

Application of Spatial decision support tools in Prioritizing areas for Trypanosomiasis control in Uganda

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Elements;


- Introduction
 - Objectives
 - Methodology
 - Outputs
 - Conclusion
- 

Introduction

- ☛ Tsetse infestation constrains rural development
- ☛ Sleeping sickness is closely linked with poverty and countries affected by sleeping sickness rank among the poorest of the poor (World Bank 2000) (Okia et al 1994).
- ☛ WHO, estimates that in Africa 300,000 – 500,000 people are infected with sleeping sickness and 60million people are at risk in 36 countries (WHO-2002).



Objectives

- The objective of the study was to “Prioritize areas for Trypanosomiasis control in Uganda for the alleviation of poverty.”
- 

Methodology

Method applied is;

☛ dependent on;

High precision data


Uniquely selected stakeholder team

☛ Makes use of ;

MCE techniques

GIS softwares i.e, ArcGIS & IDRISI

Stakeholder analysis & Consensus Building



In an attempt towards understanding the applications, key questions were raised. These were;

- ☛ Where to control?
- ☛ How to control? – Which control strategies? E.g Control vs. Eradication.
- ☛ How to control – which control methods? E.g drugs, pour-ons, baits etc.
- ☛ Whether to integrate animal trypts with SS control

Answers to the above questions positively influence the best method / approach to be taken.



Methodology is controlled by a series of determinants. These are;

- Biology, ecology (tsetse spp.), epidemiology (SS risk)
- Livestock production systems (livestock density and species)
- Feasibility/risks of different approaches
- Objective (equity vs. profitability)
- Who the target beneficiaries are
- What other constraints are faced by target beneficiaries
- Costs and benefits
- Environmental impacts and concerns
- Who is expected to pay (... Farmer, community, Govt., donor)
- What the expected time-frame is ...

Approach criteria

- ✔ Interpretation of methodology
- ✔ Assembling of Map data
- ✔ Standardization of maps
- ✔ Assigning of weights to criteria
- ✔ Conducting a Stakeholder analysis
- ✔ Performing a Pair-wise comparison
- ✔ Building Consensus
- ✔ Generation of priority map



Interpretation of methodology

This exercise made use of the
“weighted sum aggregation method”

$$\text{Priority map} = C_1W_1 + C_2W_2 + C_3W_3 + \dots + C_nW_n$$

Where: **C** = Criterion/ criterion map and

W = Weight/ relative importance of the criterion



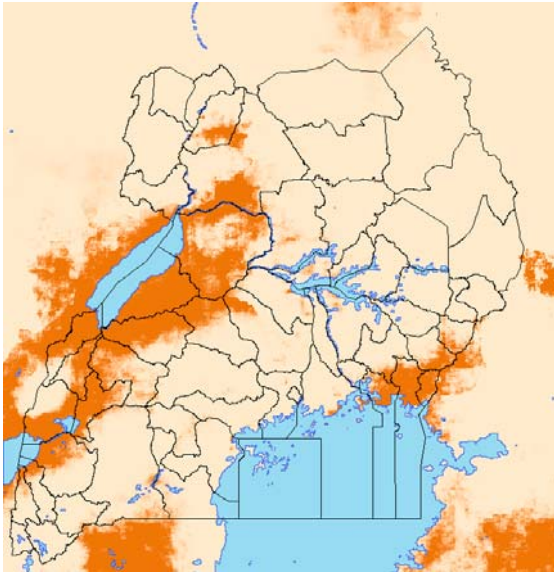
Assembling & standardization of Map data

Data sets used;

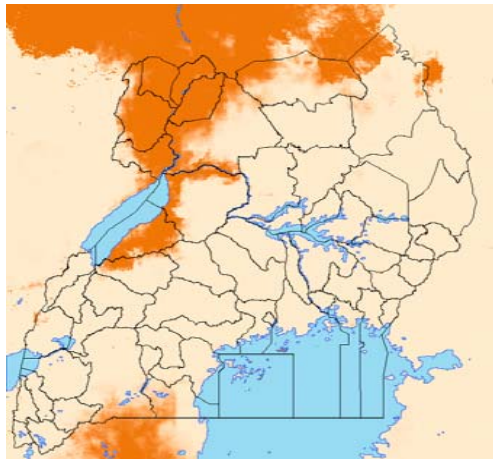
- Tsetse distributions / trypanosomiasis risk (Wint, 2002)
- Poverty (1992)
- Cattle density (2004)
- Length of Growing Period (Thornton 2005)
- Human population (2002 housing and population census)

