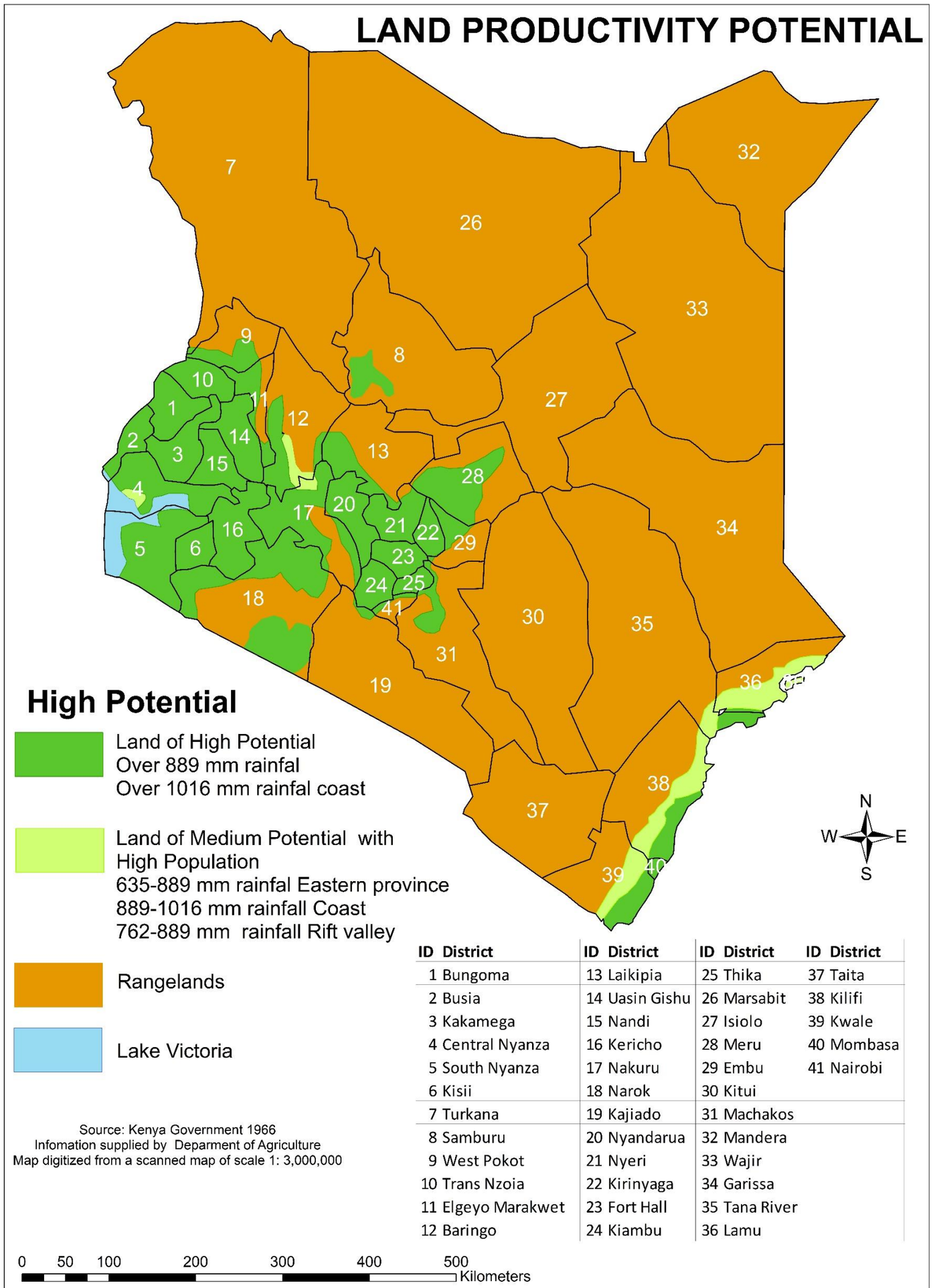
Climate change, environment and risk: how has financial inclusion impacted environmental risks and vice versa?

