

Connective Links of Local Residents and Illicit Animal Genetic Resource Trafficking in Villages Proximal to Custom Checkpoints of Western Tigray, Northwestern Ethiopia

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Abstract: Illicit animal genetic resource trafficking is a transit crime that has wide ranging implication for biodiversity conservation, national security and economic wellbeing of a given state. The study was carried out from February -April, 2017 with the aim to assess the connective links of local residents and illicit animal genetic resource trafficking in villages proximal to border checkpoints of western Tigray. The data were collected by preparing both open and close-ended questionnaire for interviews. The sampling frame was designed taking individual custom village interface as a cluster and hence cluster sampling was used. Final sampling units from each cluster were taken using systematic sampling. The data were analyzed using descriptive statistics to understand the connective links of border point local residents and illicit animal genetic resource trafficking. About (62.5%) of the local residents responded that, they know about the potentials of animal genetic resources of economic importance in the locality. They also noted that, the western part of Tigray has potential animal genetic resources subjected to smuggling. The majority (91.3%) of the local residents noted that, there is no involvement of the local residents in subsistence based illicit trafficking. However, there is an intense commercial trafficking of animal genetic resources by local business groups to adjacent neighboring states. All (100%) of the local residents noted that, smugglers make use of the illicit exit routes taking advantage of the local unemployed youths. About (60%) of the local residents noted that, porous border security is the enabling condition to make use of the illicit exit routes by smugglers. As well, smugglers are cheating the local residents to lodge in border point villages of western Tigray. The majority (95%) of the local residents responded that, illicit animal genetic resource trafficking is a serious happening. The smuggling practices of animal genetic resource are directed by middle organized businessmen's of the neighboring towns. As well, (95.7%) of the local residents reported that, there is no local market for legal commercial exchange of animal genetic resources. Thus, establishment of a local market and devising border point youth development packages should be a future concern so as to halt the underlying challenges of illicit animal genetic resource trafficking practices in custom village interfaces of western Tigray, northwestern Ethiopia.

Key words: Social network • Exit • Smuggling • Lugdi • Biogenetic

INTRODUCTION

Ethiopia is endowed with varied ecological and vastly spanning potential bio genetic resources [1]. The country is known as one of the twelve primary centers for the

origin and diversity of plant genetic resources in the world and is also rich in fauna diversity [2]. Biodiversity plays vital and diverse roles in economic, ecological and social fabrics of the country [2]. The national economy and the livelihoods of its local community are strongly

reliant on biodiversity and its ecosystem services [3]. However, newly occurring man-made and natural factors have been experiencing an array of serious environmental challenges that are eventually leading to the loss of biodiversity and ecosystem services [2]. Animal genetic resource trafficking is one of the emerging conservation challenges leading the bio-capitals to be unsustainably exploited by illegal individuals and groups [4]. Wildlife trade is any sale or exchange of wild animal and plant resources by people [5]. This can involve live animals and plants or a diverse range of products needed or prized by humans, including skins, medicinal ingredients, timber, fish and other food products [5]. Global trade in illegal wildlife is potentially vast illicit economy, estimated to be worth billions of dollars each year, impeding international efforts to conserve rare and endangered animals and plants [6]. Owing this, most plants and animals are trafficked from developing countries to the western world [7, 8]. Globally, the recent illicit trade in wildlife is estimated to be worth US\$50-150 billion per year [9]. Animal genetic resource trafficking is a transit crime that has wide-ranging implications for society [10]. Not only does it severely affect the environment by impacting biodiversity, it also hampers social and economic development in many communities [7, 11]. Furthermore, wildlife trafficking represents an increasing threat to national and global security [5] being run by sophisticated crime groups who use the profits for terrorism and rebel uprising [5, 8]. Wildlife trafficking is linked to other serious crimes such as drug trafficking, arms trafficking, human smuggling and document counterfeiting [12]. Moreover, it is cited as a means to finance the most violent and destructive activities of criminal and terrorist organizations because of the major financial benefits derived from a relatively minimal time investment, low risks of detection and lack of serious punishment [13]. The huge profits made from the illicit wildlife trade act as incentives to organized crime networks [14]. There is also growing evidence that, non-compliant or militia groups in Africa use profits from the illegal sales of wildlife to fund terrorist activities [15].

