Spatial Distribution of Livestock Raiding in Northern Kenya

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Rain and Raids in Turkanaland: Temporal Links

- Our previous research found a strong link between rainfall variability and intensity of livestock raids:

    - human casualties increase in drought years, dry months and drier-than-usual months.

- This is opposite from what Witsenburg and Adano (2010) found in Marsabit district:

    - Casualties peak in the main rain season (when water and pasture are abundant) and drop in the dry season (when resources dwindle.)

How about Spatial Variability?

○ Does frequency of livestock raids and resulting casualties fluctuate across space too?

○ If so, what is the spatial pattern?

○ What accounts for this variability?

Turkana Herding Strategies
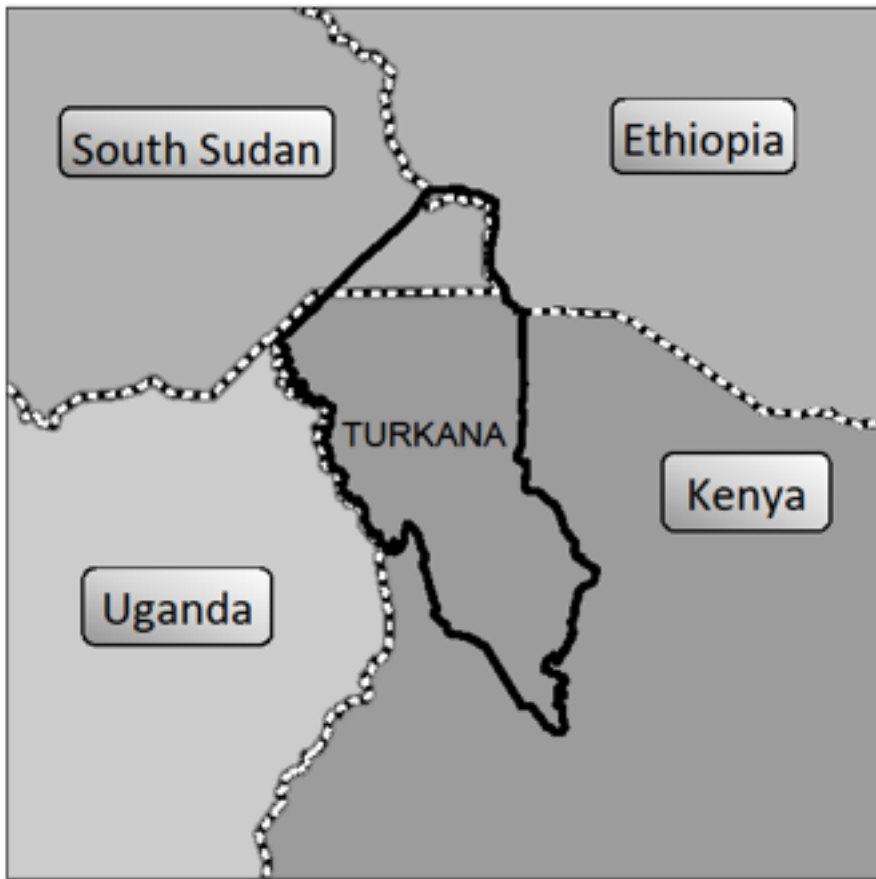
- Nilotic-speaking pastoral people in NW Kenya.

- Lose livestock to droughts, disease, and raids.

