

Diversity of Small Mammals along a Gradient of Distance from Major Infrastructure in Mikumi National Park, Tanzania

- ▶ Kisanga AC.,
- ▶ Nyahongo, JW.
- ▶ Røskft E.



Introduction

- ▶ The need for development lead to establishment of infrastructure in biodiversity rich areas of the world
- ▶ Mikumi National Park in Tanzania;
 - ▶ Established in 1954
 - ▶ the 4th largest among the 16 national parks in the country.
 - ▶ Covers 3,230 km²
- ▶ Mikumi national park in Tanzania is traversed by four major infrastructure
 - ▶ TANZAM Highway
 - ▶ TAZARA and TRL Railways
 - ▶ 2 high tension power line
 - ▶ TAZAMA-Pipeline
 - ▶ Optic Fibre (recently introduced)
- ▶ Only Optic Fibre did EIA.
- ▶ Hence they lacked baseline data that can be used for evaluation of short and long term effects.

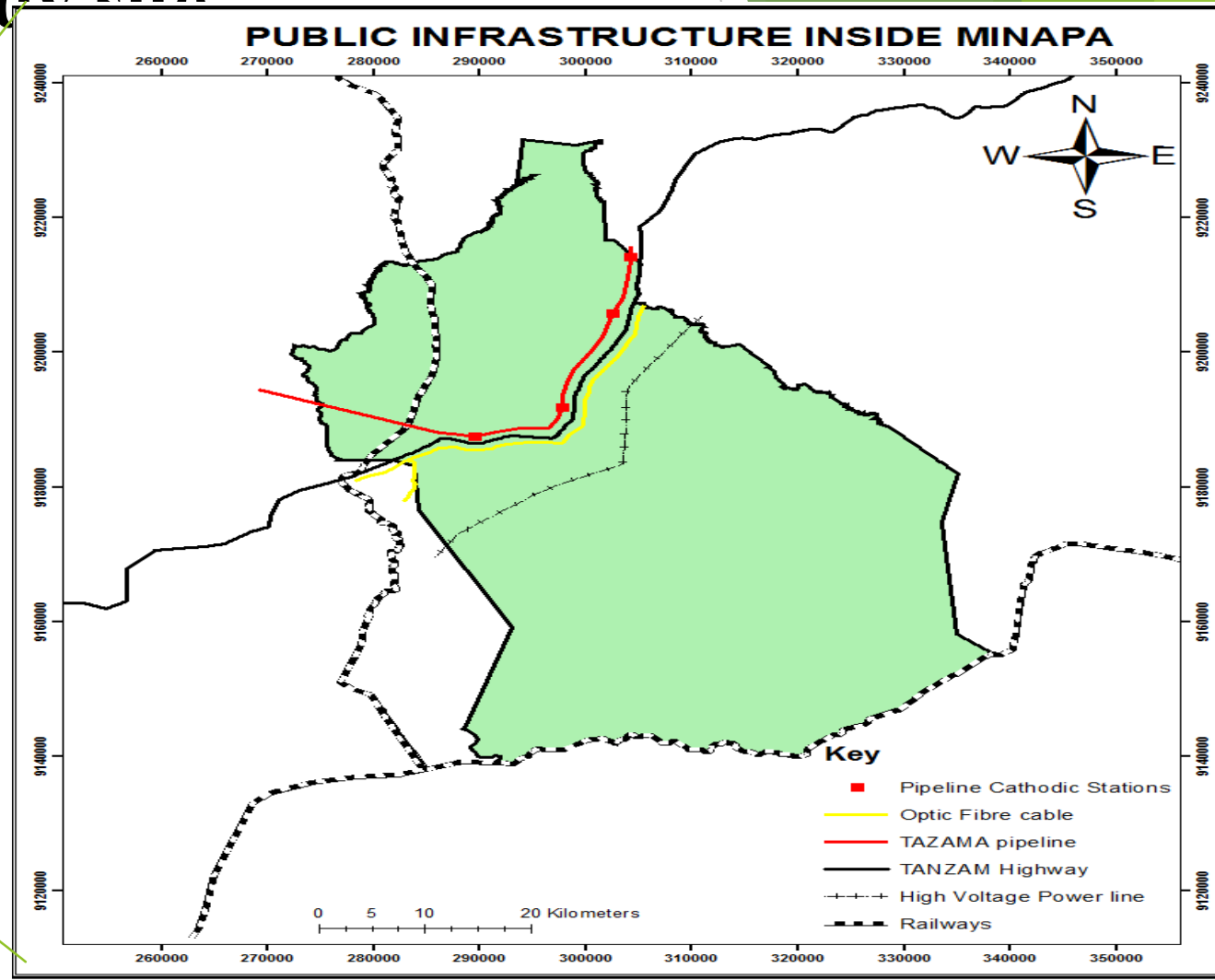
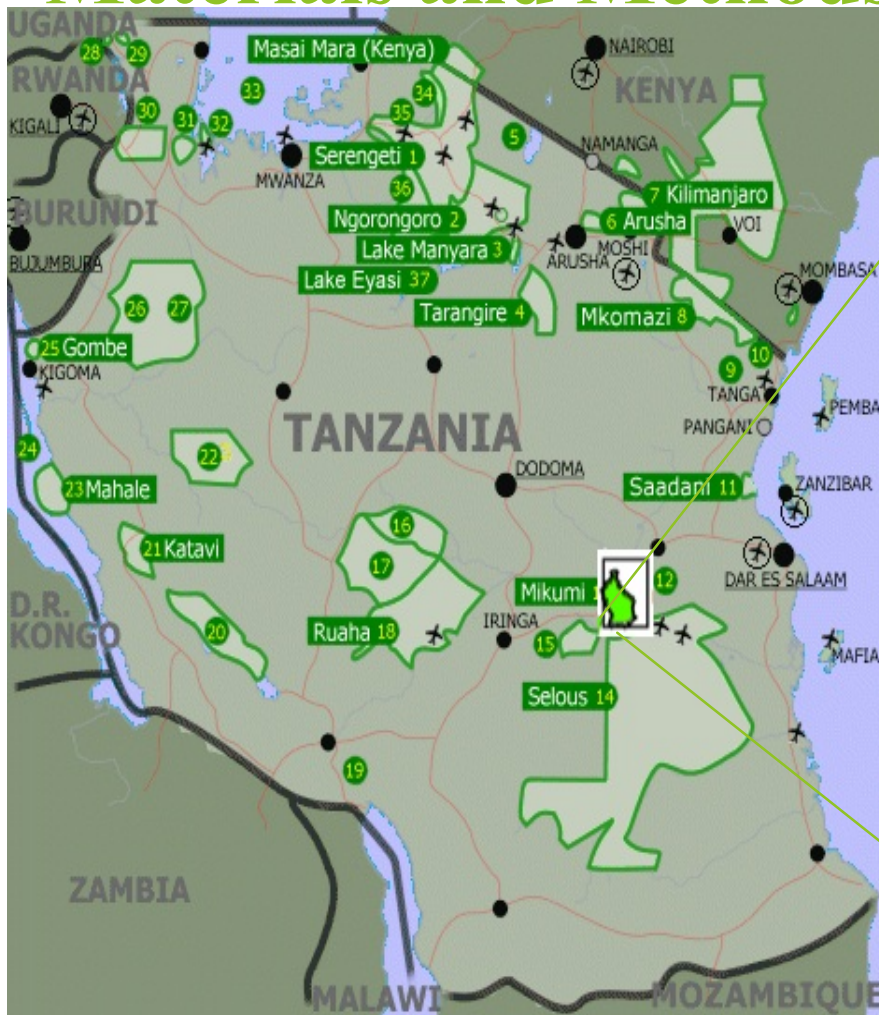
Problem statement

- ▶ The effects of these infrastructure are well documented from other parts of the world i.e. Europe and America:
 - ▶ Pollution -
 - ▶ Habitat fragmentation-/can be used as corridor for dispersion+
 - ▶ Animal killing and injuries-
 - ▶ Change of animal behavior-
- ▶ Africa have more infrastructure in PAs than the rest of the world but studies on the effects of these infrastructure are under represented in literature
- ▶ Also small mammals are under represented in ecological study in Africa.