Modelled tsetse distributions

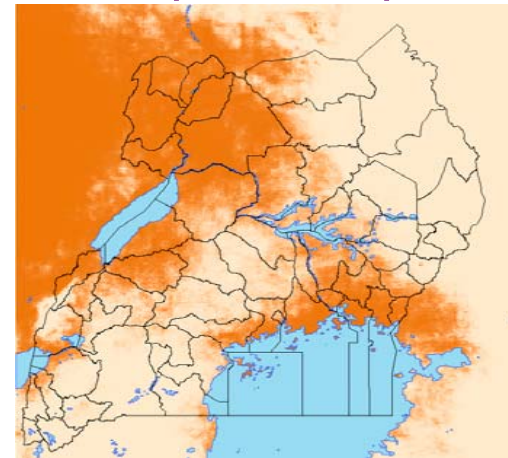
G. pallidipes



G. m. submorsitans

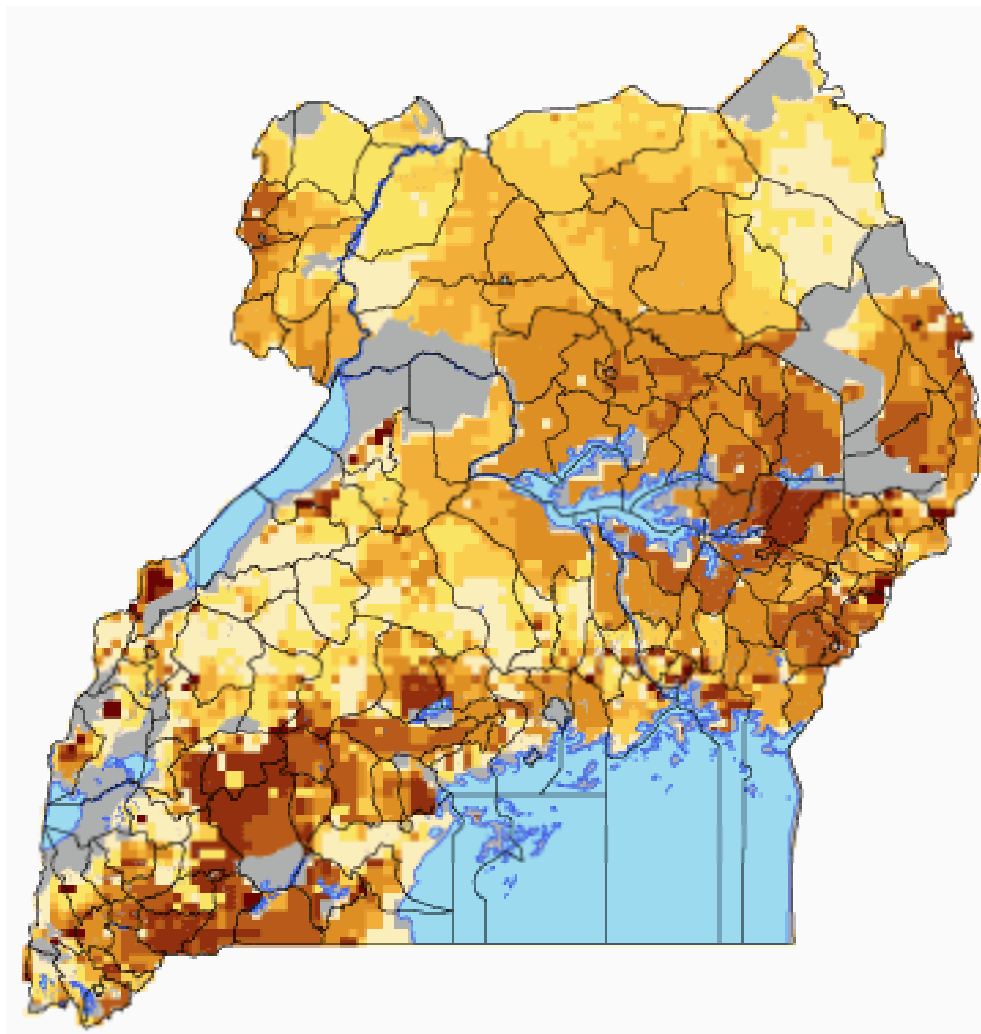


G. fuscipes fuscipes



Source:
Wint 2002

Cattle density (2004)



