

# Infrastructure Planning

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# Grid Electrification

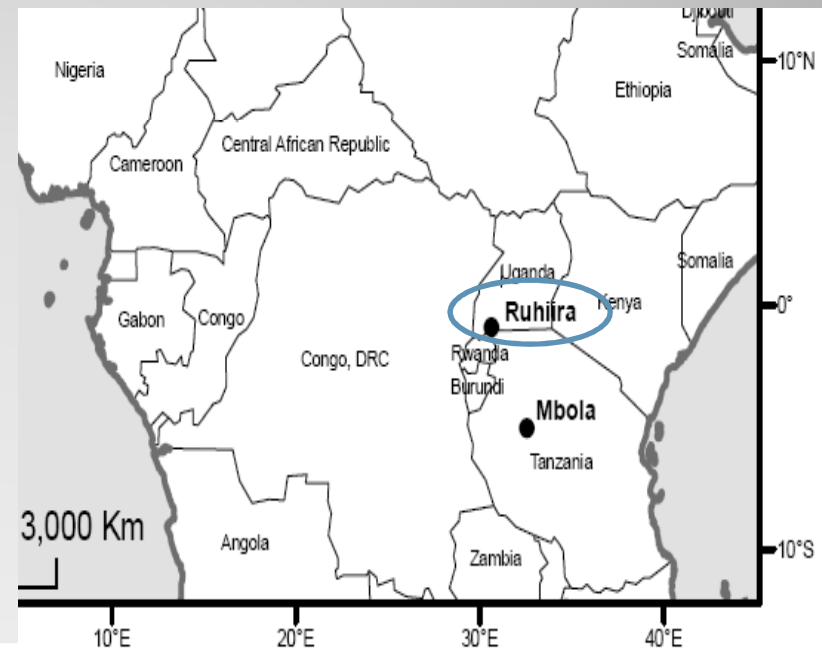
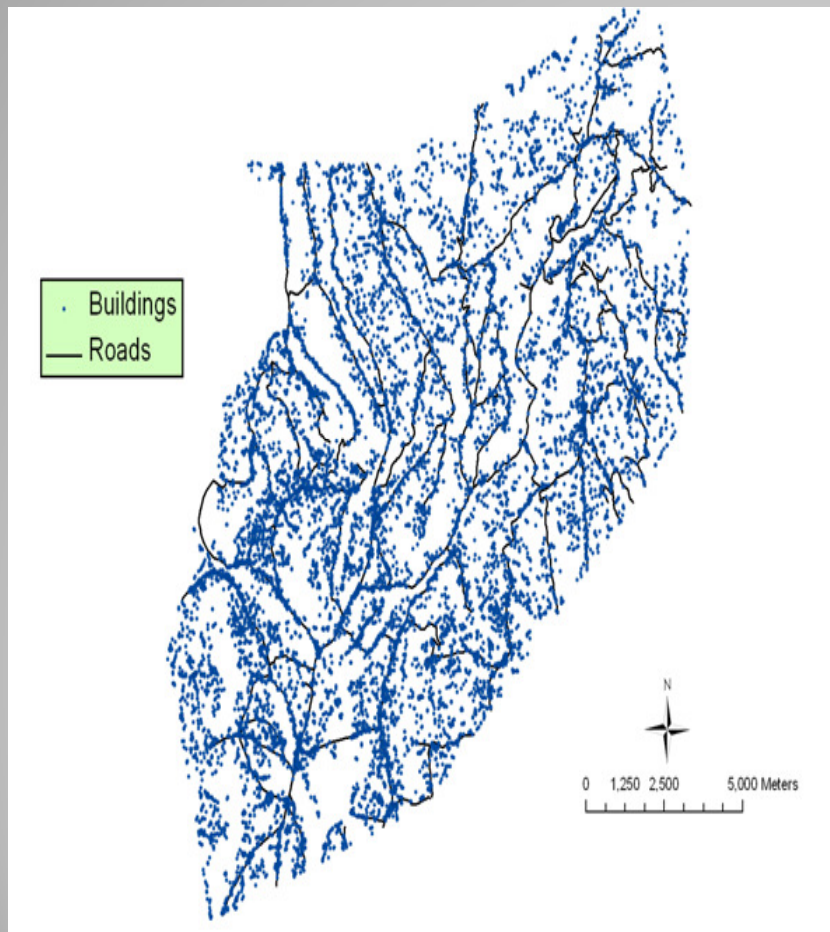
**Study Goal:** We seek to find the answers of following questions:

- How does the per-unit cost of grid construction vary with penetration rate?
- How does rural population structure affect the cost of infrastructure investments?

# Ruhiira, Uganda

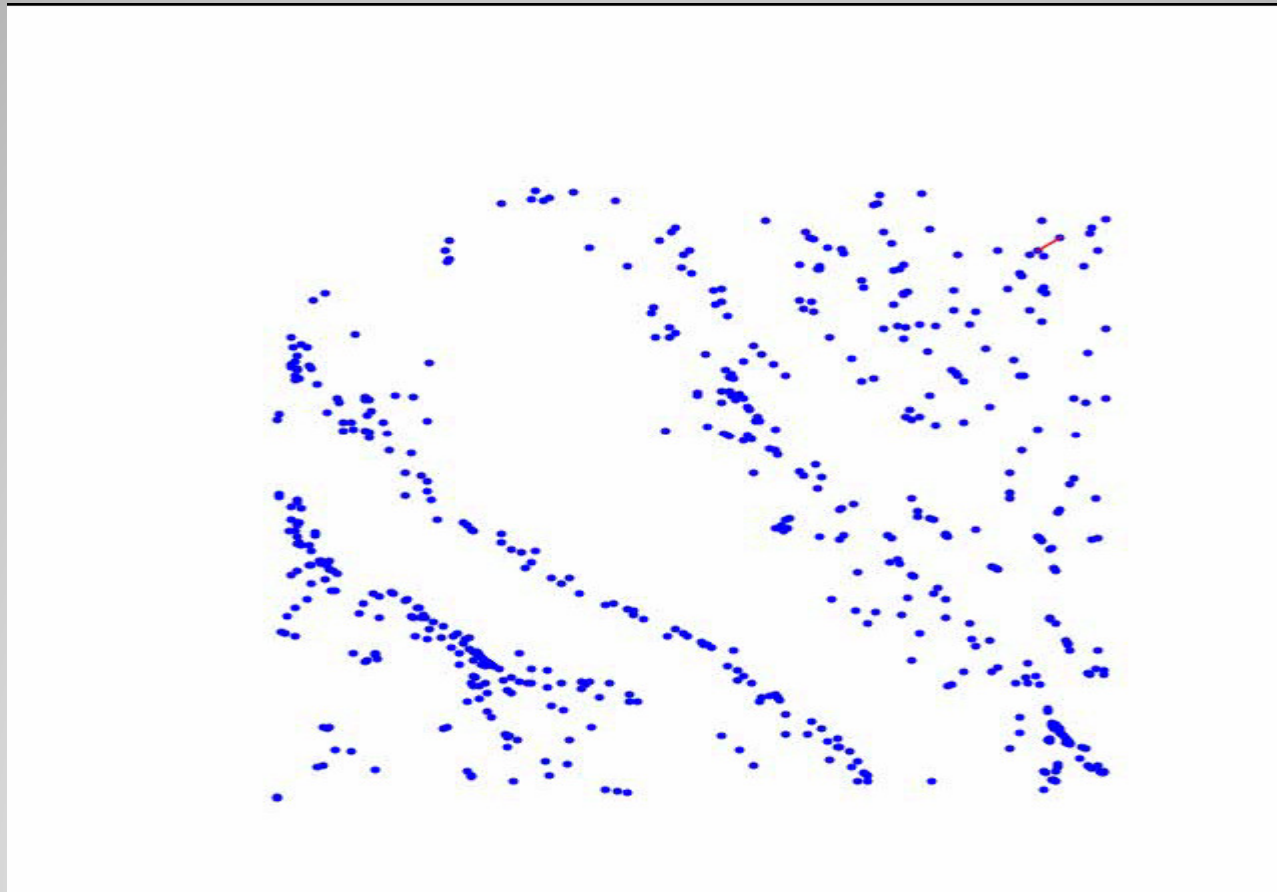


# Ruhiira, Uganda

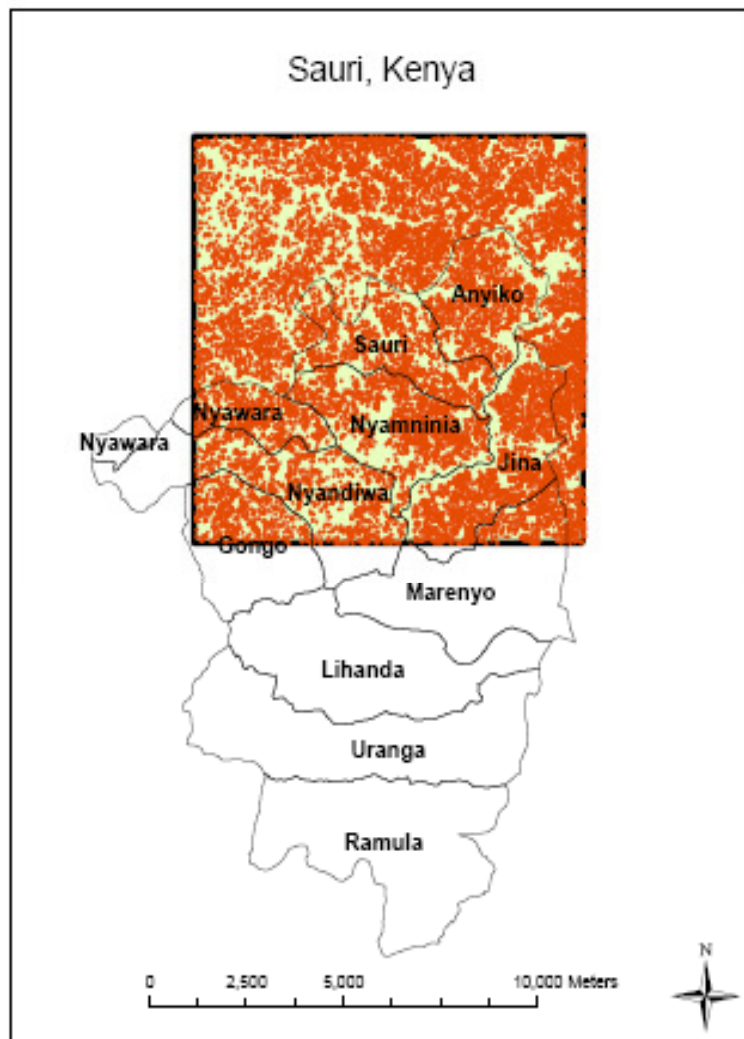


# Optimal Grid Network

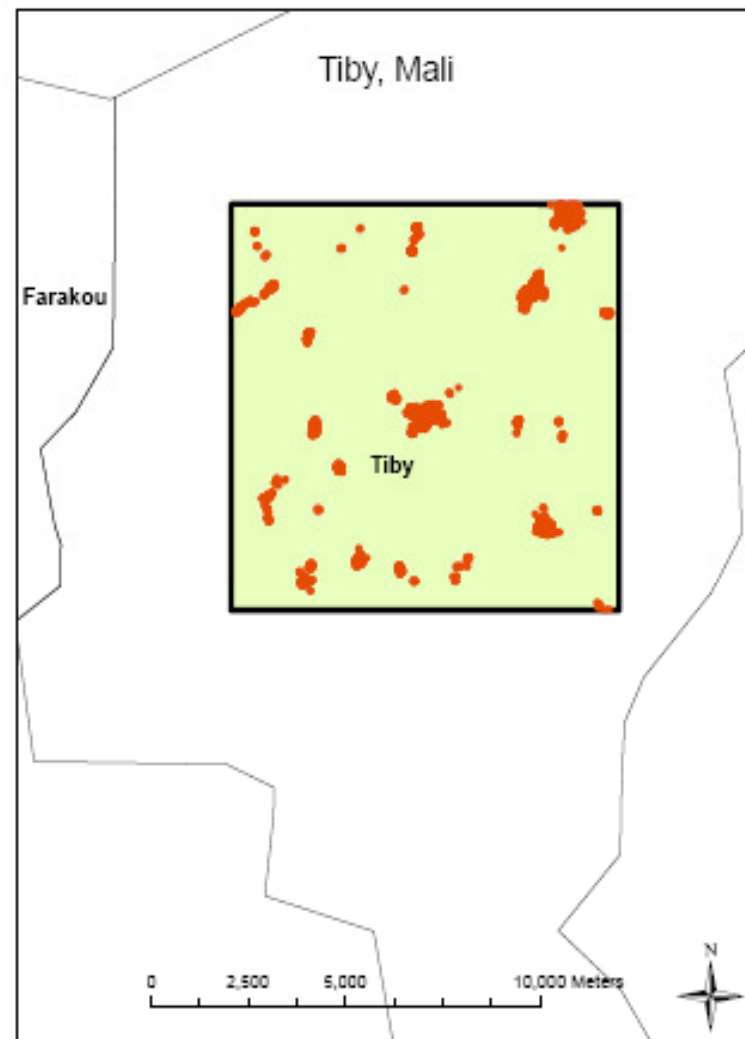