The demand for wildlife products is considerably influenced by culture and depends on different consumer groups [8]. Zimmerman [16] has identified three main types of criminals involved in wildlife trafficking: local farmers trying to supplement their incomes, mafia-style groups operating in developing countries and international smuggling networked groups. Researches revealed that, most wildlife genetic resource trafficking, particularly with regards to the initial part of the market

supply chain, is carried out by individuals; opportunistic locals who try to supplement their income and professional trappers [8]. Wildlife crimes typically occur in remote rural regions characterized by low population density and diverse geographical features [17]. These factors make it difficult for law enforcement agents to solve the crimes and bring the executors of these offenses to justice [18]. Although wildlife conservation laws and regulations provide a variety of enforcement mechanisms to curb the illicit wildlife trade, enforcement mechanisms pose a huge challenge [19]. Inadequate financial, human resources and lack of institutional capacity are barriers to enforcing these wildlife laws [20].

Poor detection of transboundary good by border custom checkpoint plays a key role in facilitating the illicit trade of wildlife [20]. Markets for protected plants, animals and animal materials includes Belgium, China, the Czech Republic, France, Hong Kong, Israel, Japan, Netherlands, Romania, Spain, the United Kingdom and Vietnam [19]. Without the commitment of the local community, customs agents and enforcement bodies in these countries and in the countries from which trafficking originates the illegal trade in endangered species will continue [20]. The great concern of wildlife trafficking in Africa is loss of security, revenue from tourism, which creates jobs and contributes resources for national development [21]. All the while, some species are pressed towards extinction at 1000 times the natural rate [22]. The fight against trans-boundary conservation crime received a boost at the G8 meeting held from 17 to 18 June 2013 at Lough Erne [23].

G8 leaders recognized the need to tackle criminal trafficking and strengthen border security, including in relation to the illicit trafficking of bio genetic resources, noting the links to governance, the rule of law and sources of funding for terrorists [24]. Ethiopia has a relatively short history of dealing with wildlife conservation crimes [25]. However, there are prominent, encouraging efforts to reduce illegal trade of wildlife by signing an international conservation and law enforcement conventions. Nevertheless, Ethiopia is identified both as a source and a key trade hub for illegal ivory trafficking [25]. Ethiopia has signed the CITES which prohibits illegal wildlife trade [23].

According to criminal justice programs and wildlife charities, a kilogram of ivory poached from elephants can be sold in Asia for around USD 850 (€650) [23]. However, the problem is still persisting with a local residents interface along border custom checkpoint village interfaces and unknown exit routes of western Tigray.

Thus, there is a need to research the connective links between illicit animal genetic resource trafficking and local residents in custom checkpoint village interfaces of western Tigray, northwestern Ethiopia.

MATERIALS AND METHODS

Description of the Study Area: The study was conducted in three custom checkpoints proximal to village interfaces of western Tigray, northwestern Ethiopia. The surveyed sites are located at 1383 km northwest of Addis Ababa, the capital city of Ethiopia and 600 km from Mekelle, the capital city of Tigray national regional state. Geographically, it is located between 13° 50' and 14° 23' N and 36° 31' and 37° 29' E. Western Tigray has three Ethiopian custom and revenue authority border checkpoints administered under Humera custom branch office. Ludgi is situated at the junction of Ethio-Sudan stretched along the highway of Dansha-Abdrafi-Maycadran ending in Humera. This is one of the transboundary transit hubs for a large volume of animal genetic resource heads crossing the border trade activities. Bereket is found in Kafta Humera Werda, 14 km away from May kadra. Moreover, Bereket is predominantly described as a kola (Lowland) agro-climatic zone. Dima is one of the custom checkpoints located in western zone Kafta Humera woreda. Based on the figures from the central statistical agency in 2005, the site has an estimated total population of 902, of which 498 are men and 404 are women [26]. Its agro-climatic zone is identified as qolla with an inclination to semi-arid. It is bordered by Eritrea in the north, in the western Sudan. Within Tigray it is positioned in the woreda of Kafta-Humera and Tahtay-Adiabo [27]. Altitude ranges from 568 to 1861 meter above sea level. The dry season occurs during the months of October to May and the wet season June to September. It has unimodal rainfall pattern which 80 to 85% of the rain falling during the wet season [28]. Annual rainfall is 448.8 and 1102.5mm for the lowland and highland areas of the district, respectively. The mean annual temperature of the area is 25°C to 27°C in the lowlands and 20°C to 25°C in the highlands. The study sites are found within the lowland part (Kola) of the district and share the mean annual rainfall and mean annual temperature recorded to the lowland areas. The people of the study area practice mixed farming systems as means of livelihood. Livestock are the valuable components of the farming system contributing enormously towards ensuring food security in the study area [28].

