

ROYAL MANAS NATIONAL PARK

.....The land of Royal Bengal Tiger

Ungulate Research Findings

Ugyen Tshring



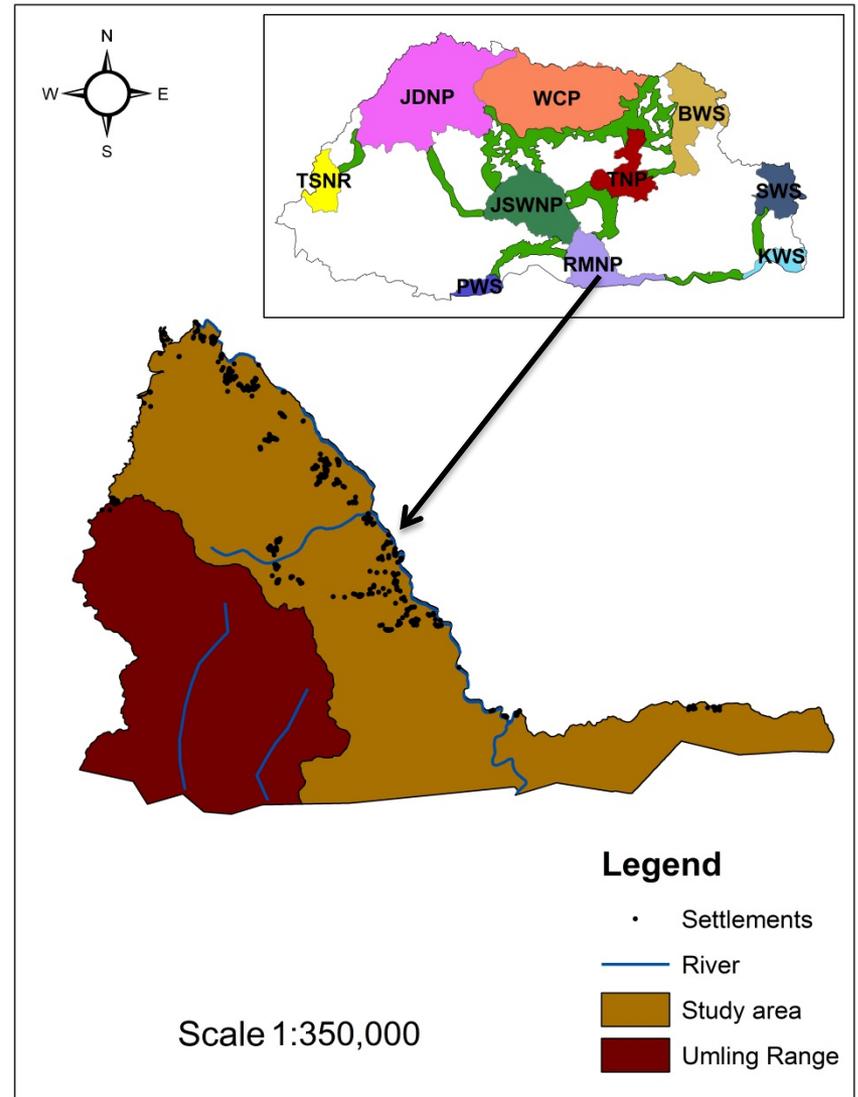
Presentation outline

- Introduction
- Objectives
- Methodology
- Result and discussion
- Conclusion



Introduction

- **Research title:**
Distribution and abundance of ungulates along elevation gradients in RMNP
- Study area: 682km²
- Survey period January & February 2014



Introduction

- Ungulates are principle prey of tigers
- Tiger density in RMNP was 5 tigers/100km²
- Ungulates species: gaur, sambar, barking deer, wild pig & serow
- Lack documentation on distribution & abundance of ungulates
- Strategize habitat management of ungulates



