biosphere Reserve (DBR). Wildlife offenses are actions break laws that govern wildlife management including illicit wildlife trade, poaching, bush meat hunting, wildlife trafficking, that term covers a wide range of activities illegal wildlife trade is just one aspect of wildlife crimes but is thought to be the fourth after trafficking, drugs people and arms (Haken, 2011).

In the Sudan high profiles trade in endangered species including leopard skin (shoes and bags) and hippopotamus skin (whips). Wildlife crimes in the Sudan were include leopard skin, Crocodiles skin, spotted cat skin, Bush Meat, poaching, Trafficking, ivory Elephant, python skin, Cheetah skin, Hippopotamus skin. While at the other side action activities such as entering the Dinder National park without permission including entrance car, cut tree, entrance pastoralist, mechanized agriculture, fish angling, fire wood collection, honey collection and charcoal production, poaching, weapons, fire, over grazing entrance, Drugs cultivation expanded agriculture and mining.

1.1. Study Objectives:

1. The aims of this study providing information about the wildlife crimes in the Sudan during the periods (2013-2017).
2. Assessment of wildlife crime and evaluate the impacts of it in wild animal's population and their habitat.
3. Determine the Wildlife crimes in the Dinder Biosphere Reserve during (2013-2017)
4. Provide information about wildlife trafficking in Khartoum airport from 2013 to 2017.

CHAPTER II

2. LITRETURE REVIEWS

2.1. Status of Wildlife Biodiversity

The wildlife occurs in protected areas and in fragmented habitats outside protected areas in desert, semi-desert, low rainfall savannah woodland, high rainfall savannah woodland and marine ecosystems. The number of many species has either noticeably declined or disappeared from many of their former habitats. The populations of the red-fronted gazelle, Dama gazelle, Barbary sheep, Nubian ibex and lion have declined to critical levels and the number of endangered species is increasing (HCENR, 2015).

In 1983 it was reported that there were 52 major wildlife species in northern Sudan. In Dinder National Park showed that 27 mammals and also several species of small mammals, and partial summer lists of 115 birds 14 snakes and scorpions, and 108 species of insect and 26 fish species are recorded. About 49 common tree species and shrubs (of which eight endangered) and 195 common herbaceous plants are identified (GOS and HCENR, 2006). Dinder BR supports a large population of animals during the dry season and the lesser number during the season (Dasmann, 1972).

2.2. Globally Important and Endangered Species in Sudan

The following list includes all mammals which occur in Sudan and are rated as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) , as reported by the Sudan Wild Life Forces, the country focal point for IUCN,2006 including mammals, birds and reptiles: Hippopotamus (*Hippopotamus amphibius*); cheetah (*Acinonyx jubatus*); African lion (*Panthera leo*); Barbary sheep (*Ammotragus lervia*); Dorcas gazelle (*Gazella dorcas*); red-fronted gazelle (*Gazella rufifrons*); Soemmerring's gazelle (*Gazella soemmerringei*); African elephant (*Loxodonta africana*);

Trevor's free-tailed bat (*Mops trevori*); horn-skinned bat (*Eptesicus floweri*); greater spotted eagle (*Aquila clanga*); imperial eagle (*Aquila heliaca*); houbara bustard (*Chlamydotis undulata*); lesser kestrel (*Falco naumanni*); lappet-faced vulture (*Torgotrache liotos*); and African spurred tortoise (*Geochelone sulcata*). By definition, the habitat of most of the Wild Life in Sudan extends beyond all political borders, in the North, South, East and West, within well defined Home Ranges. The migrating birds represent the major migratory species (USAID, 2012).

2.3. Wildlife Ordinance in the Sudan

The 1935 Wild Animals Ordinance (Sudan Government, 1962), as amended until 1982, is the basic legislation on wildlife and national parks under which the Wildlife Administration presently operates. The Ordinance provides for three classes of protected wild animals and birds (Animals in Schedule I are not to be hunted, killed or captured and eggs of birds in Schedule I are not to be collected except by a special permission from the Minister of Interior which will only be given for important scientific purposes or essential administrative purposes.

Animals in Schedule II are allowed to be hunted only by virtue of a special license by the Minister. Animals in Schedule III are allowed to be hunted under an ordinary license. The Minister could change any animal protection status but this has been rarely practiced.

Different tribes are allowed to hunt animals in Schedule III without licenses provided that they do not use firearms and apply traditional methods not prohibited by the law. Similarly the limited hunting of elephants and giraffes without the use of firearms may also be authorized with the approval of the Minister. However, this was not practiced since 1975. Laws concerned with national parks, game. The Wild Animals Ordinance and Regulations, 1935, and the National Parks, Sanctuaries and Reserves Regulation, 1939, were great steps forward in their time,

but are now out of step with world progress in this field (Dasmann, 1972). The 1939 Wild Animals Ordinance has been criticized in several areas such as lack of a clear distinction between a game reserve and game sanctuary (Darling, 1961; Moore, 1974). Laws related to big game, game birds and reptile hunting require major changes. The bag limits are far too liberal and not in accord with the decline of animals involved (Moore, 1974). No proper change have been made in laws for reptiles and finally the bag limits were and are still too liberal and therefore, cannot cope with the rapid decline of wild life species involved this awkward situation in which wild life resources remain in existence present prompted. (Hassaballa and Nimir, 1985), the new law is necessary to overcome most of the problems of the old law. However, the new law proposal has not been passed as legislation.

Laws against poaching and illegal trade in wildlife products are not strong enough to discourage offenders even if they get arrested (Nimir, 1983). The present Wildlife Act (1935) updated 1986 serves as the main legal code for Wildlife conservation and Management. The law enforcement is practiced through anti-poaching unit that is responsible for patrolling the wildlife areas. This unit is poorly equipped and therefore its performance is not effective. The Wildlife Act of 1986 prohibits hunting in national park and game reserves and hunting may be permitted in game reserves only under the authority of a special permit issued by the Director of the Wildlife administration. It also prohibits residence, cultivation, grazing of domestic animals and felling of trees in national parks and game reserves. Any other human activities within protected areas are prohibited by Wildlife (Act, 2003). The Wildlife Ordinance has been criticized in several areas for instance; it lacks a clear cut distinction between a game reserve and a game sanctuary. Although the Wildlife Administration has drafted new wildlife legislation, it has not yet been

completed for ratification. The IUCN categories of protected areas will be included in the new legislation (Nimir, 2006).

2.4. Poaching

Illicit harvest of an animal, including taking, that is not the allowed species, size, age, or sex; using illegal equipment to hunt or fish; failing to acquire a permit to hunt or fish; and harvesting outside of the allowed season or place (USAID, 2017). Poaching is widely spread in protected areas and in other fragmented habitats that still contain pockets of wildlife. The sociable lapwing, which comes from Kazakhstan and spends winter in Sinnar and the White Nile states, is being hunted at its stop-over places in the Middle East. Mesquite, an invasive species, started to increase in the sociable lapwing wintering habitat in Sinnar. Intermittent droughts prevent the bird from attending the wintering sites in Sudan. Because of the increasing popularity of falconry, most falcons are hunted and smuggled. The practice of falconry itself could be a major threat to the critically endangered Arabian Bustard and other game birds. Populations of larger animals and game birds inside parks and outside them are considerably reduced, sometimes reaching the brink of extinction, due to poaching (HCENR, 2015).

Hunting is prohibited except on license WCGA issues these licenses, which is its major source of revenue. However, WCGA has limited capacity to enforce legislation. Most parks and protected areas are inadequately staffed and financed. In addition, there are no land use plans, and most protected areas are left open to human settlement, cultivation and livestock grazing (ETOA, 2012). The most serious problem is the increase of poaching. There are four major groups of poachers operating in Radom area. The first consists of local inhabitants using traditional traps and poisoned arrows and hunting mainly for food with limited impact on wildlife populations. Local inhabitants may also

be supplied with food rations and firearms by traders so that they can go on longer hunting trips mainly searching for elephants and big game. Another serious group of poachers is mainly composed of the nomads from Western Africa who are experts in using poisoned arrows and mainly hunt animals that move in large herds and also kill considerable numbers of leopards and cheetahs. They usually hide (Nimir, 1983). Elbedawi (1976) explained that the losses of Wildlife in Setit Atbra plains caused by destruction of habitat and poaching.

2.5. Bush Meat

In rural areas, bush meat is often an important alternative protein source in place of meat from livestock, particularly where tsetse flies *Glossina spp.* are prevalent (Barnett, 1998). The scale of the bush meat trade in some Central and West African nations is such that it contributes measurably to Gross Domestic Product (Bowen-Jones *et al.*, 2003). The rising demand for bush meat in African countries from a burgeoning human population has led to a severe decline in wildlife populations in Africa. Alleviating the impacts of illegal bush meat trade requires a multidisciplinary and multi-sectarian approach involving, among others, wildlife law enforcement, programs Inadequate law enforcement is among the factors driving the unsustainable utilization of bush meat (Bush meat network, 2008). The impact of these illegal activities on the survival of wildlife species underlies the need for strong penalties that reflect the harm caused to be imposed at all levels within the judicial system (Boitani, 1981).

Elwakeel (2011) reported bush meat (wild animal's meat) has always been part of the Sudanese diet, with the exception perhaps of the most ancient agricultural societies based along the Nile. During periods of famine, conflict and critical fallback of food sources (crop and domestic livestock), many Sudanese consume all types of wild fauna, from buffalo

to field mice. This form of harvesting is completely illegal in Sudan, with the sole exception of the continued existence of a small-scale commercial trophy hunting business in the Red Sea hills. UNEP (2007) reported that proof of an ongoing widespread commercial bush meat trade (in Southern Sudan) was not reported. Local people in Southern Sudan reported both sides in the north-south conflict had taken bush meat to feed their forces and trade. In both cases, there is no empirical evidence (Elwakeel, 2011) Mohammed (1984) reported the use of a toxic chemical for killing guinea fowl in the DNP and this resulted in mass killing untargeted animal's species.