Target Population: The target population of this study was local residents of the three custom checkpoint village interfaces of western Tigray. Based on the information obtained from the Ethiopian Biodiversity Institute genetic control staff deployed in western Tigray, there are 14 proximal local residents in Lugdi where as Dima custom checkpoint has 27 proximal local residents and the numbers of local residents of Bereket custom checkpoint are 22. Therefore, there are a total of 23 proximal local residents working on the selected border custom checkpoint village interfaces of western Tigray, northwestern Ethiopia.

Methods of Data Collection: The researchers use primary data for the study. The data were collected by preparing both open and close-ended questionnaires for interview. Researchers, with continuous supervision, were contacted each and every respondent face-to-face to get questionnaire filled. Furthermore, the consent of illicit animal genetic resource trafficking for proximal local residents was confirmed being fully informed of the study objectives prior to the interview. In order to avoid communication discrepancies between the data collectors and the respondents, the questionnaires were translated to the language spoken in the custom village interfaces of western Tigray.

Variables of the Study: The response variable of the study was connective links of border point proximal local residents and illicit animal genetic resource trafficking in custom checkpoint village interfaces, information on exit routes and observation of the local residents settling adjacent to the border point. The explanatory variables/factors that were used as being factors in the practice of illicit animal genetic resource trafficking of the selected local residents in the custom checkpoint village interfaces were:

- | | | | |
|------------------|------------|----------|--------------|
| • Age | Sex | Distance | Workload |
| • Attitude | Income | Training | Unemployment |
| • Knowledge | Experience | Mobility | Literacy |
| • Household size | Location | Housing | No. of staff |

Sampling Design: The sampling procedure was designed to collect primary data. The northwestern part of Ethiopia does have three custom checkpoint village interfaces, so the data were collected taking individual custom checkpoint village interfaces as a cluster and hence cluster sampling was used. After determining the total sample size (n), proportional allocation to each cluster

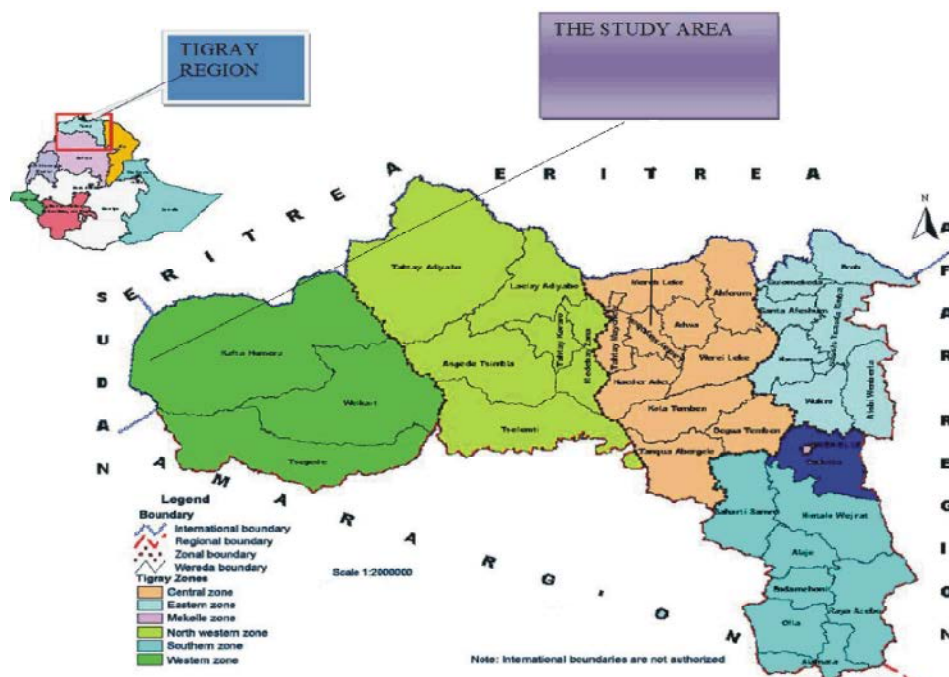


Fig. 1: Map of the study area (Custom checkpoint village interfaces of western Tigray)

(i.e. Custom checkpoint village interface) was done by further considering the amount of proximal local residents on illicit animal genetic resource trafficking from each custom checkpoint village interfaces. Final sampling units from each cluster were taken using systematic sampling. In a systematic sampling we decide the sample size n from a population size of N . In this case, the population has to be organized in some way, such that we choose a starting point along the sequence.

