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ARTICLE

Distribution, diet, and trophic level of *Arvicanthis abyssinicus* and *Tachyoryctes splendens* around the area of recently extinct Ethiopian Wolf *Canis simiensis* on Mount Guna, northwestern Ethiopia

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Abstract: Abyssinian Grass Rats *Arvicanthis abyssinicus* and Common Mole Rats *Tachyoryctes splendens* are preyed upon by the Ethiopian Wolf *Canis simiensis*. The aim of this study was to assess distribution, diet and trophic level of *Arvicanthis abyssinicus* and *Tachyoryctes splendens* on Mount Guna, where wolves have recently become extinct. Rodents were captured with Sherman trap and identified, and samples were taken to Debre Tabor University for dissection and diet analysis via microscopy examination of stomach contents. 110 *A. abyssinicus* and 52 *T. splendens* were captured from the study area, and the estimated population sizes of *A. abyssinicus* and *T. splendens* in Mt. Guna computed by Peterson-Lincoln Index were 1,364 and 416, respectively. In addition, 379 burrows (203 of *A. abyssinicus* and 176 of *T. splendens*) were counted. Both species were observed to consume plants and arthropods, with plants predominant. We recommend that intensive studies should be carried out to determine the effects of rodent communities upon Mt. Guna afroalpine and subafroalpine ecosystems.

Keywords: Afroalpine, diets, Mt. Guna, stomach analysis, subafroalpine.

Afan Oromo abstract: Guduunfaa: Gosoota hantuutaa keessaa tuqaa (*Tachyoryctes splendens*) fi hantuutni huuraa (*Arvicanthis abyssinicus*) soorata jeedala diimtuu (*Canis simiensis*) keessaa isaan tokko. Kaayyoon qo'annoo kanaa bakka duraan jeedalli diimtuu irra jiraachaa turte keessatti iddoowwan hantuutotni armaan olii kun qubatan, nyaata isaanii fi sadarkaa saaphaphuu nyaataa isaan irratti argaman adda baasuu ture. Hantuutotni kunneen erga kiyyeeffamanii booda nyaata garaacha isaanii keessatti argamu adda baasuuf gara Yuunivarsiitii Dabra Taaboritti geeffaman. Bu'aan qo'annichaa akka mul'isutti hantuuta huuraa lakkoofsaan 110 ta'anii fi tuqaa lakkoofsaan 52 ta'antu bakka qo'annoon kun itti gaggeeffame sanaa qabame. Lakkoofsi hantuutota sanaa yaroo 'Peterson-Lincoln Index'n shallagamu kan hantuuta huuraa 1,364 fi kan tuqaa 416'tti tilmaamama. Dabalataanis, boolla hantuutaa gara 379 (kan hantuuta huuraa 203 fi kan tuqaa 176) ta'antu bakkichaa adda ba'e. Caalatti biqiltoota kan sooratan ta'anis, gosootni hantuutotaa kun mukootaa fi ilbiisotaa garaagaraa akka nyaatantu qo'annoo kanaan mirkanaa'e. Bu'aa qo'annoo kanaarratti hundaa'uun dhiibbaan gosootni hantuutaa kun Gaara Gunaa irraan ga'aa jiran gadi fageenyaan akka qoratamu yaada dhiyeessina.

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Author contributions: All authors equally contributed to proposal development, data collection, and write up of this study. However, the corresponding author has prepared the manuscript for publication and carried out activities during publication process.

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INTRODUCTION

Rodents exploit a wide range of habitats throughout the world (Lange et al. 2004). Their distribution and abundance is influenced by vegetation structure and composition (Gebresilassie et al. 2004; Kannan & James 2009), which influence micro-climate and provide food and cover against predators (Hansson 1999).

Ethiopia is a physically and biologically diverse country in Africa, where differences in climate and topography have resulted in a wide diversity of habitats and species (Tedla 1995; Abunie 2000). Of 284 mammals identified from Ethiopia, rodents comprise 25% and contribute about 84% of the total endemic species (Yalden & Largen 1992; Bekele et al. 1993; Bekele & Leris 1997; Laverenchenko et al. 1997). Ecological knowledge about these rodent, including their distribution and abundance, is limited (Habtamu & Bekele 2008).