2.6. Illegal Wildlife Trade

Illicit commerce in animals or their parts, usually intended to include production (harvest, transformation into a product), transport and sale. Sudan has been center for elephant hunting and ivory trade for centuries (USAID, 2017). The main center of the ivory trade is Omdurman, a city across the river from Khartoum. The Non-Governmental Organization NGO (2005) reported quotes 50 souvenir shops, 150 craftsmen and up to 2,000 items in individual shops. The main customers were reported to be Asian expatriates since 1990, however, it has been illegal under the Convention on International Trade in Endangered Species (CITES) to export ivory. Killing elephants or selling ivory from animals killed after 1990 is also illegal in Sudan. Given that most of the old (pre-1990) unmarked stock was in all likelihood used up long ago, any current ivory trade is no doubt illegal. Nonetheless, the ivory trade and poaching of elephants in Sudan continue to this day, with export through illegal international trade networks. The international NGO Care for the Wild conducted a detailed investigation of the issue in 2005, and follow-up reconnaissance and interviews by UNEP in mid-2006 largely confirmed the findings (UNEP, 2007)

The Wildlife Administration in Southern Darfur (1981) estimates that captured wildlife products represents about 5% of the illegal trade in wildlife products, estimate has been based on real accounts of the activities performed by the Wildlife Administration in Southern Darfur include controlling poaching and illegal trade in wildlife products. The basic assumption made by the author and the senior wildlife inspectors in Southern Darfur was that the probability of capturing illegally acquired wildlife products is the same every day during the dry season.

2.7. Wildlife Trafficking

Often interchangeable with the previous term, this may also specify illicit trade after poaching has occurred. In the U.S. National Strategy to Combat Wildlife (U.S., 2014), Trafficking, the term deliberately encompasses both poaching and illicit trade (USAID, 2017).

2.8. Fire

Forests fires are a serious problem in nearly all forest areas in the Sudan. Only the semi-desert areas, where the grass is normally too sparse to burn, are relatively free from fires. Even in these areas, fires sometimes occur and do considerable damage. Surface fire seriously reduce gum Arabic yield of *Acacia senegal* and results in the total destruction of the stands if the fire is repeated in the following years. Increased wildfire hazard is associated with low humidity, high fuel loads and the presence of moving grazers. Repeated fires pose a serious threat to rangelands resulting in the consumption of 10-30% of the standing dry forage in different ecological zones, loss of seeds and erosion of the fire unresisting species. However, fires statistics are lacking except for limited incidents (HCNER, 2014)

In late 1971 and early 1972, before the game department personnel were stationed in the park for opening the roads, most of the park was burned (Dasman, 1972). Many of the fire originated and are admittedly

set outside the park by nomad's herdsman, cultivators, honey collectors and others seeking to reduce the grass cover in order improve access of livestock to perennial grasses. Game scouts also set fires when opening up roads at the beginning of the dry season (December-May). Fires in the Dinder National Park originate from many source livestock herders set fire to eradicate the new growth of the Riverine grasses. The park staff could do little to control this fire without firefighting equipment. They were forced to let them burn. It is generally admitted by park personnel that most, if not all, of the park burned nearly every year (kanno, 2004).

2.9. Human Settlement

Dasman (1972) reported that Tribesmen from Ethiopia cross the border into the park to kill game and take home loads of biltong to sell. According to (Dasman, 1972) the most serious limitation of the park is that it is left open to human settlement, cultivation, poaching and heavy use by livestock. He reported that the practice of closing the park and pulling out all the staff at the start of the rainy season leaves the park wide open to poaching. People from the villages that have sprung up during recent years within the Rahad Game Reserve are generally recognized as poachers (Dasman, 1972).

2.10. Mining

Traditional miners just look for gold anywhere and thereby disturb ecosystems and the diversity they contain both in the semi desert and woodland savannah. In addition to habitat destruction, intensive and extensive poaching is taking place and pollution of water resources by cyanide which is used by big companies in gold processing will result in the death of many birds particularly the sand grouse (HCNER, 2015)

2.11. Habitat Destruction

Most wildlife habitats are fragmented, thereby reducing chances of wildlife survival and genetic diversity (HCNER, 2015) the habitat and

wild life in Dinder National Park can currently be described as badly degraded and under serious threat from a number of ongoing problems, including desert encroachment, habitat degradation and poaching (UNEP, 2007). Habitat destruction and fragmentation from farming and deforestation is the root cause of most biodiversity loss in northern and central Sudan. Vast areas of savannah and dry land pasture have been replaced with agricultural land, leaving only limited shelter belts or other forms of wildlife refuge. The intensity of mechanized agricultural development has forced pastoralists to use smaller grazing areas and less suitable land, leading to the degradation of the rangelands and increased competition between livestock and wildlife. The net result is that larger wildlife have essentially disappeared from most of northern and central Sudan, and can only be found in the core of the protected areas and in very low numbers in remote desert regions (UNEP, 2007)

Many wild animals migrate outside the Dinder National park during the wet season. The wet season habitats have been destroyed by mechanized farming. The migrant animals are subject to increasing harassment and killing. Both poachers and honey collectors greatly affect the ecology of the area by lighting fires throughout the park. Felling of trees is observed near the villages and had greatly accelerated the erosion and sedimentation process (Abdel Hameed et al., 1999).

2.12. Charcoal Production

Licenses are being issued by forestry administration, allowing felling of trees for charcoal production. The wet season habitat is affected by this practice and it requires strict control measures to be taken for its conservation (Nimir, 1983).

2.13. Mechanized Agriculture

Licenses were issued for establishing farms around the park without consulting the wildlife Administration (Nimir, 1983). In addition many

unlicensed farms were being developed and efforts to prevent them have not been successful. The farms have reduced the area of wet season. Mechanized farming destroys the natural vegetation, which may not recover even if this practice is stopped. The expansion of the farms surrounding the park has limited the movement of nomadic herders, reduced forest cover and natural rangelands and forced them to trespass into the park, poaching is also practiced by farmers.

2.14. Overgrazing by Livestock

Abdelhameed (1998) reported that agricultural schemes in the vicinity of the DBR depleted range lands so livestock herds are forced to trespass to the park. Many researchers (Zakarea, 2004 and Abdlgader, 2009) reported livestock trespass into the DBR. The impact of the livestock trespassing into protected areas can be felt in the Dinder Biosphere Reserve. Most traditional grazing land around the park, which is also wet season habitat for the migratory ungulates, has been depleted. The situation inside the park is even worse where Livestock compete with some wildlife species for food of the tsetse fly; the Radom area has been free from any use by domestic livestock. The nomad frustrated by deterioration of pastures to the north of Bahr el Arab, and encouraged by availability of vaccines for their livestock, started invading the Radom area in the dry season with thousands of their livestock. This trend, if not checked, will not only result in chasing the wild animals from the Radom area, but will also extend the overgrazed and depleted pastures south of Bahr el Arab (Nimir, 1983).

CHAPTER III

3. MATERIALS AND METHODS

3.1. Study areas

3.1.1. The Location

The area of Sudan is 1,882,000 square kilometers, borders seven countries, namely Egypt, Libya, Chad, Central Africa Republic, Republic of South Sudan, Ethiopia, Eritrea and the Kingdom of Saudi Arabia across the Red Sea (USAID, 2012)

3.1.2. Geography and Environment

Sudan is a vast country with an area of 1.8 million km². It lies between latitudes 10° and 22° N and longitudes 22° to 38° E. Its landscape consists primarily of gently sloping plain, with the exception of Jebel Marra Massif, Red Sea Hills and Nuba Mountains. Mean annual temperatures vary between 26° C and 32° C across the country.

The northern part is almost desert and semi desert with average annual temperatures around 30° C and average annual rainfall of about 150 mm. The central part is semi-desert to savannah with average annual temperatures around 27° C, and average annual rainfall of about 200 mm. Rainfall, which supports the DBR rainfall (HCNER, 2014).

3.1.3. The Dinder Biosphere Reserve

The Dinder Biosphere Reserve which is located in the Sinnar State between latitudes 11-13° N and longitudes 34-36° E, adjacent to the Ethiopian border at a distance of 550 Km south east Khartoum. It is drained by two seasonal rivers, Dinder and Rahad, and covers 10,290 km². The climatic conditions of park in general, can be summarized as cool and dry in winter and wet and warm in summer (Kano, 2004).

3.2. Methodology

The methods used to obtain the necessary data information pertaining to the study were:

3.2.1. Records in Wildlife Conservation General Administration (WCGA):

1. Direct examination of annual report of violation law in the Sudan in the head quarter of wildlife officers during (2013-2017)
2. Records of wildlife law violation and offenses were obtained the Wildlife Conservation General Administration, annual reports of D.N.P (2013-2017).

3.2.2. Questionnaires of WCGA:

One hundred copies of questionnaire (Appendix, 1) were distributed to personnel of WCGA in the Khartoum. For the purpose of detecting the impact of crimes committed against wild animals on their habitat and populations.

3.3. Statistical analysis

Data was analyzed by descriptive procedure statistics as percentage (%), Frequency and histograms.

CHAPTER IV

4. RESULTS

4.1. Types of Wildlife Offenses in the Sudan

The Table (1) showed the types of wildlife crimes in Sudan. It's clear that the highest was poaching with percentage (59.8%), bush meat (6.5%), trafficking (6%) and Illegal wildlife Trade (2%).