Joseph O. Ogutu and Michael King

Land Productivity Potential in Kenya—1965

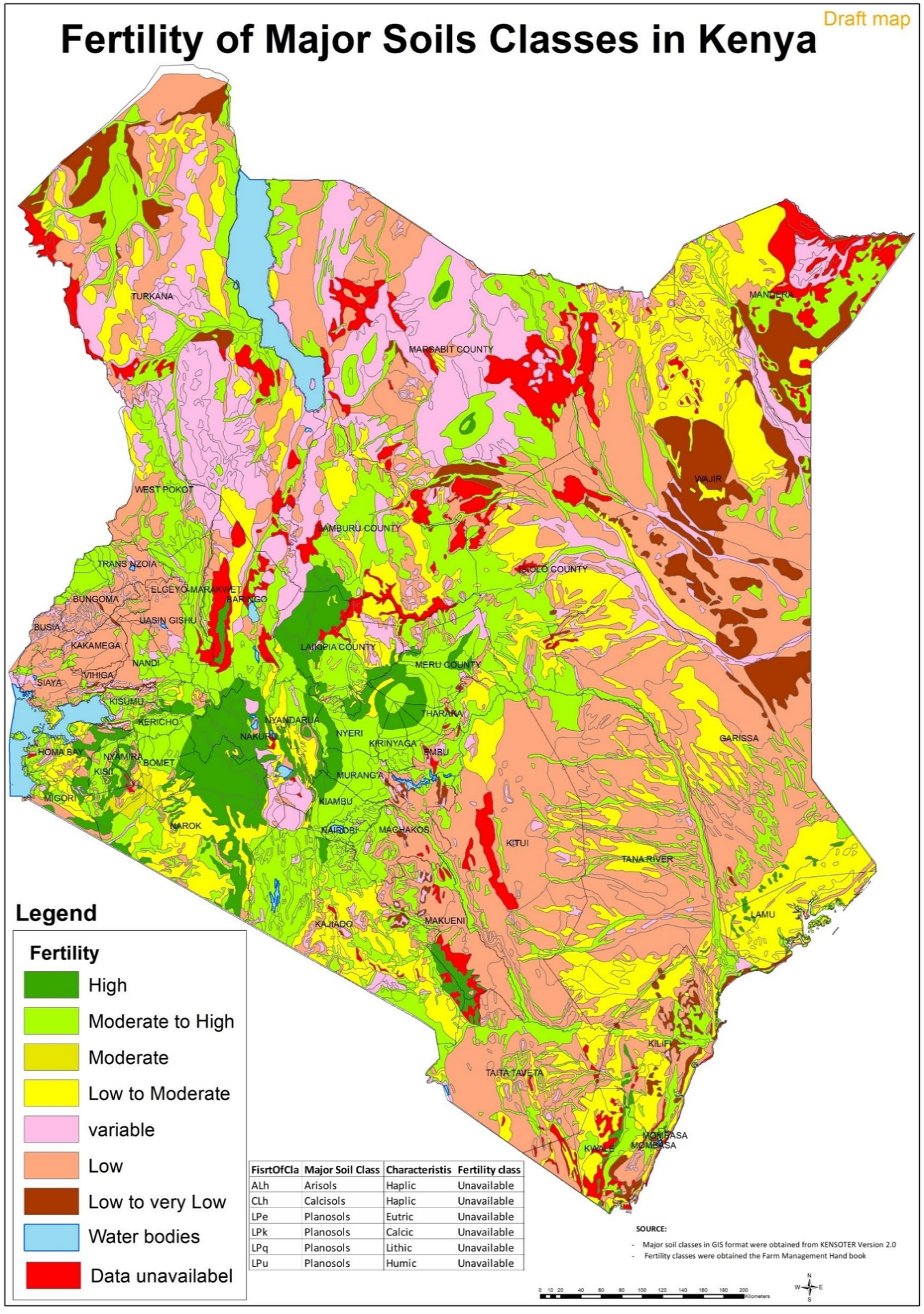
Drylands =88% of Kenya

High Potential =12% of Kenya



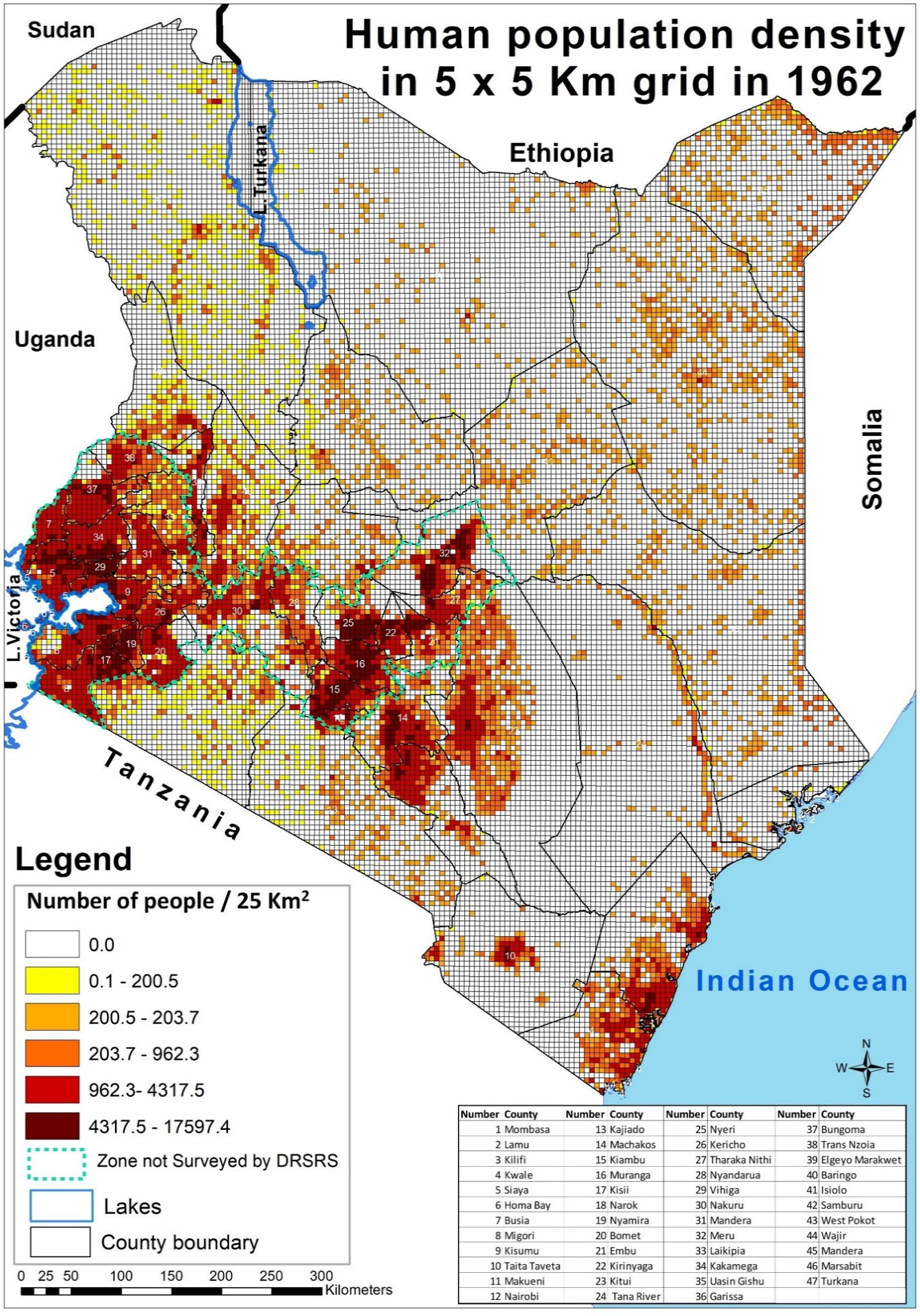
ID	District	ID	District	ID	District	ID	District
1	Bungoma	13	Laikipia	25	Thika	37	Taita
2	Busia	14	Uasin Gishu	26	Marsabit	38	Kilifi
3	Kakamega	15	Nandi	27	Isiolo	39	Kwale
4	Central Nyanza	16	Kericho	28	Meru	40	Mombasa
5	South Nyanza	17	Nakuru	29	Embu	41	Nairobi
6	Kisii	18	Narok	30	Kitui		
7	Turkana	19	Kajiado	31	Machakos		
8	Samburu	20	Nyandarua	32	Mandera		
9	West Pokot	21	Nyeri	33	Wajir		
10	Trans Nzoia	22	Kirinyaga	34	Garissa		
11	Elgeyo Marakwet	23	Fort Hall	35	Tana River		
12	Baringo	24	Kiambu	36	Lamu		