Distribution and abundance of rodents can be estimated by trapping and recording of animals signs, holes, or related elements that infer the presence of animals (Krebs 1978; Rabinovich 1980). The best techniques are those based on the use of capture traps and recording of signs, due to the crepuscular habits of rodents (Aplin et al. 2003).

Rodents are omnivorous, mainly consuming plant parts such as fruits and seeds, as well as small arthropods (Best et al. 1993). Techniques commonly used to assess the diets of rodents include field observations of partially consumed organisms (Meyer & Shiels 2009), captive-feeding trials (Shiels 2011), and stomach content analysis (Ruffino et al. 2011). While effective, stomach content analysis has in a relatively small number of studies (Hope & Parmenter 2007).

The Ethiopian Wolf *Canis simensis* is a Critically Endangered medium-sized canid highly adapted to live in Ethiopian afroalpine and subafroalpine ecosystems above altitudes of 3,000 m, and it is the almost exclusive predator of high altitude rodents (Marino et al. 2010; Yihune & Bekele 2012). The Ethiopian Wolf Conservation Program (EWCP) team confirmed the extinction of this species from Mt. Guna in 2011, after several years of serious decline (IUCN/SSC 2011). A preliminary survey by Debre Tabor University staff in 2014 confirmed that the Ethiopian Wolf had not been seen for the last four years in Mt. Guna (Sillero-Zubiri & Macdonald 1997). As a result, rodent numbers were observed to have increased on Mt. Guna, possibly resulting in ecosystem disturbance.

Fluctuations in rodent population density can have major impacts on the dynamics of their food (arthropods and plants) and predators (Ims & Fuglei 2005). If the population density of rodents in an ecosystem exceeds the carrying capacity, prey can be affected by overconsumption and the ecosystem can collapse unless control measures are taken. Conversely, if the population density of rodents is too low to sustain predators, they can become locally extinct. The aim of the present study was to assess distribution, diet and trophic level of two rodent species on Mt. Guna known to be prey of the now-extinct Ethiopian Wolf population.

MATERIALS & METHODS

Study area

Mt. Guna is located in South Gondar Zone at 11.750^{0}N, 38.250^{0}E, with a peak rises to 4,231 m (Figure 1). Mt. Guna has afroalpine (3,500–4,231 m) and subafroalpine (3,200–3,500 m) ecosystems suitable to Ethiopian Wolf *Canis simensis* and mountain rodents. The area coverage is 210 km^2 of land above 3,200 m, and 110 km^2 above 3,400 m, but no more than 40 km^2 above 3,800 m which is good habitat for Ethiopian Wolf (Sillero-Zubiri & Macdonald 1997; Belste et al. 2012)

Mt. Guna is surrounded by six districts of South Gondar Zone namely Lay and Tach Gayint, Farta, East Este, Simada, and Dera. The economy of the people living in those districts is mainly dependent on subsistence Agriculture. They cultivate crops like barley, wheat, bean, potato, and own livestock including cattle, sheep, donkey, and horse. The vegetation of Mt. Guna includes different grass species like 'guassa' and tree species with many animal lives including rodents, jackals, gelada baboons, hyenas, and rock hyraxes. The area is also inhabited by giant lobelia tree which is known to be the unique characteristic to afroalpine and subafroalpine ecosystems (ALZR 2006; Belste et al. 2012).

Data collection

Before starting the field work, permission for rodent collection and habitat observation was acquired from South Gondar Zone Wildlife Conservation Authority Office, Ethiopia. A quantitative cross-sectional study was conducted in the dry season of 2015 on Mt. Guna, northwestern Ethiopia. Samples were collected at three localities: bottom, middle and top of Mt. Guna. Three 60 X 60 m trapping grids (1.08 ha) were set at each site, and 36 Sherman traps were placed: 12 at top of afroalpine, 12 at middle, and 12 at bottom of subafroalpine ecosystem in the sampling period. Traps were baited with a mixture of rolled oats and peanut butter. The traps were set