Table 1: Types of Wildlife Offenses in the Sudan (2013-2017)

YEARS CRIMES	2013	2014	2015	2016	2017	Total	Percentage
Bush meat	-	2	5	2	4	14	6.5%
Poaching	13	18	47	20	30	128	59.8%
Trafficking	2	1	2	3	4	12	6%
Illegal Wildlife trade	2	2	-	-	-	4	2%
Total	25	39	69	28	53	214	100%

Source: Wildlife Administration annual reports (2013 - 2017)

Table (2) shows that the trafficking seized by Khartoum airport consisted of Crocodile skin (18.3%) Snake skin (6.7%) Grivet monkey (11.7%) leopard skin (13.3%) Ivory elephant (21.7%) bird meat (13.3%) mammals meat (11.7%)

Table 2: Wildlife Trafficking Seized in Khartoum Airport

YEARS CRIMES	2013	2014	2015	2016	2017	Total	Percentage
Crocodile skin	0	1	1	3	6	11	18.3%
Snake Skin	0	0	2	0		4	6.7%
Grivet Monkey	0	3	2	2	0	7	11.7%
Leopard Skin	1	0	1	0	6	8	13.3%
Ivory of Elephant	3	3	2	3	2	13	21.7%
Bird meat	4	2	2			8	13.3%
Mammals meat	1	3	3			7	11.7%
Total	9	12	13	8	18	60	100%

Source: Wildlife Administration annual reports

Table (3) shows that highest wildlife crimes seized in Khartoum markets is leopard (shoes) (24.6%) leopard skin (17.4%) Hippopotamus whips (18.2%) Python shoes (20.6%) Monitor Nile skin (11.9%) Crocodile skin (7.1%).

Table 3: Wildlife Crime Seized in Khartoum Markets

YEARS CRIMES	2013	2014	2015	2016	2017	Total	percentage
Crocodiles skin	5	6	4	1	2	18	11.9%
Leopard shoes	11	9	22	14	6	62	24.6%
Leopard skin	3	8	2		31	44	17.4%
Hippopotamus whips	12	7	15	8	4	46	18.2%
Python shoes	3	13	7	22	7	52	20.6%
Nile Monitor skin	4	2	11	8	5	30	11.9%
Total	38	45	61	53	55	252	100%

Source: Wildlife Administration annual reports

Table (4) shows percentage of crimes in each of six state in 2013 River Nile had highest percentage of crimes (40.3%) while the lowest percentage of crimes were committed in Alshamalia state (4.5%) crimes committed in Algadaref, Alkartoum, Algazera, Northern Kordofan State were 18.1%, 13.6%, 13.6% and 9.3% .

Table 4: Wildlife crime in the Sudan, state wise 2013

States	Frequency	Percentage
River Nile	9	40.3
Northern Kordofan	2	9.3
Al Gadaref	4	18.1
Al Khartoum	3	13.6
Al Gazera	3	13.6
Al Shamalea	1	4.5
Total	25	100

Source: Wildlife Administration annual reports

Table (5) shows Types of wildlife crimes in the Sudan 2013 Illegal wildlife trade 40% Trafficking (8%) and poaching (52%).

Table 5: Types of Wildlife Crimes in the Sudan 2013

Type of crimes	Frequency	Percentage
Illegal Wildlife trade	10	40%
Trafficking	2	8%
Poaching	13	52%
Total	25	100%

Source: Wildlife Administration annual reports

Table (6) showed types of crimes in each of seven state in 2014 percentage of crimes River Nile (20.5%) while Al Gadaref (20.5%), Al Khartoum (20.5%), Al Shamalia (10.2%), Kassala (10.2%), Red sea (12.8) and South Kordofan (7%).

Table 6: Wildlife crimes in the Sudan, state wise 2014

State	Frequency	Percentage
Khartoum	7	20.5
Kassala	4	10.2
River Nile	8	20.5
Al Gadaref	8	20.5
Al Shamalia	4	10.2
Red Sea	5	12.8
South Kurdofan	3	7
Total	39	100

Source: Wildlife Administration annual reports

Table (7) showed Types of wildlife crimes in the Sudan in year 2014 was Illegal wildlife trade (46.13%) Trafficking (2.56%), poaching (46.2%) and Bush meat (5.12%)

Table 7: Types of Wildlife crimes in the Sudan 2014

Type of crimes	Frequency	Percentage
Bush meat	2	5.12%
Poaching	18	46.2%
Trafficking	1	2.56%
Illegal wildlife Trade	18	46.12%
Total	39	100%

Source: Wildlife Administration annual reports

Table (8) shows Types of wildlife crimes in the Sudan year 2015 as Illegal wildlife trade (20.3%) Trafficking (2.9%), poaching (68.1%) Bush meat (8.7%)

Table 8: Types of wildlife crimes in the Sudan 2015 (items):

Type of crimes	Frequency	Percentage
Bush meat	6	8.7%
Poaching	47	68.1%
Trafficking	2	2.9%
Illegal wildlife trade	14	20.3%
Total	69	100%

Source: Wildlife Administration annual reports

Table (9) shows the crimes in each of seven states in 2015 percentage of crimes state wise River Nile (15.8%) while Al Gadaref (23.2%), Al Khartoum (16%), Sennar (17.4%), Kassala (8.7%), Red sea (4.4%), White Nile (10 %) and Blue Nile (8.7%).

Table 9: Wildlife crime in the Sudan, state wise 2015:

State	Frequency	Percentage
Al Khartoum	11	16%
Kassala	6	8.7%
River Nile	4	5.8%
Al Gadaref	16	23.2%
Blue Nile	6	8.7%
Red Sea	3	4.4%
West Darfur	4	5.79%
Sennar	12	17.4%
White Nile	7	10%
Total	69	100%

Source: Wildlife Administration annual reports

Table (10) shows the crimes in each of four states in 2016 percentage of crimes state wise Al Khartoum (50%) while Kassala (17.9%), River Nile (17.9%) and Al Gadaref (14.2%).

Table 10: Wildlife crime in the Sudan, state wise 2016:

State	Frequency	Percentage
Al Khartoum	14	50
Kassala	5	17.9
River Nile	5	17.9
Al Gadaref	4	14.2
Total	28	100

Source: Wildlife Administration annual reports

Table (11) shows Types of wildlife crimes in the Sudan in 2016 Illegal wildlife trade (10.7%), Trafficking (10.71%), poaching (71.42%) and Bush meat (7.14%).

Table 11: Types of wildlife crimes in the Sudan 2016

Type of crimes	Frequency	Percentage
Illegal wildlife trade	3	10.71%
Bush meat	2	7.14%
Poaching	20	71.42%
Trafficking	3	10.71%
Total	28	100%

Source: Wildlife Administration annual reports

Table 12: Wildlife crime in the Sudan, state wise 2017

State	Frequency	Percentage
Al Khartoum	5	8.5
Kassala	11	20.7
River Nile	3	5
Al Gadaref	5	8.5
Darfur	4	5.7
Red Sea	10	17
West Kordofan	3	5
Al Shemalia	4	5.7
White Nile	2	3.3
Al Gazera	6	11.5
Total	53	100%

Source: Wildlife Administration annual reports

Table (13) shows Types of wildlife crimes in the Sudan 2017 Illegal wildlife trade (28.29%) Trafficking (7.54%), poaching (56.63%) and Bush meat (7.54%)

Table 13: Types of wildlife crimes in the Sudan 2017(items)

Type of crimes	Frequency	Percentage
Bush meat	4	7.54%
Poaching	30	56.63%
Trafficking	4	7.54%
Illegal wildlife trade	15	28.29
Total	53	100%

Source: Wildlife Administration annual reports

Table (14) shows the distribution wildlife crime in the Sudan it's clear that the highest rate of wild life crimes in the Khartoum state while the lowest rate of wildlife crimes in South Kordofan State.

Table 14: Total distribution wildlife crimes in locality (state wise)

Years State	2013	2014	2015	2016	2017	Total	percentage
Al Khartoum	3	7	11	14	5	40	18.6%
Kassala	3	4	6	5	11	29	13.5%
River Nile	9	8	4	5	3	29	13.5%
Al Gadaref	4	8	16	4	5	37	17.2%
Blue Nile	-	-	6	-	-		3%
Red Sea	-	5	3	-	10	18	8.5%
West Darfur	-	-	4	-	-	4	1.8%
Sennar	-	-	12	-	-	12	5.6%
White Nile	-	-	7	2	-	9	4.2%
N. Kordofan	2	-	-	3	-	5	2.3%
N. Darfur	-	-	-	-	4	4	1.8%
S. Kordofan	-	3	-	-	-	3	1%
Al Gazera	3	-	-	-	6	9	4.2%
Al Shamalea	1	4	-	-	4	9	4.2%
Total	25	39	69	28	53	214	100%

Source: Wildlife Administration annual reports

4.2. Wildlife Offenses in the Dinder Biosphere Reserve:

Table (15) shows wildlife crimes in Dinder Biosphere Reserve, Highest rate wildlife crimes in DBR, over grazing by livestock, lowest rate wildlife crimes in DBR, fish angling, Highest rate wildlife crimes in DNP was in 2015, lowest rate wildlife crimes in DBR was in 2013.