The total sample size ($n=23$ local residents) was proportionally allocated to each border custom checkpoint village interfaces using the formula [29].

$$n_l = \frac{N_l}{N} n \quad l = 1, 2, 3$$

where:

N_l : Total number of local residents in l^{th} custom checkpoint village interfaces, $l = 1, 2, 3$

N : Total population of local residents on illicit animal genetic resource trafficking in northwestern checkpoint village interfaces.

n_l : Total sample size taken from l^{th} checkpoint village interfaces

n : Total sample size determined from a custom checkpoint village interfaces of northwestern Ethiopia

The three individual clusters (i.e. Custom checkpoint village interfaces) for the sample sizes of residents was:

Lugdi ($N_1=14$) Dima custom checkpoint village interface ($N_2= 27$) Bereket custom checkpoint village interfaces ($N_3=22$)

The proportional allocation size was computed as follows:

$$n_1 = \frac{N_1}{N} n, \quad n_2 = \frac{N_2}{N} n \quad \text{and} \quad n_3 = \frac{N_3}{N} n$$

$$n_1 = \frac{14}{63}(23) \approx 5 \quad n_2 = \frac{27}{63}(23) \approx 10 \quad n_3 = \frac{22}{63}(23) \approx 8$$

The sample size taken from the local residents was 5, 10 and 8 for Lugdi, Dima and Bereket custom checkpoint village interfaces respectively.

Statistical Analysis: The data were analyzed through SPSS version 20.0. The study uses descriptive methods to understand the nature of the data for illicit animal genetic resource trafficking practices. Inferential methods for detail analysis of the variables were also used.

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Local Residents in Custom Checkpoint Village Interfaces of Western Tigray: The mean age of the interviewed local residents is 53.31, 36.3, 43.3 in Bereket, Dima and Lugdi custom checkpoint village interfaces respectively (Fig. 2).

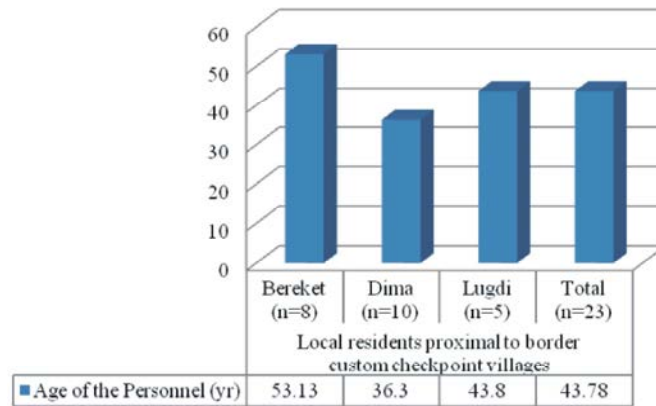


Fig. 2: Age of local residents proximal to custom checkpoint village interfaces of western Tigray

Table 1: Educational background of the local residents in custom checkpoint village interfaces of western Tigray

			Local residents proximal to border custom checkpoint villages			
No.	Variables	Categories	Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Educational Background	Illiterate	37.5	0.0	40.0	21.7
		3 rd	0.0	10.0	20.0	8.7
		4 th	12.5	0.0	0.0	4.3
		5 th	25.0	0.0	20.0	13.0
		6 th	25.0	20.0	0.0	17.4
		7 th	0.0	20.0	20.0	13.0
		8 th	0.0	40.0	0.0	17.4
		10 th	0.0	10.0	0.0	4.3

Around (37.5%) of the interviewed local residents has an illiterate educational background in Bereket custom village interface. As well, (40%) of the interviewed local residents in Dima village are grade 8th. On the other hand, about (40%) of the local residents in Lugdi custom village interfaces are illiterate. Despite the illiteracy level the local residents are aware of illicit animal genetic resource trafficking of economic and conservation importance. This probably reflects that, regardless of their educational background they are alert about the potential animal genetic resource of economic importance found in their local environment.