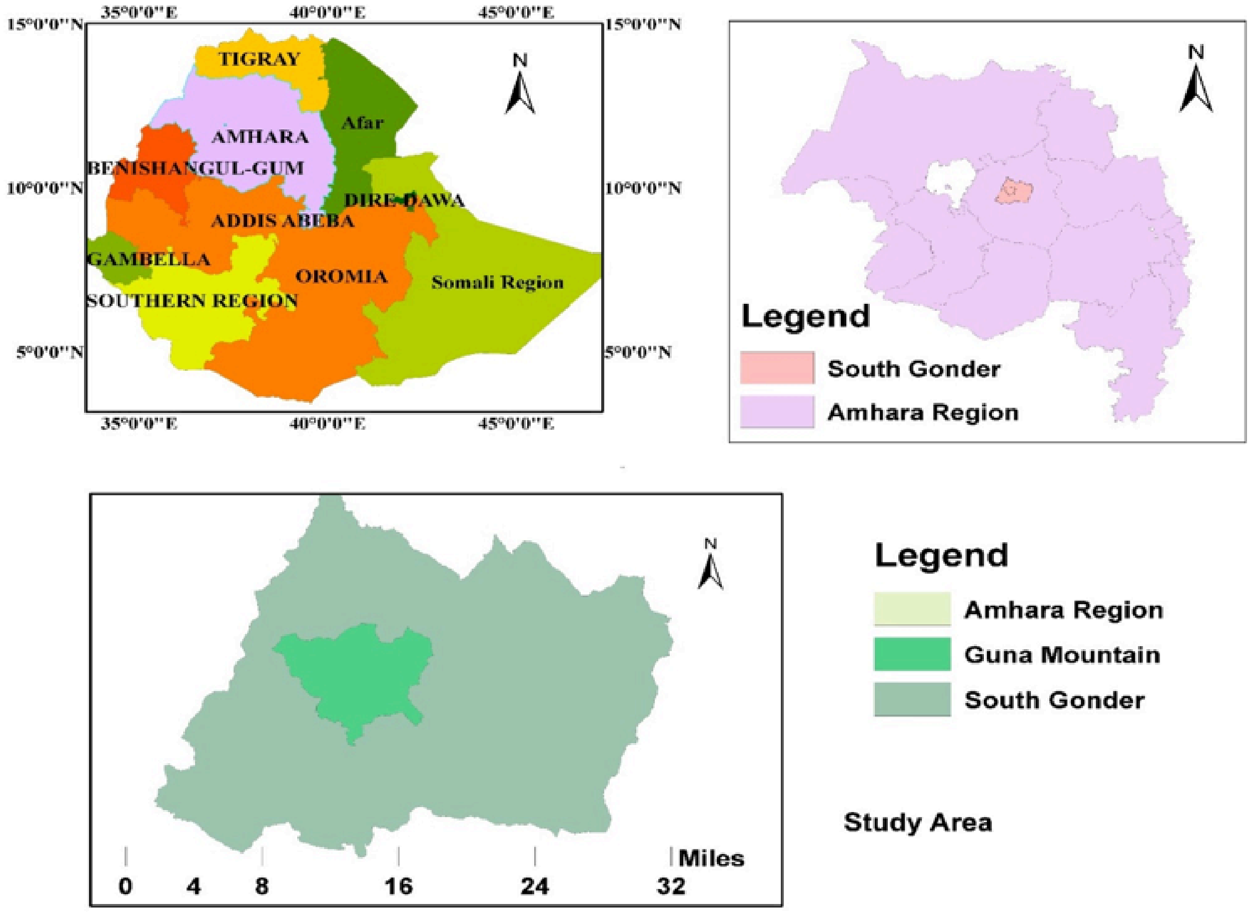

Figure 1. Map of Mt. Guna

in the late afternoon (1500–1600 h) and left in the sampling sites for three consecutive days and nights. They were checked during the morning (0600–1200 h) and afternoon (1600–1800 h). Capture terms consisted of two sampling periods (February and March) separated by a month interval without trapping. All captured rodents were used for species identification, distribution, as well as stomach contents analysis according to the standard (Hope & Parmenter 2007). After identification done through morphological characteristics including differences in body size, shape, fur texture and colour (Aplin et al. 2003; Jonathan 2004), only two species of rodent namely Abyssinian Grass Rat *A. abyssinicus,* and Common Mole Rat *T. splendens* were counted, marked and released to their respective habitats with other trapped rodents when encountered. In addition, active burrows (fresh burrows that have marks of rodents and freshly excavated soil and cut parts of various plants) of the above rodents were identified and counted from the same grids for further determination of distribution and abundances. Percentage of active burrows in the area was estimated as:

Population of active burrows %= (Number of active burrows/Total burrows examined all over) * 100 (Feliciano et al. 2002; Desoky 2007).

