

Dynamics of Scavenging Ecosystem Service Role in the Absence of Vultures in the Terai Region of Uttarakhand and Its Implications



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Introduction

- ▶ India provides habitat to **nine species of vultures** and Uttarakhand state also hold populations of all the nine species,
 - ▶ Vultures play an important **ecosystem service role through scavenging** dead animal carcasses in villages, towns and cities, and thus prevent spreading of diseases,
 - ▶ During the years 1990s and 2000s the populations of all resident vultures have **declined up to 99 percent** in the Indian sub-continent,
 - ▶ The decline in vulture population has resulted in the **loss of critically important ecosystem services** which has widespread consequences,
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- ▶ Decomposing carcasses serve as incubators for many pathogens, and animals that come into contact with rotting carcasses may be exposed to infectious agents (Jenelle et al., 2009),
- ▶ Small predators like rats, feral dogs, etc. appear to increase in abundance in the absence of vultures, are well-known disease reservoirs (Pain et al. 2003),
- ▶ Secondary scavengers such as hyenas and jackals host a number of pathogens that infect a wide range of other wild and domesticated species (Harrison et al. 2004),
- ▶ Vultures are vital to keeping the environment clean, survival of other wildlife and survival of human being,





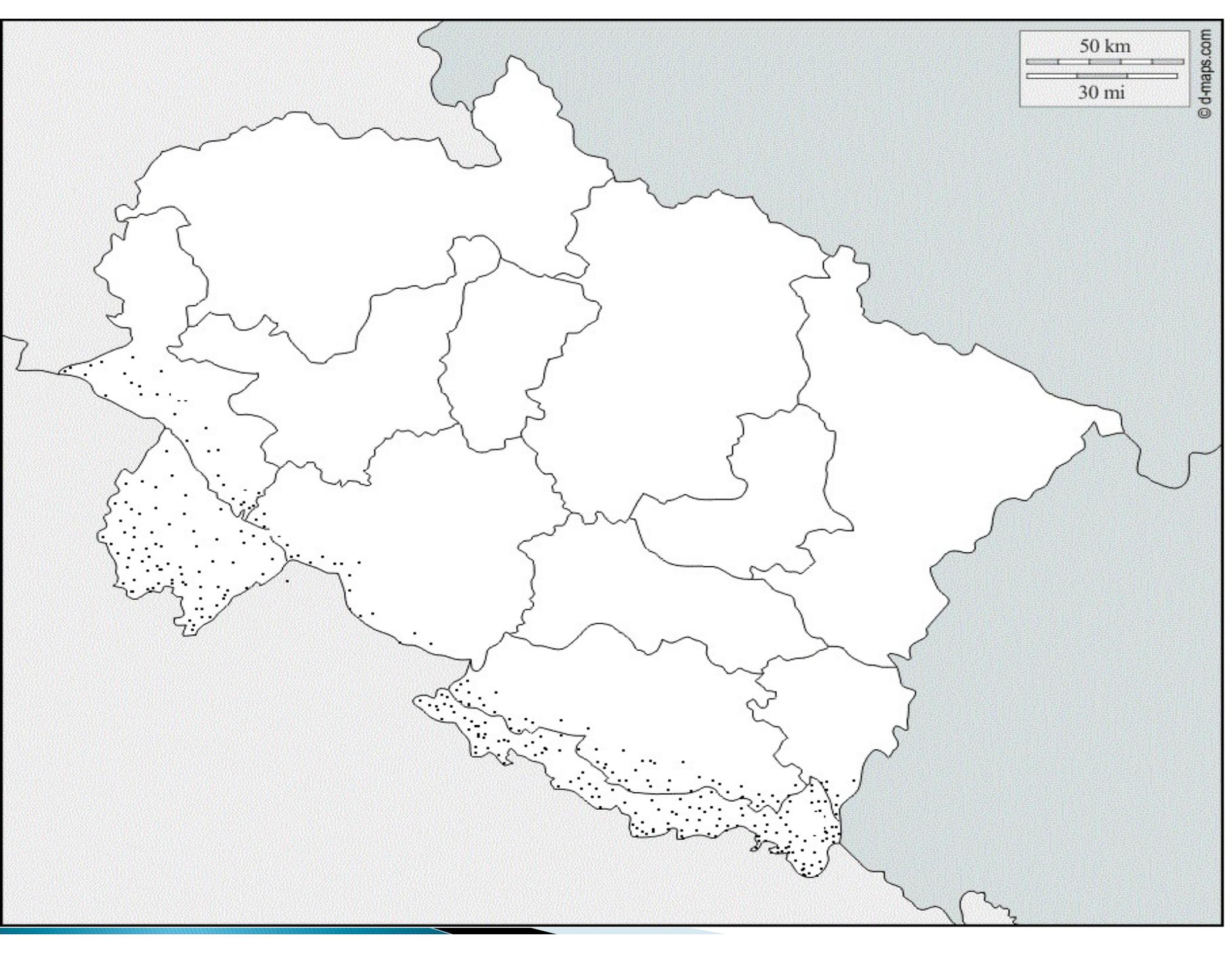
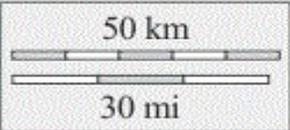
Objectives