Knowledge of the Local Residents on Illicit Animal Genetic Resource Trafficking in Custom Checkpoint Village Interfaces of Western Tigray: Almost half of (62.5%) the local residents of Bereket responded that, the local residents are cognizant about the potential animal genetic resources of the custom village interfaces. All (100%) of Lugdi local residents responded that, they are informed of animal genetic resources of economic importance found within the catchment (Table 2). This is consistent with what has been previously reported in western Tigray, the cattle

population in Tigray is higher than other livestock species. Among the cattle breeds, Begait cattle breed is known for its high milk yield and is mainly found in the western lowlands of Tigray, western Ethiopia [28]. This is also consistent with what has been previously reported [28], Tigray is one of the regional states of Ethiopia where livestock production has been an important component of the livelihoods of smallholder farming communities.

Almost half (56%) of the local residents responded that, there are site specific potentials of animal genetic resource in the current network of custom checkpoint village interfaces. Almost a majority (76.3%) of the local residents responded that, there is illicit animal genetic resource trafficking practices which didn't accorded priority status in custom checkpoint village interfaces of western Tigray.

Social Network Interfaces of Illicit Animal Genetic Resource Trafficking in Custom Checkpoint Village Interface of Western Tigray: The majority (91.3%) of the local residents responded that, the local residents didn't take part in illicit animal genetic resources trafficking. The majority of the local residents responded that, the

Table 2: Knowledge of the local residents on illicit animal genetic resource in custom checkpoint village interface of western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Do you know about animal genetic resources found in the custom village interfaces of the locality?	Yes	62.5	20.0	100.0	52.2
		No	37.5	80.0	0.0	47.8
2.	Is there a site specific potential of animal genetic resource in the custom village interface of the locality?	Yes	87.5	30.0	60.0	56.5
		No	12.5	70.0	40.0	43.5
3.	Are their practices of illicit animal genetic resource trafficking in the custom village interfaces of the locality?	Yes	100.0	100.0	0.0	78.3
		No	0.0	0.0	100.0	21.7

Table 3: Social network interfaces of illicit animal genetic resource trafficking in custom checkpoint village interface of Western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Is their involvement of the local residents in illicit animal genetic resource trafficking in custom village interfaces of the locality?	Yes	12.5	10.0	0.0	8.7
		No	87.5	90.0	100.0	91.3
2.	If your answer to question No1 is "Yes" which groups of the local residents are involved in illicit animal genetic resource trafficking?	Unemployed youths	12.5	0.0	0.0	4.3
		others	87.5	100.0	100.0	95.7
3.	Is there a practice of illicit animal genetic resource trafficking for subsistence purpose?	Yes	25.0	10.0	60.0	26.1
		No	75.0	90.0	40.0	73.9
4.	Is there a practice of illicit animal genetic resource trafficking for commercial purpose?	Yes	87.5	70.0	0.0	60.9
		No	12.5	30.0	100.0	39.1
5.	Is there a local market for the exchange of animal genetic resources in the custom village interface?	Yes	37.5	0.0	20.0	17.4
		No	62.5	100.0	80.0	82.6
6.	Is there a link between trafficking wildlife and ethno zoological medicinal practices of neighboring states?	Yes	0.0	0.0	20.0	4.3
		No	100.0	100.0	80.0	95.7
7.	What are the terminal destinations of animals genetic resources trafficked through the custom village interface of the locality?	Sudan	100.0	100.0	100.0	100.0
		Eritrea	0.0	0.0	0.0	0.0

local society does not take part in illicit animal genetic resources trafficking. This could be associated with the social links of the custom checkpoint proximal household and the existing animal husbandry based livelihood approaches. This could also be allied with what has been reported [28], which noted that livestock are the valuable components of the farming system contributing enormously towards ensuring food security in the surveyed sites. The majority (73.9%) of the local residents responded that, there is no illicit animal genetic resource trafficking for subsistence purposes. The finding of the present study is consistent with what have been reported [28] in western Tigray. Livestock and crop production plays an important role in improving the livelihood of farmers in the surveyed area [28]. Hence, subsistence trafficking is not an issue of concern owing to the its tense social network within the network of the custom checkpoint village interfaces of western Tigray. Almost half (60.9%) of the local residents responded that, there are certain commercial practices of illicit animal genetic trafficking in the custom village interfaces of western Tigray (Table 3). This could be associated with the porous border security and the lofty market demand of

animal genetic resources in neighboring states. As well, the finding of the present study is in line with the result reported [30] who reported that, the population size of Begait cattle breed is reducing significantly and it is at a higher risk of extinction due to animal smuggling in the custom checkpoint village interfaces.