Table 15: Wildlife Crimes in the Dinder Biosphere reserve

Years Crimes	2013	2014	2015	2016	2017	Total	Percent
Cars Entrance	4	6	6	5	4	25	2.2%
Cut trees	5	2	6	3		16	1.4%
Poaching	1	3	4	4	11	23	2%
Charcoal production	7	4	4	1	1	17	1.5%
Entrance pastoralist	3	11	10	18	4	46	4.1%
Fish angling		1			2	3	0.2%
cultivation	8	7	1	3	2	21	1.9%
Honey collection	3		1	1		5	0.4%
Over grazing	106	158	240	175	120	799	72.9%
Mining	1	0	16	0	0	17	1.5%
Firewood Collection	3	1	0	0	0	4	0.3%
Mechanized Agriculture	5	6	10	9	5	35	3.1%
Weapons	7	12	13	12	14	53	4.8%
Total	153	211	311	231	163	1069	100%

Source: Wildlife Administration annual report

Figure (15) overgrazing by livestock the highest rate trespassed livestock in DBR, was in 2015 lowest rate trespassed live stock in DBR, was in 2017 while the Highest rate trespassed live stock in DBR, sheep and lowest rate of camel.

Table 16: Overgrazing by livestock

Years Livestock	2013	2014	2015	2016	2017	Total	Percentage
Cattle	40	12	9	0	3237	3298	2.7%
Sheep	21165	21633	29513	15753	9252	97316	79.4%
Goat	3473	4339	6553	4722	2203	21290	17.3%
Camel	69	76	90	111	60	406	0.4%
Donkey	49	43	95	46	25	258	0.2%
Total	24796	26103	36260	20632	14723	122568	100%

Source: Wildlife Administration annual reports

4.3. Questionnaire:

Data collection and analysis were assessed the perception of law enforcement rangers with regard to wildlife crime activities patterns and impact this crime in wild life population and habitat through interview results that questionnaire as the follows.

Table (17) shows (80%) Agricultural effects of wild animals while (20%) expanding Agricultural it's no effects of wild animals.

Table 17: Effects of Expanding Agricultural on Wild animals:

affects Agricultural on wild animals	Freq.	Percent
Yes affects Agricultural on wild animals	80	90%
No affects Agricultural on wild animals	20	10%
Total	100	100%

Table (18) shows the reasons of affects expansion agricultural on wild animal (40%) Agricultural effects of wildlife habitats, (32%) effect of infringement wild animal's pasture while effect of migration of wild animals was (8%).

Table 18: Reasons of affects expansion agricultural on wild animal

Reasons of affects expansion agricultural on wild animal	Freq.	Percent
Effect of wildlife habitat	40	40%
Effect of infringement wild animals pasture	32	32%
Effect of migration of wild animals	8	8%
Total	80	80%

Table (19) shows the effects of poaching on wild animals (100%) say there is poaching effect of wild animals.

Table 19: Effects of Poaching on wild animals:

poaching effect of wild animals	Freq.	Percent
Yes poaching effect of wild animals	100	100%
No poaching effect of wild animals	0	0%
Total	100	100%

Table (20) shows the reasons of effects of poaching on wild animals (78%) decline wildlife population number (22%) on the environmental balance.

Table 20: Reasons Affect poaching on wild animals:

Reasons Affect poaching in wild animals	Freq.	Percent
Decline wildlife population number	78	78%
On the environmental balance	22	22%
Total	100	100%

Table (21) shows the effect of over grazing on wildlife habitat the results was (15%) over grazing effect on wildlife habitat, (85%) over grazing it's not effect on wildlife habitat.

Table 21: Effect of Overgrazing on Wildlife Habitat:

Over grazing effect on wildlife habitat	Freq.	Percent
Yes overgrazing affect wildlife habitat	15	15%
Overgrazing not affect wildlife habitat	85	85%
Total	100	100%

Table (22) effect over grazing on wildlife animals its effect on Competition for the pasture (62%), on soil erosion (17.6%), effect on Diseases transmission (20%)

Table 22: Effect Overgrazing on Wildlife animals:

affect over grazing on wild life animal	Freq.	Percent
Competition for the pasture	53	62.4%
On soil erosion	15	17.6%
Diseases transmission	17	20%
Total	85	100%

Table (23) shows Penalty for over grazing, Confiscation of animals (50%), the prison (12%), selling animals and taking percentage of their price (8%) Make adjustment (30%).

Table 23: Penalty for overgrazing:

Penalty for over grazing	Freq.	Percent
Confiscation of animals	50	50%
The prison	12	12%
Selling animals and taking percentage of their price	8	8%
Make adjustment	30	30%
Total	100	100%

Table (24) shows affect mining of decline wild life population number (34%) and effect of Destruction of wild life habitat (66%).

Table 24: Effect of Mining of Wild animals:

affect mining of wild animal	Freq.	Percentage
decline wild life population number	34	34%
Destruction of wild life habitat	66	66%
Total	100	100%

Table 25 shows reasons conflict in the pasture between livestock and wildlife on water (13%) and pasture (87%).

Table 25: Conflict reasons between livestock and wildlife in pasture

Reasons conflict in the pasture	Freq.	Percent
On water	13	13%
On pasture	87	87%
Total	100	100%

Table 26 shows (82%) wildlife trafficking impact on wildlife population, (18%) wildlife trafficking it's not impact on wildlife population (18%)

Table 26: Impacts Wildlife trafficking on wildlife population

wildlife trafficking impact on wildlife population	Freq.	Percentage
Yes wildlife trafficking impact on wildlife population	82	82%
No wildlife trafficking impact on wildlife population	18	18%
Total	100	100%

Table (27) shows Reasons the fires in wildlife area because open ways (36%), Honey collection (40%), Clean the land (24%).

Table 27: Reasons the Fires in Wildlife Areas

Reasons the fires in wildlife area	Freq.	Percentage
Open ways	36	36%
Honey collection	40	40%
Clean the land	24	24%
Total	100	100%

Table (28) showed the impact of fires in wild animal's death of some animals (42%) Weed replacement (58%)

Table 28: Impacts of fires on wild animals

impact fires in wild animals	Freq.	Percent
Death of some animals	42	42%
Weed replacement	58	58%
Total	100	100%

Table 29 shows kinds of punishment applies to the perpetrators of poaching crimes, all this punishment applies (75%) Make adjustment (10%) Confiscation of means of transport (15%)

Table 29: Punishment applies to the perpetrators of poaching crimes

punishment applies to the perpetrators of poaching crimes	Freq.	Percent
All this punishment applies	75	75%
Make adjustment	10	10%
Confiscation of means of transport	15	15%
Total	100	100%

Table (30) shows Control of wildlife markets (83%) shows (17%) No control of wildlife markets.

Table 30: Control of Wildlife Markets

Control of wildlife markets	Freq.	Percent
Yes control of wildlife markets	83	83%
No control of wildlife markets	17	17%
Total	100	100%

Table (31) shows (76%) certification with poaching licenses, (24%) No certification with poaching licenses.

Table 31: Certification with poaching licenses:

certification with poaching licenses	Freq.	Percentage
Yes certification with poaching licenses	76	76%
No certification with poaching licenses	24	24%
Total	100	100%

Table (32) shows average number of monthly Irregularities Less than 10 (77%) average number of monthly Irregularities more than 10 (23%)

Table 32: Average number of monthly Irregularities

Average number of monthly Irregularities	Freq.	Percentage
Less than 10	77	77%
More than 10	23	23%
Total	100	100

Table (33) shows (81%) patrols in wildlife area shows (19%) no patrols in wildlife areas.

Table 33: Patrolling in Wildlife Areas:

Patrols in wildlife area	Freq.	Percentage
Yes	81	81%
No	19	19%
Total	100	100%

Table (34) shows (38%) Law enforcement because lack means of deportation, shows (62%) law enforcement because Weak funding.

Table 34: Law Enforcement:

weak law enforcement	Freq.	Percentage
Lack means of deportation	38	38%
Weak funding	62	62%
Total	100	100%

CHAPTER IV

DISCUSSION

The present study conducted on crimes committed against wildlife in the Sudan with special reference to Dinder Biosphere reserve the results shows impact wildlife crimes on animal population and habitat in Sudan.

The types of wildlife crimes in Sudan was found evidence for wildlife trafficking, poaching, fire wood collection, over grazing by livestock, charcoal production, spotted cat, Crocodile skin, leopard skin, bush meat, Hippopotamus skin, Cheetah skin, Elephant ivory, python skin, ivory rhinoceros, fish angling, weapons and mechanized agriculture

The highest of type wildlife crimes in the Sudan were; poaching because, increase population around wildlife area and weak implementation of the wildlife law and the lack of coverage of police full for all walks of wildlife area.

Shows 78% on community study the poaching effect on wild animals by decline wildlife population, shows 22% poaching effect on the environmental balance.

Less proportion of wildlife crimes in the Sudan horns of Rhinoceros, because the lack of it and it threatened endangered species. Highest wildlife crimes seized in the Khartoum state because its near Al Botana area and Omdurman, found Gazelles and Rabbits, and it represses the biggest market and very close to airport. Next River Nile state because near the Jebel Alhasania National Park and Al Gadaref state because it's near the DBR.

Less wildlife crimes the Southern Kordofan state because the war. The types of wildlife crimes occurring in Uganda are diverse. We found evidence for to the available evidence, bush meat hunting highest type of crimes were the most widespread type of wildlife crime in Uganda, occurring in at least 20 of the 23 protected areas for which we evidence,

Plant or land related grazing), firewood collection, timber harvesting, building poles and charcoal and other crimes lowest type of wildlife crimes in Uganda gorilla (Harrishon, 2013).

UNODC (2015) reported wildlife crimes has transformed in to one on the largest transnational criminal activities, next to drug trafficking, arms dealing and trafficking in human beings. Evidence shows that criminal groups are using the same routes and techniques for wildlife trafficking as for smuggling other illegal commodities and exploiting similar in national gaps in national law enforcement and criminal justice systems. In an endeavor to save the declining wildlife resources from pressure of increasing human population and other human activities

Hashim and Nimir (1978) concluded the same remarks that the Wildlife administration had done very little to enforce conservation in protected areas. They also stated that all protected areas in the Sudan have experienced serious deterioration in the densities and numbers of wild animals and their habitats.