Problem statement

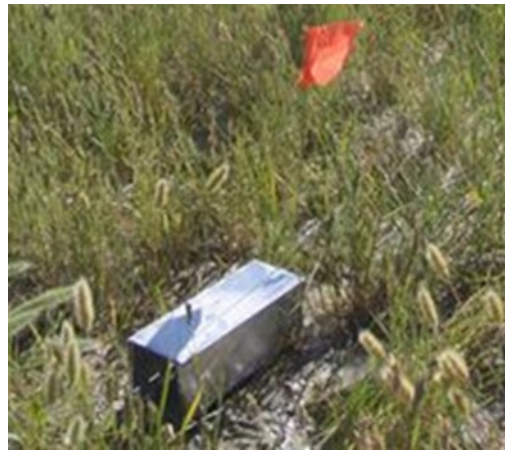
- ▶ Small mammals are good indicators of environmental health
- ▶ Therefore study on the patterns of diversity and abundance of small mammals along the gradient of distance from the four linear infrastructure in an effort to understand the effects of these infrastructures on small mammals is important.
- ▶ We hypothesized that, the diversity and abundance of small mammals will increase along the gradient of distance from the four infrastructure.

Materials and Methods- Study site



Materials

- ▶ **Target animals;** order Eulipotyphla (shrews) and Rodentia (rats and mice)
- ▶ **Trapping equipment;** Sherman live traps **GPS**
- ▶ **Tents**
- ▶ **Baits;** sardines, coconuts and peanut butter
- ▶ **Checking time;** 0700 am for six days