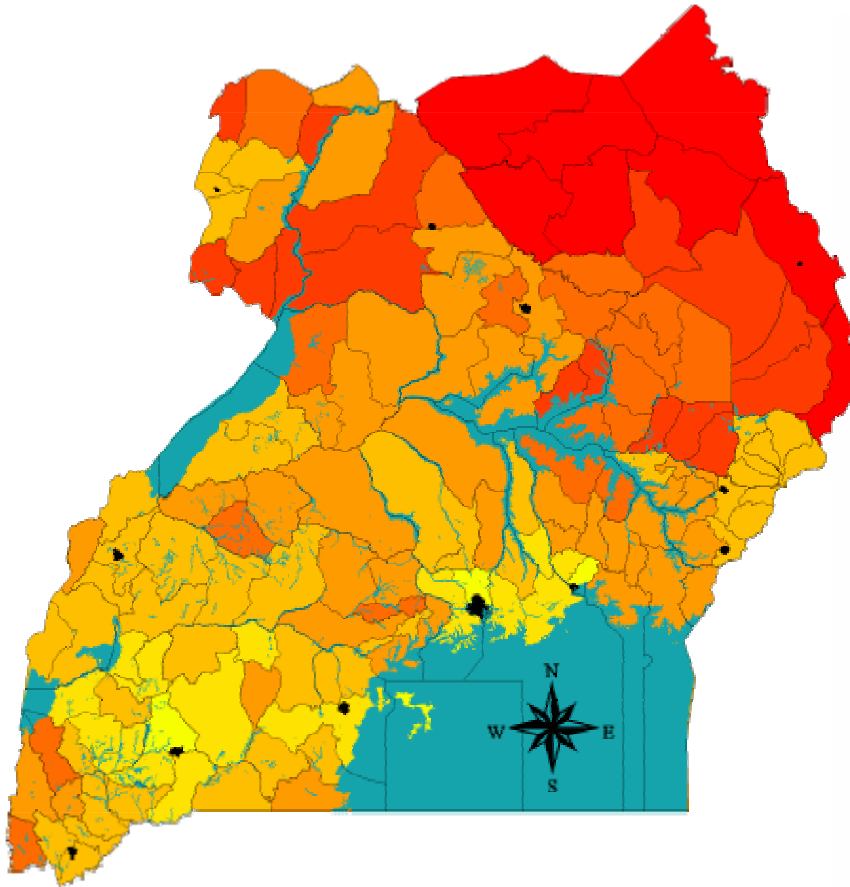
Legend

- Subcounties
- Water Bodies
- Unsuitable
- < 1 per sq km
- 1 - 5
- 6 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- 100 - 250
- > 250

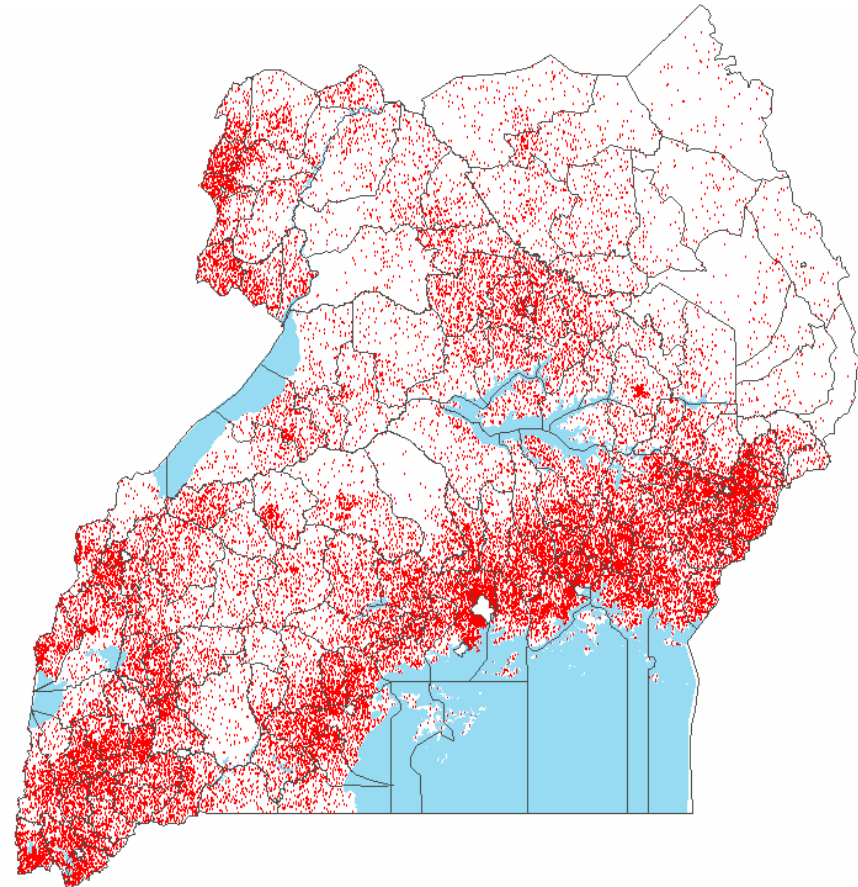
Source: FAO (2004)

Poverty in Uganda (1992)