- Risk minimizing strategies include species diversification and moving frequently..
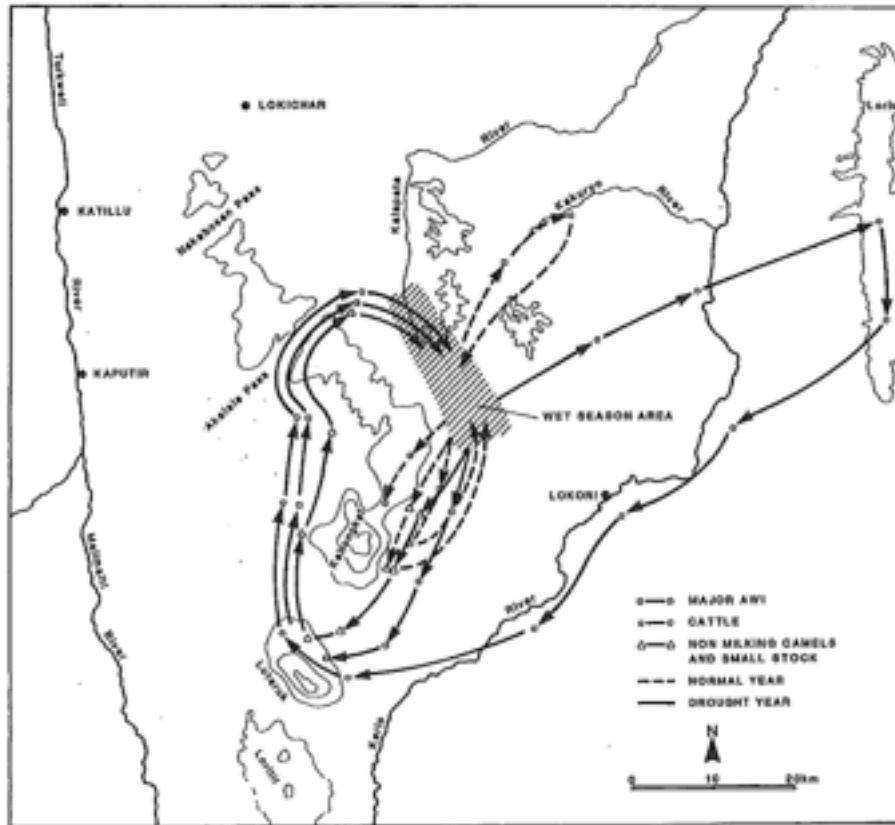
Map 10.6. Ngisonyoka migration: Normal and drought years. (From McCabe 1994, in African Pastoralist Systems: An Integrated Approach, edited by E. Fratkin, K. A. Galvin, and E. A. Roth, p. 80. Copyright © 1994 by Lynne Rienner Publishers. Used with permission.)

Their moves have a clear geographic pattern:

- Normal years – between wet and dry season camps

- Drought years – greater distance and frequency to access patches of highly productive drought reserves.

Methods: Sampling Procedure

- Source database: LexisNexis Academic (http://www.lexisnexis.com/hottopics/Inacademic/

- Source categories: Newsletters, Aggregate News Sources, News Transcripts, Newswires, Major Newspapers

- Time period: 1998-2009

- Search: All news reports involving "Tur*ana"

- Results: Initial search typically yielded about 500 reports per year.

Methods: Data Collection

- Selected reports if <u>all</u> of the following were satisfied:

  - Socially-organized violence of some kind involving Turkana, either as attackers or attacked

  - Occurred in Turkana district or territories bordering Turkana

  - Involved actual or attempted raid of livestock

- Data collected from reports:

  - date and place of incident

  - ethnic or state groups involved

  - number of deaths

Methods: Rainfall and Geographic Data Sources

○ All measures of rainfall are constructed from meteorological data on 0.25 square degree (approximately 30 square kilometers) quadrants by month and year from 1998-2009. Data obtained from the NASA Tropical Rainfall Measuring Mission (TRMM) 3B43.

○ Landform and standing water from Geonames database (http://www.geonames.org)

○ Rivers and other smaller watercourses from DIVAGIS (http://www.diva-gis.org)

Methods: Placing Reported Raids on GIS-based Map

- Place names in news reports are used to estimate latitude/longitude of raid locations.

- Incidents are then assigned a quadrant.

- Centroid of quadrant is used to place a violence episode.

- 82% of incidents are located to specific places; 9% to Location level and 9% to Division level-- locations with greater degrees of approximation (District level) were omitted.

Analysis of Spatial Variations

- Do blocks with less annual rainfall variability have more livestock related incidents & human casualties? (We expected that Turkana in dry times try to go to better rainfall areas.)

- How about other water features such as rivers and seasonal streams?

- What landform features predict more incidents and deaths?

- Our analyses are mostly exploratory with the GIS features.

Results

- In a preliminary analysis, we are better able to predict livestock related incidents than the number of deaths.

- Results are somewhat different inside Turkana district than outside Turkana district. Here we concentrate on inside Turkana district.