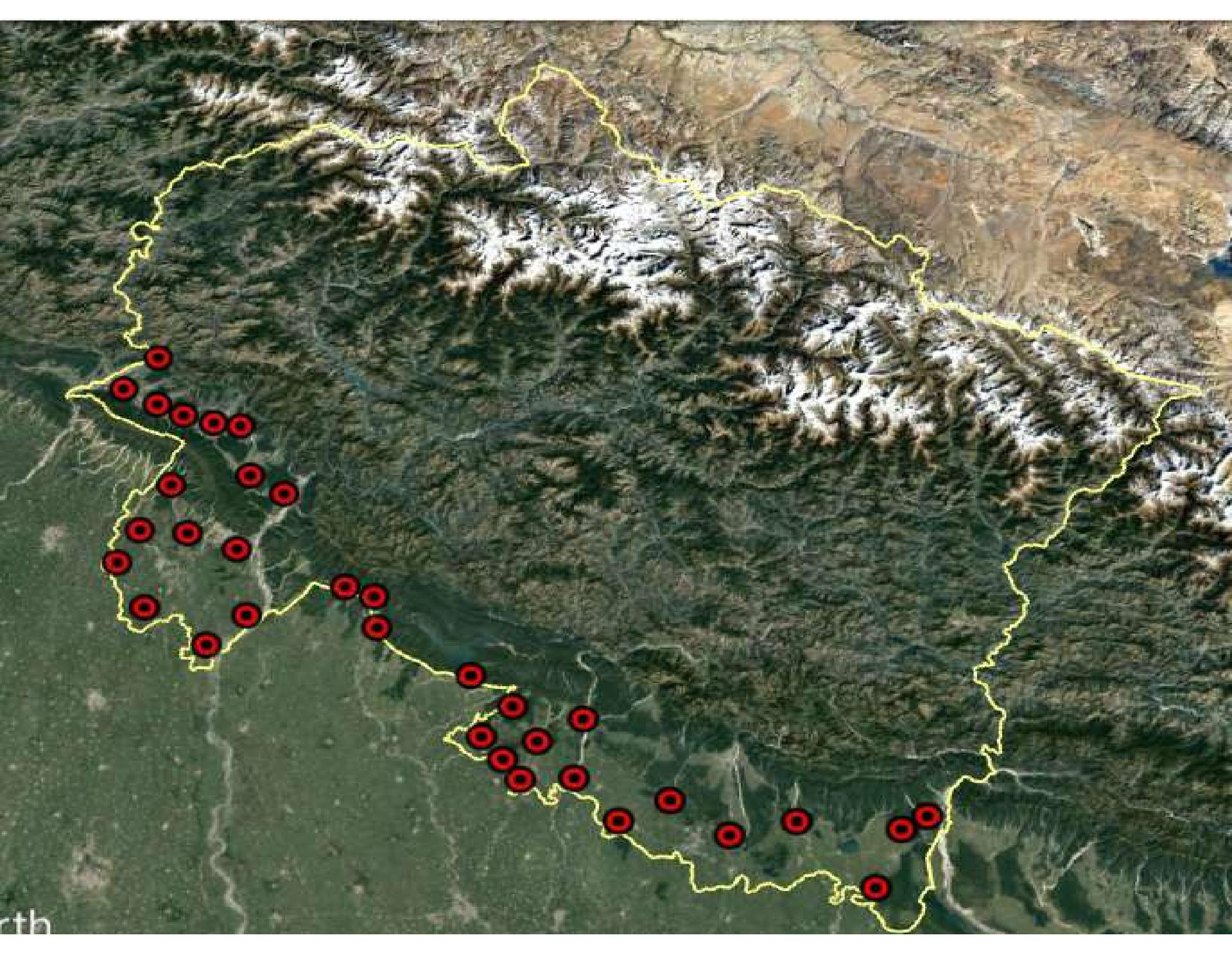
A study was conducted in Terai region of Uttarakhand during August 2014-June 2018 with the objectives;

- ▶ To understand the implications of vulture decline in other scavenger populations in the Terai region of Uttarakhand,
 - ▶ To understand the dynamics of scavengers in urban and rural settings,
 - ▶ To understand the livestock carcass dumping patterns in Terai region of Uttarakhand vis-a-vis vulture use,
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Study Area

- ▶ Widespread about 400 km from Kalsi in Dehradun district to Tanakpur in Champawat district, ranging from 300 m asl to 1000 m asl,
 - ▶ Two major landscapes namely Rajaji Tiger Reserve and Corbett Tiger Reserve,
 - ▶ Most populated area in terms of human and livestock population of Uttarakhand state,
 - ▶ Situated between Yamuna river in west and Sharda river in the east
 - ▶ Important for major river systems of the state,
 - ▶ Witnessed rapid industrialization, urbanization, and habitat conversion as well as fragmentation in recent decades,
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Methodology