<http://invisibleroads.com/movie.swf>



Sauri, Kenya



Tiby, Mali



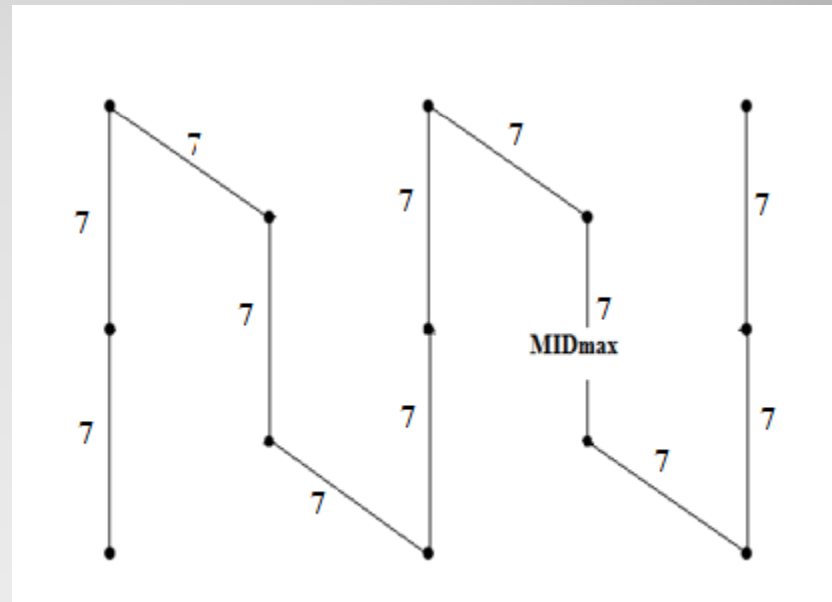
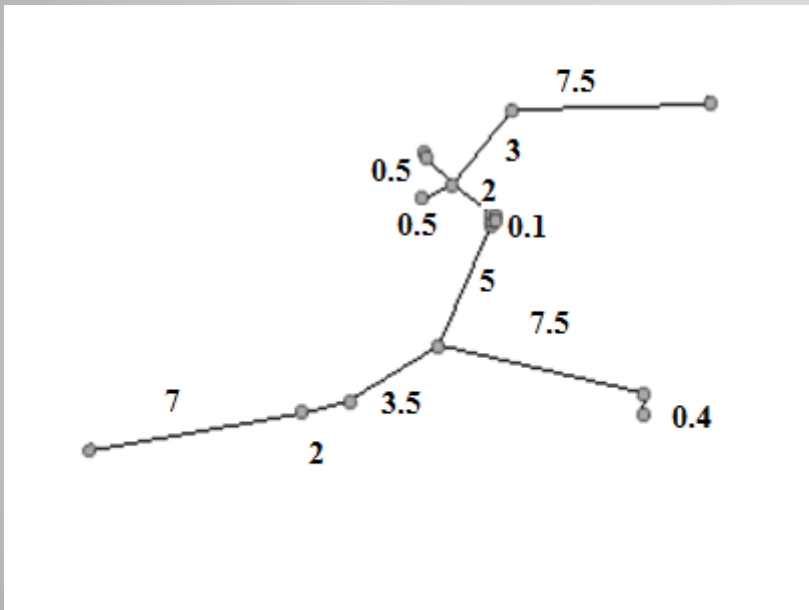
# Homogeneity Index (H-index)