Poverty rate

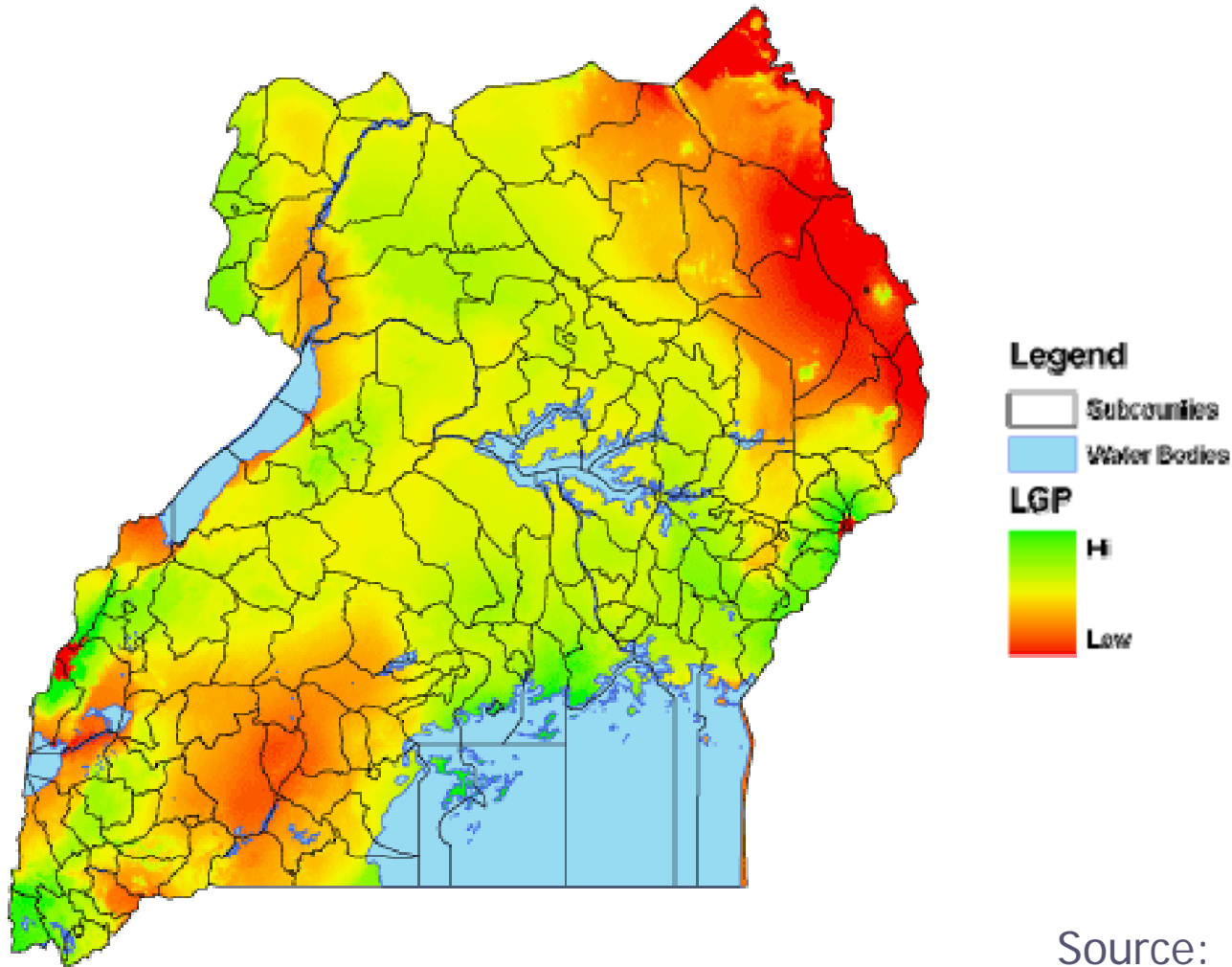


Poverty density



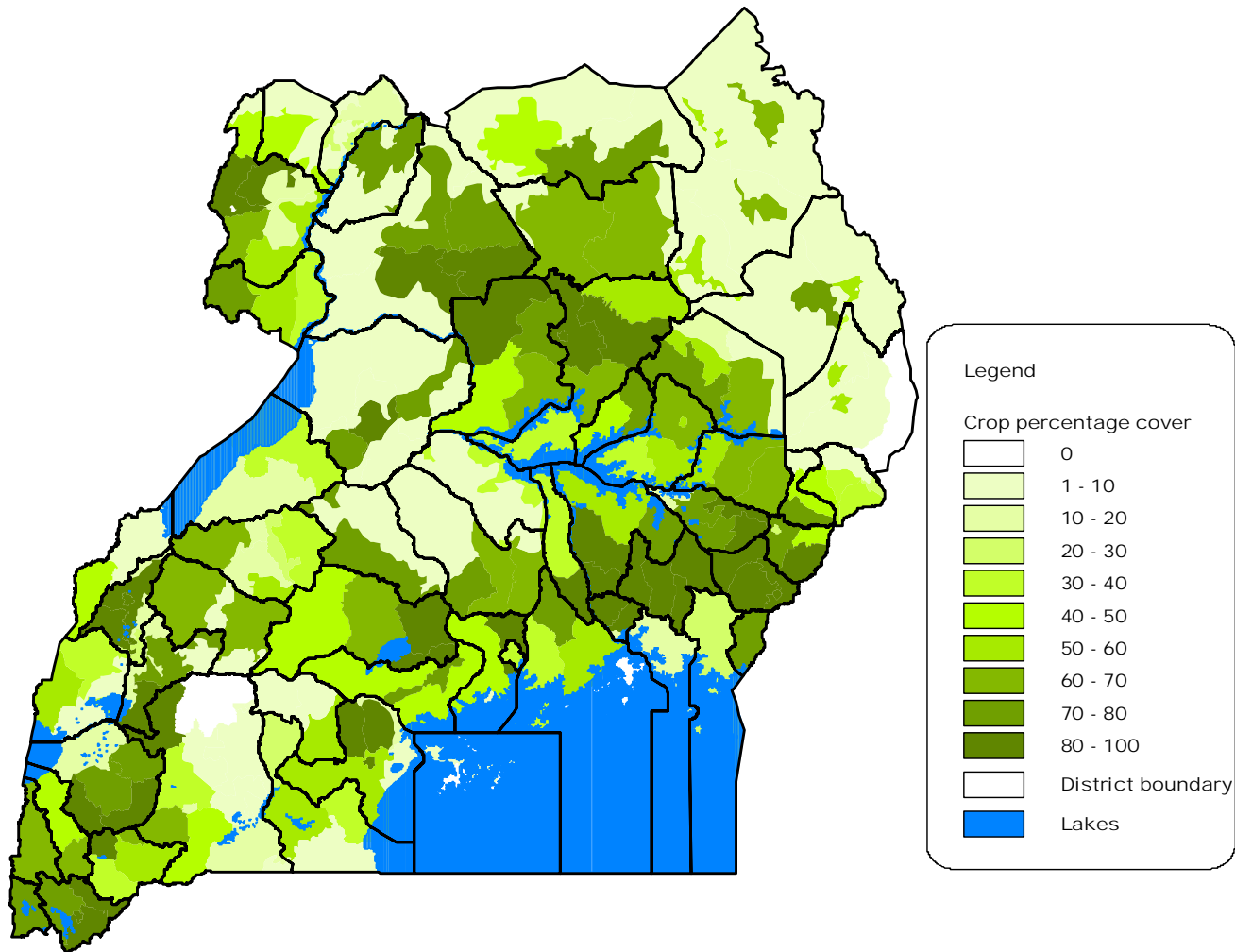
Source: UBOS (2004)