Soil Fertility in Kenya



FisrtOfCla	Major Soil Class	Characteristis	Fertility class
ALh	Arisols	Haplic	Unavailable
CLh	Calcisols	Haplic	Unavailable
LPe	Planosols	Eutric	Unavailable
LPk	Planosols	Calcic	Unavailable
LPq	Planosols	Lithic	Unavailable
LPu	Planosols	Humic	Unavailable

Human population density distribution in Kenya in 1962



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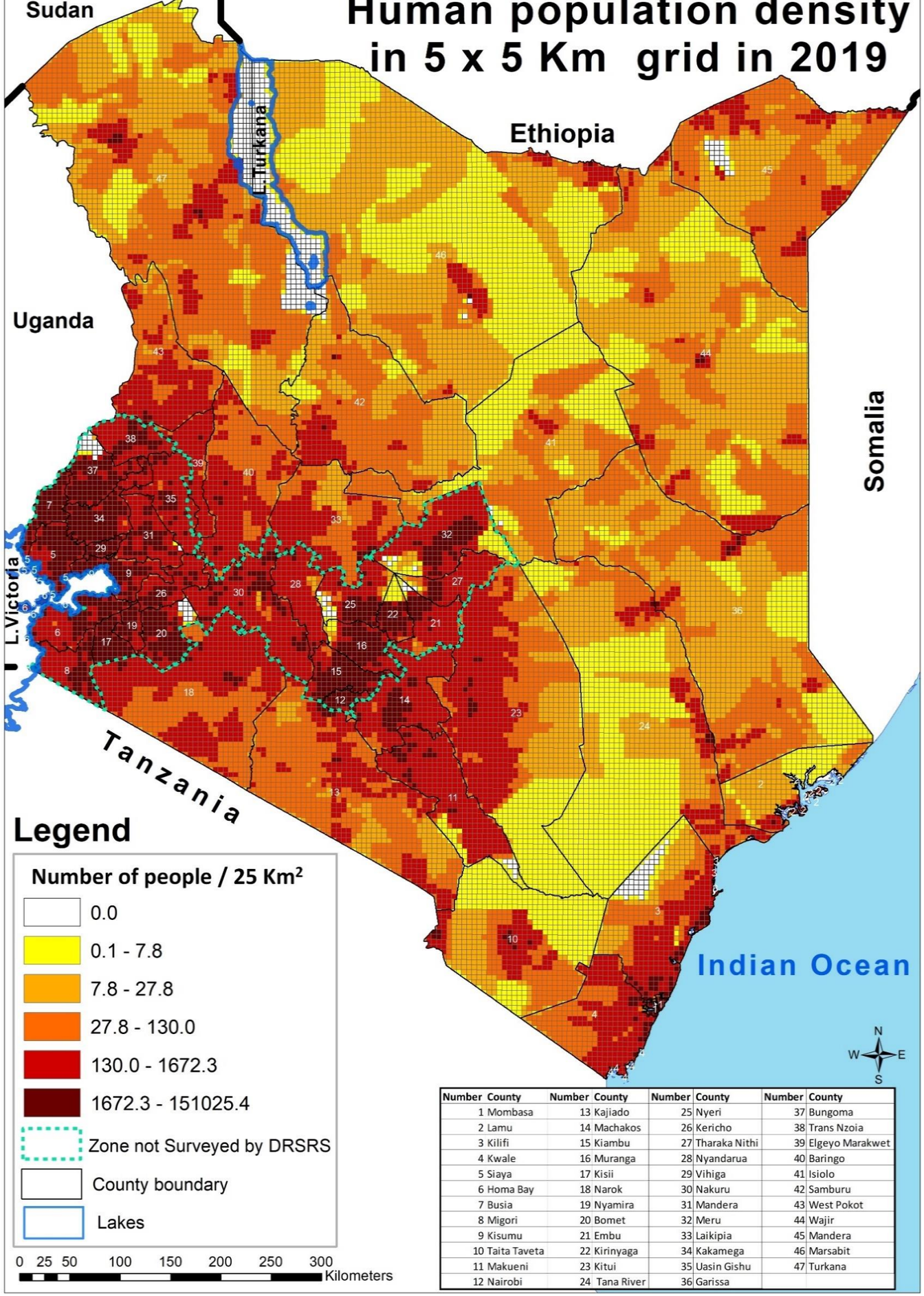
2	Lamu	14	Machakos	26	Kericho	38	Trans Nzoia
3	Kilifi	15	Kiambu	27	Tharaka Nithi	39	Elgeyo Marakwet
4	Kwale	16	Muranga	28	Nyandarua	40	Baringo
5	Siaya	17	Kisii	29	Vihiga	41	Isiolo
6	Homa Bay	18	Narok	30	Nakuru	42	Samburu
7	Busia	19	Nyamira	31	Mandera	43	West Pokot
8	Migori	20	Bomet	32	Meru	44	Wajir
9	Kisumu	21	Embu	33	Laikipia	45	Mandera
10	Taita Taveta	22	Kirinyaga	34	Kakamega	46	Marsabit
11	Makueni	23	Kitui	35	Uasin Gishu	47	Turkana
12	Nairobi	24	Tana River	36	Garissa		