- ▶ Enumeration and mapping of livestock carcass dumping sites in the study area,
 - ▶ Intense monitoring surveys in select 35 carcass dumping sites in all six Terai districts,
 - ▶ Repeated number of observations or visits in each select dumping sites,
 - ▶ Documentation of fresh carcasses in each observation and recording of vulture and other scavenger population within 500 m-1 km range,
 - ▶ Average number of livestock carcass dumping events in each day in each urban and rural sites calculated
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VULTURES OF INDIA भारत में पाये जाने वाले गिद्ध



Lammergeier/ हडफोड़ गिद्ध



Egyptian Vulture/ सफेद गिद्ध



White-rumped Vulture/ बंगाल का गिद्ध



Long-billed Vulture/ भारतीय गिद्ध



Slender-billed Vulture/ लम्बी चोंच का गिद्ध



Himalayan Vulture/ हिमालयी गिद्ध



Eurasian Vulture/ यूरोशियाई गिद्ध



Cinereous Vulture/ काला गिद्ध



Red-headed Vulture/ लाल सिर वाला गिद्ध

A= Adult (वयस्क), SA = Sub-adult (बालक)



Let's come together to conserve vultures of India आइये हम सब मिलकर गिद्धों के संरक्षण में अपना योगदान दें



Results

- ▶ Total number of carcass dumping sites mapped = 350 (see map)
- ▶ A total of 35 sites, 540 observations and 5020 dumping events recorded in the last four years including all months,
- ▶ Average number of livestock carcasses in each dumping sites of rural area = $1.25 \pm 0.43/\text{day}$
- ▶ Average number of livestock carcasses in each dumping sites of Urban area = $0.87 \pm 0.09/\text{day}$
- ▶ Total Number of carcasses calculated in all dumping sites in a year = 134596 approx.
- ▶ Average number of feral dogs in each carcass dumping sites = 53.53 ± 28.63
- ▶ Number of feral dogs calculated for all carcass dumping sites = 18734

Dynamics of livestock carcass dumping and feral dogs in surveyed districts of Uttarakhand during the study period

District	Urban (carcass/day)	Rural (carcass/day)	Urban (carcasses/year)	Rural (carcasses/year)	Dogs population
Dehradun	1.05±0.45	1.56±0.54	382.05±162.51	568.92±196.79	79.21±29.95
Haridwar	0.89±0.15	0.82±0.33	323.25±52.23	299.0±119.68	68.64±20.78
Pauri	0.84±0.23	0.72±0.34	278.65±42.65	251.85±56.66	40.28±18.99
US Nagar	0.83±0.28	1.13±0.09	293.59±101.00	413.67±34.41	65.76±18.39
Nainital	0.82±0.34	1.07±0.28	267.54±67.65	398.87±158.86	50.40±20.68
Champawat	0.85±0.15	1.58±0.25	273.02±61.52	444.60±143.11	39.10±14.04
Average	0.87±0.09	1.25±0.43	319.25±32.35	457.56±154.67	53.53±28.63