Eight rodents (four for each species) were taken to Debre Tabor University, laboratory of Department of Biology, for dissection to remove the gastro-intestinal contents. Diet analysis was carried out using the method of DeBlasé & Martin (1981). Accordingly, contents of the stomach were placed in a petri dish and thoroughly mixed to loosen material to give all constituents a uniform distribution. Then the contents were examined under a light microscope at 20x magnification to identify food items. Four fields of observation were examined. The diagram of food web was also drawn and trophic level of rodents was shown for Mt. Guna based on current result and the literature.

Since Belste et al. (2012) reported the presence of Ethiopian Wolf in Mt. Guna after the report of species extinction (IUCN/SSC 2011), interview questions were administered to check the presence-absence of the species. Fifty local people were purposively selected and interviewed to know when the wolf was observed for the last time in the study area and the reason for extinction. The local people were purposively selected based on the knowledge of the wolf, distance from the study area (nearby) and residence in the adjacent villages.

Data analysis

Distribution of *A. abyssinicus* and *T. splendens* was calculated with descriptive statistics. Number of rodents and their burrows collected from the three sites was shown on table and graph. Absolute number of the rodents in a population was calculated by Peterson-Lincoln index (Seber 1982) as follows. $N = \frac{M.S}{R}$, where N= population size estimate, M= marked individuals released, S= size of second sample captured, and R= marked animals recaptured.

Food web for the overall study area was shown by table and diagram. Independent two-sample t-test on Minitab software was used to compare food items eaten by both species. In addition, Independent two-sample t-test on R-software was used to compare distribution of both species among the three sites. Statistical value of 0.05 was taken as significance level.

RESULTS

Rodent species identification and distribution

In the present study, two species of rodent namely Abyssinian Grass Rat and Common Mole Rat were collected from afroalpine and subafroalpine ecosystems of Mt. Guna (Image 1). From all sites, a total of 162 rodents were captured during the first session of study period. From these, 110 (52.73% from the top, and 47.27% from the middle) were *A. abyssinicus* and 52 (23.08% from the top, 26.92% from the middle, and 50% from the bottom) were *T. splendens*. Regarding to the distribution, high number of *A. abyssinicus* (52.73%) was collected from the peak of the mountain following the middle (47.27%); however, low number of *T. splendens* (23.08%) was collected from the top, even though there was no significant differences among the three sites (p= 0.41, df= 2.22). On the other hand, high number of *T. splendens* (50%) was sampled from the bottom of Mt. Guna from where no single *A. abyssinicus* was collected as indicated on Table 1. In addition, 124 *A. abyssinicus* and 48 *T. splendens* were captured in the second session of the study period with almost similar distribution as of first session (Table 2). The overall estimated population number of *A. abyssinicus* and *T. splendens* in the study area computed by Peterson-Lincoln Index was 1,364 and 416, respectively.

A total of 379 burrows, of which 179 were active, were counted from the same grids laid in total of 3.24 ha to sample rodents. As shown on Table 1, there was no *A. abyssinicus* burrow counted from the bottom of the study area whereas 104 (59.09 %) *T. splendens* burrows were counted from the same site. However, there was high population of *A. abyssinicus* at the top (n= 107, 52.63 %) followed by the middle (n= 96, 47.37 %) of the mountain. These distribution differences of burrows among the three sites were also not significant (p= 0.84, df= 2). Out of the total burrows of each rodent, 51.14 % of them were active for *T. splendens*, whereas 43.84 % were active for *A. abyssinicus*. Such high percentage of active burrows supports the existence of significant numbers of both rodents in the study area.