Human population density distribution in Kenya in 2019

Pop in drylands =32.9%

Pop in high potential=67.1%

Pop=47.6 million



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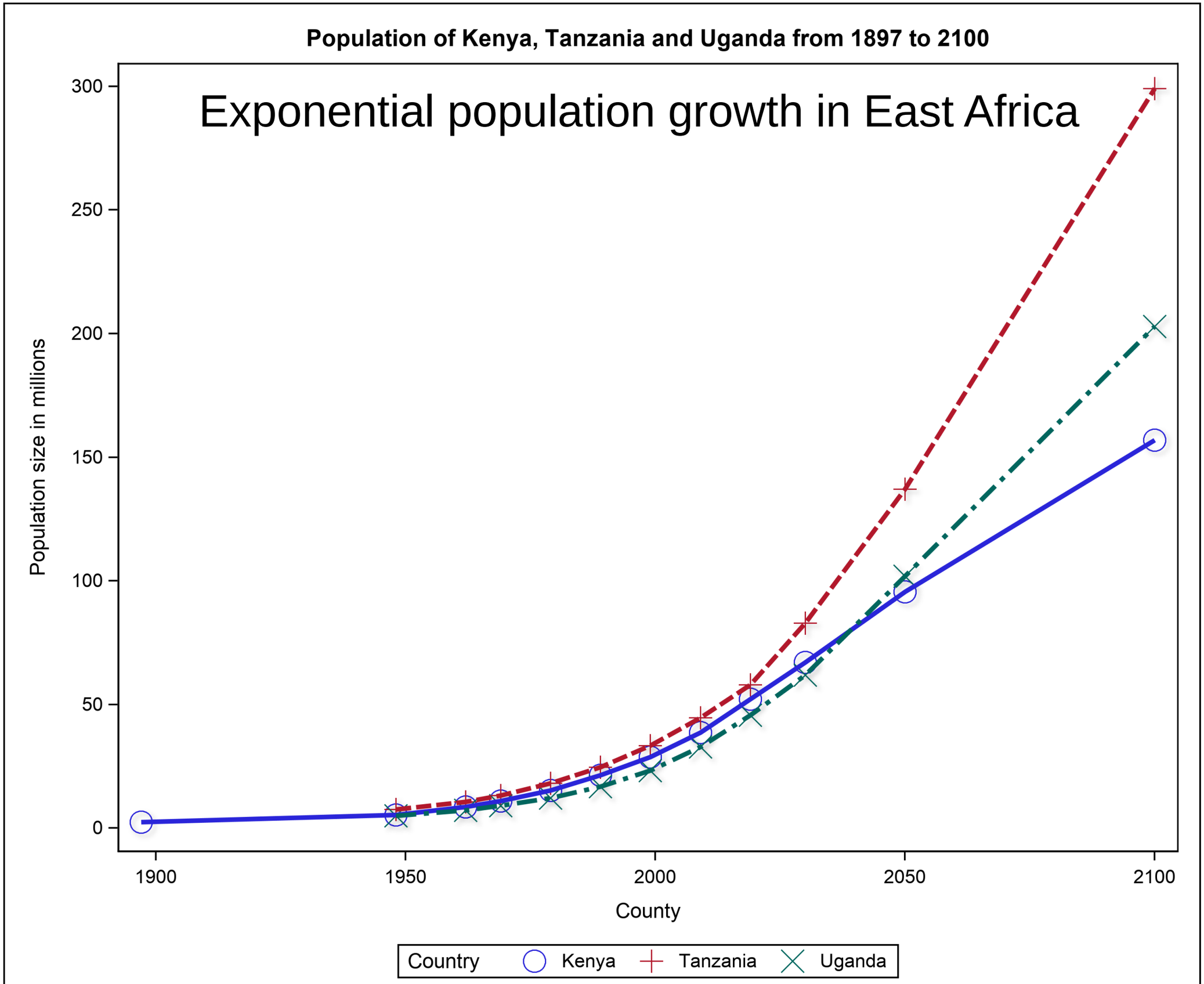
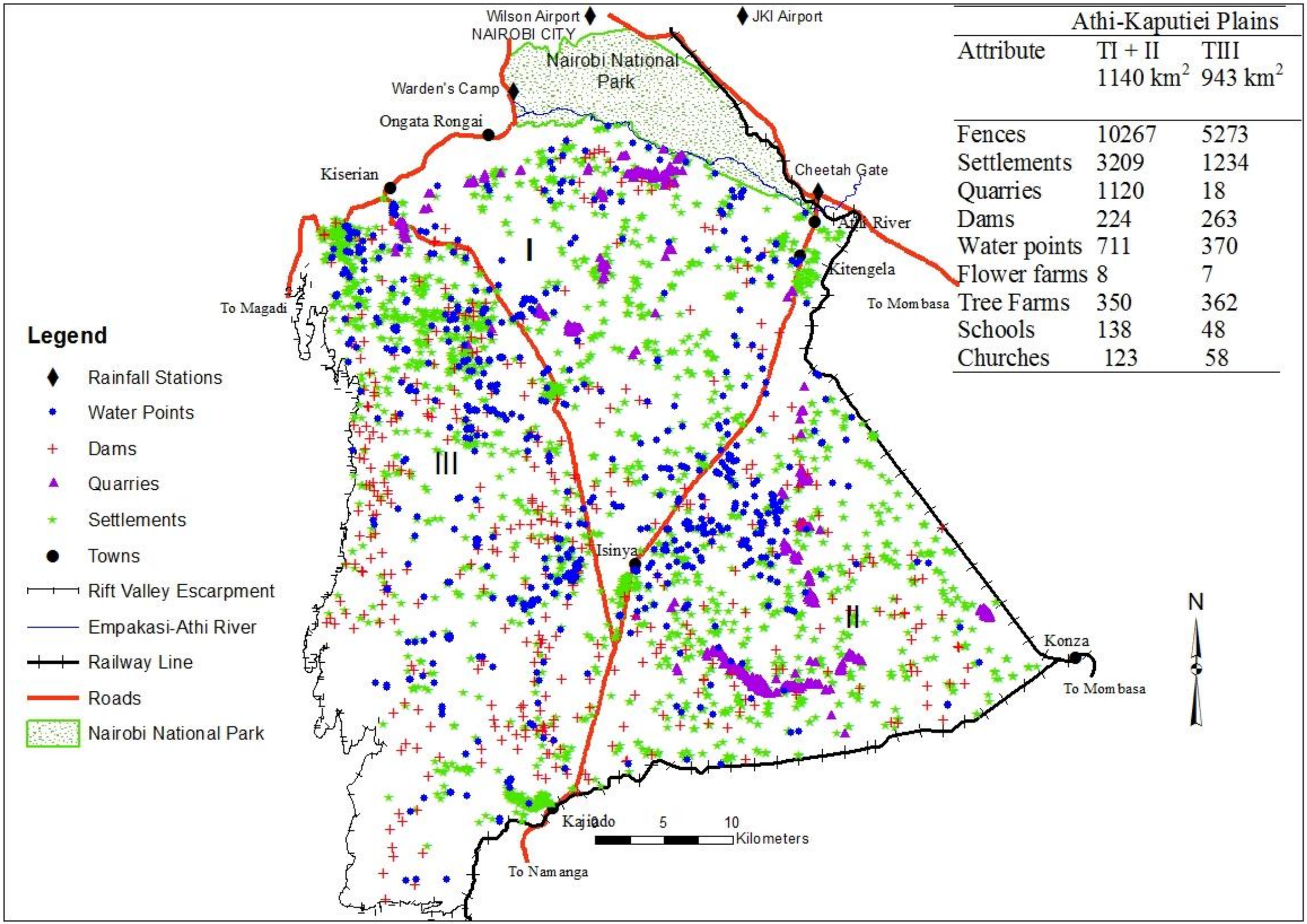
Human population growth in East Africa-1897-2100