In the Sudan the natural forest vegetation has been subjected to heavy over exploitation for agriculture through the removal the tree cover for crop production, felling trees for fuel wood and building poles and overgrazing to the extent that extensive stretches of forests land lie bare of vegetation. As a result of overgrazing in the semi desert area, several studies revealed that the tree soil seed bank is zero and no natural tree regeneration is expected in this area unless reseeding or afforestation programs are set (Bashir, 2010; Mutwali, 2007).

Ali and Nimir (2006) reported that the main threats facing the DNP could be summarized as; the absence of proper land use surrounding the park, ever increasing size of human population in the Dinder area; trespassing of pastoralists, pastoralists are forced to enter the park in spite of number of any herd caught inside the park.

Explain the current study that overgrazing has ranked first in the crimes of the wildlife in the DNP, the entry of the sheep(97316), entry goat 21290, and entry cattle 3298, and entry camel 406, and entry donkey 258 in the five years from 2013-2017. Because, expansion agriculture its shortage during the dry season, food available in the park and found increase population around the park.

Overgrazing of livestock confirmed that (17%) of population of wildlife cause spread the diseases, because the wild domestic animals transpose the diseases. Also (53%) of overgrazing by competition in pasture

Mohamed (1980) reported consequently competition takes place between livestock and wild animals jeopardizes the survival of wild animal's transmission of contagious diseases in the end of dry season, such as render best and anthrax killed large number of animals in 1980, also competition between some wild animals and trespassing livestock. Sheep, Taing (*Damaliscus lunatus tiang*) and Buffalo (*Syncerus caffer*) consumed a similar diet (Abdelhameed, 1985).

Present study showed that the fires in areas of wildlife in the Sudan casus by open ways, and clean land, and honey collection .these fires caused the death some wild animals and weed replacement. Fire in DNP originates from many sources. Livestock herders set fire to eradicate ticks and to stimulate the new growth of the riverine grasses. When they collect honey from trees cavities, the honey collectors use fire to repel the honey bees (Abdalla, 2011).

Fires were a serious problem in nearly all forest areas in the Sudan. Only the semi-desert areas, where the grass is normally to sparse to burn, were relatively free from fires. Even in these areas, fires sometimes occur and do considerable damage. Surface fire seriously reduce gum Arabic yield of *Acacia senegalensis* and results in the total destruction of the stands if the fire is repeated in the following years (HCNER, 2014).

As the results wildlife conservation in the Sudan challenges faced enforcing wildlife law, shows (Mahgob, 2004) reported considerable proportion of the Park is burnt annually, which depletes the cover for the wild animals. Moreover, the burning may kill reptiles, nestlings, small mammals and sometimes large mammals (Payne and Bryant, 1998).

Sixty tow study community stressed the weak implementation of the wild life law weak funding, shows 38% the community study the reason weak implementation the wildlife law lack means deportation (Ouduk, 2013) reported in the Badingilo National Park in the south Sudan results The major challenges faced by the officers when enforcing wildlife laws include number of vehicles and equipment's, inadequate staff and political interference. The study concluded that many factors have made the enforcement of wildlife laws difficult although the most conspicuous ones are the effects of poverty, negative attitude towards conservation, lack of alternative resources and increase in population.

Crocodile and python skin accessories are popular in markets in Khartoum, but there is no data on the impact of this trade on reptile populations in Sudan (UNEP, 2007). The present study shows wildlife seized by the Khartoum markets; the highest rate of Leopard shoes because they are regarded as fashion and lowest rate accessories crocodile skin.

This study shows trafficking in the Khartoum airport highest rate of trafficking in was 2017 it is 30%, and lowest rate of trafficking in was 2017 it is 13.3%. Shows 66% of the community study the mining affect wildlife by destruction habitat, shows 34% of the community study mining decline wild animals because toxic water in wildlife area and migrate wild animals far the mining place.

CONCLUSSION AND RECOMMENDATION

Conclusion:

The Wildlife crimes in the Sudan during (2013-2017) includes; poaching which represented highest rate, implementation of the Wildlife law, trafficking in Khartoum airport constituted highest proportion, ivory trafficking because of its high price, illegal wildlife trade highest crimes seized in the Khartoum Markets Leopard shoes because they are regarded as fashion. These crimes pose a major threat to endangered species, where the use of Hippopotamus skin in Whips and use cheetah skin in shoes.

The wildlife crimes in Dinder Biosphere Reserve were found Evidence for fire wood collection, Mining, fish angling, honey collection, charcoal production, cultivation, overgrazing, expanded agricultural, Entrance car, weapons, highest wildlife crimes in DBR over grazing by livestock represented 72.9%, because, expansion agriculture, its shortage during the dry season, food available in the park, found increase population around the park.

Recommendation:

- 1-Awareness to create understanding of the public of the importance of wild animals as a source of naturally renewed, the resources must be protected for present and of subsequent generations.
- 2- Necessitated governments in the Sudan establish law enforcement departments. To assure wildlife conservation and protect resources from illegal use thereby maintain viable wildlife population and high genetic diversity.
- 3- To persuade citizens to respect the hunting laws.
- 4- Provision of a special budget for the management of wildlife.
- 5- Further study of Wildlife crimes in the Sudan.

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APPENDIXES

Appendix 1: Questionnaire

Impact wildlife crimes in wild animal and habitat

- 1-The name 2-function.....
3-sex..... 4-Organization

1-Dose Agricultural expansion effects of wild animals?

- (A)yes (B)No

If yes how agricultural expansion effects of wild animals

- (A) Infringement on wild animal pasture
(B) Infringement on the migration of wild animals
(C) Trolling of wild animals habitat
(D) Other

2- Dose poaching effects of wild animals?

- (A)yes (B)No

If yes, how poaching effects of wild animals?

- (A) On the population of animals
(B) On the environmental balance

3- Dose over grazing effects of wild life habitat?

- (A)yes (B)No

If yes choose one of the following?

- (A) Competition for the pasture
(B) Soil erosion
(D)Disease transmission

4-Is there any impact of mining on wild animal?

(A)yes (B) No

If yes how the mining effects of wild animals?

(A) Low wild life population

(B) Destruction of wild life habitat

(C) Other

5-is there conflict in the pasture between herders and wild life

(A)yes (B)No

If the answer yes what is the conflict?

(A)Water (B)Pasture (C)Other

6- Is wild animals smuggling an impact of wild animals?

(A)yes (B)No

Is yes how it affects?

(A) Wildlife habitat (B) Wildlife population (C)Other

7-Is there fire in wild life area?

(A) yes (B)No

If yes, what are the causes of these fires?

(A) Weed replacement (B) burning hives

(D)Death of some wild animals

8-What kinds of punishment applies to the perpetrators of poaching crimes?

(A) The fine (B) Goal

(D) Confiscation of means of transport (E) make adjustment

9-what is the penalty for over grazing?

(A) Confiscation of the animals (B) the prison

(D) Selling animals and taking percentage of their price

(E) Make adjustments

10 –Is there a control over markets for wild products (shoes-leather-bags)?

(A)Yes (B)No

11-Is poaching done with certification with poach licenses?

(A)Yes (B) No

12-Are there any excesses in poaching licenses?

(A)Yes (B) No

13- Average number of monthly irregularities?

(A) Less than 10 (B) More than 10 (C) None

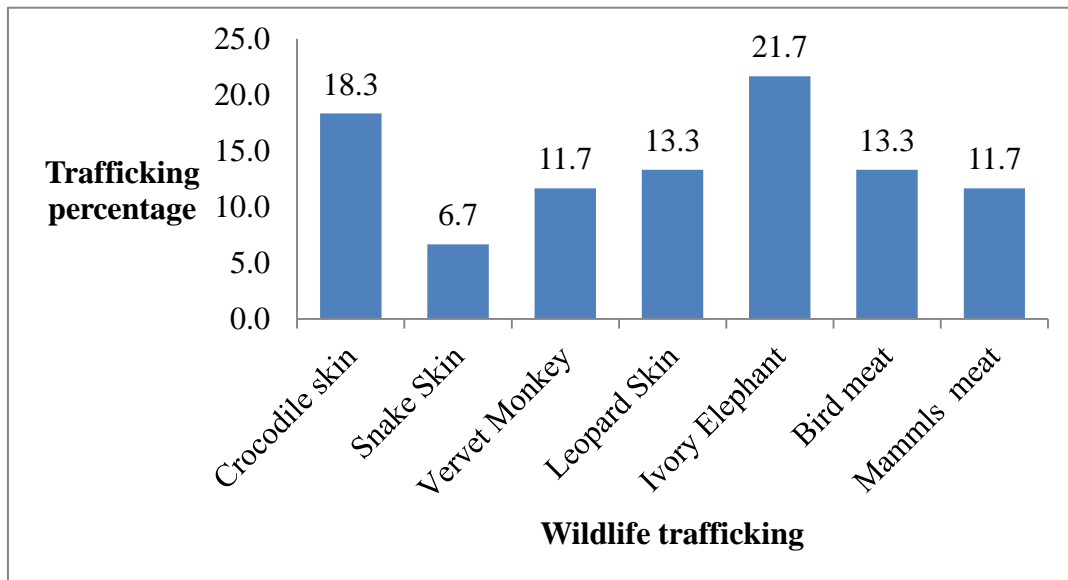
14-Are there wild life patrols?