Stomach content analysis

Eight rodents: four *T. splendens* and four *A. abyssinicus* were dissected and stomach contents were taken. Diets of each rodent were identified into plant and arthropod types under the light microscope. Accordingly, *T. splendens* and *A. abyssinicus* have been identified to consume both plants and arthropods (Table 3). In contrast, there was no significant difference on the consumption of arthropods between both species (p= 0.466, df= 4). In addition to the stomach content analysis, the remains of leftover of plant parts and arthropod parts after their feeding were observed on the way to their burrows during field work.

Habitat observation

During data collection, the authors have repeatedly observed Mt. Guna afroalpine and subafroalpine ecosystems. Destruction of grasses and other vegetation due to high population of rodents, rock hyraxes and livestock at the bottom and middle of the ecosystems was observed (Figure 2). Furthermore, the same condition was seen at the top of afroalpine due to high populations of rodents and some groups of Gelada *Theropithecus gelada,* endemic to Mt. Guna, foraging in the same habitat. Moreover, rodents living adjacent to agricultural lands were observed to migrate to agricultural fields and damage farmers' crops.

Assessment on the extinction of Ethiopian wolf

Side by side with data collection of rodents in Mt. Guna, 50 respondents were interviewed to check whether Ethiopian Wolf is present or locally extinct. All interviewees assured the local extinction of the wolf

Table 1. Number of rodents collected in first session and total burrows counted from the three sites of Mt. Guna.

	No. of rodent		No. of burrows	
Grids	*A. abyssinicus*	*T. splendens*	*A. abyssinicus*	*T. splendens*
Top	58 (52.73%)	12 (23.08%)	107 (52.63%)	12 (6.82%)
Middle	52 (47.27%)	14 (26.92%)	96 (47.37%)	60 (34.09%)
Bottom	---	26 (50%)	---	104 (59.09%)
Total	110 (100%)	52 (100%)	203 (100%)	176 (100%)
	df= 2.22 p= 0.41		df= 2 p= 0.84	

Table 2. Number of first captures and recaptures of *A. abyssinicus* and *T. splendens* by Sherman traps from three sites (three grids from each site= S1, S2 and S3) of Mt. Guna

Species	Site	First capture (marked individuals and released)	Second capture	Marked animals recaptured
A. abyssinicus	Top			
	S1	23	27	2
	S2	20	19	1
	S3	15	21	1
	Total	58	67	4
	Middle			
	S1	15	20	2
	S2	20	19	2
	S3	17	18	2
	Total	52	57	6
	Overall total	110	124	10
T. splendens	Top			
	S1	4	5	--
	S2	5	2	--
	S3	3	4	1
	Total	12	11	1
	Middle			
	S1	6	8	1
	S2	3	5	1
	S3	5	4	--
	Total	14	17	2
	Bottom			
	S1	7	5	--
	S2	9	7	1
	S3	10	8	--
	Total	26	20	1
	Overall total	52	48	4

by habitat destruction in spite of other factors such as human killing, rabies virus and climate change they were asked. Most of the respondents had observed the wolf between 6–8 years followed by before 10 years. All of them responded that they have never seen the wolf since four years (Figure 2). They said that a single wolf has been observed for years until total disappearance from the study area in 2011.

Image 1. Grid sites: A—bottom | B—middle | C—top of Mt. Guna. © Hirpasa Teressa

Table 3. Frequency of plants and arthropods diet identified from the stomach of four *T. splendens* and four *A. abyssinicus* collected from Mt. Guna.

Rodent species		Frequency of plant parts	Frequency of arthropod parts
T. splendens (T)	T1	38 (73.08%)	14 (26.92%)
	T2	53 (79.10%)	14 (20.90%)
	T3	41 (82%)	9 (18%)
	T4	48 (90.56%)	5 (9.44%)
Average		45 (81.08%)**	10.5 (18.92%)*
A. abyssinicus (A)	A1	31 (75.61%)	10 (24.39%)
	A2	28 (71.79%)	11 (28.21%)
	A3	25 (64.10%)	14 (35.90%)
	A4	34 (69.38%)	15 (30.62%)
Average		29.50 (70.24%)**	12.5 (29.76%)*

** Significant at 0.05 significance level (P= 0.017, df= 3)
* Not significant at 0.05 significance level (P= 0.466, df= 3)