Elevation & Livestock Related Violence 1998-2009: Turkana as Attackers
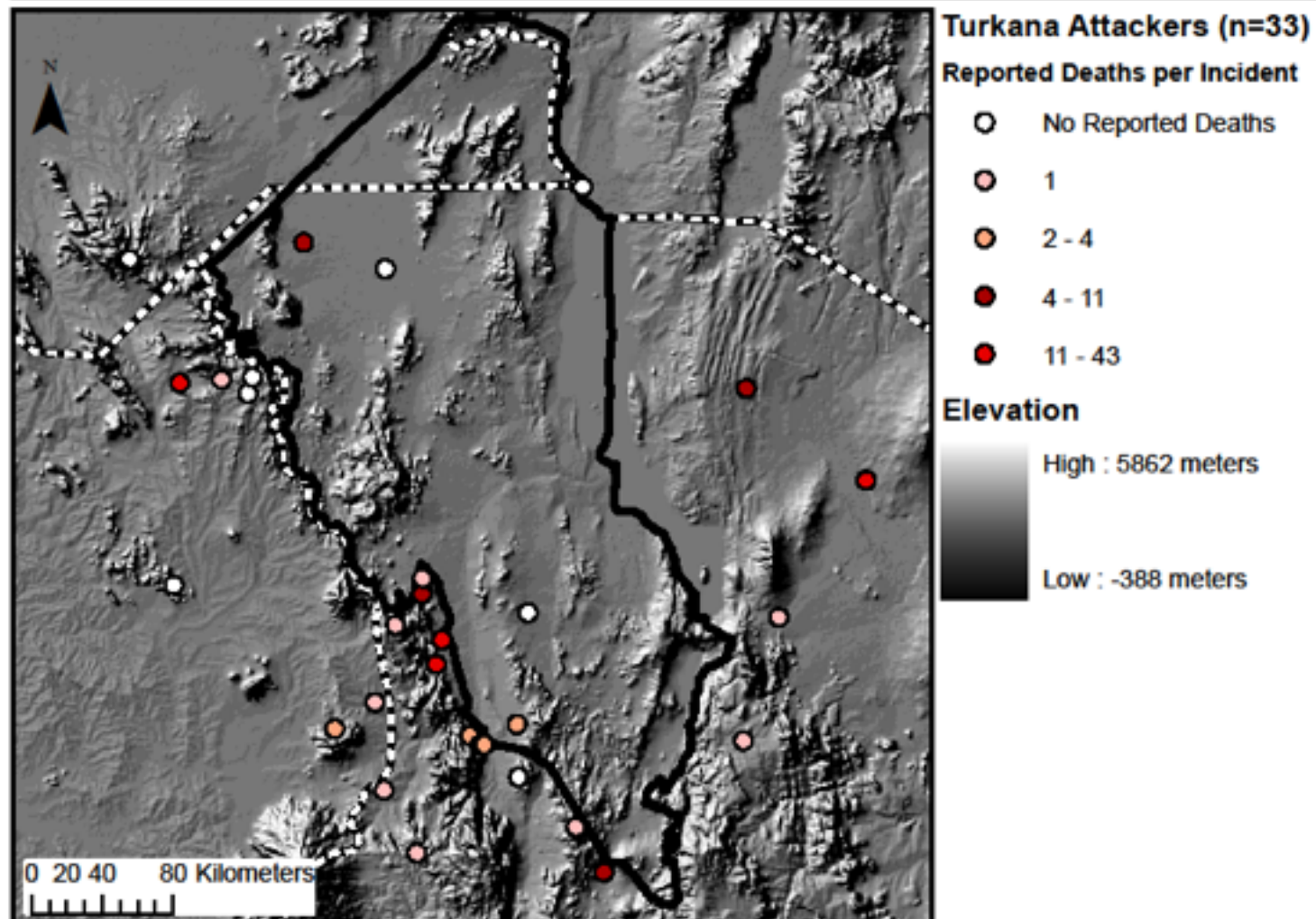
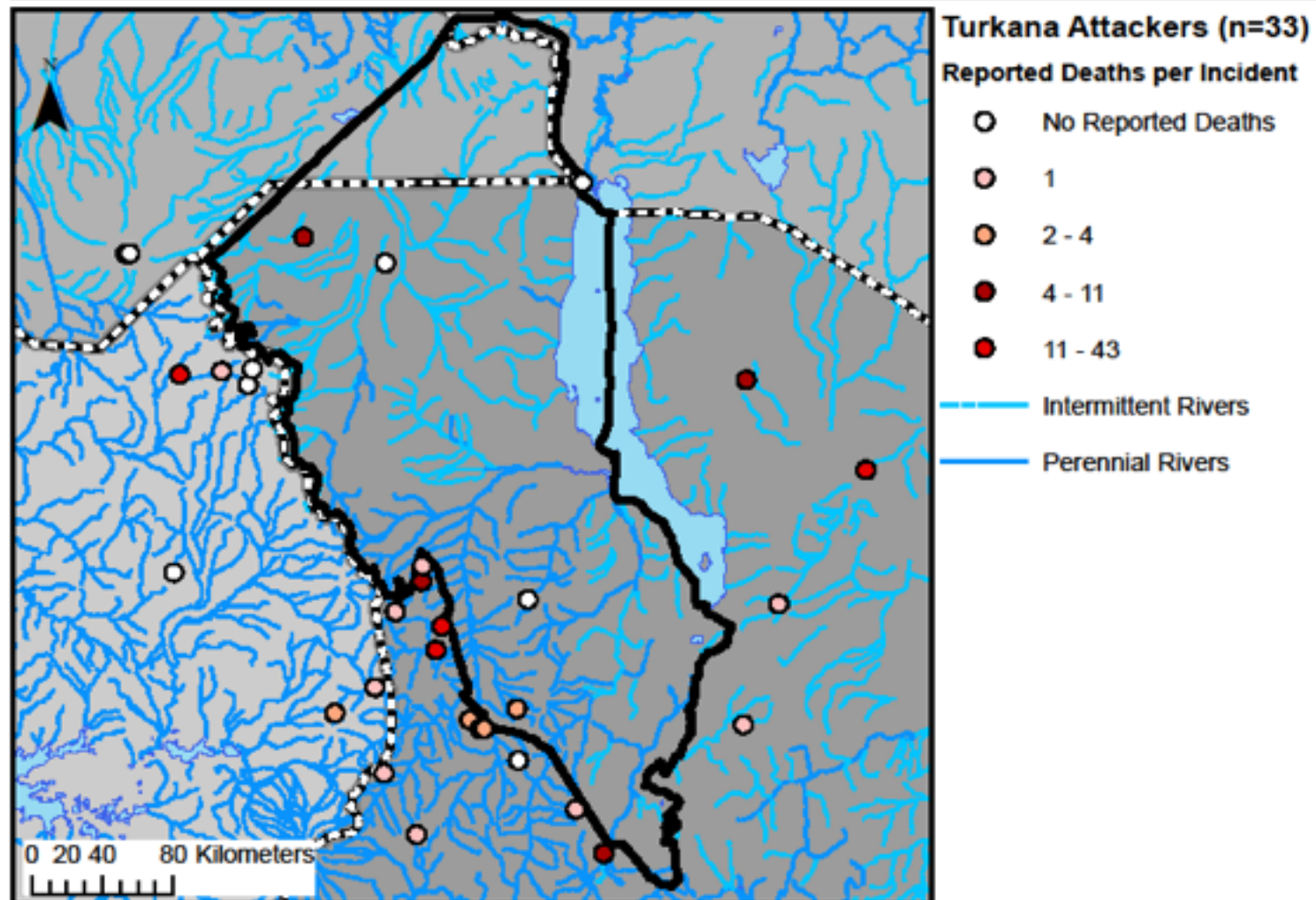