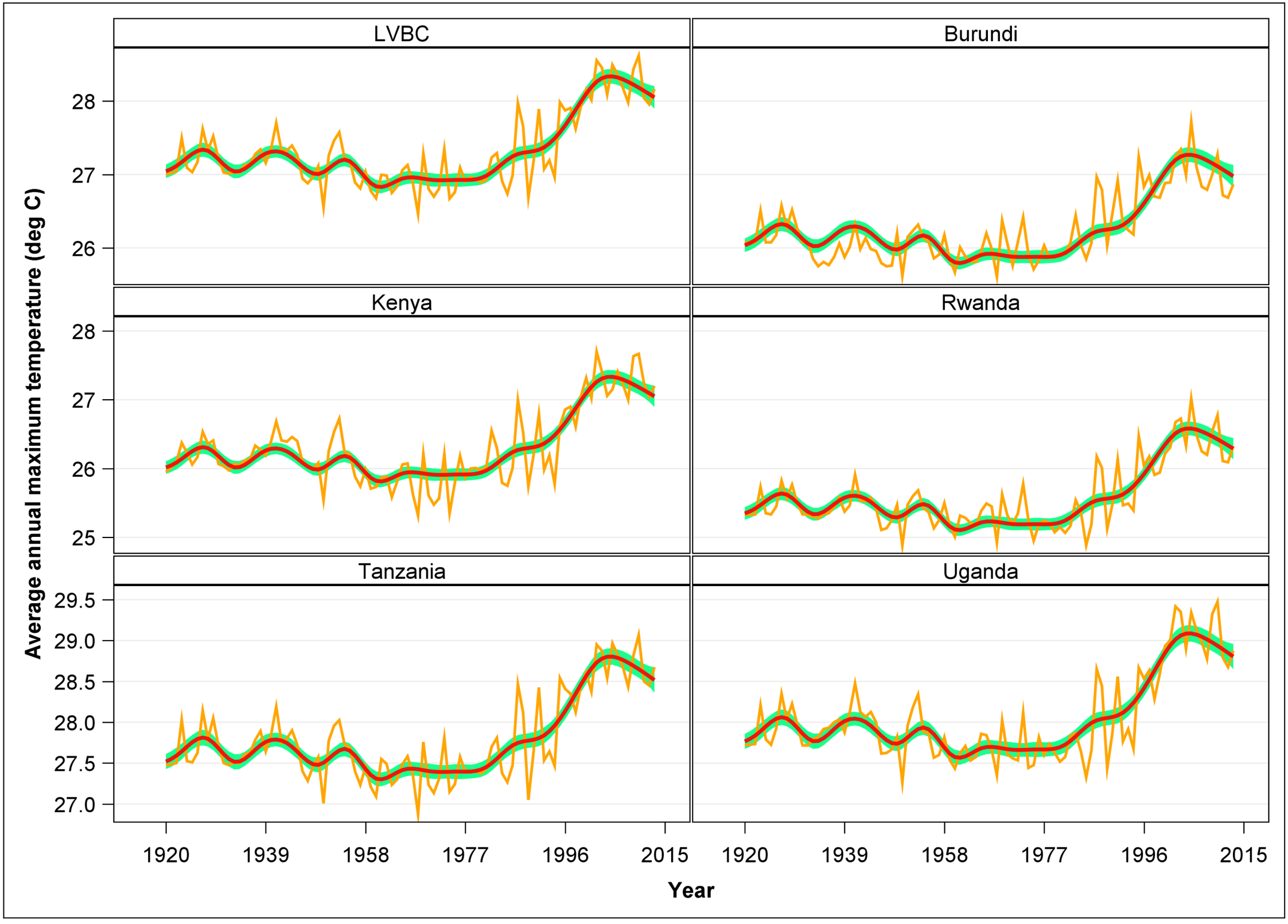


Land degradation and fragmentation in Athi-Kaputiei Ecosystem in 2010

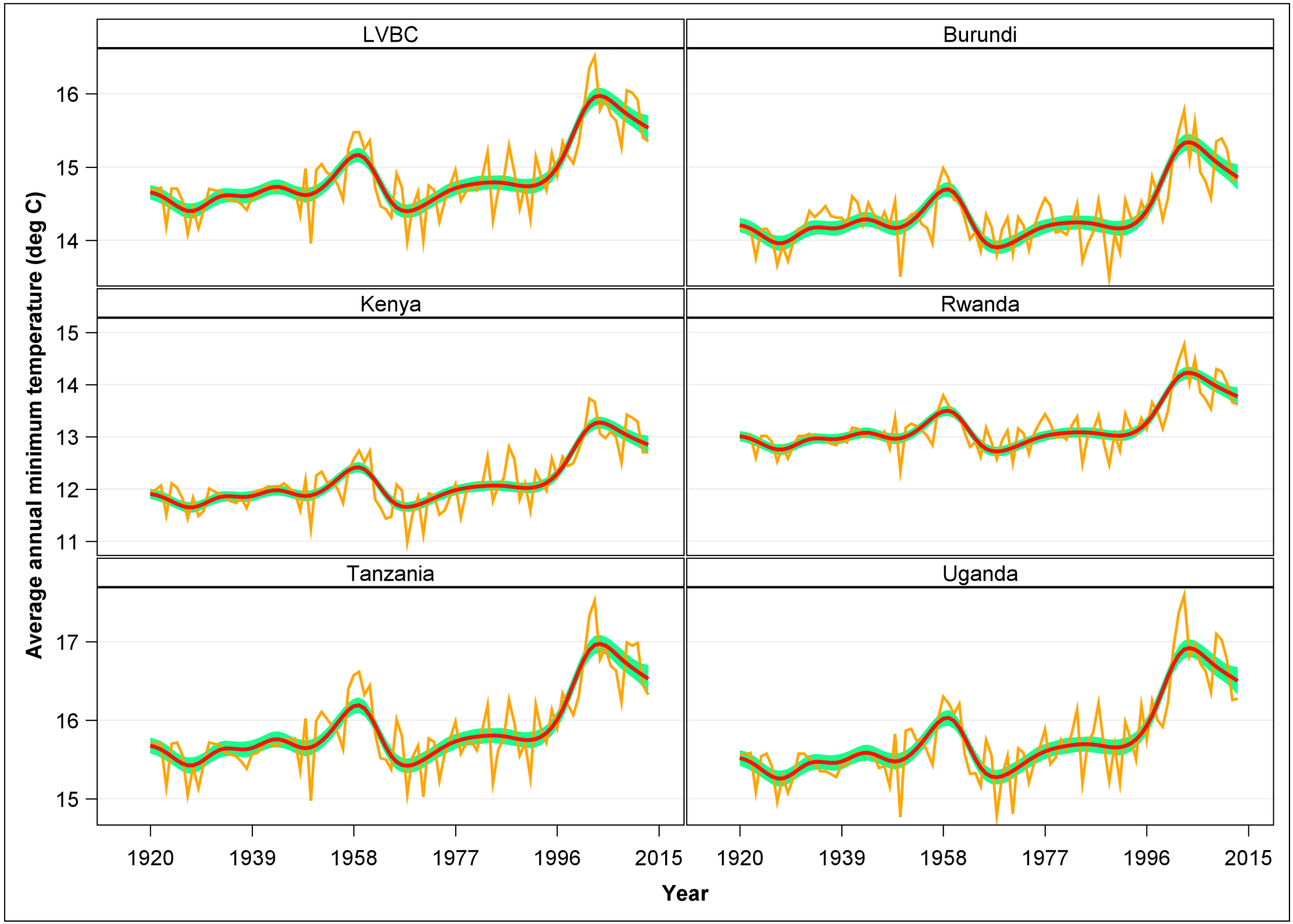


	Athi-Kaputiei Plains	
Attribute	TI + II 1140 km^2	TIII 943 km^2
Fences	10267	5273