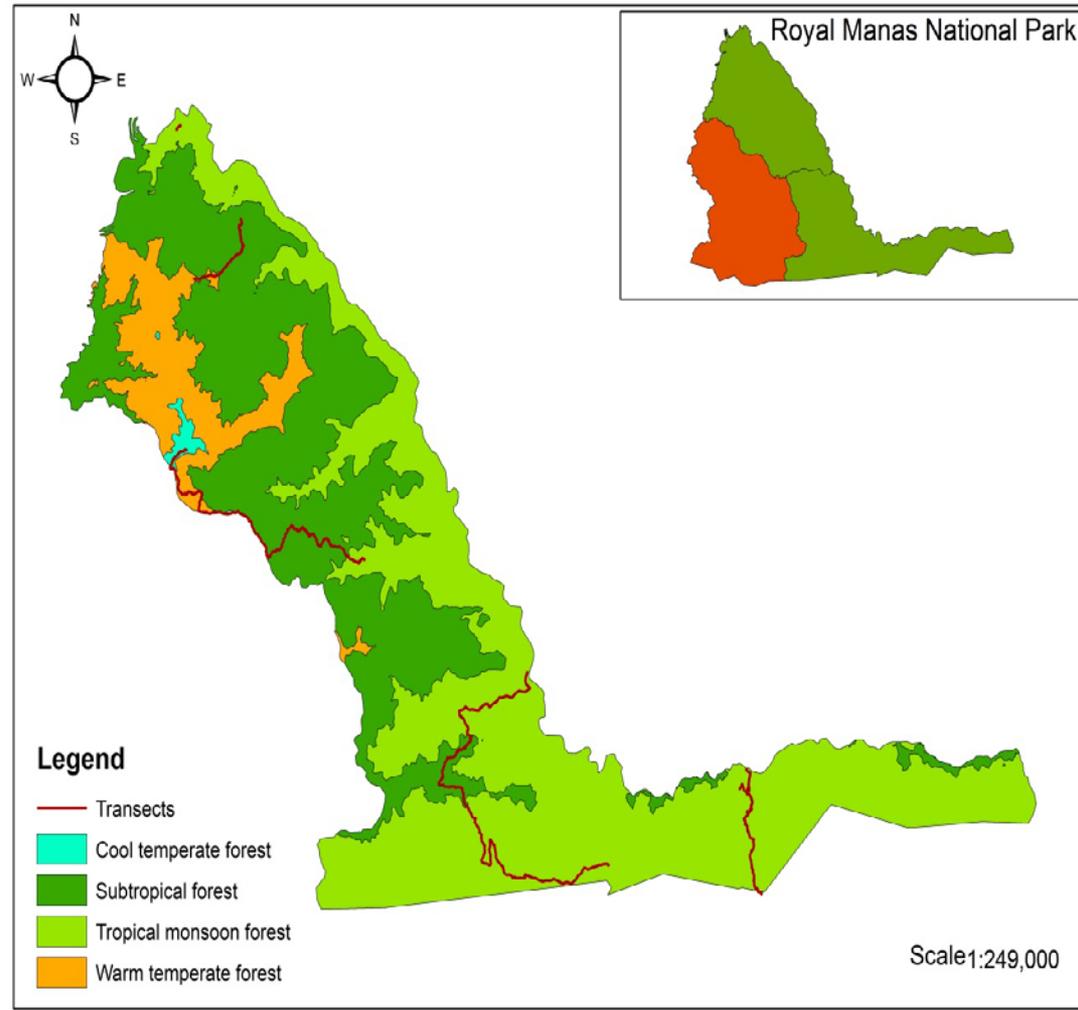
Objectives

- To estimate abundance of ungulate in relation to habitat types
- To map the distribution and predict the suitable habitat of ungulates
- To assess affect of salt licks and water holes to ungulate distribution



Methods

- Study area classified as <1000, 1000 – 2000, 2000 – 2500, > 2500 masl
- Elevation zones corresponds to TFM, STF, WTF, CTF



Methods continued

- Five transect randomly laid in all elevation zones
- 20 x 20 m quadrat was laid along transect at every 100 m elevation
- 2 x 2 m subplot was laid in quadrat to assess ground cover



