

Taphonomy perspectives on Tiger (*Panthera tigeris*) kills and natural deaths of domestic buffalo *Bubalus bubalis* (Linnaeus, 1785) with special reference to vultures and others scavenger vertebrates

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Abstract

In this study, a clandestine cemetery was simulated in an area of Sigur Plateau of Tamil Nadu part of the Nilgiri Biosphere Reserve, India. 32 domestic buffalo carcasses of the size of 363.66± (6.87) kg each were recorded in the forest areas in different periods of 2011 and 2015. Seven species of birds were recorded and five of them were eating the carcasses of mammals: 1) Accipitriformes: White-rumped Vulture- *Gyps bengalensis* (Gmelin, 1788) and Long-billed Vulture- *Gyps indicus* (Scopoli, 1786), Red-headed Vulture- *Sarcogyps calvus* (Scopoli, 1786), Egyptian Vulture-*Neophron percnopterus* (Linnaeus, 1758), Tawny Eagle-*Aquila rapax* (Temminck, 1828); 2) Passeriformes: House crow-*Corvus splendens* (Vieillot, 1817) and Common Myna-*Acridotheres tristis* (Linnaeus, 1766) Artiodactyla: Wild Boar *Sus scrofa* (Linnaeus, 1758) 4) Carnivora: Stray Dogs *Canis lupus Familiaris*, Wild Dog *Cuon alpines* (Pallas, 1811), Stripped Hyaena *Hyaena hyaena* (Linnaeus, 1758); and 5) Tiger *Panthera tigris* (Linnaeus, 1758). The behaviour of these animals interfered in the decomposition process and resulted in the dispersion and loss of bony parts.

Keywords: Vultures, domestic buffalo, carcasses

INTRODUCTION

Taphonomy is defined as the study of the processes by which animal and plant remains become fossilized. The discipline arose from the work of paleontologists to explain the contexts and conditions of fossilized remains. Taphonomy, with its roots in the Greek "taphos" for tomb or burial, and "nomos"-laws, was adapted by physical anthropologists to explain, and sometimes predict, the condition and contexts of more recent and often forensically significant finds. The activities of scavengers animals, specially vultures, can modify the crime scene and generate several artifacts (Morton and Lord 2006; Carter et al. 2007; Ururahy-Rodrigues et al. 2008; Reeves 2009), as the concealment of the body and/or its dismemberment (Haglund and Sorg, 1997; Spradley et al., 2012). Either opportunistically or by lack of food, some predators such as big cats (Rippley *et al.*, 2012), rodents, dogs and coyotes (Haglund, 1997a,b) may occasionally feed on the carcasses, dismantling and moving it. The activity of these animals can modify the rate of

decomposition and the post-mortem events as well as the estimates of the post-mortem interval (PMI) (Spradley *et al.*, 2012). Most of the taphonomy studies were attempted on experimental levels in much literature (Mortonand Lord 2006;; Ururahy-Rodrigues *et al.*, 2008). This study is aimed to attempt thaponomy perspectives on tiger kill and natural death of the domestic buffalo in the natural forest ecosystem.

MATERIALS AND METHODS

During 2011 and 2015, a total of 32 domestic buffalo carcasses weighing approximately up to 363.66±(6.87) were recorded in the Sigur Plateau of Tamil Nadu part of the Nilgiri Biosphere Reserve, India in order to simulate a clandestine cemetery of which 24 of them were hunt by tigers rest of them (8) were observed as natural death. With the aim to record the vertebrates that fed on the carcasses, we regularly monitored by survey and placed a camera trap near them and left it there for 24 hours/day, from the moment of death until skeletonization. The carcasses monitoring was divided in to five stages, which included initial, bloated, decay, post decay and dry, and the scavengers presence was recorded based on these five stages

RESULTS AND DISCUSSION

The camera took a total of 2800 photos. A total of 12 species of vertebrate fauna of which nine species of

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birds and five species of mammals were recorded: 1) Accipitriformes: White-rumped Vulture Gyps bengalensis and Long-billed Vulture Gyps indicus, Redheaded Vulture Sarcogyps calvus, Egyptian Vulture Neophron percnopterus, Tawny Eagle Aquila rapax Passeriformes: House crow Corvus splendens Common Myna (Acridotheres tristis) Artiodactyla: Wild Boar Sus scrofa 4) Carnivora: Stray Dogs Canis lupus familiaris, Tiger Panthera tigris, Wild Dog Cuon alpines, Stripped Hyaena Hyaena hyaena. The presence of the scavenger vertebrates was associated with the five stages of decomposition: initial, bloated, decay, post decay, and dry (Table I). Vultures, one of the most versatile scavenging birds, were the only vertebrates observed during the experiments that are known to have a diet composed almost entirely of carcasses (Ruxton and Houston, 2004). In India, nine species of vultures in the wild have been reported (Ali and Reply, 1987). Of which four of them are found in Tamil Nadu part of the NBR. They include the Oriental White-backed Vulture, Long billed Vulture, Egyptian Vulture and Red Headed Vulture (Ramakrishnan et al., 2010, 2012; Samson et al., 2014, 2014) These birds are usually the first vertebrate scavenger to access the carcasses (Ramakrishnan et al., 2012) and can eat meat in advanced stage of putrefaction. Tiger is the top carnivore present in the forest ecosystem and has the ability to hunt larger prey (Prater, 2005). Ullas Karant (2003) stated that tigers are very active nocturnal hunters and buffalo is the semi nocturnal species which become easy victim and prey for tigers (n=24) in certain circumstances. Vultures are

