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Ecology and conservation of spotted hyena (*Crocuta crocuta* Erxleben 1777) in human dominated landscapes in Northern Ethiopia

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Summary

Ecology and Conservation of Spotted Hyena (*Crocuta crocuta* Erxleben 1777) in a Human Dominated Landscape in Northern Ethiopia

Key words

Adaptability, coexistence, Ethiopia, hyena diet, hyena human interaction, spotted hyena (*Crocuta crocuta*)

Hyena was historically one of the most widely distributed predators across the world. Hyena may have originated in Asia, and ranged throughout Europe until the end of the late Pleistocene era. Currently, hyena exists only in Africa, and is the most abundant large carnivore in the continent. A tentative estimate of the total population of hyena in Africa is between 27,000 and 47,000, which is more likely to be an underestimate of the hyena population across Africa. The largest known populations occur in the Serengeti ecosystem, Tanzania and the Kruger national Park, South Africa with estimates of 8,700 and 3,900 hyena, respectively.

Most scientific literature on hyena-human interrelationships in Africa suggests conflict situations, often resulting in the killing of hyenas. Hyenas survive with difficulty in human-altered habitats and coexistence between hyenas and local communities is problematic. This is because hyenas need extensive areas, usually with few people and sufficient prey. In contrast to this, the present dissertation presents an exceptional case of peaceful coexistence between hyenas and humans. Based on regular observations of hyenas and anecdotal reports, I hypothesized that hyenas in the Tigray region, northern Ethiopia, survive in human-dominated landscapes because of a unique combination of adaptation to anthropogenic food and cultural tolerance towards hyenas. My research aimed to investigate hyena ecology and behavior in human-dominated and prey-depleted landscapes in Tigray.

Hyenas are common in many parts of Ethiopia, and in most of those areas, prey populations have been depleted. In northern Ethiopia, the natural prey base is depleted due to agricultural expansion, deforestation, human settlement, and habitat fragmentation and degradation. Hyenas depend entirely on domestic prey species, partly through depredation but more important-

ly through scavenging on (peri-) urban waste. Scavenging alone can probably sustain viable hyena populations; the addition of depredation to hyena carrying capacity is not essential. In the scat analyses, we found mainly prey items from livestock species. It is likely that most human hairs found came from scavenging at garbage dumps and cemeteries, as we do not have reports of people killed by hyenas at the time of study.

My study showed a remarkable change hyena diet during the fasting period, from predominantly scavenging on waste to active predation on donkeys. During this period, a vast majority of people in northern Ethiopia do not consume animal products, leading to a sharp decline in demand for meat. Hyenas mainly scavenge on waste of butchers and households but during fasting, donkeys provided an alternative food source. The reduced availability of waste from slaughtering forced hyenas to supplement their diet with alternative food sources during the fasting period.

In my study area, a population of 535 hyena lives close to communities without any reports of retaliatory killing. This demonstrates a rare case of coexistence, where hyenas benefit from waste disposal and human communities benefit from the waste clearing service provided by hyenas. It also demonstrates the high adaptability of hyenas, which in this case specialize entirely in waste consumption. This confirms that a moderately high density of hyenas can persist in human-dominated landscapes, outside of conservation areas. Cultural-religious conditions allow coexistence between hyenas and humans. The Orthodox Tewahedo Church celebrates Enkutatash (New Year), Meskel (Finding of the True Cross), Ledet (Christmas), Timket (Epiphany) and Fasika (Easter) every year. Similarly, Islamic tradition also celebrates religious festivals such as Muharram, Ramadan, and Eid-ul-Fitr. During these and other religious festivals, livestock are slaughtered across the country. Solid waste management is generally poor and waste is dumped along roadsides and in open areas. Butchers' and household waste appears to be a key ecological factor influencing abundance and distribution of spotted hyenas within close proximity of human settlements. My findings confirmed 'commuting' movements and raised questions about local hyena social structure. The relative abundance of spotted hyenas at garbage dumping sites reflects their dependence on anthropogenic food sources rather than natural prey.

Even in two national parks, Awash and Chebera Churchura, prey remains of domestic species were dominant. This presents a new finding on hyena diets in national parks, as previous studies showed their diet to consist of a va-

riety of prey, predominantly wild. This is probably due to very low densities of natural prey in these national parks, and or due to scavenging around the houses of park rangers and near villages and/or extensive illegal grazing and livestock encroachment, which is evident in almost all Ethiopian national parks. Domestic animals remain the predominant food for hyenas even in national parks. I postulate that depletion of natural prey species forces hyena to depend on anthropogenic food sources. Hyenas commonly occur in suburban and urban areas across Ethiopia.

Livestock depredation is not a serious problem in my study area compared to studies across Africa. A range of technical measures including construction of enclosures and the use of guards and dogs are used to mitigate depredation. In my study, domestic dogs were not effective in protecting villages from hyena attacks. Hyena, leopard and jackal showed divergent predatory behavior towards livestock, with regard to the type of prey they attacked, time of day and location of livestock attacks. More livestock predation was observed during the nighttime for hyena and leopard and daytime for jackal.

Survival of hyenas is largely and widely dependent on waste management. Hyena population persistence is secure under present conditions, as waste is dumped along roadsides and into open areas. A change in waste management from open to closed systems would immediately impact on viability of the hyena population. Mekelle city is considering an improvement in solid waste management from an open to a closed system. For long term conservation, I recommend that dumps should have permit hyena entrance.

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