- $H\text{-Index} = \text{Actual Network Length} / \text{Max. Possible Network Length}$
- *Actual MID / Max Possible MID*  
MID: Mean Interhousehold Distance

Actual Network Length =  $7 + 2 + 3.5 + 7.5 + 0.4 + 5 + 0.1 + 2 + 0.5 + 0.5 + 3 + 7.5 = 39$

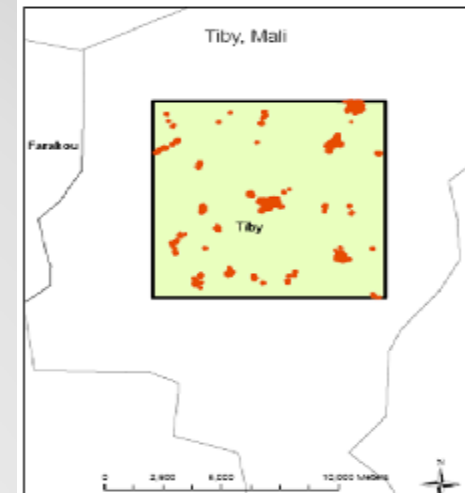
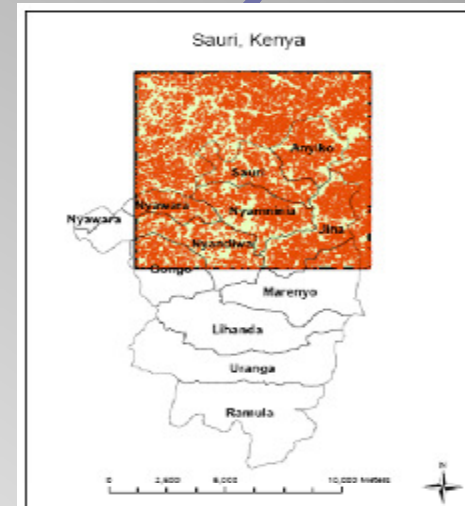
Max. Possible Network Length =  $7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 = 84$

H-Index =  $39 / 84 = 0.46$



# Homogeneity Index (H-index)

Site	Maximum Possible MID(100) (m)	Actual MID(100) (m)	Density	H-Index
			(structures / km <sup>2</sup> )	
Mbola	313	99.7	11.70	0.32
Potou	218	54.3	18.80	0.22
Ruhiira	134	56.9	64.30	0.42
Tiby	215	32.7	25.00	0.15
Sauri	82	41.6	176.10	0.51
Ikaram	274	46.5	14.83	0.17
Mayange	140	47.5	58.95	0.34
Pampaida	303	72.7	13.08	0.24