the largest scavenging birds in the world (Huston 1985). In most of the cases (n=18) tiger's hunting behaviour was not favoured to assess the carcasses to vultures in initial stages because the feeding behavior of tiger was start from anus to head (Ullas Karanth 2003) vultures are wait for to assess the carcasses more open. //Vague // Anatomically tigers are very strong animal to rotate the carcass and facilitate to consume the carcass to other scavenger vertebrates. Ullas Karant (2003) stated that initially tigers consumed 20 to 35 kg of flesh from it first meal and it will stay 1 to 7 days according to the size of the pray. So 50% of flesh was consumed by tiger and the rest was consumed by vultures and other scavenger vertebrates. Wild boars are the opportunistic scavenger's ability to out compete the carcasses with huge numbers in nature./vague/ In certain cases (n=8) the entire buffalo carcass was fully assess by the wild boars in this study. Wild dogs are recorded in two fresh buffalo kills from initial stages to consume the fresh flesh from the tiger kills. Hyenas were recorded to assess 3 buffalo carcasses in the post decay periods and basically hyenas are the scavengers and eat up to born level of the carcasses (Prater, 2005). Scavenging preference of the carcasses was showed that especially two gyps vulture species namely whiterumped and long billed vultures preferred to scavenge on initial four decomposing stages followed by Red headed vultures preferred initial two stages of decomposing because red headed vultures are fresh carcass feeders in nature and also play an opener of the carcasses because the bill was very strong in nature

Species	Decomposition Stages				
	Initial	Bloated	Decay	Post decay	Dry
Gyps bengalensis (Gmelin, 1788)	V	\checkmark	N	N	
Gyps indicus (Scopoli, 1786)	V	N	\checkmark	N	
Sarcogyps calvus (Scopoli, 1786)	V	N			
Neophron percnopterus (Linnaeus, 1758)			\checkmark	N	
Aquila rapax (Temminck, 1828)	V				
Corvus splendens (Vieillot,1817)			\checkmark	N	V
Acridotheres tristis (Linnaeus, 1766)		N	\checkmark		
Sus scrofa (Linnaeus, 1758)	V	V	\checkmark	N	V
Canis lupus familiaris			\checkmark	N	N
Panthera tigris (Linnaeus, 1758)	V				
Cuon alpines (Pallas, 1811)	V				
Hyaena hyaena (Linnaeus, 1758)			\checkmark	N	N

Table 1. Decomposition stages of different carcasses

√- Efficient visiting; √- Inefficient visiting

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when compared to other vulture species (Ramakrishnan et al. 2012). Egyptian vultures were recorded in two decaying stages of decomposition (Decay and Post decay). Egyptian vultures are preferred to consume the flesh on decaying condition and it consumes flesh from the bone (Boyan et al., 2012). Tawny eagle presence in the carcasses was recorded only once in the fresh stage of the carcasss. Crow is the common scavengers in the environment and the occurrences were recorded in the advanced stage of decaying till to dry. Stray dogs presence was recorded in the advanced stage of decaying till to dry and it will separate the carcasses and take away from the original place, and to a maximum of the carcasses' born was recorded from 1 to 2 km periphery of the original place. Mechanical movements, spontaneous or deliberate, become important events for the interpretation of the crime scenes. Allied to this, moving the carcasses facilitates the dispersion of the body parts, as observed by Ururahy-Rodrigues et al. (2008). Studies involving the reconstruction of crime scenes are important and must consider the activity of scavengers in order to separate the peri-mortem and postmortem events in the investigation (Ubelaker, 1997).