LGP(2005) – Agric potential



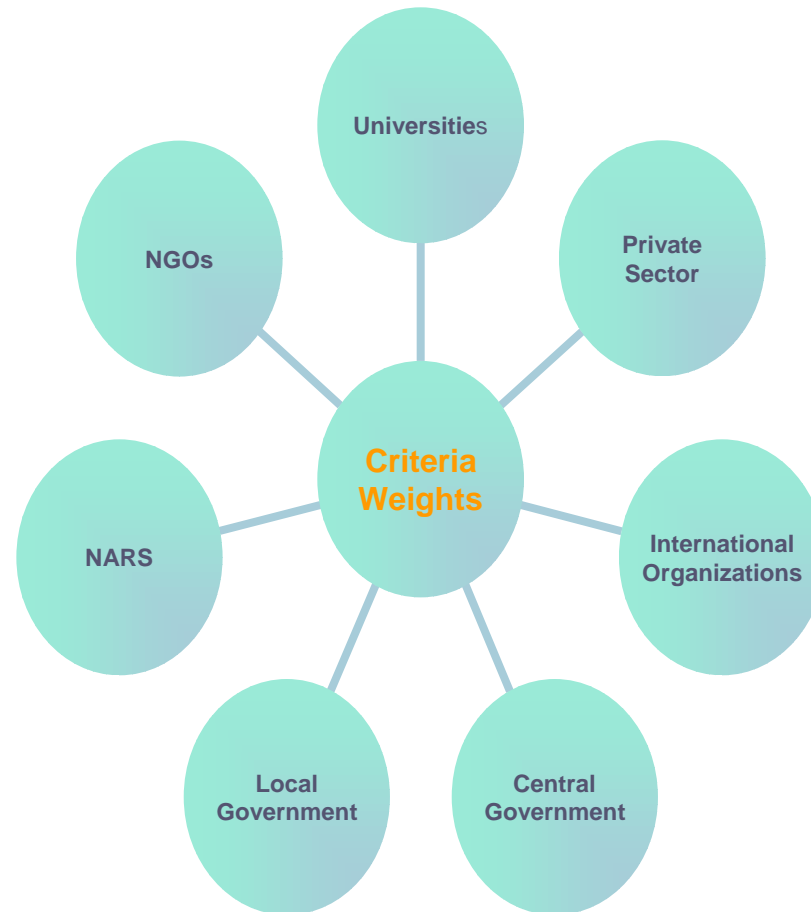
Source: Thornton (2005)

Percentage crop cover (1995)



Conducting a Stakeholder analysis

- Multi-criteria evaluation
- Participatory approach
- Decision makers and other stakeholders



Assigning of weights to criteria

9	7	5	3	1	1/3	1/5	1/7	1/9
extremely	very strongly	strongly	moderately	equally	moderately	strongly	very strongly	extremely
More important				Less important				

The weight for the criteria maps were generated using the pair wise comparison method. This is a method of generating weights by comparing criteria using a **nine-point continuous scale**

Performing a Pair-wise comparison

Considering the objective: To Prioritize areas for Sleeping Trypanosomiasis control in Uganda for the alleviation of poverty"

	Livestock	People	Agriculture	LGP	Poverty	Tryps risk
Livestock	1					
People	1/5	1				
Agriculture	1/3	1	1			
LGP	1/3	3	1	1		
Poverty	1	7	5	5	1	
Tryps risk	5	7	3	3	3	1