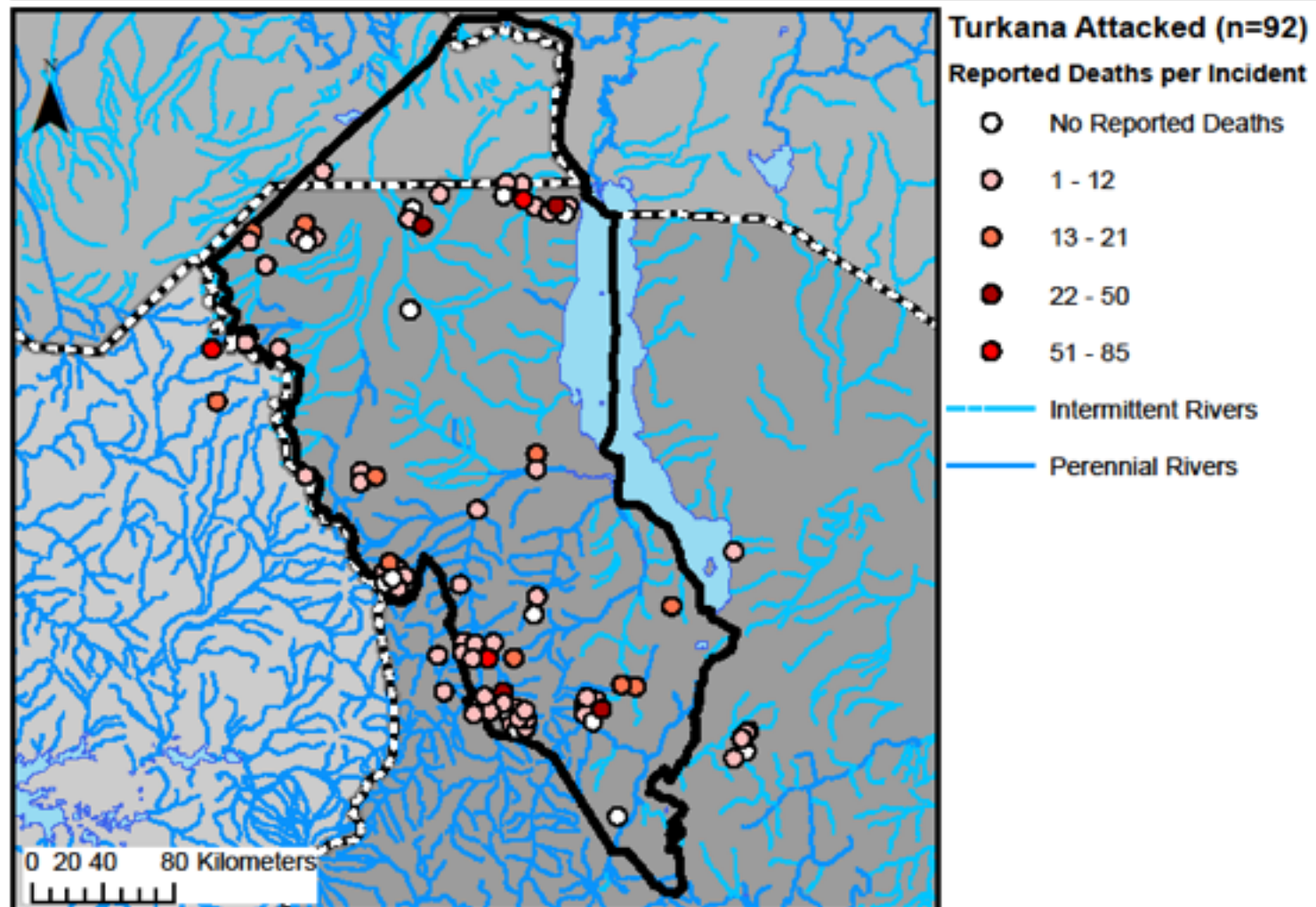Elevation & Livestock Related Violence 1998-2009: Turkana Attacked