REFERENCES

- Ali, S. and Ripley, S.R., 1987. Handbook of Birds of the birds of India and Pakistan, Oxford University press, New Delhi, Pp.76.
- Boyan, M., S. Nikolay and Vasil, P., 2012. Diet of the Egyptian vulture (*Neophron percnopterus*) after livestock reduction in Eastern Bulgaria. North-Western Journal of Zoology., 8 (2): 315-323
- Carter, D.O., Yellowlees, D. and Tibbett, M., 2007. Cadaver decomposition in terrestrial ecosystems. *Naturwissenschaften.*, 94: 12-24. PMid:17091303 <u>https://doi.org/10.1007/s00114-006-0159-1</u>
- Haglund, W.D. and Sorg, M.H., 1997. Introduction to Forensic Taphonomy, p. 1-26. In: W.D. Haglund & M.H. Sorg (Eds). Forensic Taphonomy: The Post Mortem Fate of Human Remains. Boca Raton, CRC Press, XXVI+636p.
- Haglun, W.D., 1997a. Rodents and Human Remains, p. 405-413. In: W.D. Haglund & M.H. Sorg (Eds). Forensic Taphonomy: The Post Mortem Fate of Human Remains. Boca Raton, CRC Press, XXVI+636p.
- Haglun, W.D., 1997b. Dogs and Coyotes: Postmortem involvement with Human Remains, p. 367-379. In:
 W.D. Haglund & M.H. Sorg (Eds). Forensic Taphonomy: The Post Mortem Fate of Human Remains. Boca Raton, CRC Press, XXVI+636p. <u>https://doi.org/10.1201/9781439821923.sec3</u>
- Morton, R.J. and Lord, W.D., 2006. Taphonomy of child-sized remains: a study of scattering and scavenging in Virginia, USA. *Journal of Forensic Sciences.*, 51: 475-479. PMid:16696691 https://doi.org/10.1111/j.1556-4029.2006.00134.x

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- Prater, S. H., 2005. The Book of Indian Animals, Bombay Natural History Society and Oxford University Press, pp. 194– 197.
- Ramakrishnan, B., Kannan, G., Samson, A., Ramkumar, K. and Ramasubramaniyan, S., 2014. Nesting of Whiterumped vulture (*Gyps bengalensis*) in the Segur Plateau of The Nilgiri North Forest Division .*Indian Forester.*,140(10): 1014-1018
- Ramakrishnan, B., Ramasubramanian, S. and Samson, A., 2012. Occurrence of Red-headed vulture in Segur plateau, Tamil Nadu. *Current Science.*, 102 (6): 832
- Ramakrishnan, B., Ramasubramanian, S. Saravanan, M. and Arivazhagan, C., 2010. Is Diclofenac the only culprit for declining population of *Gyps* Vultures in the Moyar Valley. *Current Science.*, 99 (12): 1645-1646.
- Reeves, M.A., 2009.Taphonomic effects of vulture scavenging. Journal of Forensic Sciences., 54: 523-528. PMid:19432736 https://doi.org/10.1111/j.1556-4029.2009.01020.x
- Rippley, A., Larison, N.C., Moss, K.E., Kelly, J.D. and Bythermay, J.A., 2012. Scavenging Behavior of Lynx rufus on Human Remains. Science International., 219: 57-63. PMid:22236440 https://doi.org/10.1111/j.1556-4029.2011.02017.x
- Ruxton, G.D. and Houston, D.C., 2004. Obligate scavengers must be soaring fliers. *Journal of Theoretical Biology.*, 228: 431-436. PMid:15135041 https://doi.org/10.1016/j.jtbi.2004.02.005
- Samson, A., Ramakrishanan, B., Kannan, G., Renuka, S. and Ramasubramanian, S., 2014. Emerging threats for Egyptian vulture (*Neophoran percnopterus ginginianus*) in the Chamundi Hills Reserved Forest, Mysore, Karnataka. *Newsletter for Birdwatchers* 50(2): 16-17
- Samson, A., Ramakrishnan, B., Renuka, S., Ravi, P. and Ramasubramanian, S., 2014. Bathing behavior and waterhole importance of white-rumped vulture conservation in the Segur Plateau, Tamil Nadu, Southern India. *Journal of Applied Science and Research.*, 2(5):92:99
- Spradley, M.K., Hamilton, M.D. and Giordano, A., 2012. Spatial patterning of vulture scavenged human remains. *Forensic Science International.*, 219: 57-63. PMid:22204892 https://doi.org/10.1016/j.forsciint.2011.11.030
- Ubelaker, D.H., 1997. Taphonomic Applications in Forensic Anthropology, p. 77-90. *In*: W.D. Haglung& M.H. Sorg (Eds). Forensic Taphonomy: The Post Mortem Fate of Human Remains. Boca Raton, CRC Press, XXVI+636p. <u>https://doi.org/10.1201/9781439821923.ch5</u>
- Ullas Karant, K., 2003. Tigers Ecology and Conservation in the Indian Subcontinent. *Journal of Bombay Natural History* Society., 100: 169-189
- Ururahy-Rodrigues, A., Rafael, J.A., Wanderley, R.F., Marques, H. and Pujol-Luz, J.R., 2008. Coprophanaeus lancifer (Linnaeus, 1767) (Coleoptera, Scarabaeidae) activity moves a man-size pig carcass: relevant data for forensic taphonomy. Forensic Science International., 182: 19-22. PMid:18990518 https://doi.org/10.1016/j.forsciint.2008.09.009

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