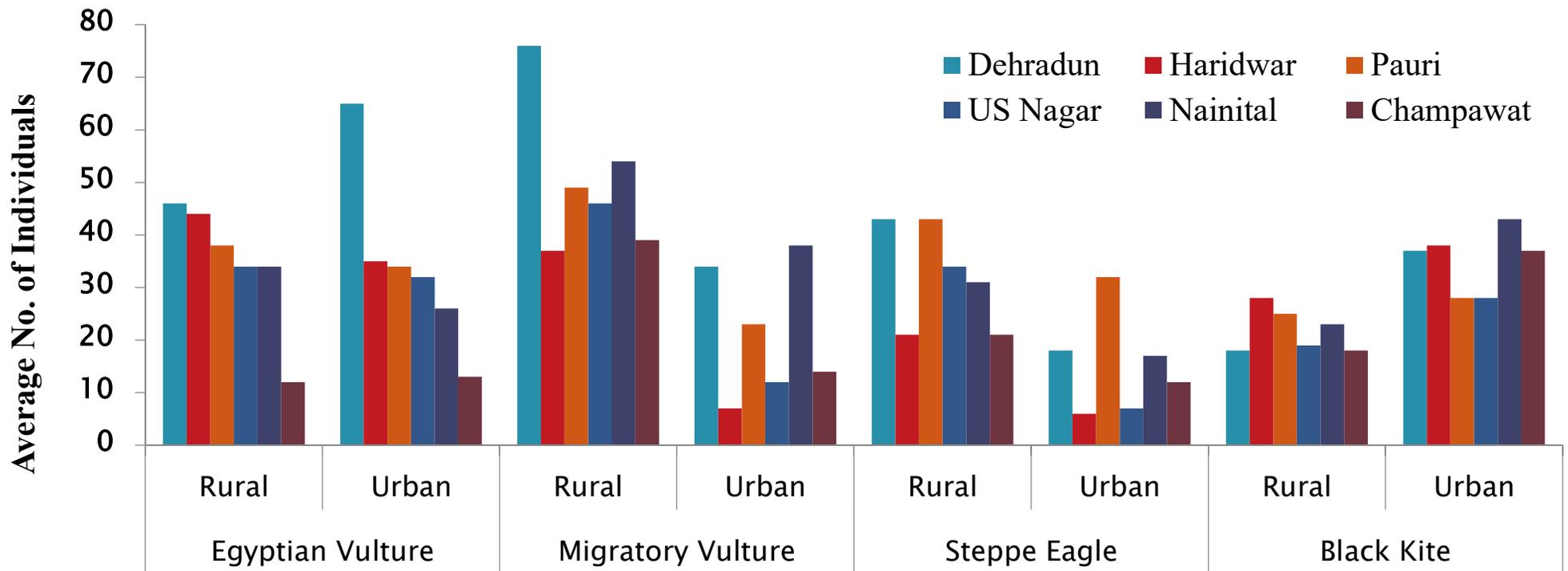


Fig 6: Average populations of raptors in carcass dumping sites (December to April)

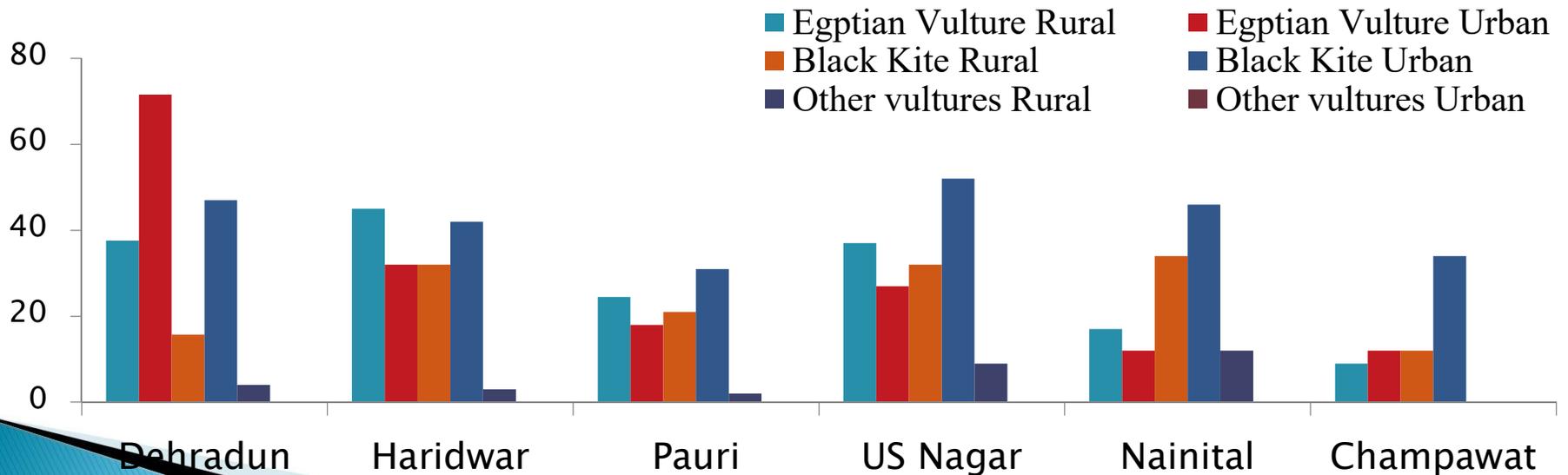


Fig : Average populations of raptors in carcass dumping sites (May to November)