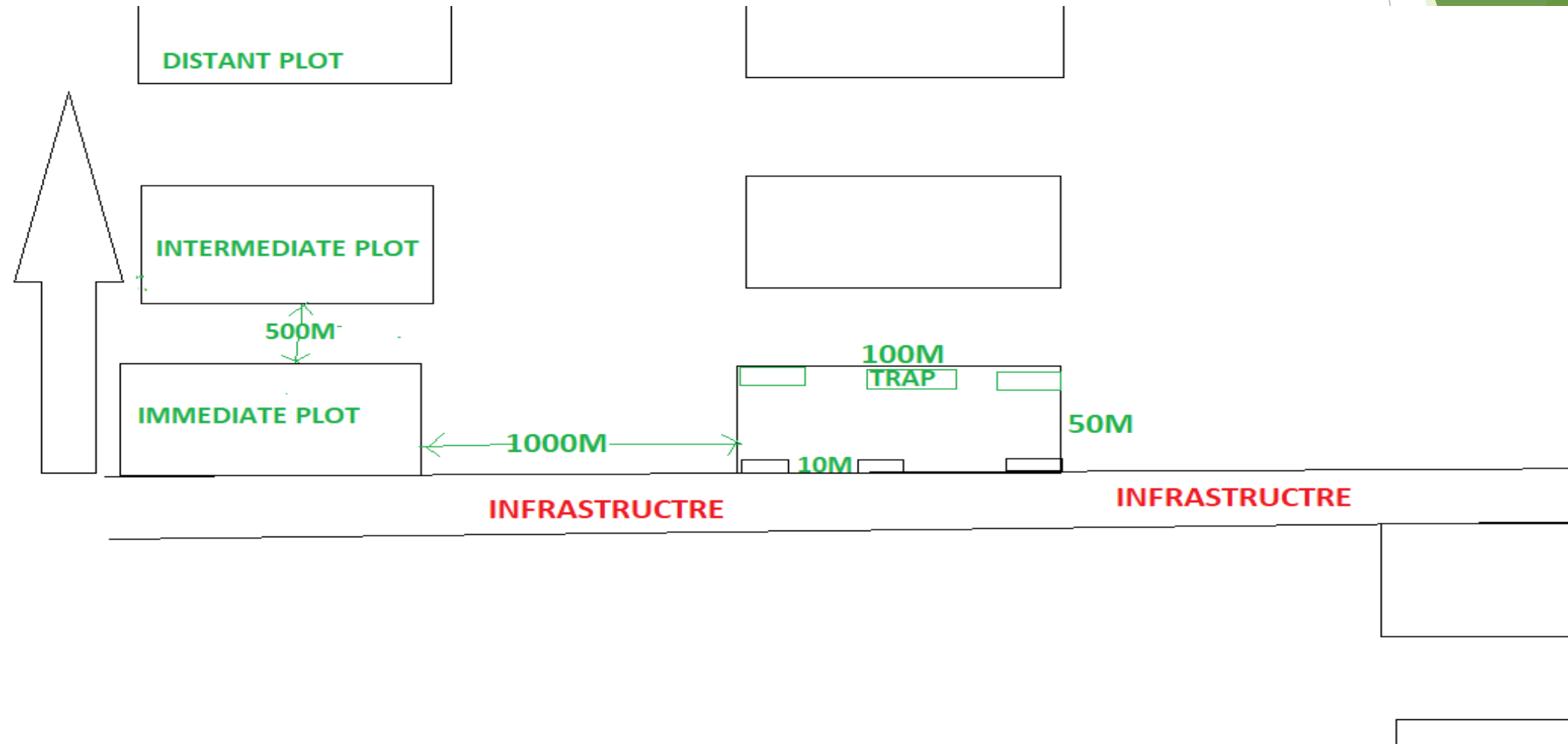


Small mammals trapping

- ▶ trapped during both wet (February to April) (except railway) and dry (July to September) seasons in 2018
- ▶ Plots-immediate intermediate and distant
- ▶ Captured animals were identified by aid of field guide, aged, sexed, measured, inspected for ectoparasites, marked and released (except for those which were taken for endoparasite and ecotoxicological analysis).



Methods -layout of traps



Data analysis

- ▶ Shannon-diversity Index was computed and compared between plots, infrastructure and season by diversity t-tests in PAST software
- ▶ For assessment of trap success animals were grouped into three groups namely, *Mastomys natalensis*, *Crocidura spp* and other species
- ▶ Trap success for each day in each plot was obtained by dividing total number of trapped individuals to the total of trapping effort times 100 trap nights.
- ▶ Zero Inflated Poisson (ZIP) in R software was employed to plot and model the influence of species, season, infrastructure and plot distance on trap success.

Table 1 Species and their percent of catch

	Wet season		Dry season	
Species	N individuals	% catch	N individuals	% catch
<i>Mastomys natalensis</i>	118	79.7	217	71.1
<i>Crocidura</i> spp	24	16.2	40	13.1
<i>Lemniscomys rosalia</i>	2	1.3	16	5.2
<i>Gerbilus</i> spp	0	0	21	6.9
<i>Acomys wilsoni</i>	4	2.7	5	1.6
<i>Aethomys</i> spp	0	0	2	0.7
<i>Dasymys incomtus</i>	0	0	1	0.3
<i>Arvicanthis</i> spp	0	0	1	0.3
<i>Herpestes sanguineus</i>	0	0	2	0.7
Total	148	100	305	100

Table 2 Pairwise comparison of Shannon diversity (by diversity t-test)

	Immediate	(df)tvalue	pvalue	Intermediate	(df)tvalue	pvalue	Distant	(df)tvalue	pvalue
Wet season	RD-PW	(21)3	0.002	RD-RP	(19)17	<0.0001	ns	-	-
	PP-PW	(11)2.3	0.042				ns	-	-
Dry season	RD-RL	(15)-3.5	0.003	PW-RD	(23) 4	0.0004	RD-RL	(17) 3	0.004
	PP-RL	(38)-2.4	0.01	PW-PP	(32)8	<0.0001	PP-RL	(19.8) 3	0.002
	RP-RL	(37)-3.3	0.0017	PW- RP	(37) 8	<0.0001	RP-RL	(23) 2.3	0.03
	PW-RL	(45)-2.3	0.02				PW-RL	(17)3	0.006

Figure 2 Seasonal variation of mean trap success between groups and plots (error bars=SD).