(A)Yes (B)No

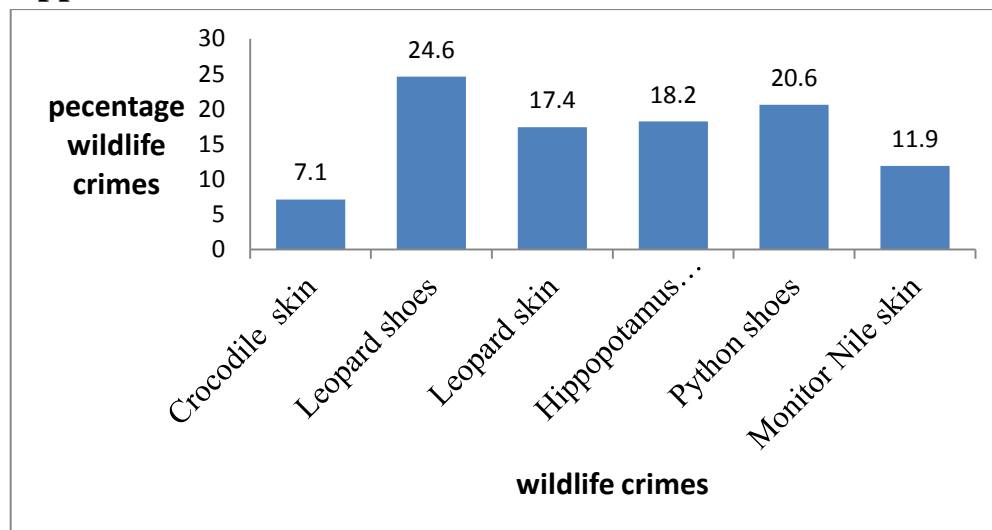
15-What are the problems that prevent legal supervision?

(A)lack means of deportation (B)weak funding

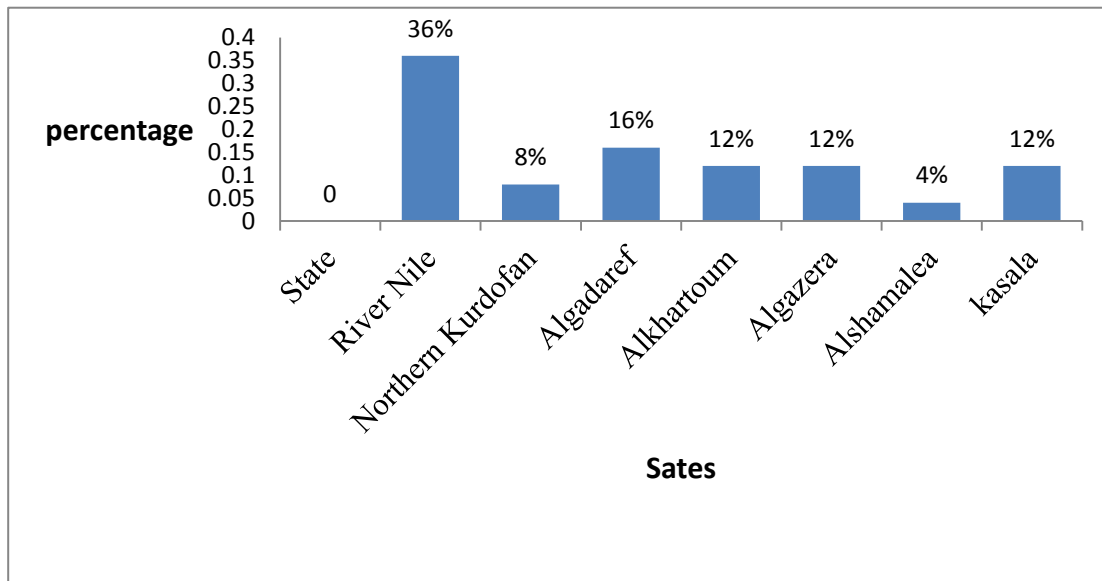
Appendix 2: Wildlife Trafficking Seized in Khartoum Airport



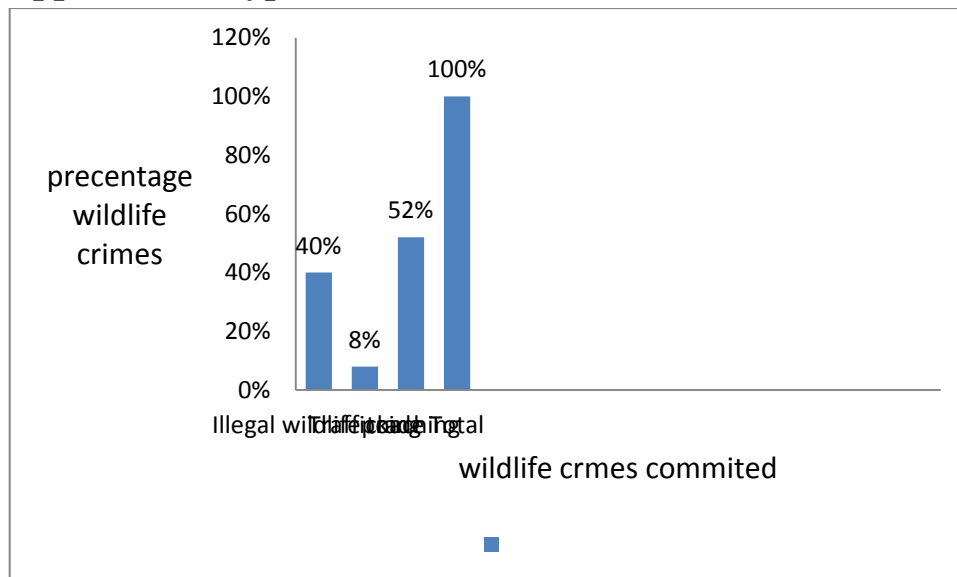
Appendix 3: Wildlife crimes in the Khartoum Markets



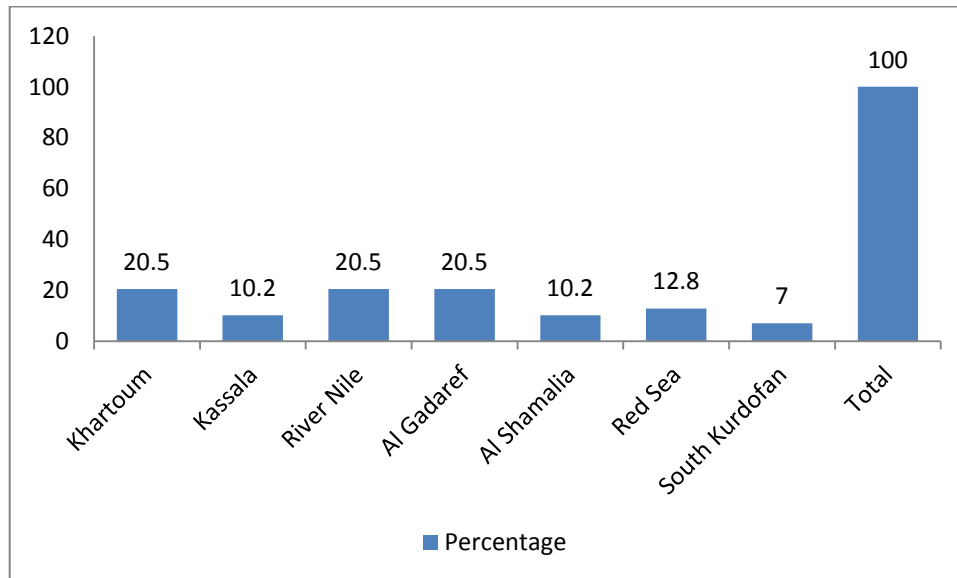
Appendix 4: Wildlife crime in the Sudan, state wise 2013



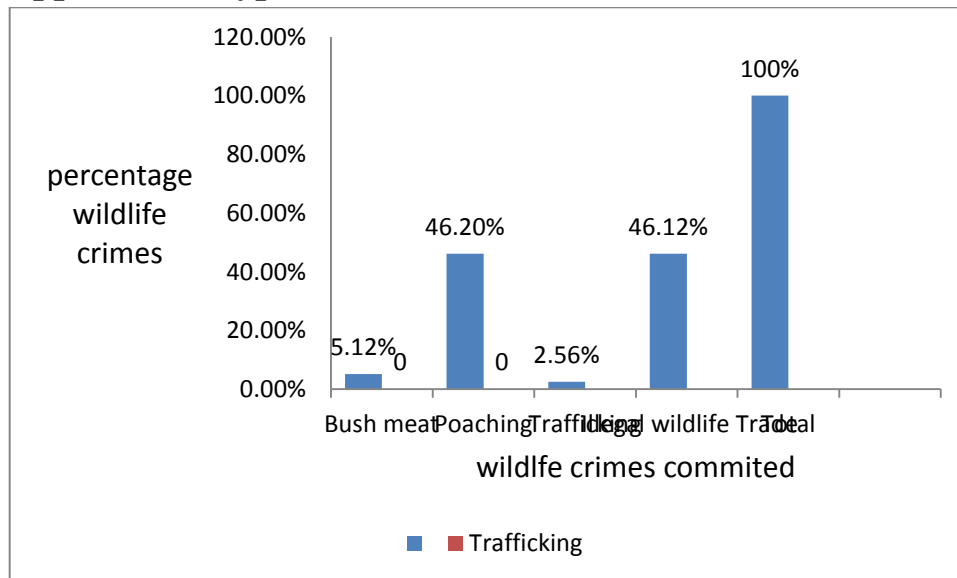
Appendix, 5: Type of Wildlife crimes in the Sudan, items 2013