Agriculture is

9	7	5	3	1	1/3	1/5	1/7	1/9
extremely	very strongly	strongly	moderately	equally	moderately	strongly	very strongly	extremely
More important					Less important			

... than livestock

Resultant weight table

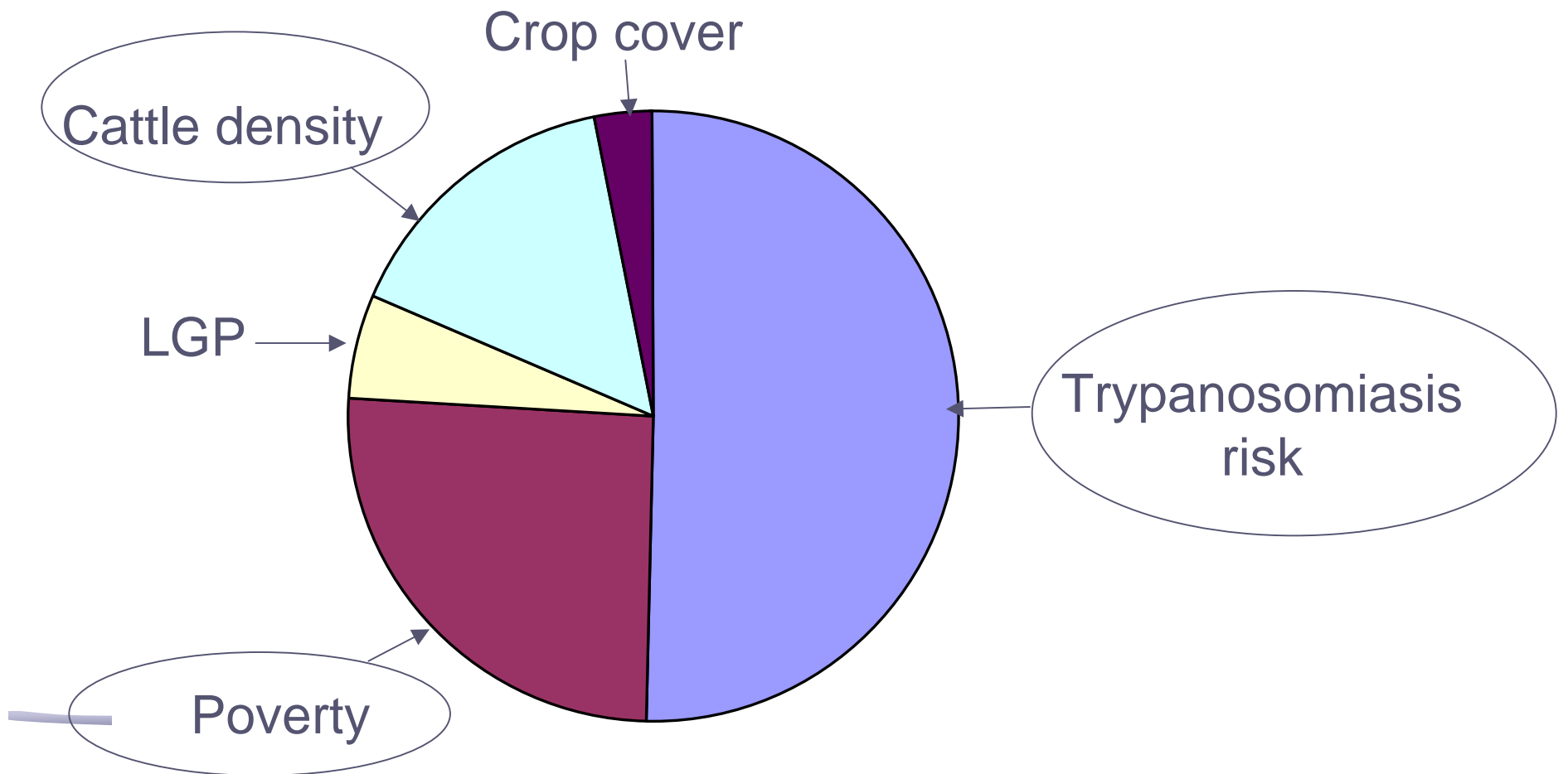
Factors	Weights		
	Group 1	Group 2	Consensus
Trypanosomiasis risk	0.4363	0.5036	0.5030
Density of poor livestock keepers	0.1152	0.2418	0.2562
Length of growing period	0.0465	0.0689	0.0559
Cattle density	0.3591	0.1397	0.1546
Percentage crop cover	0.0429	0.0460	0.0304