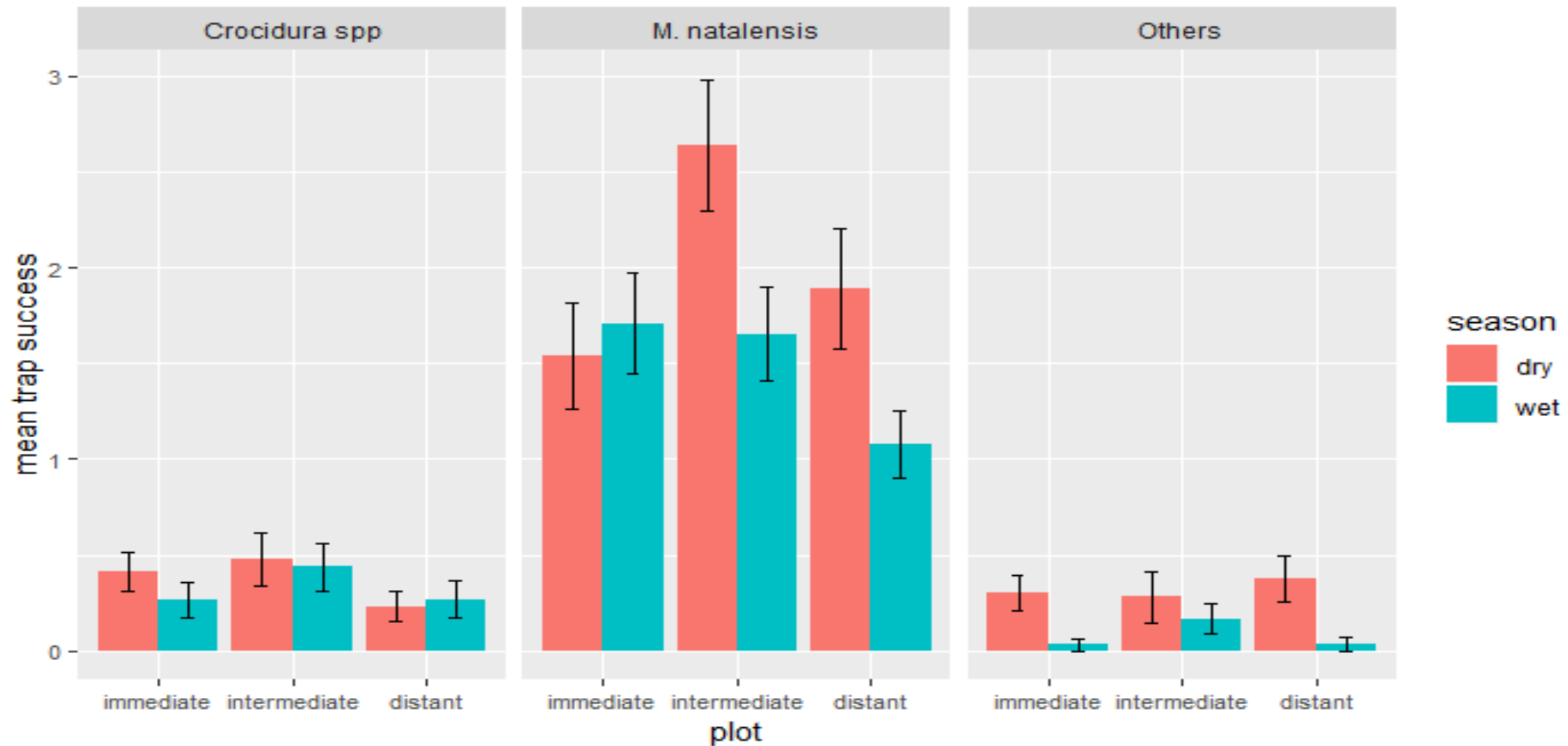
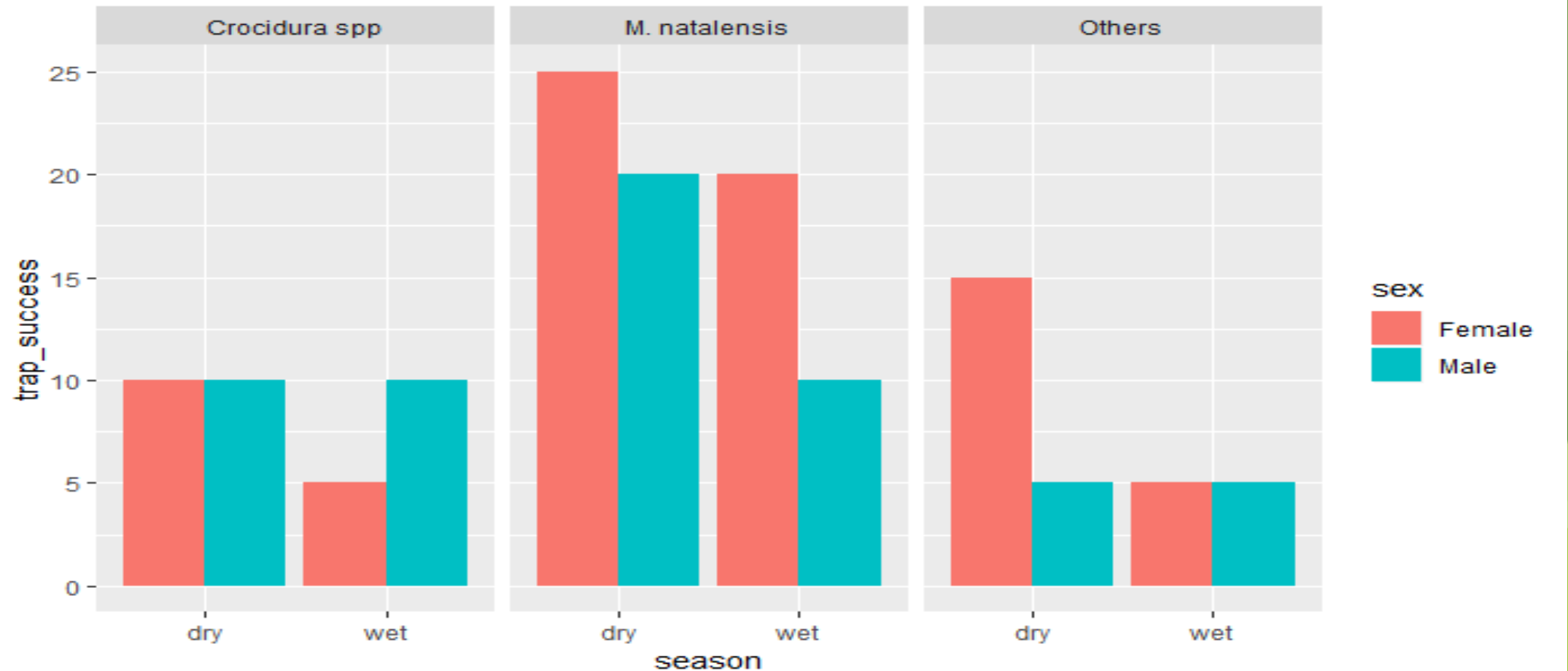