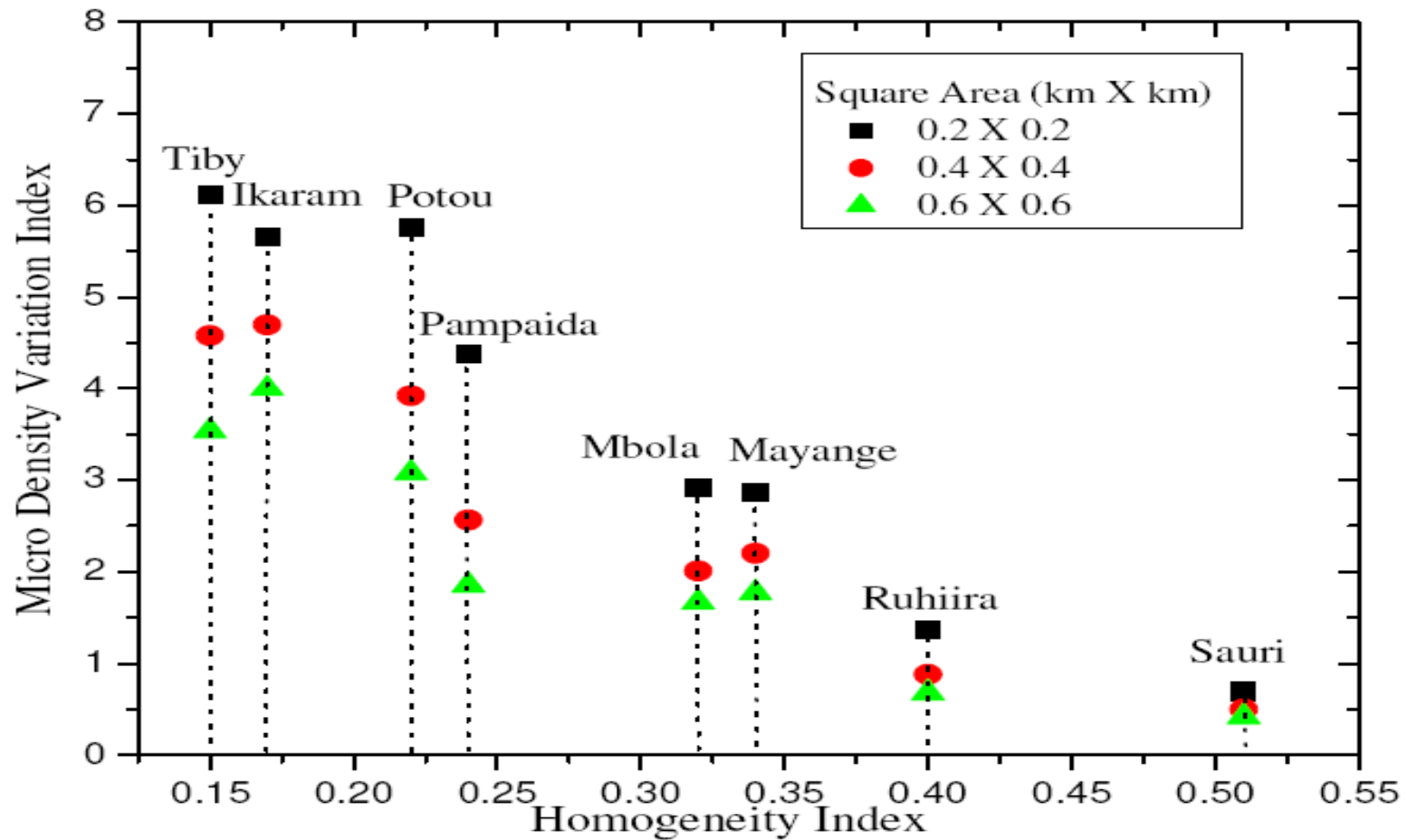


## Micro Density Variation Index (MDVI)

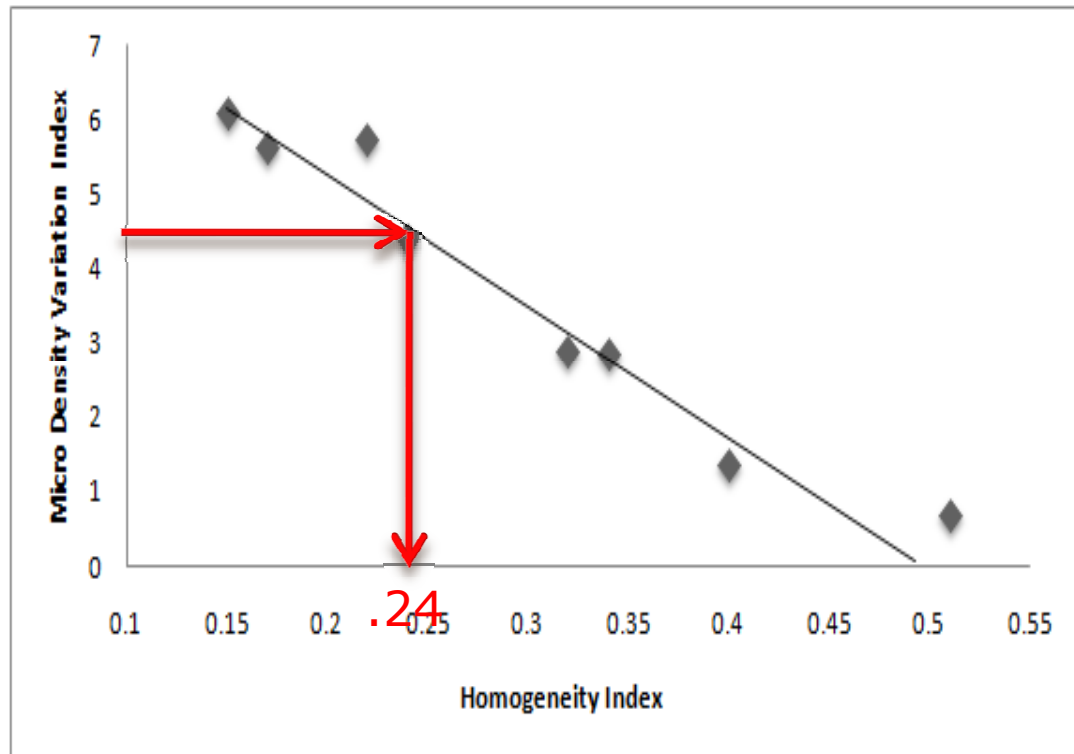
- Count the number of structures in a small sized square which spans the entire region
- Calculate sample coefficient of variation