$$\text{Priority map} = C_1W_1 + C_2W_2 + C_3W_3 + \dots + C_nW_n$$

Where: **C** = Criterion/ criterion map and

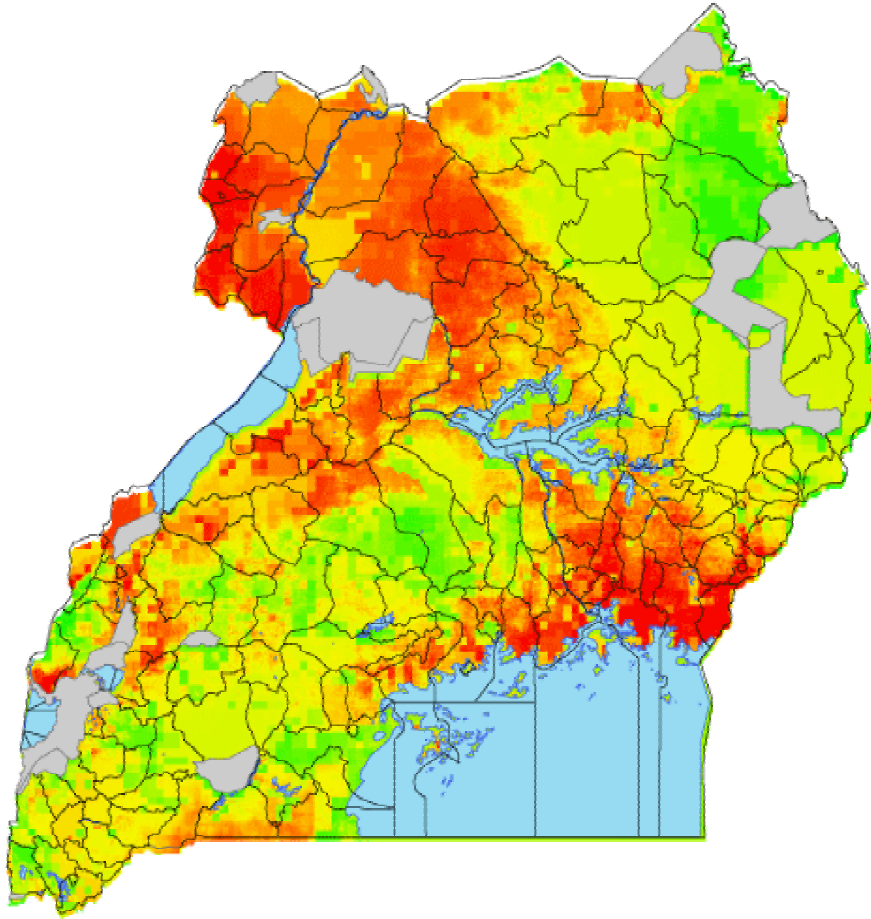
W = Weight/ relative importance of the criterion