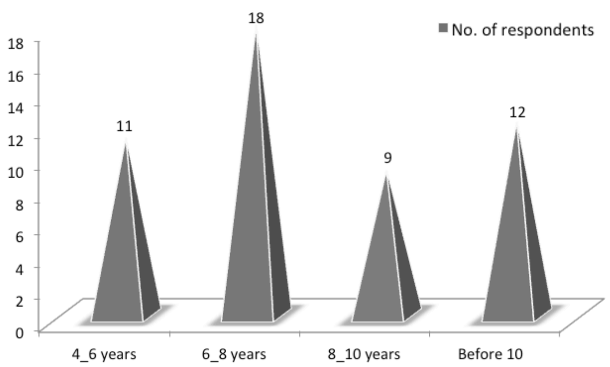

Figure 2. Number of respondents according to their year of observation of wolf in Mt. Guna.

DISCUSSIONS

In the present study, distribution, diets and trophic level of two species of rodents, the Abyssinian Grass Rat and Common Mole Rat, were assessed. Both species were identified in afroalpine and subafroalpine ecosystems of Mt. Guna. Mark-recapture method indicated that there was high population of *T. splendens* at the bottom, while *A. abyssinicus* was abundant at the peak of Mt. Guna. In agreement to the current study, Belste et al. (2012) identified Abyssinian Grass Rat and Common Mole Rat along with common home rat *Arvicanthis* spp., Harrington's Rat *Desmomys harringtoni*, Harsh-furred Rat *Lophuromys flavopunctatus*, and White-footed Rat *Stenocephalemys albipes* from the study area.

Since active burrows give an idea of the number of rodents living in the study area (Desoky 2007), burrow count was also carried out to support the mark-recapture method. The result of burrow counts confirmed the existence of high population of *A. abyssinicus* and *T. splendens* in the study area. Like trap method, burrow count method also indicated that there was high population of *T. splendens* at the bottom, but *A. abyssinicus* was totally absent from the bottom grids though field observation depicted the existence of it in smaller number. However, there was high distribution of *A. abyssinicus* at the top and middle of the ecosystems. Study conducted by Yihune & Bekele (2012) in afroalpine habitat of Simien Mountains National Park (SMNP) also identified significant number of *A. abyssinicus* and *T. splendens*.

Environmental degradation due to high population of rodents as a result of the extinction of wolf predator from Mt. Guna was clearly seen through field observation. In support to this, study shows that cyclic fluctuations in population density of rodents have major impacts on the dynamics of their food and vertebrate predators (Ims & Fuglei 2005). In addition, high population of livestock was observed in the ecosystems. Such pressures can lead to massive destruction, depletion and degradation of wildlife habitats as well as severe reduction in wildlife population (Hillman 1993). Furthermore, field observation and interviews of local farmers showed that those rodents living in the study area migrated to nearby agricultural fields for searching of additional foods. Such migration observed to cause crop damage in agricultural fields even though it was not quantified by the present study.

Out of the total diets consumed by both species, there was high frequency of plant parts (not identified into species level) in their stomach contents which assures the fact that the majority of their diet is plant. However, more plant parts were consumed by Common Mole Rats than by Abyssinian Grass Rats. Even though both species consume arthropods (not identified into species level), it was significantly less when compared to plant parts. In agreement to the current study, Best et al. (1993) identified that rodents are omnivorous animals mainly consuming large quantities of plant parts. This might be due to the availability, selectivity, and palatability of plant diets in afroalpine and subafroalpine habitat as already stated by Beyene (1986) for other species of the *Tachyoryctes* genera.

Based on the current result of stomach content analysis and other published literatures, trophic levels and food web have been diagrammatically shown for the study area. Besides to the stomach content analysis,

Table 4. Major animals identified from Mt. Guna and their food items.