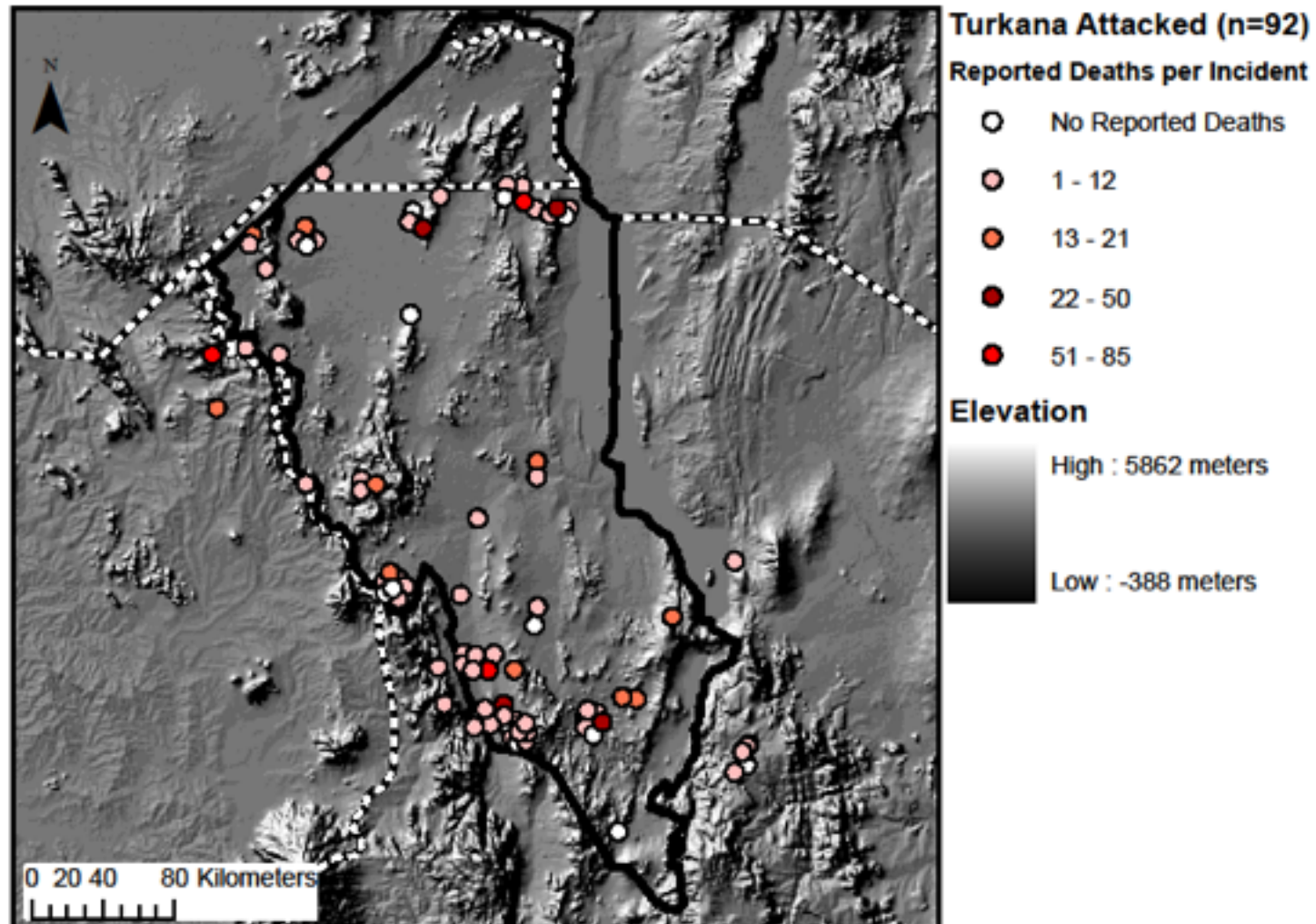
Land forms and relationship to number of livestock-related incidents and deaths in quadrant (Pearson r's)