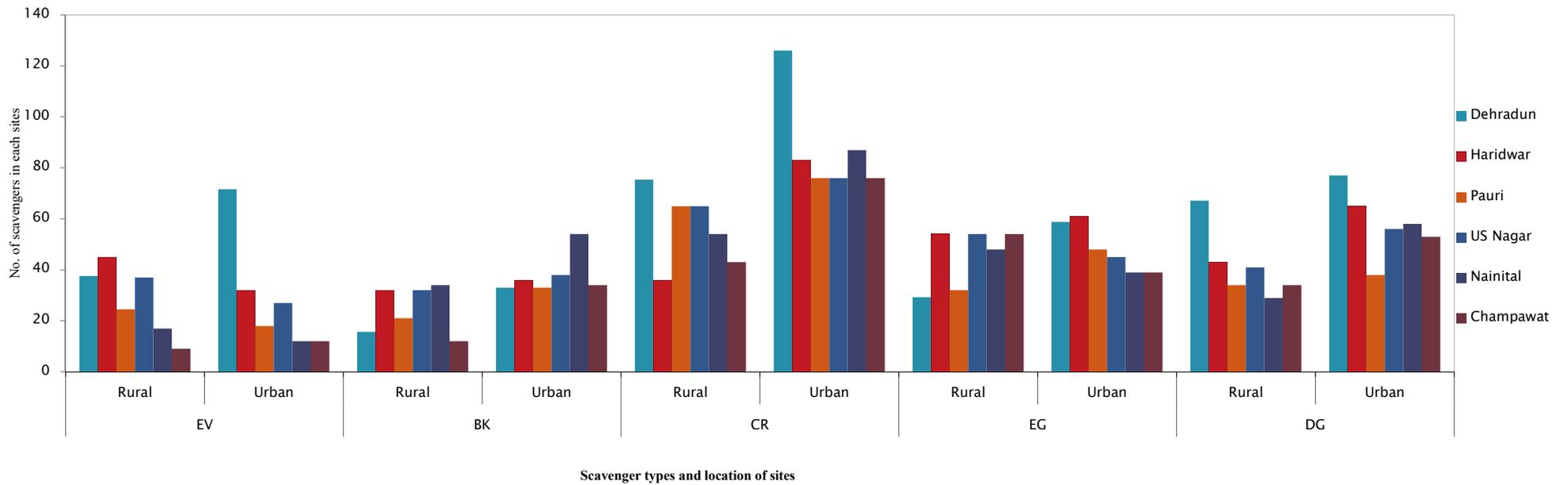


Fig.6 Average population of different scavengers in each carcasses dumping sites during May to November

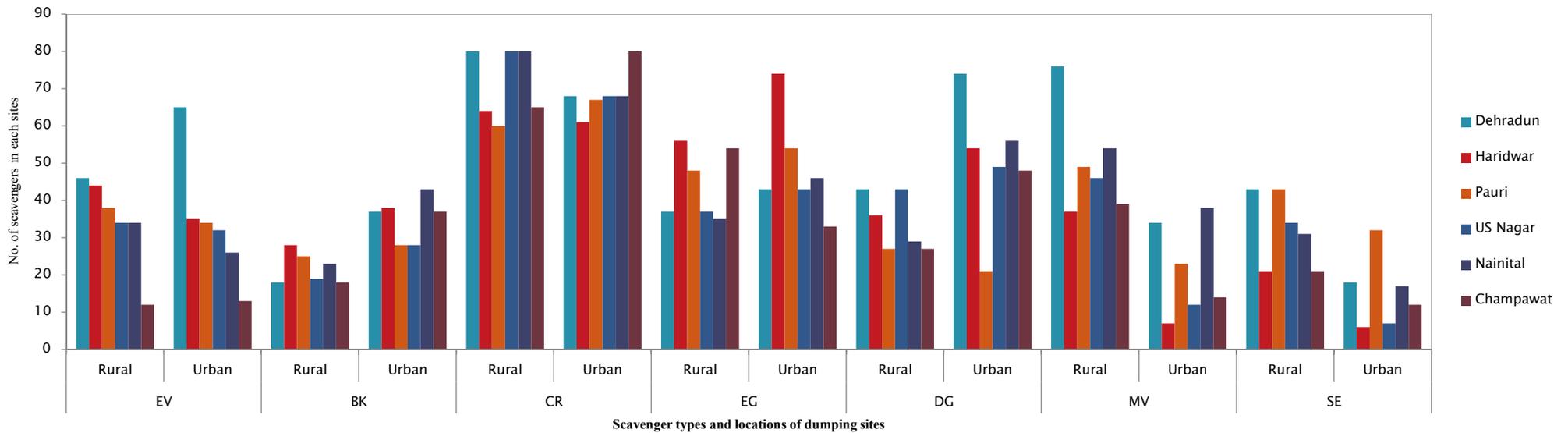


Fig.7 Average population of different scavengers in each carcasses dumping sites during December to April