Settlements	3209	1234
Quarries	1120	18
Dams	224	263
Water points	711	370
Flower farms	8	7
Tree Farms	350	362
Schools	138	48
Churches	123	58

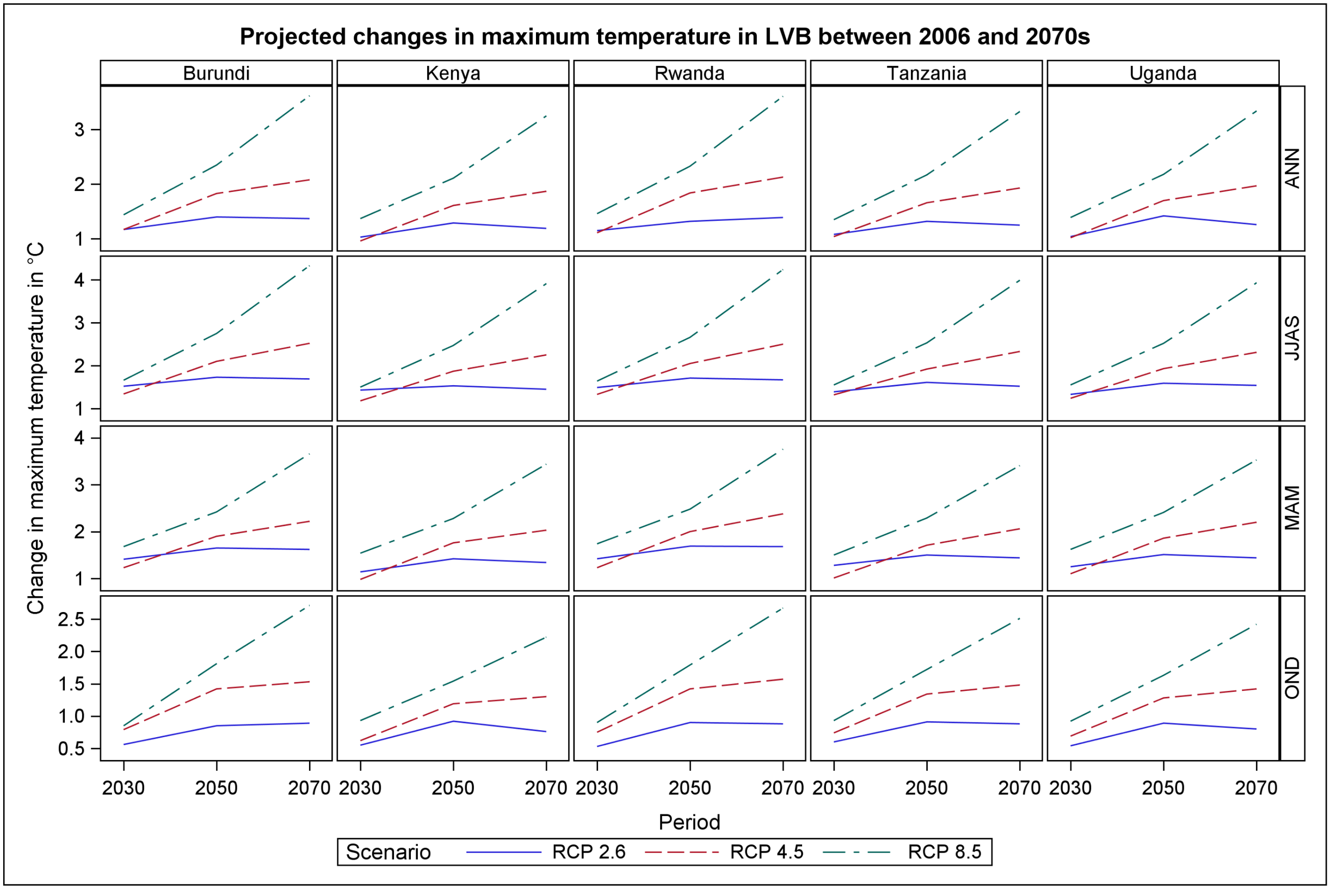
Historial maximum temperature trends in Lake Victoria Basin (1900-2015)