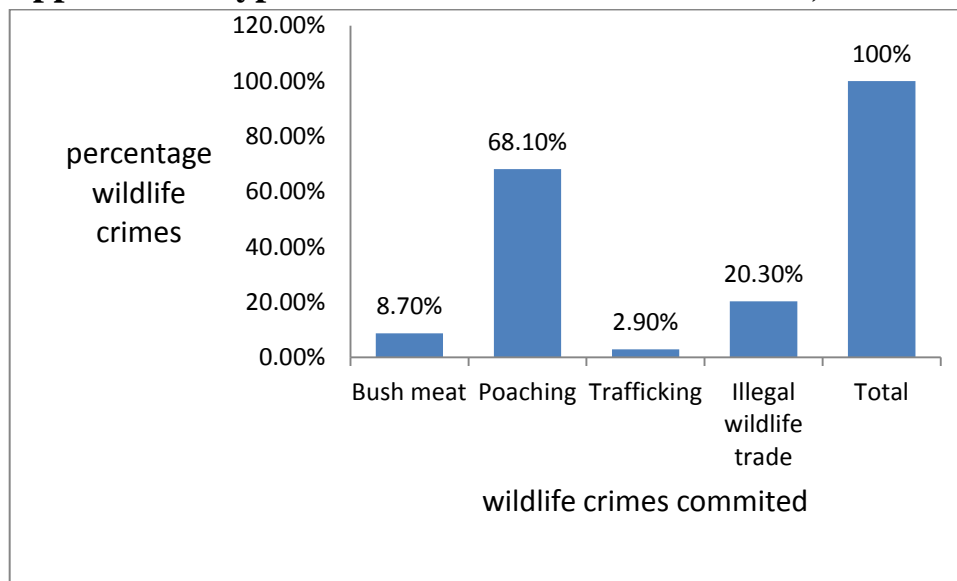
Appendix 6: Wildlife crime in the Sudan, state wise 2014



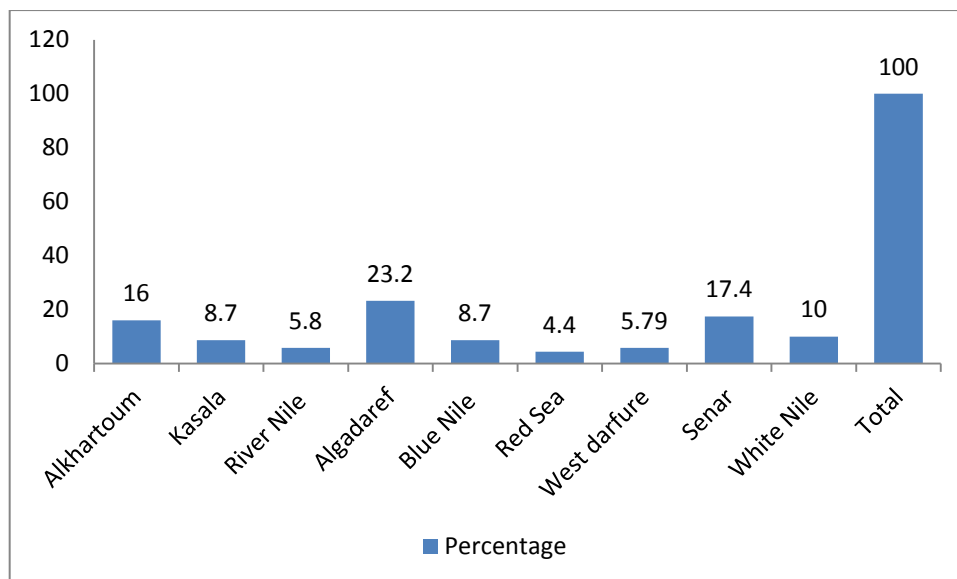
Appendix 7: Types of Wildlife crimes in the Sudan, items 2014



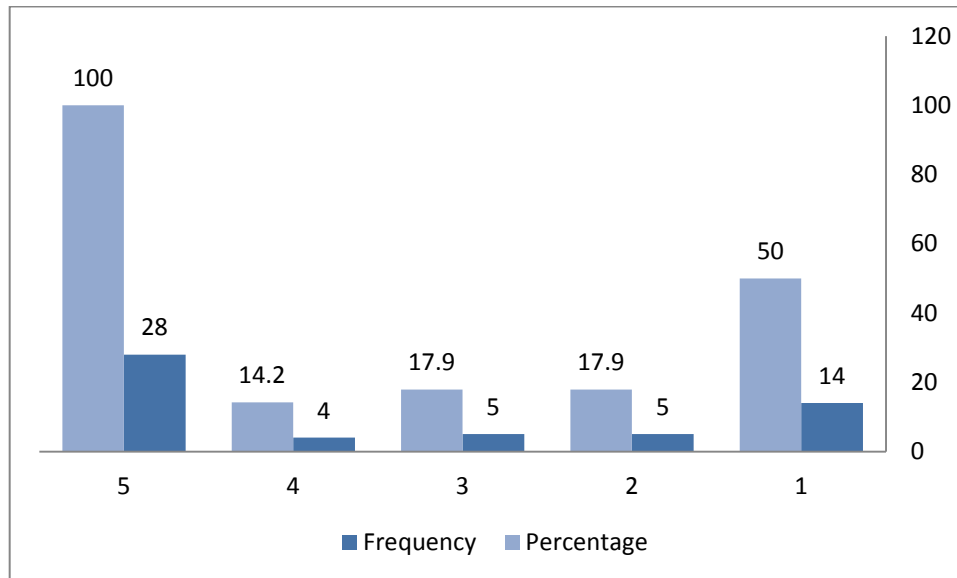
Appendix 8: Types of Wildlife crimes in the Sudan, items 2015



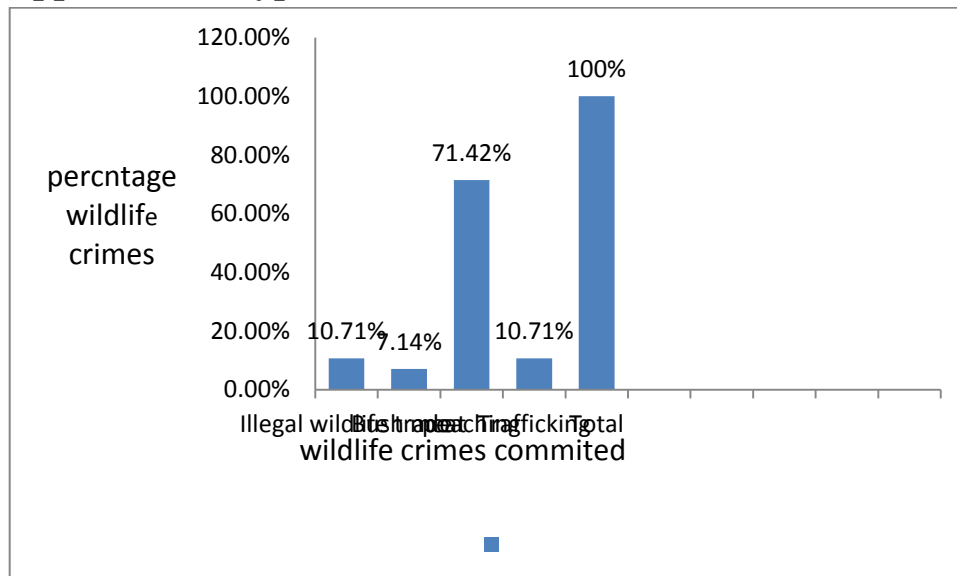
Appendix 9: Types of Wildlife crimes in the Sudan, items 2015



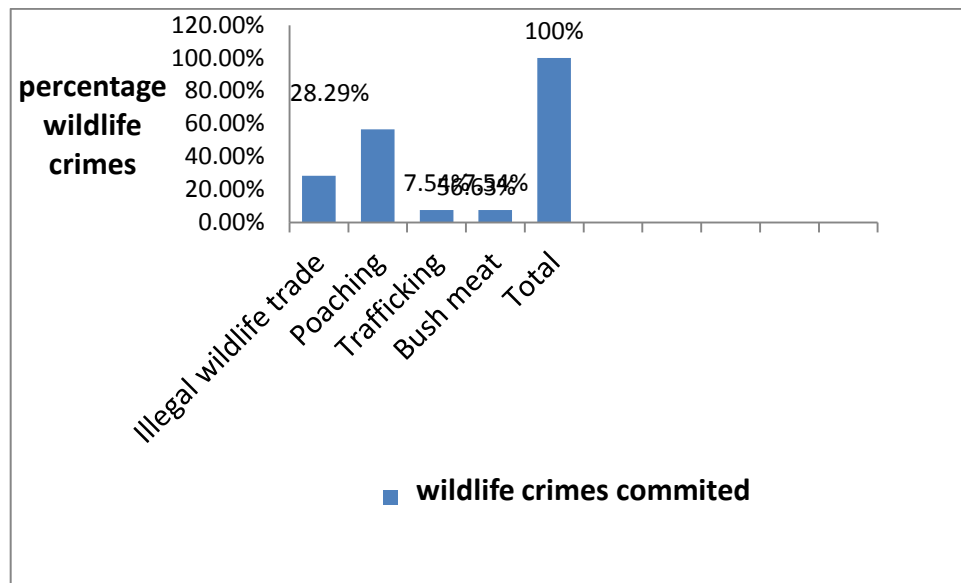
Appendix 10: Type of Wildlife crimes in the Sudan, items 2016