The majority (82.6%) of the local residents responded that, there is no local market for the commerce of animal genetic resources of the small holder farmers. This could probably reflect the absence of a market chain of the abundantly found local animal genetic resources.

Almost all (95.7%) of the local residents responded that, there is no interconnection between the local residents and illicit wildlife genetic resource trafficking alongside the ethno zoological medicinal practices of neighboring states. All (100%) of the local residents responded that, Sudan is the bounding destination for illicit animals genetic resources trafficking within the extended network of villages proximal to border checkpoints of western Tigray. This could be associated with the porous border security and mix of the physical geography of the neighboring Sudan with local agricultural investment groups of Ethiopia.

Table 4: Exit point of illicit animal genetic resources trafficking in custom checkpoint village interfaces of western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Is their cross border trafficking of animal genetic resources via exit routes adjacent to the custom village interfaces?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
2.	Who is accessing the hidden exit routes for illicit animal genetic resource trafficking?	Individuals coming from adjacent villages	37.5	40.0	40.0	39.1
		Organized local business groups	25.0	0.0	20.0	13.0
		Smugglers paid local youths	37.5	60.0	40.0	47.8
3.	What are the likely enabling conditions to make use of the hidden exit routes adjacent to the custom interface villages?	High demand of the animals from destination consumers		10.0		4.3
		Poor border point security	37.5	80.0	60.0	60.9
		Less emphasis on legal & regional authorities on animal trafficking	62.5	10.0	40.0	34.8
4.	Is there a lodging service for illicit animal genetic resource traffickers in the custom village interfaces before they leave to the bordering states?	Yes	100.0	0.0	0.0	34.8
		No	0.0	100.0	100.0	65.2

Exit Points of Illicit Animal Genetic Resource Trafficking in Custom Checkpoint Village Interfaces of Western Tigray: All (100%) of the local residents responded that, there is a cross border illicit animal genetic resources trafficking via the illicit exit routes adjacent to border point villages. Almost half (47.8%) of the local residents responded that, unemployed and smugglers paid local youths are smuggling animal genetic resources through the illicit exit routes (Table 4). This could be associated with the weak law enforcement and less integration of border point enforcement groups working within the catchment and other parallel agents. Almost half of the local resident noted that, unemployed and smugglers paid local youths were engaged in illicit animal genetic resource trafficking. This might be related to the absence of border point youth development package and alternative livelihood approaches.

About (60.9%) of the local residents responded that, porous border point security is the likely enabling condition to make use of the exit routes neighboring the custom village interfaces of western Tigray. This could be allied with the absence of sufficient patrolling human resources in the extended physical geography of custom village interfaces of western Tigray. All (100%) of the local residents in Bereket responded that, illicit animal genetic resource traffickers are deceiving local residents to lodge in the custom village interfaces before they

depart to bordering states. On the other hand, All (100%) of Dima and Lugdi local residents responded that, illicit animal genetic resource traffickers lodge in the custom checkpoint adjacent villages before they head off to the neighboring states. This could be related with lack of awareness among the local residents towards the smugglers of animal genetic resources.

The Key Actor Involved in Illicit Animal Genetic Resource Trafficking in Custom Village Interfaces of Western Tigray: All (100%) of the local residents responded that, there are key actor implicated in illicit animal genetic resources trafficking within the custom villages interfaces. Almost half (43%) of the local residents responded that, middle organized businessmen's are the key actors involved in illicit animal genetic resource trafficking. Similar studies carried out in Borena zone, southern Ethiopia has noted that, businessmen's are the key actors involved in illicit trafficking of animal genetic resources [31]. They also noted that, it is attributed by the weak enforcement of legal frameworks and gaps related to knowledge, attitude and practice of the merchants to both contributors and receiver countries of genetic resources [31]. Furthermore, this could be connected with lack of integrated security units to address the underlying problem of illicit animal genetic resources trafficking.