Animal species (Belste et al. 2012)	**Food items**	**Identification of food items**
Rodents		
Common Mole Rat *Tachyoryctes splendens*	Plant parts, arthropods	Current Lab work
Abyssinian Grass Rat *Arvicanthis abyssinicus*	Plant parts, arthropods	Current Lab work
Harrington's Rat *Desmomys harringtoni*	---	xx
Harsh-furred Rat *Lophuromys flavopunctatus*	Arthropods, small vertebrates, plant matter	Dieterlen 1976
White-footed Rat *Stenocephalemys albipes*	---	xx
Carnivores		
Common Jackal *Canis aureus*	Rodents, ungulates, livestock	Bošković et al. 2013
Black-backed Jackal *Canis mesomelas*	Rodents, ungulates, birds, Reptiles, insects, grass	Humphries et al. 2015
Ethiopian Wolf *Canis simensis**	Rodents, sheep (rare)	Ashanafi et al. 2005
Caracal *Caracal caracal*	Rodents, birds, ungulates	Braczkowski et al. 2012
Wildcat *Felis silvestris lybica*	Shrews, rabbits, birds, reptiles, rodents, insects	Moleón & Gil-Sánchez 2003
Serval *Leptailurus serval*	Rodents, antelopes, insects, reptiles	Ramesh & Downs 2014
Leopard *Panther pardus*	Livestock, monkey, rodents, birds, hares	Kshettry et al. 2018
Spotted Hyena *Crocuta crocuta*	Livestock, human, porcupine, hare, bushbuck, kudu, waterbuck, common duiker	Yirga et al. 2015
Striped Hyena *Hyaena hyaena*	mammals, rodents, insects, livestock	Alam & Khan 2015
Common Dwarf Mongoose *Helogale parvula*	Insects, spiders, scorpion, lizards, snakes, small birds and rodents	Ramulondi & Zengeya 2014
African civet *Civettictis civetta*	mammals, birds, reptiles, insects, plant parts	Tadesse et al. 2017
Primates		
Gelada baboon *Theropithecus gelada*	Grasses, herbs, other plant parts	Kelil et al. 2018
Vervet Monkey *Cercopithecus aethiops*	Invertebrates, plant parts	Tournier et al. 2014
Olive baboon *Papio anubis*	Plant parts, insects, birds, mushrooms	Okecha & Newton-Fisher 2006
Herbivores		
Common Duiker *Sylvicapra grimmia*	Herbivores feed on vegetation such as grasses, fruits, leaves, roots, bulbs, etc.	Karmiris et al. 2011
Klipspringer *Oreotragus oreotragus*		
Rock Hyrax *Heterohyrax brucei*		
Birds		
Hooded Vulture *Necrosyrtes monachus*	A review by Lopes et al. (2016) identified all diet types and food categories for tropical birds. The study revealed 23 food types frequently eaten by birds and proposed standard names for birds (e.g., granivore, frugivore, and insectivore). Accordingly, plant diet consumed by birds mainly are fruits, seeds, grains, plant fluids, leaves, buds, grasses, nectar, pollen, etc. In addition, birds also consume insects including ants, cockroaches, termites, locusts, bugs, beetles, flies, butterflies, dragonflies, bees, wasps, stoneflies, and mayflies. Birds of prey eat animal flesh including fish, reptiles,mammals, birds, insects, and molluscs.	
Greater Spotted Eagle *Aquila clanga*		
Red-throated Bee-eater *Merops bullocki*		
Blue-winged Goose Cyanochen cyanopterus		
Wattled Ibis *Bostrychia carunculata*		
Black-winged Lovebird *Agapornis taranta*		
White-collared Pigeon *Columba albitorques*		
Ring-necked Dove *Streptopelia capicola*		
Red-eyed Dove *Streptopelia semitoquata*		
Thick-billed Raven *Corvus crassirostris*		
Fan-tailed Raven *Corvus rhipidurus*		
Abyssinian Long Claw *Macronyx flavicollis*		
Abyssinian Catbird *Parophasma galinieri*		
Ankober Serin *Serinus ankoberensis*		
White-cheeked Turaco *Tauraco leucotis*		
Moorland Francolin *Francolinus psilolaemus*		
Red-fronted Parrot *Poicephalus gulielmi*		
African Firefinch *Lagonosticta rubricate*		
Ethiopian Swallow *Hirundo aethiopica*		
Widowbird *Euplectes orix*		

*—Locally extinct | **—No published work on the diets of the animals.