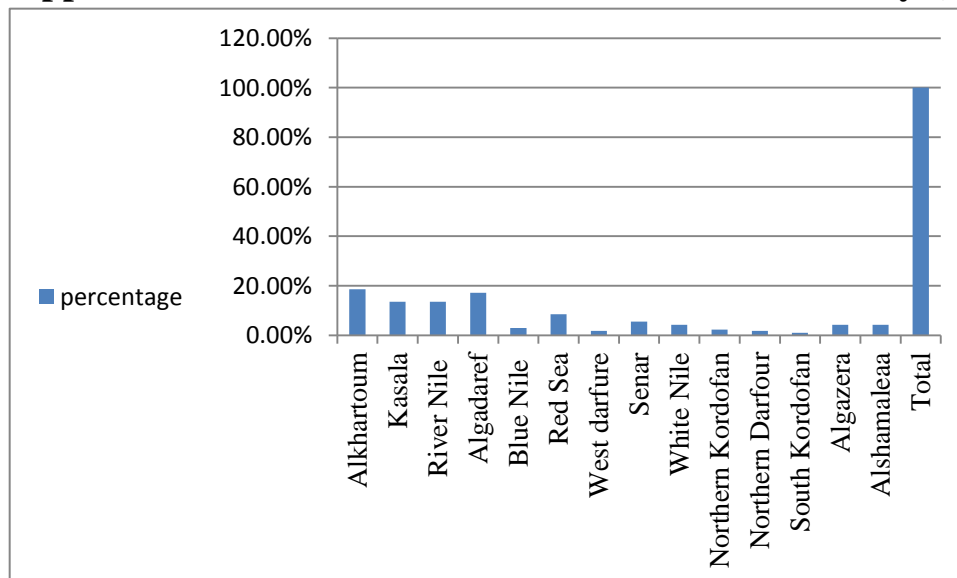
Appendix 11: Type of Wildlife crimes in the Sudan, items 2016



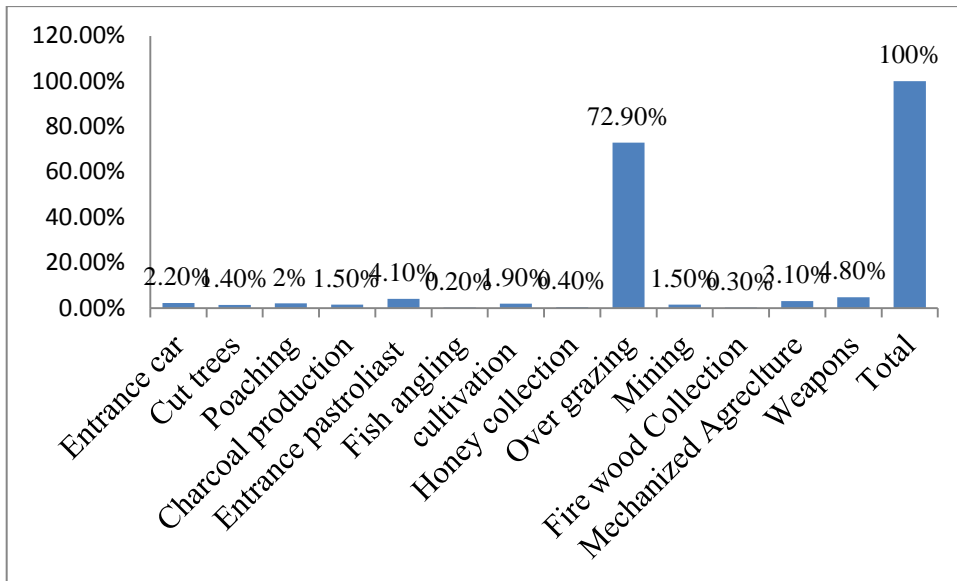
Appendix 12: Type of Wildlife crimes in the Sudan, items 2017



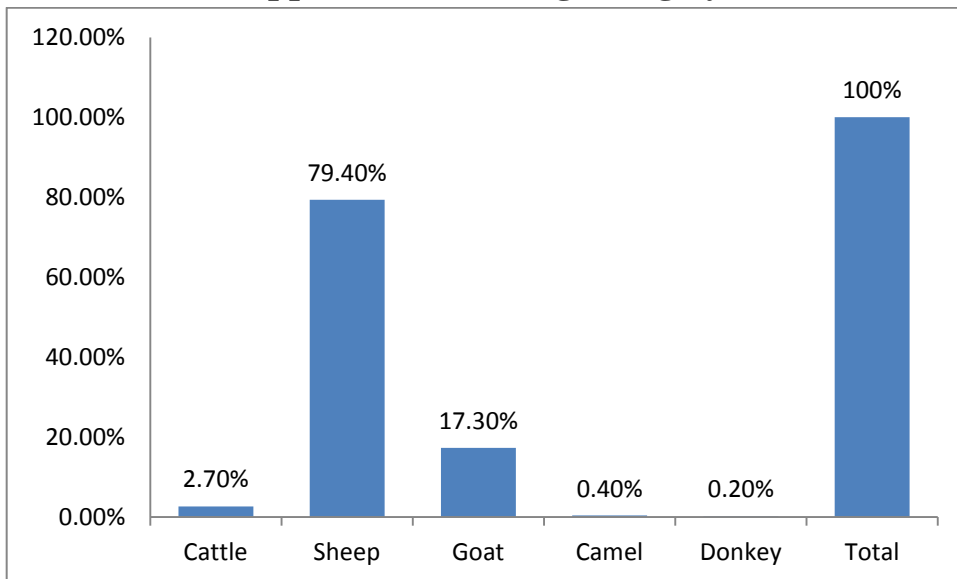
Appendix 13: Total distribution wild life crime locality (state wise)



Appendix 14: Wildlife Crimes in the Dinder Biosphere Reserve:



Appendix 15: Over grazing by livestock



Appendix 16: Python and Crocodile Accessories



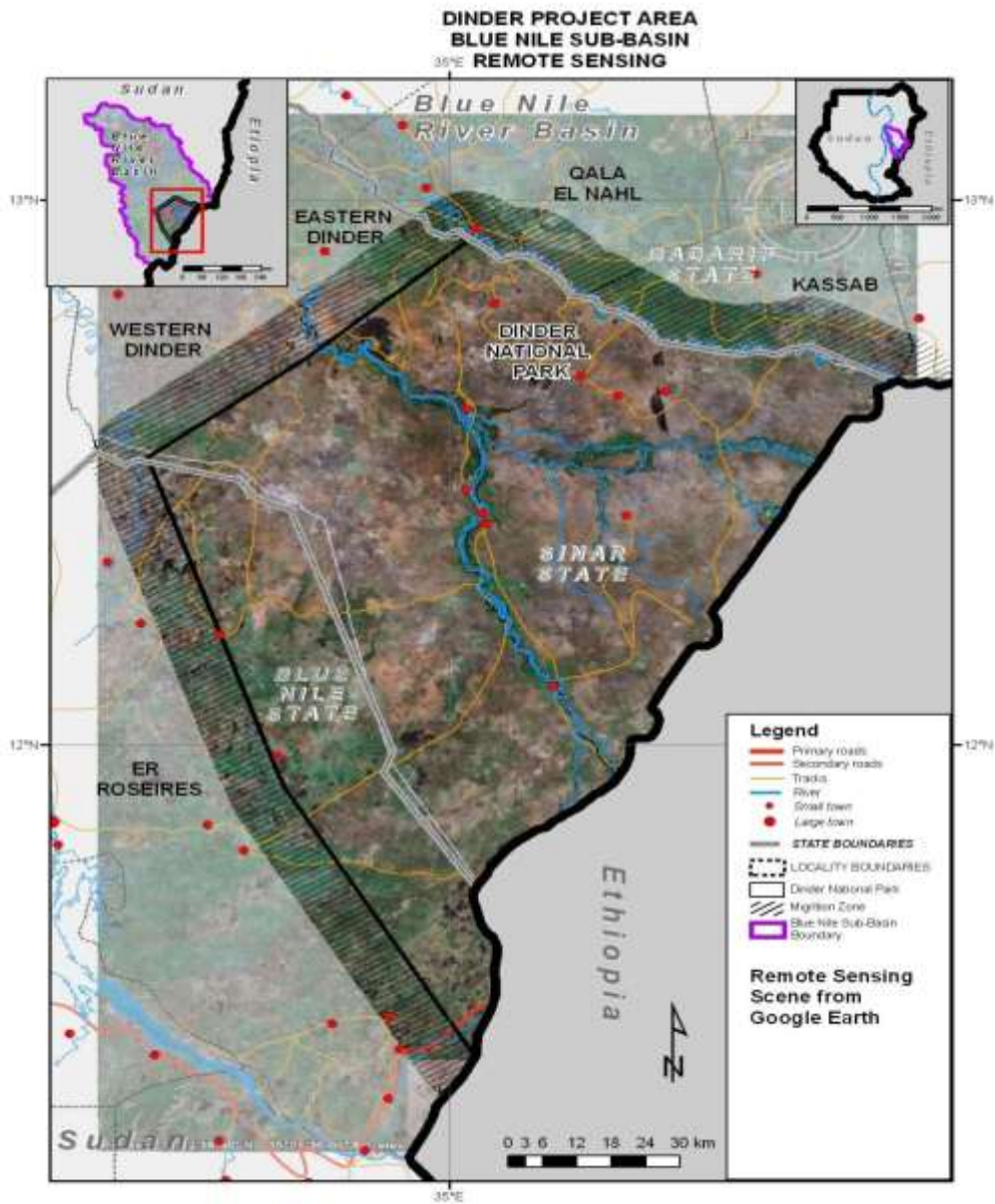
Source: UNEP (2007)

Appendix 17: Sudan location



Source: ETOA (2012)

Appendix 18: Location of Dinder Biosphere Reserve



Source: Elyas and Hashim (2015)