• Habitat variables

Sampling methods

- Tree species Enumerated plant species of >1.37 m high
- DBH of tree Plant of height >1.37 m was measured
- Canopy cover Tree canopy estimated visually
- Ground cover Plants <1.37 m were measured as ground cover
- Elevation Measured from the center of sample plot
- Aspect Recorded degrees from the center of plot
- Slope Measured in degrees from the center of plot



Methods continued

- Pellet groups were recorded from 20 x 20 m quadrat

Abundance of species =

$$\frac{\text{Total no. of pellet groups present in all sample plots}}{\text{Total no. sampling plots in which pellet occurred}}$$



Methods continued

- Human disturbance: Presence and absence
(grazing, forest fire, wood cutting, NWFP collection)



Result & discussion

Ungulates abundance

Species	Total pellet	RP	UP	Abundance	RA
Gaur	18	13	40	1.38	21.3
Sambar	17	11	42	1.55	23.8
Barking deer	31	23	30	1.35	20.7
Wild pig	11	9	44	1.22	18.8
Serow	3	3	50	1.00	15.4

*RP= Pellet recorded plot, UP= Pellet absent plot, RA= Relative abundance



Result & discussion

Ungulate abundance in different elevation range

	<1000 m	1001-2000 m	2001-2500 m	>2500 m
Total pellet	45	29	6	0
Gaur	12	5	1	0
Sambar	14	2	1	0
Barking deer	10	18	3	0
Wild pig	7	3	1	0
Serow	2	1	0	0
Mean pellet	9	5.8	1.2	0
Max (Min)	14 (2)	18 (1)	3 (0)	0 (0)
SD	4.7	7.0	1.1	0
No. of plots	26	20	5	2



Result & discussion

- Occurrence of gaur ($r = -.356, p < .05$) and sambar ($r = -.337, p < .05$) is negatively correlated to elevation