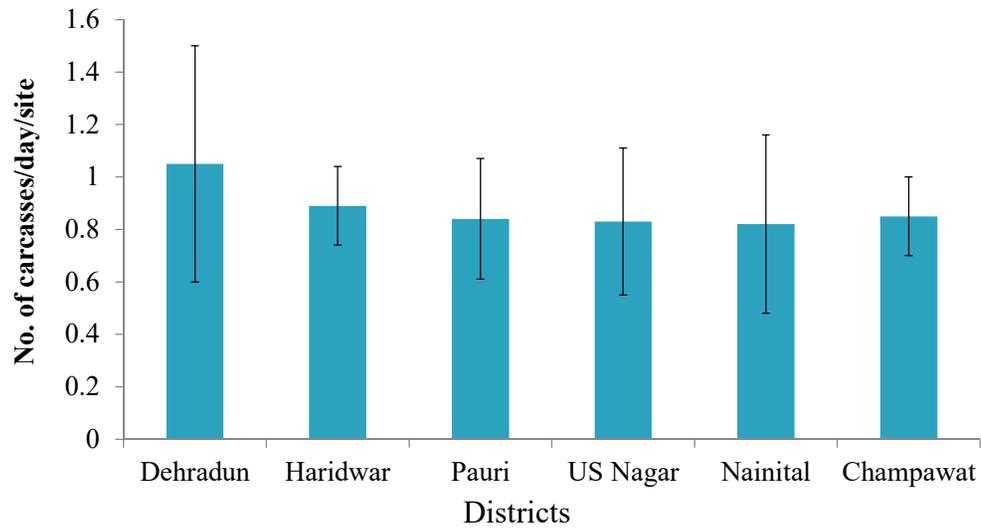


Fig.1 Carcasses in Urban sites

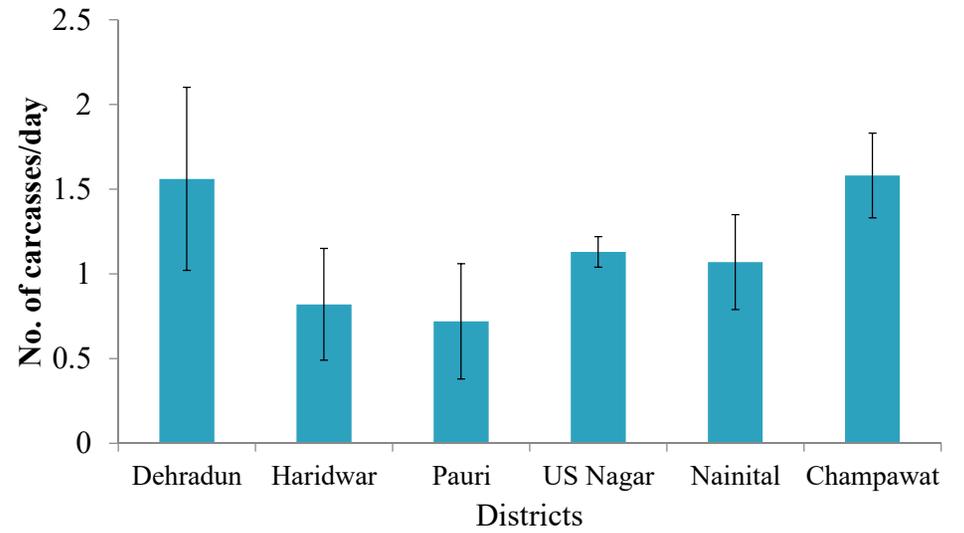


Fig.3 Carcasses in Rural sites

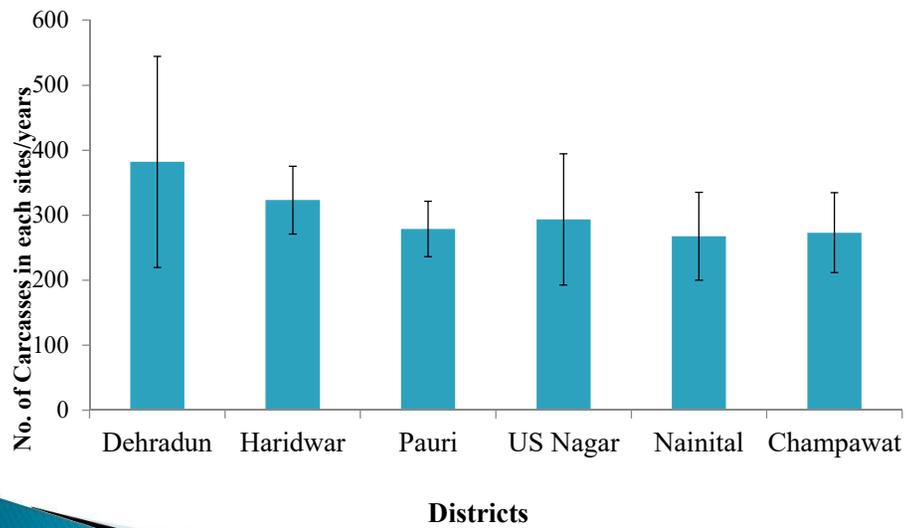


Fig.2 Carcasses in Urban sites