Table 5: Key actors involved in illicit animal genetic resource trafficking in custom check point village interfaces of western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Are their key actors involved in illicit animal genetic resource trafficking in custom checkpoint village interfaces?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
2.	If your answer to question number 1 is “Yes” who are the key actors involved in illicit animal genetic resource trafficking?	Local business mans	12.5	20.0	80.0	30.4
		Middle organized business groups	87.5	20.0	20.0	43.5
		Unemployed youths	0.0	60.0	0.0	26.1
3.	How serious is illicit animal genetic resource trafficking in the custom checkpoint village interfaces?	It was happening antiquity but not knows		10.0	0.0	4.3
		Wildlife genetic resource trafficking is not a serious issue	100.0	90.0	100.0	95.7
4.	What motivates traffickers to take on the exchange of illicit animal genetic resource trafficking with neighboring states?	It is a primary source of income	12.5	20.0	0.0	13.0
		Pressure from neighboring states	12.5	0.0	0.0	4.3
		Lack of awareness about animal genetic resources	12.5	20.0	100.0	34.8
		Way in to life changing money	62.5	60.0	0.0	47.8

The majority (95.7%) of the local residents responded that, the extent of illicit animal genetic resource trafficking is serious within the current network of custom village interfaces of western Tigray (Table 5). Almost half (47.8%) of the local residents responded that, the illicit traffickers of animal genetic resource are motivated to take on smuggling with neighboring Sudan. This could be associated with the number of porous border security and toothless law coupled with weak law enforcement efforts in the locality. Inline to the finding of the current study [31] has noted that, the degree and trend of bio-genetic resource trafficking in southern Ethiopia is sharply increasing at an alarming rate.

Market Accessibility of Illicit Animal Genetic Resource Trafficking in Custom Village Interfaces of Western Tigray: The majority (95.7%) of the local residents responded that, there is no a common local market for the exchange of illicit animal genetic resources for ethno zoological practices with neighboring states (Table 6). This might be linked with the absence of border point ethno zoological practices with neighboring states.

On the other hand, (69.6%) of the local residents responded that, smugglers bring the animal genetic resources of trafficking importance from proximal local markets (Table 6).

Almost half (43%) of the local residents responded that, smugglers potentially access the exit routes in

seasons were by animals of trafficking importance are abundantly found.

Community Interfaces of Illicit Animal Genetic Resource Trafficking in Custom Village Interfaces of Western Tigray: About (69.6%) of the local residents responded that, Ethiopian community members living adjacent to border point villages are taking part in animal genetic resource smuggling to the black market of neighboring states (Table 7). This could be associated with lack of effective law enforcement practices and porous border security within the current network of custom village interfaces of western Tigray. All (100%) of the local residents responded that, there are individuals or groups involved in illicit animal genetic resources trafficking through the border point custom checkpoint interfaces of western Tigray. This could be coupled with the less emphasis given by the local government and pertinent sectors to local livelihood development mechanisms. Moreover, the majority (87%) of the local residents responded that, the key actor involved in illicit animal genetic resources trafficking are businessmen’s coming from various parts of the Ethiopian national regional states. [31] has also reported that, trans-boundary travelers and business groups are the key actors involved in illicit animal genetic resource trafficking practices. Moreover, this probably reflects that, the missing links in the internal smuggling corridors connected to the border point village interfaces of western Tigray.

Table 6: Market accessibility of illicit animal genetic resources trafficking in custom village interfaces of western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Is there a common hidden local market for the exchange of illicit animal genetic resource of medicinal importance?	Yes	12.5	0.0	0.0	4.3
		No	87.5	100.0	100.0	95.7
2.	From where did traffickers bring the animal genetic resource for illicit trafficking purpose?	From proximal local Market	87.5	50.0	80.0	69.6
		From community based forest area and local resource	12.5	0.0	20.0	8.7
		From nesting sites and adjacent villages	0.0	10.0	0.0	4.3
		From back yard suitable as a nesting sites	0.0	40.0	0.0	17.4
3.	From where did traffickers bring the animal genetic resource for the illicit trafficking purpose?	From proximal local Market	12.5	10.0	20.0	13.0
		From community based forest area and local resource	50.0	60.0	80.0	60.9
		From nesting sites and adjacent villages	12.5	20.0	0.0	13.0
		From back yard suitable as a nesting sites	25.0	10.0	0.0	13.0
4.	When did smugglers illicitly access the animal genetic resource of trafficking importance?	Market accessibility	12.5	0.0	0.0	4.3
		Seasons were by animals are abundantly found	50.0	10.0	100.0	43.5
		Others	37.5	90.0	0.0	52.2

Table 7: Community interfaces of illicit animal genetic resources trafficking in custom village interfaces of western Tigray