	No. Incidents that Turkana are attacker	Deaths when attacker	No. Incidents that Turkana are attacked	Deaths when attacked	Notes re outside Turkana
Plains (yes, no)	.24*	.05	.18†	.10	n.s
Mountain	-.06	.00	-.07	.13	Sign. for Turkana attacker incidents
Elevation	.07	.18†	.17†	.12	n.s.

Rivers & Livestock Related Violence 1998-2009: Turkana as Attackers

Turkana Attackers (n=33)
Reported Deaths per Incident
○ No Reported Deaths
○ 1
○ 2 - 4
● 4 - 11
● 11 - 43
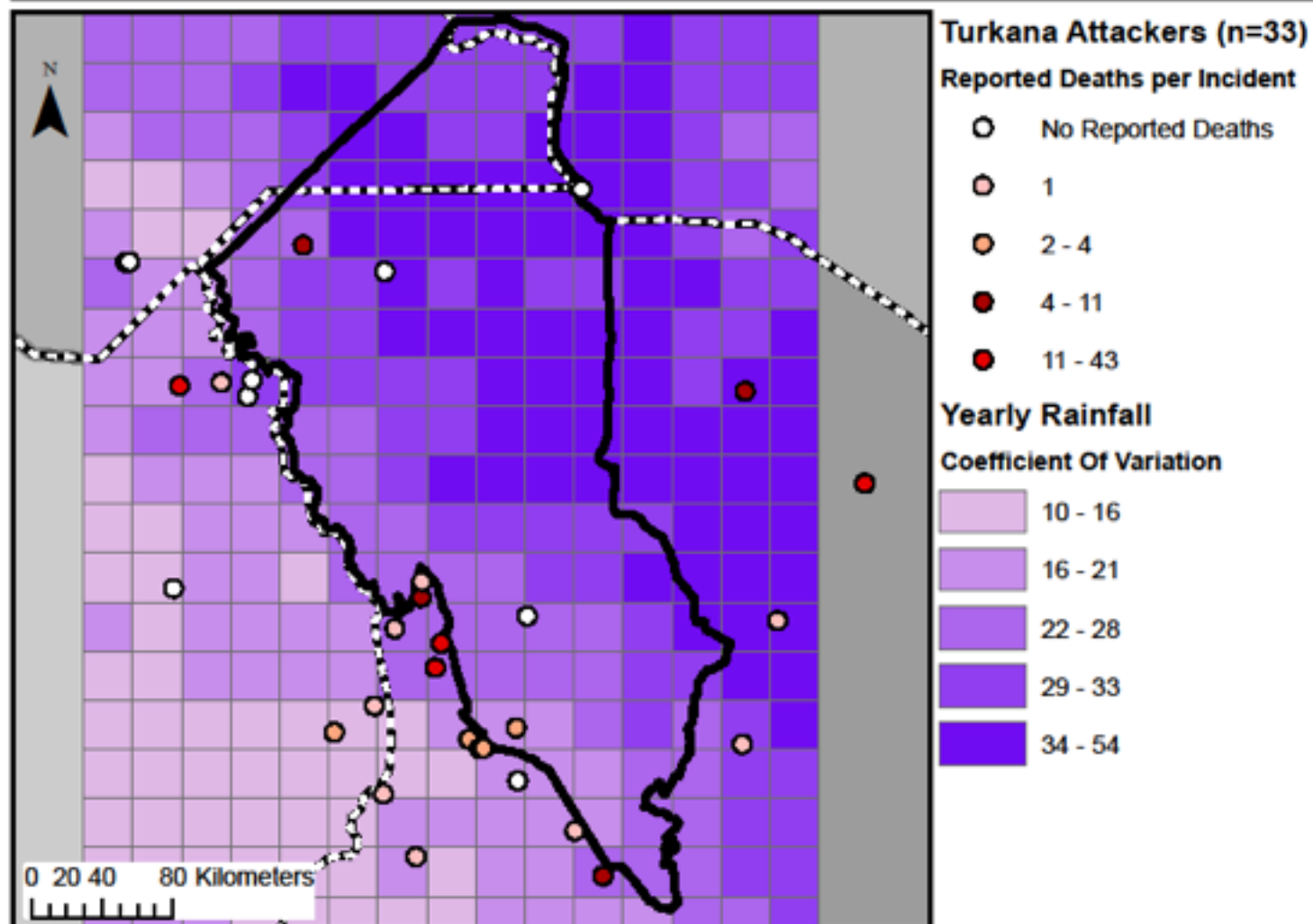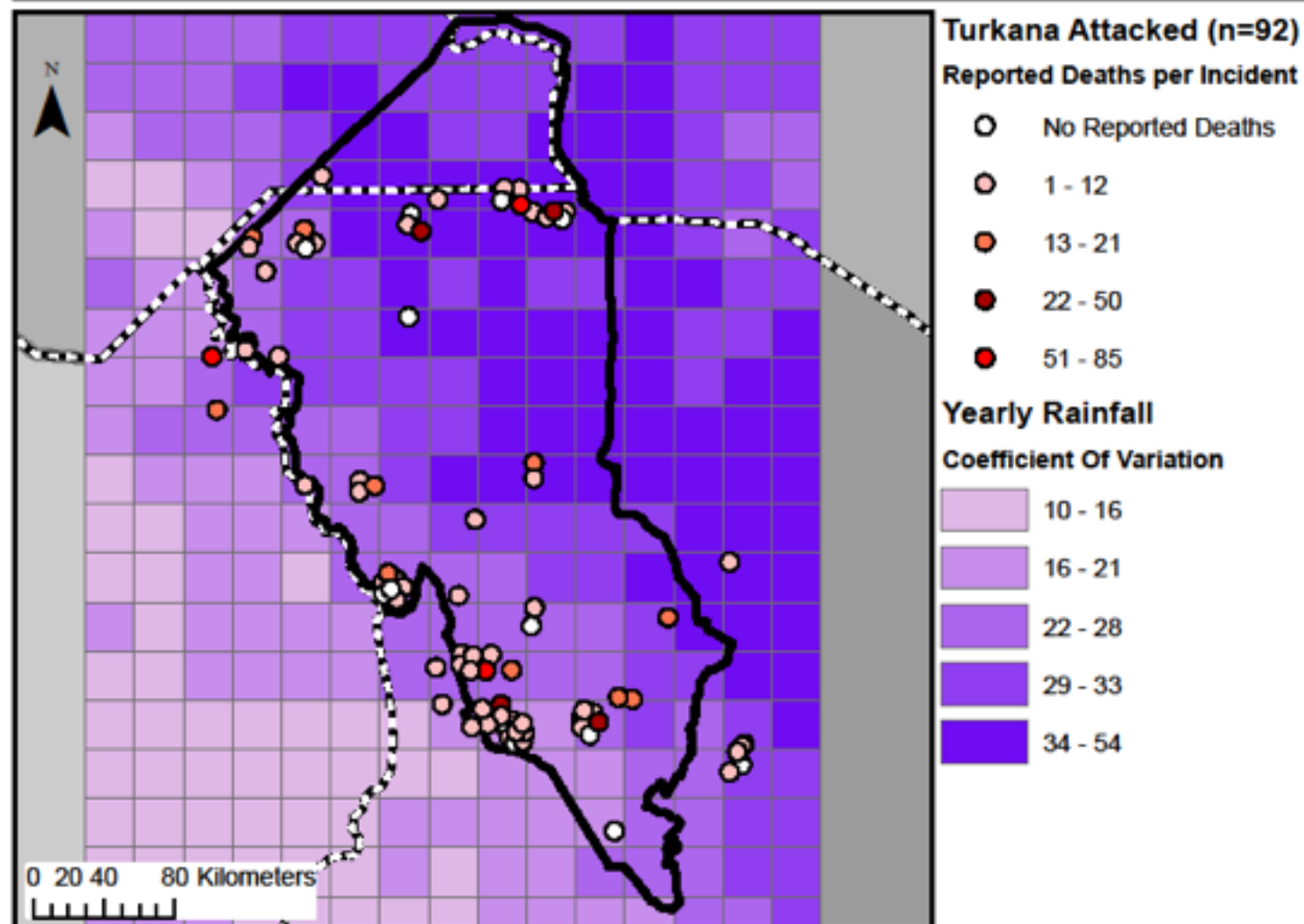--- Intermittent Rivers
— Perennial Rivers