Figure 3 variation in trap success by sex among the small mammals groups



conclusion

- Results shows different patterns of small mammals' community between infrastructure and season

Work on progress



Challenges



- ▶ Limited time and fund to establish season's replications and equipments (Vehicle) to accommodate field work
- ▶ Insufficient funds to complete some research activities such as soil sample analysis

Acknowledgements

- ▶ PELIBIGO project under Energy and Petroleum (EnPe) for their financial support.
- ▶ SUA-Director of center of pest management
- ▶ NTNU- Department of Biology-Molecular and Cellular toxicology Laboratory

Supplementary table

Count model coefficients (poisson with log link)					
covariate	estimate	SE	Z=	P=	Significance
Intercept	1.953383	0.078774	24.797	< 2e-16	***
speciesM.natalensis	0.425969	0.059948	7.106	1.2e-12	***
speciesOther	0.06828	0.10072	0.678	0.49786	
sexMale	-0.11436	0.04260	-2.685	0.00726	**
seasonwet	-0.402399	0.047077	-8.548	< 2e-16	***
infrastructurePW	0.008679	0.064897	0.134	0.893606	
infrastructureRD	-0.106520	0.064414	-1.654	0.098189	
infrastructureRL	-0.489533	0.139794	-3.502	0.000462	***
infrastructureRP	-0.113885	0.066218	-1.720	0.085462	
plot-intermediate	0.121515	0.054201	2.242	0.024966	*
plot-immediate	0.043025	0.057410	00.749	0.453590	
Zero-inflation model coefficients (binomial with logit link)					
Intercept	2.32963	0.25500	9.136	< 2e-16	***
sppM. natalensis	-1.61171	0.16751	-9.622	< 2e-16	***
speciesOther	0.7015	0.2199	3.190	0.00142	**
sexMale	0.1304	0.1214	1.074	0.282767	
seasonwet	0.05307	0.16058	0.330	0.74104	
infrastructurePW	-0.37722	0.23765	-1.587	0.11245	
infrastructureRD	-0.59933	0.22338	-2.683	0.00730	**
infrastructureRL	1.21705	0.38806	3.136	0.00171	**
infrastructureRP	-0.34276	0.23681	-1.447	0.14778	
Plot-immediate	-0.10386	0.19481	-0.533	0.59393	
Plot-intermediate	-0.40011	0.19162	-2.088	0.03680	*

Thank you
for your
attention