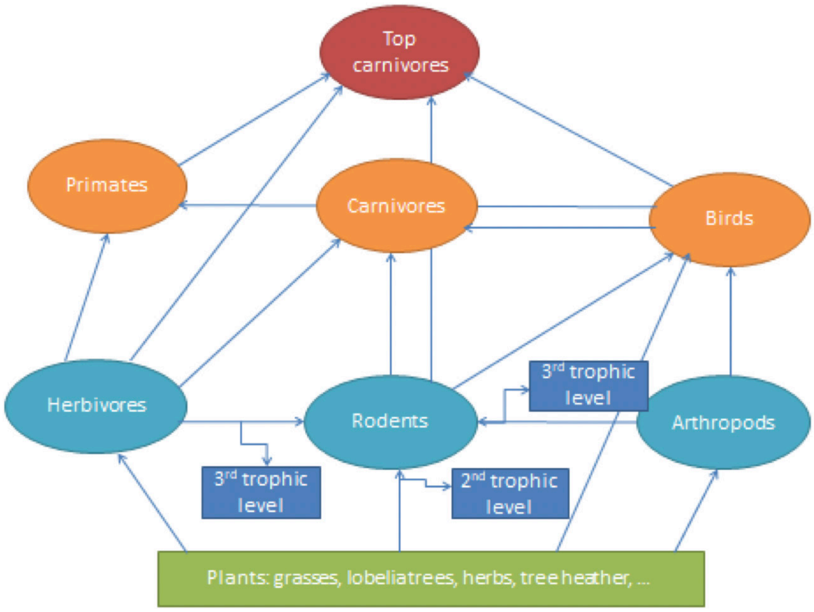

Figure 3. Diagram of food web in Mt. Guna (sketched by Hirpasa Teressa).

diets of animals existing in Mt. Guna were reviewed and summarized in Table 4. Based on the summary, a diagram of food web was drawn (Figure 3).

As shown on Figure 4, *T. splendens* and *A. abyssinicus* consume both plants and arthropods, hence grouped under omnivorous animals (2nd, 3rd and even more trophic levels). However, it is difficult to determine specific position of omnivores' trophic level since they consume materials from different trophic levels of the food web (Williams & Martinez 2004).

Ethiopian Wolf *Canis simensis*, which is endemic to Ethiopia, is the rarest canid in the world with a total global population of 500 individuals and classified as 'Endangered' on the IUCN Red List of Threatened Species (Marino & Sillero-Zubiri 2013; Marino et al. 2017). The wolf highly adapted to live in afroalpine and subafroalpine ecosystems above altitudes of 3,000 m, and is almost exclusively the predator of high altitude rodents (Marino et al. 2010; Yihune & Bekele 2012). Study shows that Ethiopian Wolf is an important flagship species for conservation of the afroalpine biodiversity (IUCN/SSC 2011), but faces serious threats to its survival in its ecosystem. In the present study, all the interviewees agreed the local extinction of Ethiopian Wolf *Canis simensis* due to habitat degradation. According to the respondents the single wolf was seen in 2011 for the last time. This agrees with the report by IUCN/SSC (2011) on its extinction from Mt. Guna although Belste et al. (2012) claimed to identify the wolf from the same study area referring to the local community. For long, the ecosystems of Ethiopian highlands had been threatened by overpopulation, overgrazing, and crop cultivation (Leipzig 1996). Similarly, Mt. Guna is currently under human induced threats from agricultural expansion, livestock overstocking, overharvesting of natural resources and settlements (Belste et al. 2012) that might mainly resulted in the local extinction of Ethiopian Wolf.

CONCLUSION

In the current study, the distribution, diets and trophic level of two rodent species namely Abyssinian Grass Rat and Common Mole Rat was assessed from Mt. Guna afroalpine and subafroalpine ecosystems. The results from Sherman traps and burrows count showed that both species were identified to be highly populated in the study area. Stomach content analysis revealed that both species consume both plants and arthropods, hence grouped under omnivorous animals (2nd, 3rd and even more trophic levels). Furthermore, Ethiopian Wolf was also confirmed to be locally extinct from Mt. Guna due to habitat degradation.

Based on the current study, we recommend that intensive studies should be carried out to analyse the effect of rodent community on Mt. Guna ecosystems due to the extinction of Ethiopian Wolf. To reduce effects of rodent pests and environmental degradation in the present study area, the long run rodent prey control by their predator, and habitats conservation should also be taken into consideration. Further study that include different seasons and impact of pest rodents on agricultural lands should also be carried out in Mt. Guna.

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