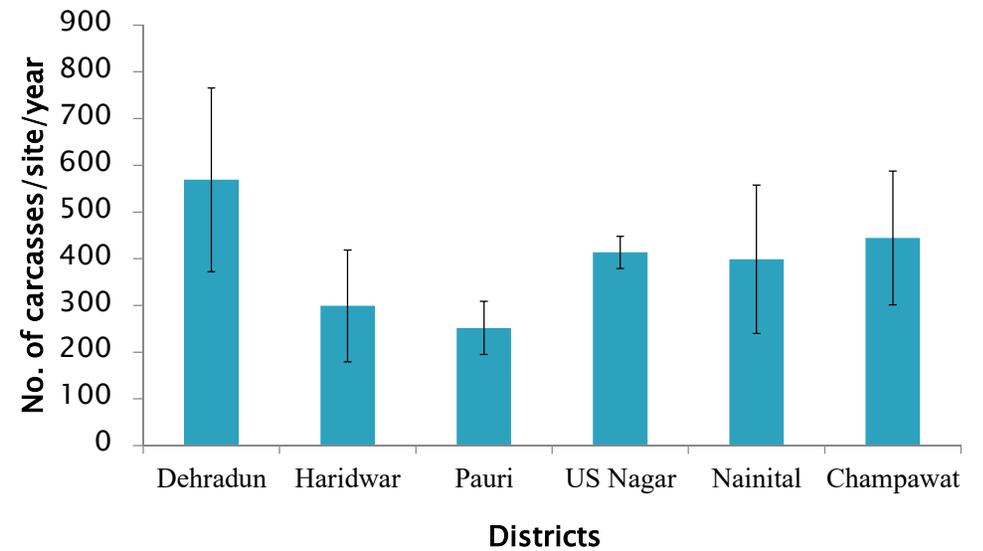


Fig.4 Carcasses in Rural sites

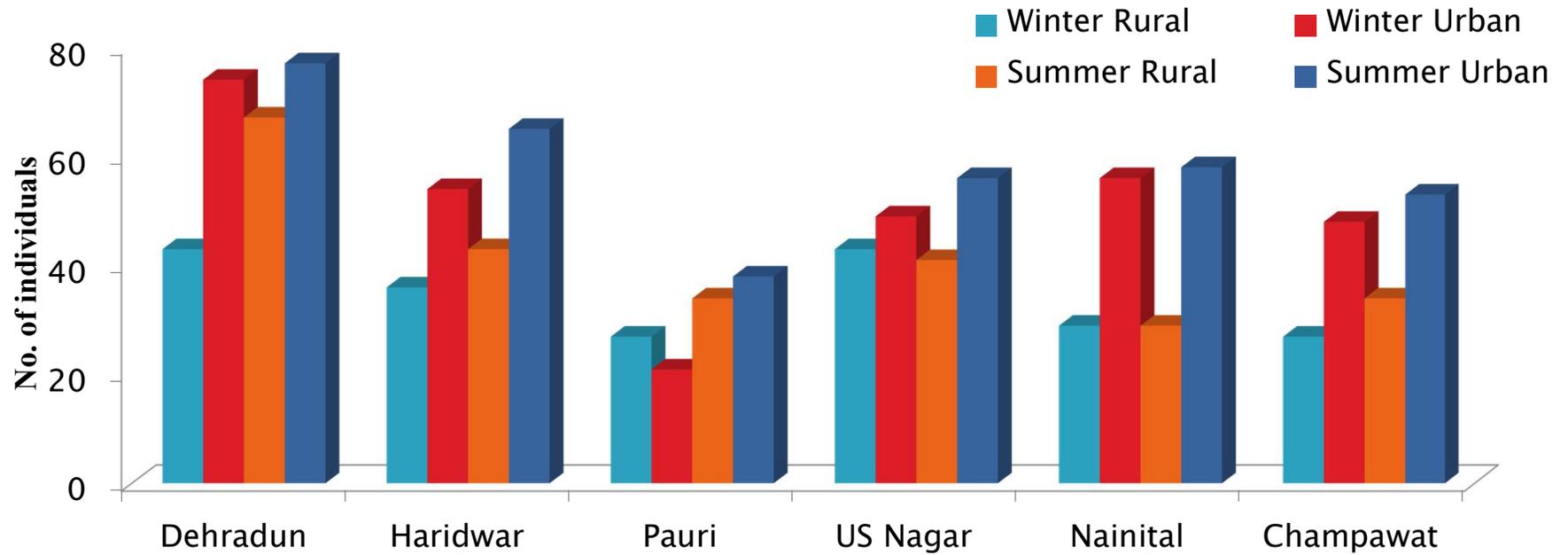


Fig: Seasonal variation in average population of feral dogs in each carcasses dumping sites