Criteria / Factor weights

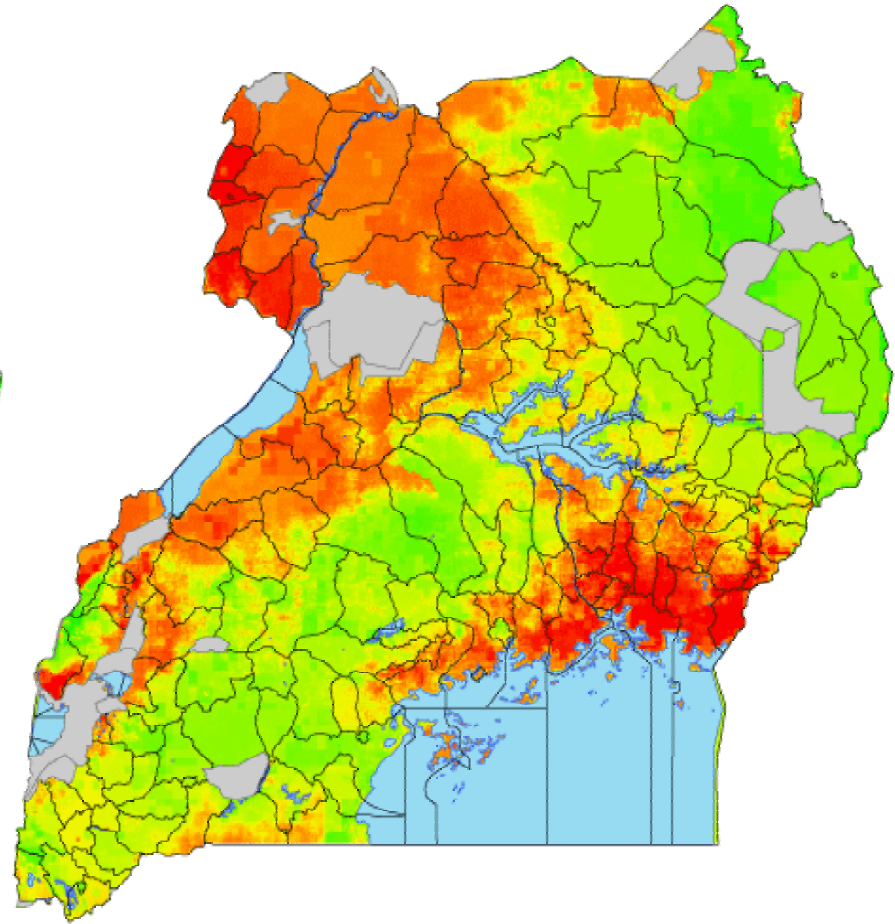


Outputs: Control priority maps

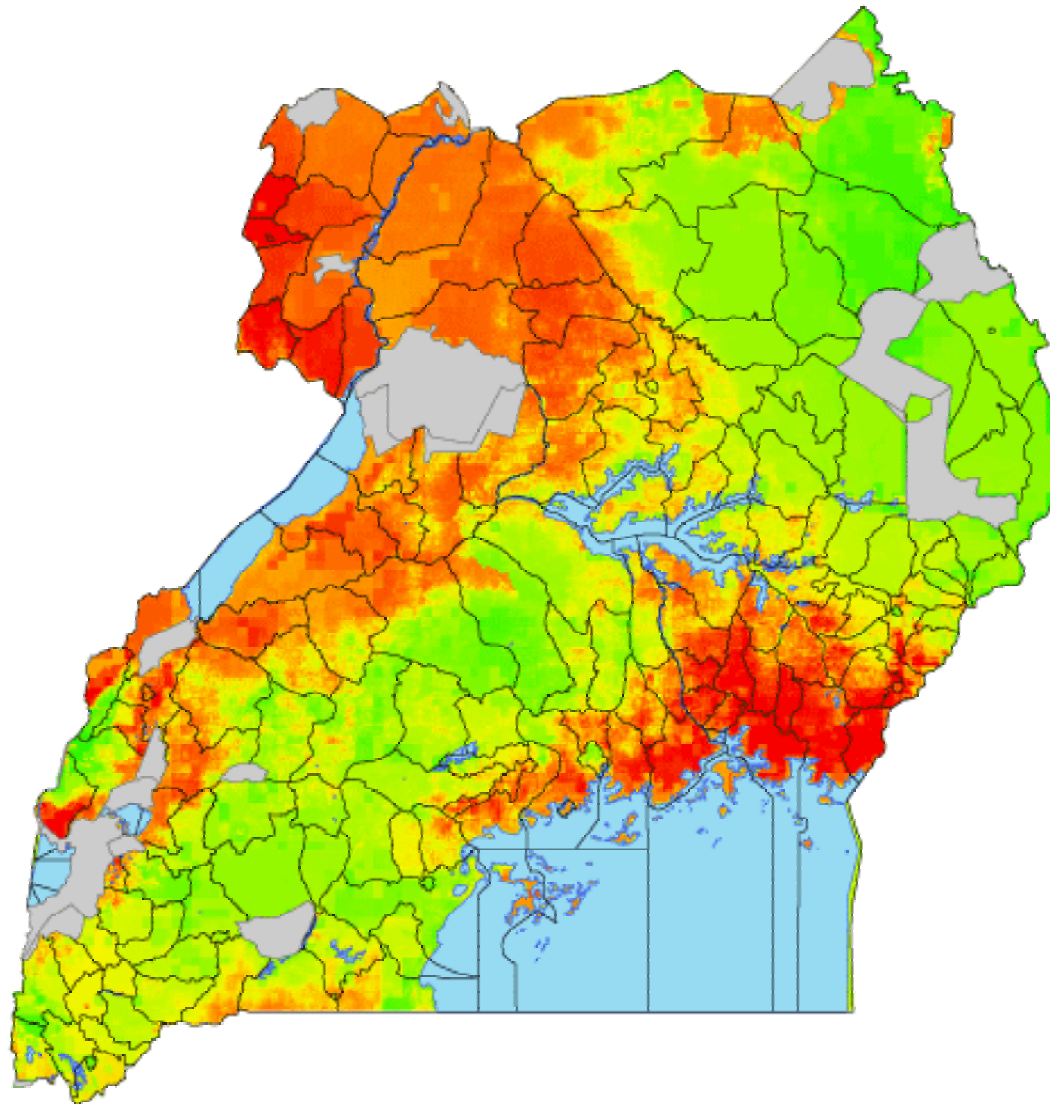
Group 1



Group 2






Trypanosomiasis control priority map

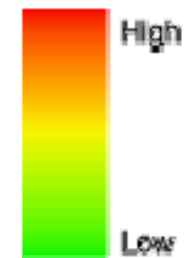


Group
Consensus

Legend

-  National Parks
-  Subcounty Boundaries
-  Water bodies

Priority



On-going developments to the approach

☛ Incorporate new data layers

- Sleeping sickness
- Land cover
- Market accessibility

☛ Link to cost-benefit analysis

- Costs and benefits of different control approaches

☛ Develop multi-objective approach

- Appropriateness of different control technologies

Conclusion

- Identification of target areas in terms of size and location as reflected by this methodology does not necessarily provide an automatic solution to the problem. Rather it offers a strong foundation towards a desired intervention.
- Actions on the targeted areas will require a detailed assessment of amount of logistics available, accessibility to target area and reliability of control methods at disposal.
- These outputs have been widely analyzed and already assembled for use in the on-going area-wide tsetse control plan (PATTEC-Uganda chapter).



Acknowledgements

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- 



Thank You !!!!!