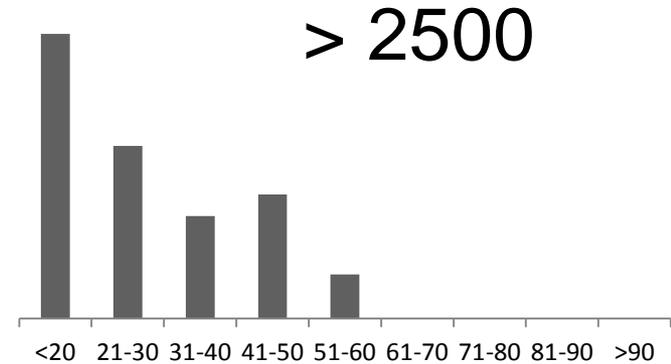
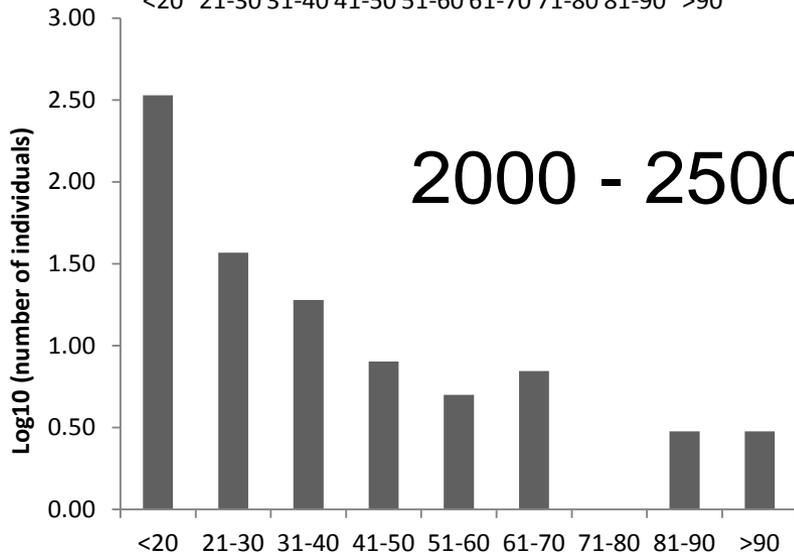
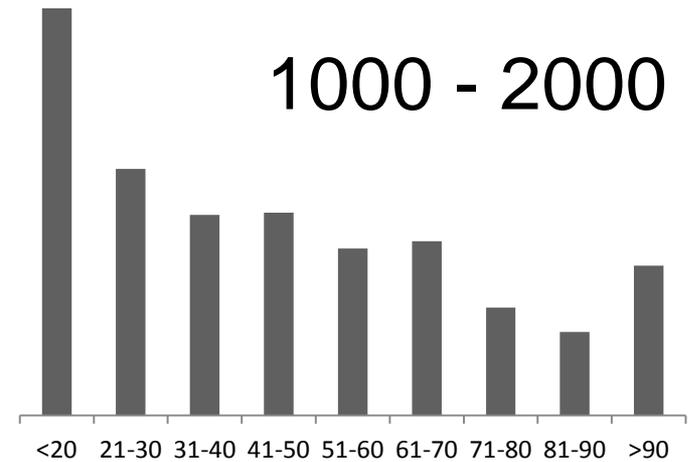
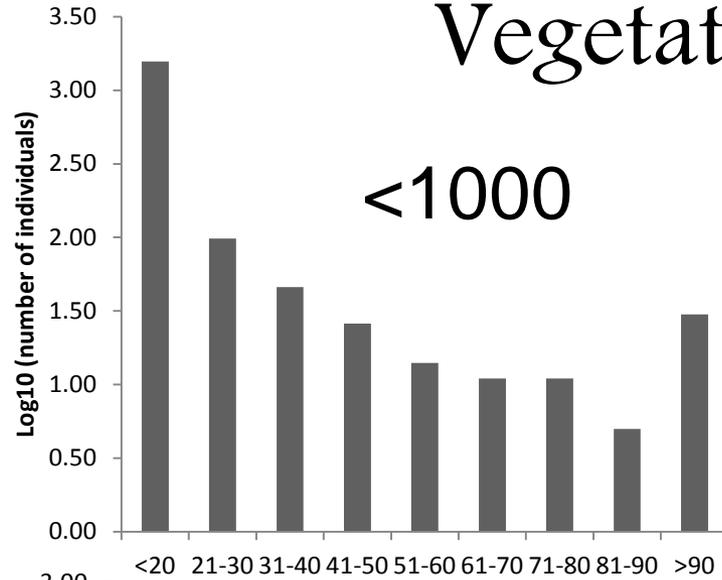
Result & discussion

Vegetation summary

	TMF	STF	WTF	CTF
H'	3.35	3.68	2.54	1.98
Spp. richness (M)	8.92	8.28	7.17	6.50
J'	0.62	0.73	0.68	0.77
Canopy cover (M)	49.88	38.68	40	15
Total stem	69	54	70	58
No. of plots	26	19	6	2



Vegetation structure



DBH class of trees above 1.37 m in height



Result & discussion

- Summary of ground cover across elevation zones

	Elevation zones			
	<1000	1000-2000	2000 -2500	> 2500
• No. of species	91	56	19	7
• No. of family	50	30	16	6
• H'	3.2	2.67	1.22	0.47
• Cover (%)	grass	herb	herb	herb



Result & discussion

Occurrence of pellet group in different slope

	Gentle	Moderate	Steep	Total
Gaur	15 (M=.65)	1 (M=.04)	2 (M=.33)	18
Sambar	15 (M=.65)	2 (M=.08)	0 (M=.00)	17
Barking deer	8 (M=.35)	20 (M=.83)	3 (M=.50)	31
Wild pig	6 (M=.65)	5 (M=.21)	0 (M=.00)	11
Serow	2 (M=.09)	1 (M=.04)	0 (M=.00)	3
Total	46	29	5	80