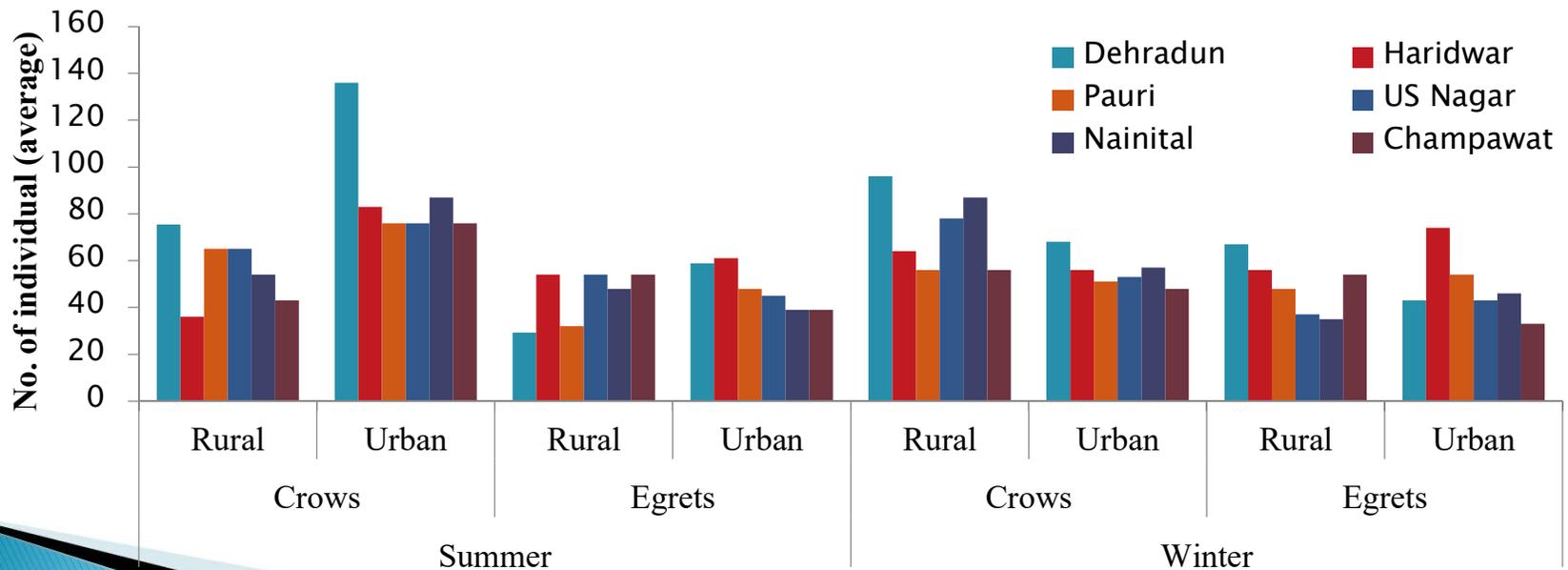


Fig: Seasonal variation in average population of other avian scavengers in each sites

Sequence of changing scavengers in the absence of vultures

- ▶ Feral Dogs
 - ▶ Resident vultures
 - ▶ Crows
 - ▶ Kites
 - ▶ Egrets
 - ▶ And others (Jackal, wild boar, monitor lizard)
 - ▶ Migratory vulture and
 - ▶ Steppe eagle
- 



























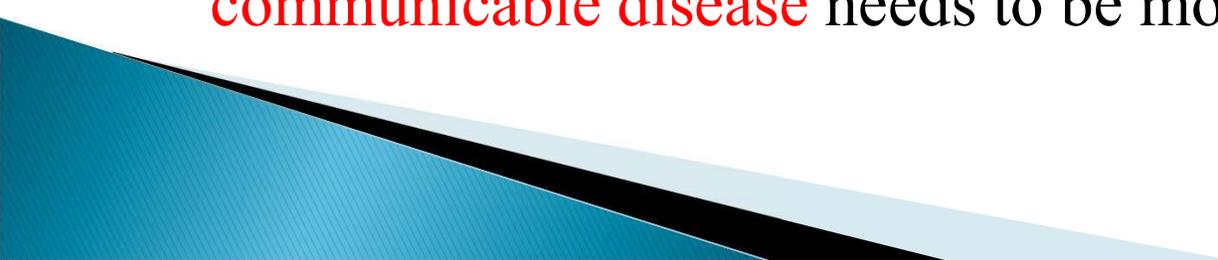




Conclusion

- ▶ **Egyptian vultures and feral dogs** (more in urban sites) play an important role in scavenging carrions throughout the year in the state,
 - ▶ In **December to April** months, **Himalayan vultures, Eurasian vultures and Cinereous vulture (Migratory vultures), Steppe Eagle (Migratory)** contributed to scavenging, mostly in rural areas,
 - ▶ It was observed that during the months of **May to November, in the absence of migratory vultures feral dogs** constituted to be the major scavenger
 - ▶ **Crows, kites and egrets are other major co-scavengers** that can be seen in large number in majority of the dumping sites throughout the year,
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- ▶ White-rumped vulture, Red-headed vultures and Indian vultures whose numbers have drastically declined were observed only in some of the dumping sites, however, in greater number in the protected Corbett landscape,
 - ▶ Scavenging dynamics has shifted from vultures to feral dogs in the 35 monitored carcass dumping sites.
 - ▶ In the absence of livestock carcasses, feral dogs are reported predated on small livestock in the rural areas, as also on the wild herbivores and other wild animals close to the forested landscape of the study area.
 - ▶ With increasing feral dog population, instances of rabies and other communicable disease needs to be monitored,
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Acknowledgement

- ▶ Conservation Leadership Programme
 - ▶ (Birdlife International, Flora & Fauna International, Wildlife Conservation Society)
 - ▶ Rufford Foundation
 - ▶ MBZ Species Conservation Fund
 - ▶ Royal Society for the Protection of Birds (RSPB)
 - ▶ Oriental Bird Club
 - ▶ Wildlife Trust of India
 - ▶ Uttarakhand Forest Department
 - ▶ Skinners, villagers and “Vulture Mitra”
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Thank you