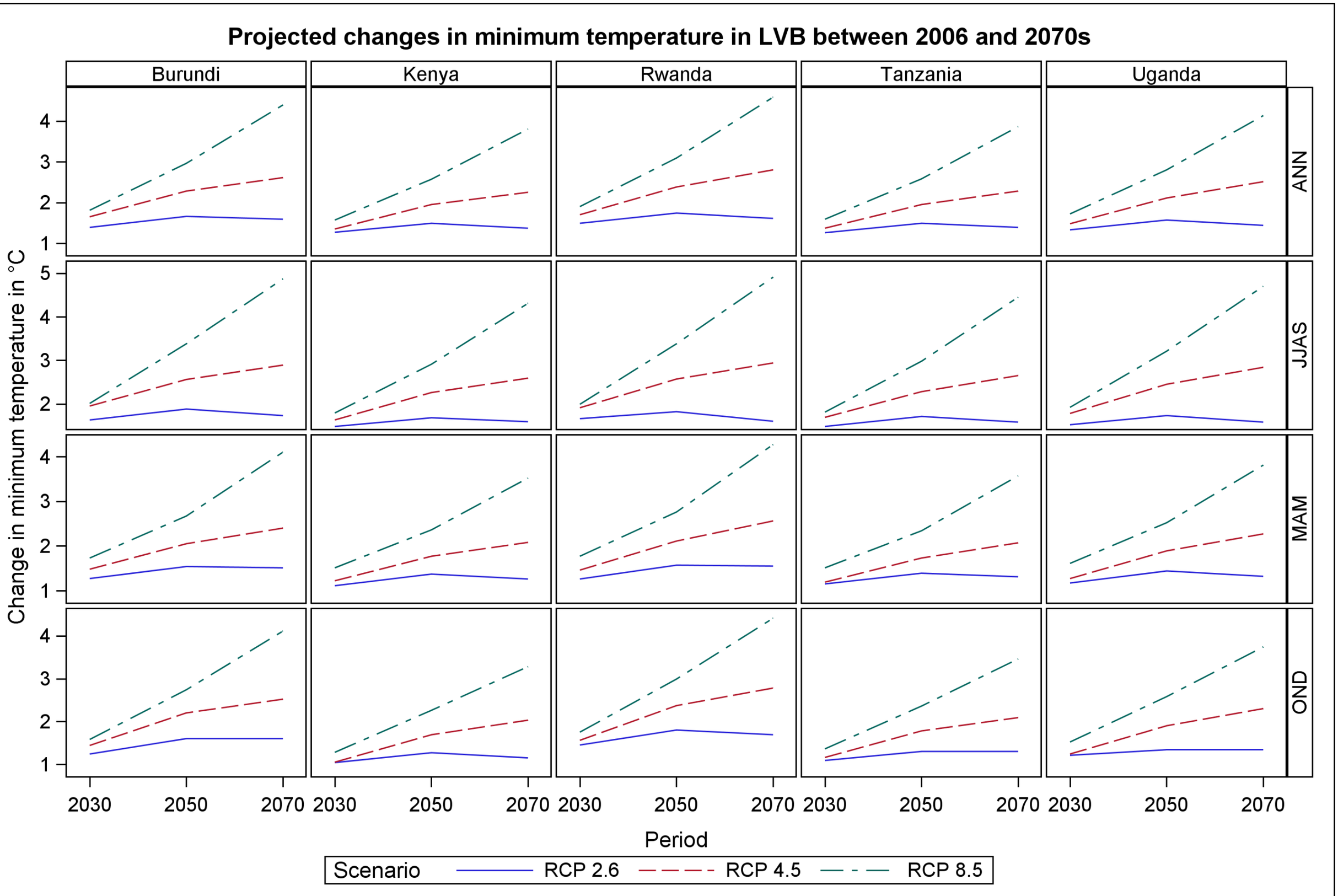
Historial minimum temperatures trends in Lake Victoria Basin (1900-2015)



Projected Maximum temperature trends in Lake Victoria Basin (2006-2100)



Projected minimum temperature trends in Lake Victoria Basin (2006-2100)



Finance can Increase Environmental and Climate Risks

(1) Insurance instruments, if not appropriately designed to address environmental risks, can have adverse impacts. Example --index based livestock insurance promotes restocking of herds in drylands soon after droughts. This suppresses vegetation recovery, leading to habitat deterioration and greater sensitivity to climate risks

(2) Finance can increase environmental and climate risks through stimulating investment that puts stress on fragile eco-systems- especially in contexts of poor planning. Examples--availability of finance which enables excessive water abstraction for irrigation (e.g. subsidised solar irrigation pumps); or intensive cultivation of marginal land which is more suited to extensive livestock production; or fencing on wildlife migration routes in drylands

(3) Finance can increase livelihood risks in variable climates. Example—Credit-financed intensive agricultural production in areas with frequent and severe droughts can result in longterm asset depletion. For example, farmers can be forced to sell their lands to offset credit and fall into a poverty trap.

Finance can can also reduce environmental and climate risks

- Finance can play a role through supporting **livelihood diversification**, which takes the pressure off land-based livelihoods in rural areas (e.g. via finance for business, small-scale manufacture, youth education etc.); especially targeting women and youth

- Finance can (and to an extent already is) incentivise **adoption of technologies** that improve agricultural sustainability and productivity, such as asset financing to support rain water harvesting, etc.; molecular breeding for better drought and disease resistance and artificial intelligence to support breeding and other technologies

- Finance needs to be **closely integrated into planning and appropriate land management** to have positive impacts in fragile eco-systems. For example, how can weather insurance balance land use intensification and food security in drylands with protecting vital ecosystem services and processes, such vegetation restoration, animal migration, functional habitats and natural water cycles?