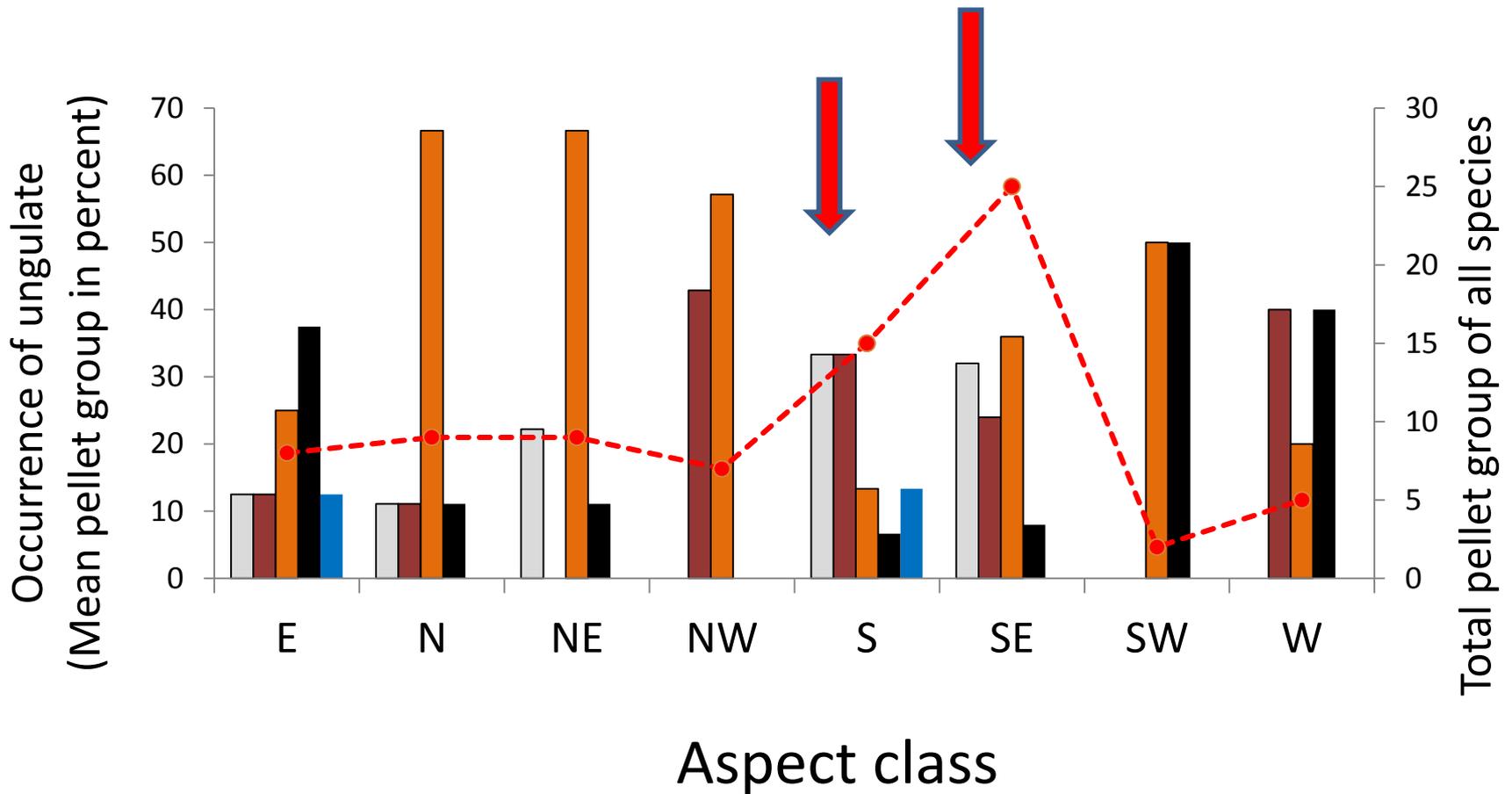
- Elevation zone and slope is positively correlated ($r_s = .450$, $p < .01$)