No.	Questions	Categories	Local residents proximal to border custom checkpoint villages			
			Bereket (n=8)	Dima (n=10)	Lugdi (n=5)	Total (n=23)
1.	Which community members of the border point villages take part in smuggling animal genetic resources?	Ethiopia	37.5	80.0	100.0	69.6
		Sudan	62.5	20.0	0.0	30.4
2.	Are their individuals or groups involved in illicit animal genetic resource trafficking through the custom checkpoint village interfaces?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
3.	If your answer to question number 2 is "Yes" who are the key actors involved in illicit animal genetic resource trafficking?	Local traders of animal genetic resource	12.5	10.0	0.0	8.7
		Traders coming from center of the state	87.5	80.0	100.0	87.0
		Groups established to engage in exchange of animal genetic resource	0.0	10.0	0.0	4.3
4.	Are there problems happening to adjacent local community due to illicit animal genetic resource smuggling crimes in the custom village interfaces?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0

CONCLUSIONS

The study revealed that, illicit animal genetic resource smugglers are taking advantage of the unemployment status of the local youths. Illicit animal genetic resource trafficking is not an issue of subsistence practices. Moreover, There is no local market for legal exchange of animal genetic resource within the network of custom village interfaces of western Tigray. The local residents

noted that, Sudan is the terminal point for the illicitly trafficked animal genetic resources of conservation and economic importance. The local residents noted that, there are illicit exit routes of animal genetic resource within the current physical geography of western Tigray. The largest extent of illicit animal genetic resource trafficking is headed by unemployed paid local youths through the hidden exit routes. Furthermore, The porous border security is linked as the likely enabling condition for illicit

animal genetic resource trafficking. The local residents noted that, the smugglers of animals are deceiving the local residents so as to receive lodging service around the catchment area of the custom village interfaces. Similarly, The local residents noted that, middle organized businessmen are the key actor involved in illicit animal genetic resource trafficking. Besides, the degree of illicit animal genetic resource trafficking is seriously happening. As well, the traffickers carry out the smuggling practices seasonally were by animals are abundantly found in the catchment area. Moreover, the cross border illicit animal genetic resource trafficking is undertaken by the Ethiopian community settling adjacent custom checkpoint villages than neighboring states. The smugglers are groups or individuals coming from the center of the Ethiopia national regional states. Thus, strengthening the patrolling efforts and integrating community based management approaches is vital to address the scale of the conservation crimes.

Recommendations:

- There are commercial lines of illicit animal genetic resource trafficking. Hence, in an effort to reduce the scale of the circumstances there is a need to create a networked local market supplying the national market demand of animal resources.
- Local markets of animals should be established to avoid the networked smuggling lines which adversely affect the economic wellbeing of the small holder farmers.
- The local residents noted that, there are illicit exit routes of animal genetic resource trafficking. Thus, a satellite checkpoint with a scheduled patrolling effort of the proximal society should be devised in the vulnerable areas of illicit animal genetic resource trafficking.
- Unemployed and smugglers paid local youths are engaged in illicit animal genetic resource trafficking. Thus, border point local youths development package should be devised so as to reduce the involvement of the unemployed local youths.
- The local residents responded that, the porous border security is the enabling condition to make use of the illicit exit routes. Hence, strengthening the patrolling human resource with a restructured and integrated community effort should be done so as to come up with the solutions to effectively manage the underlying animal genetic resource conservation crime operating in custom village interfaces of western Tigray.
- Middle organized businessmen's are the key actors involved in illicit animal genetic resource trafficking. Thus, local market networking with the businessmen's in a manner which heads to the larger segment of the national market should be devised as a focus of logical intervention approaches.
- The patrolling efforts should be aligned with market seasonality of the smuggling practices of illicit traffickers within the current network of the custom village interfaces. As well, tackling of poachers of animal genetic resources should target the market seasonality of the area by the local enforcement groups.
- The local residents noted that, improving the livelihood of the adjacent villagers should lessen smugglers perception to pay local unemployed youths for illicit animal genetic resource trafficking. Thus, livelihood and illicit animal trafficking should be regionally and nationally emphasized along the logical intervention approaches.
- Make strong Economic policies that encourage young people to embark on a modest business in order to bring down the rate of youth unemployment
- Support village level association to strengthen youth participation in village level saving and loan associations which contribute to youth's chance to engage in self-employment economic activity.
- Designate more custom checkpoints which monitor illegal animal genetic resource trafficking.
- Promote as appropriate domestic, regional and international exchange of experiences

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