0 20 40   80 Kilometers

Rivers & Livestock Related Violence 1998-2009: Turkana Attacked

Yearly Rainfall & Livestock Related Violence 1998-2009: Turkana as Attackers

Yearly Rainfall & Livestock Related Violence 1998-2009: Turkana Attacked

Turkana Attacked (n=92)
Reported Deaths per Incident

○ No Reported Deaths
○ 1 - 12
○ 13 - 21
● 22 - 50
● 51 - 85

Yearly Rainfall
Coefficient Of Variation

10 - 16
16 - 21
22 - 28
29 - 33
34 - 54

0 20 40   80 Kilometers

Water forms/rain and relationship to livestock-related incidents and deaths in quadrant (Pearson r's)

	No. Incidents that Turkana are attacker	Deaths when Attacker	No. Incidents when Turkana are attacked	Deaths when Attacked	Notes— outside Turkana District
Flowing water	.32**	.24*	.26*	.16	Similar results
Length of river	.28**	.36***	.18†	.14	n.s.
Intermittent River	.11	.14	.15	.09	mostly pos. and sign.
Length Int. River	-.18†	-.16	-.17†	-.18†	n.s
Standing water (yes, no)	-.15	-.18	.14	.25*	n.s.
Yearly mean rain	.26*	.13	.22*	.18†	Mostly neg. and sign.
Yearly coeff. of variation in rain	-.28**	-.21*	-.28**	-.19†	n.s.

†p<.10; *p<.05; **p<.01; ***p<.001 (all two-tailed)

Yearly coefficient of variation and raids and raid intensity within quadrants

Quintiles of yearly coefficient of variation	Avg. No. Raids Turkana are Attackers	Avg. No. Deaths when Turkana are Attackers	Avg. No. Raids Turkana are Attacked	Avg. No. Deaths when Turkana are Attacked
Lowest-1	0.12	0.06	.00	0.00
2	1.06	8.00	.28	1.67
3	0.72	4.39	2.89	31.00
4	0.28	0.94	1.39	13.94
Highest-5	0.28	0.76	1.00	12.35
ANOVA	p=.003	p=.024	p=.027	p=.112

Conclusions

What do these findings say about links between spatial (as opposed to seasonal) variation in resource context and dynamics of livestock raids in Turkanaland?

- Violence more likely in areas with water (pasture/ watering)

- These areas may be near the drought reserves that are more dangerous to be around (nearness to attackers and predictable need of reserves)

- Worth investigating specific cases for plains near mountains, and nearness to roads

Acknowledgements