Result & discussion

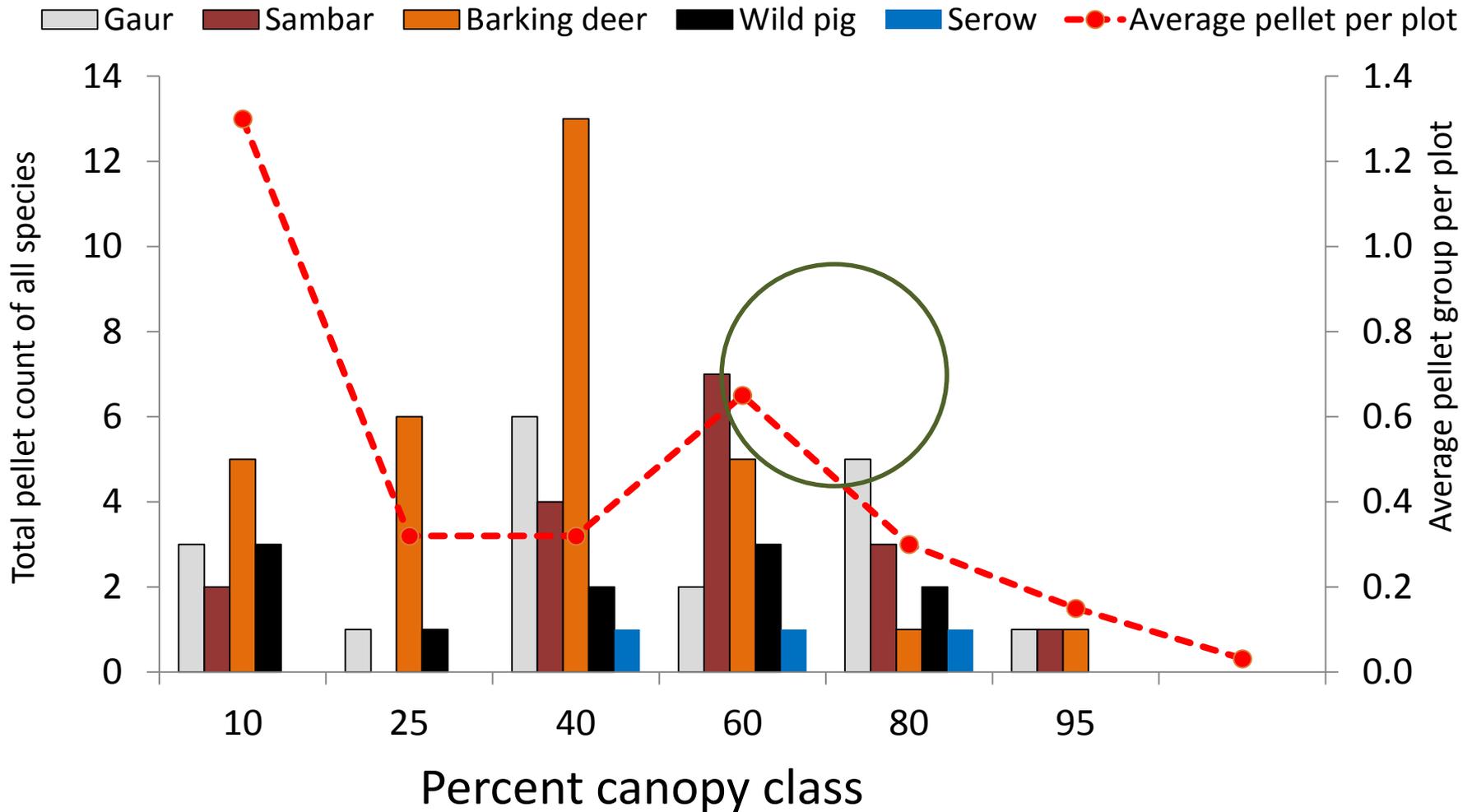
Ungulate occurrence across different canopy class

Gaur
 Sambar
 Barking deer
 Wild pig
 Serow
 ● Total pellet



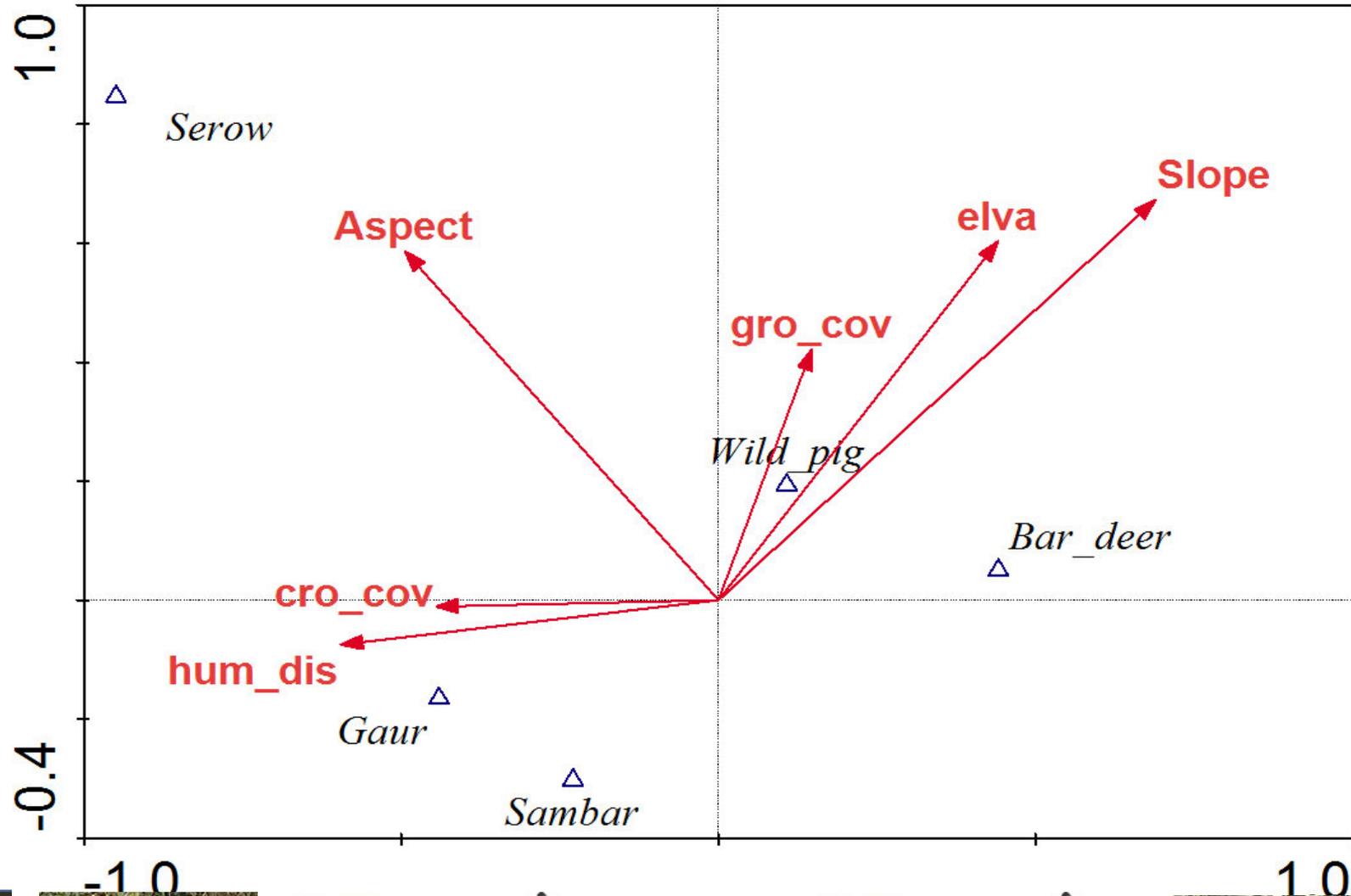
Result & discussion

Ungulate occurrence across different canopy class

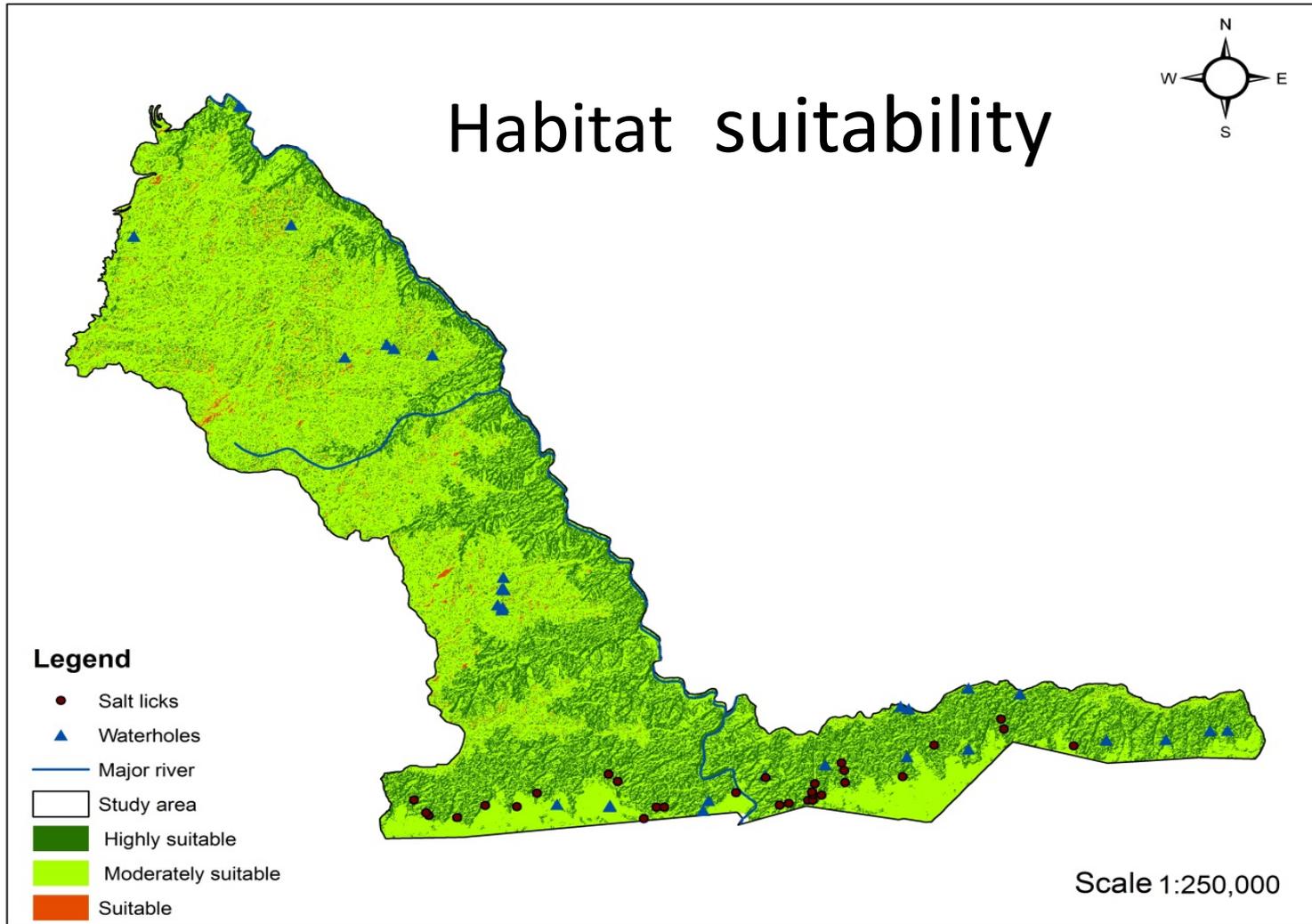


Result & discussion

Factor Affecting ungulates distribution



Result & discussion



Conclusion & Recommendation

- High sambar abundance indicates good sign for tiger conservation
- Ungulates prefer lower elevation zone also means more carnivore at this zone. However, studies round the season would confirm all season distribution
- Habitat conservation at lower elevation would conserve ungulates and their prey
- Dietary analysis of ungulates could be a future research area



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