  - Standard Deviation/ Mean



# MDVI-H Index



# MDVI-H Index



*Example: Pampaida, Nigeria*

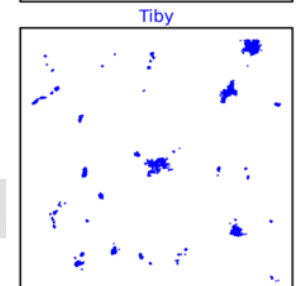
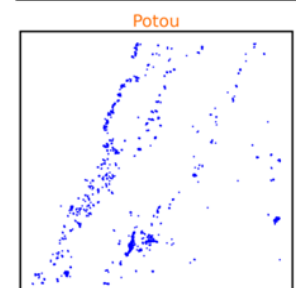
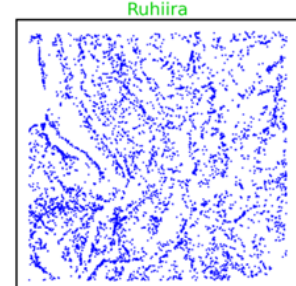
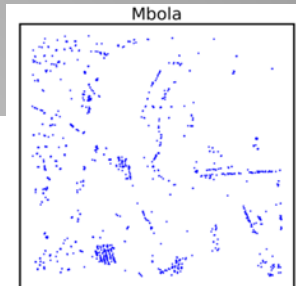
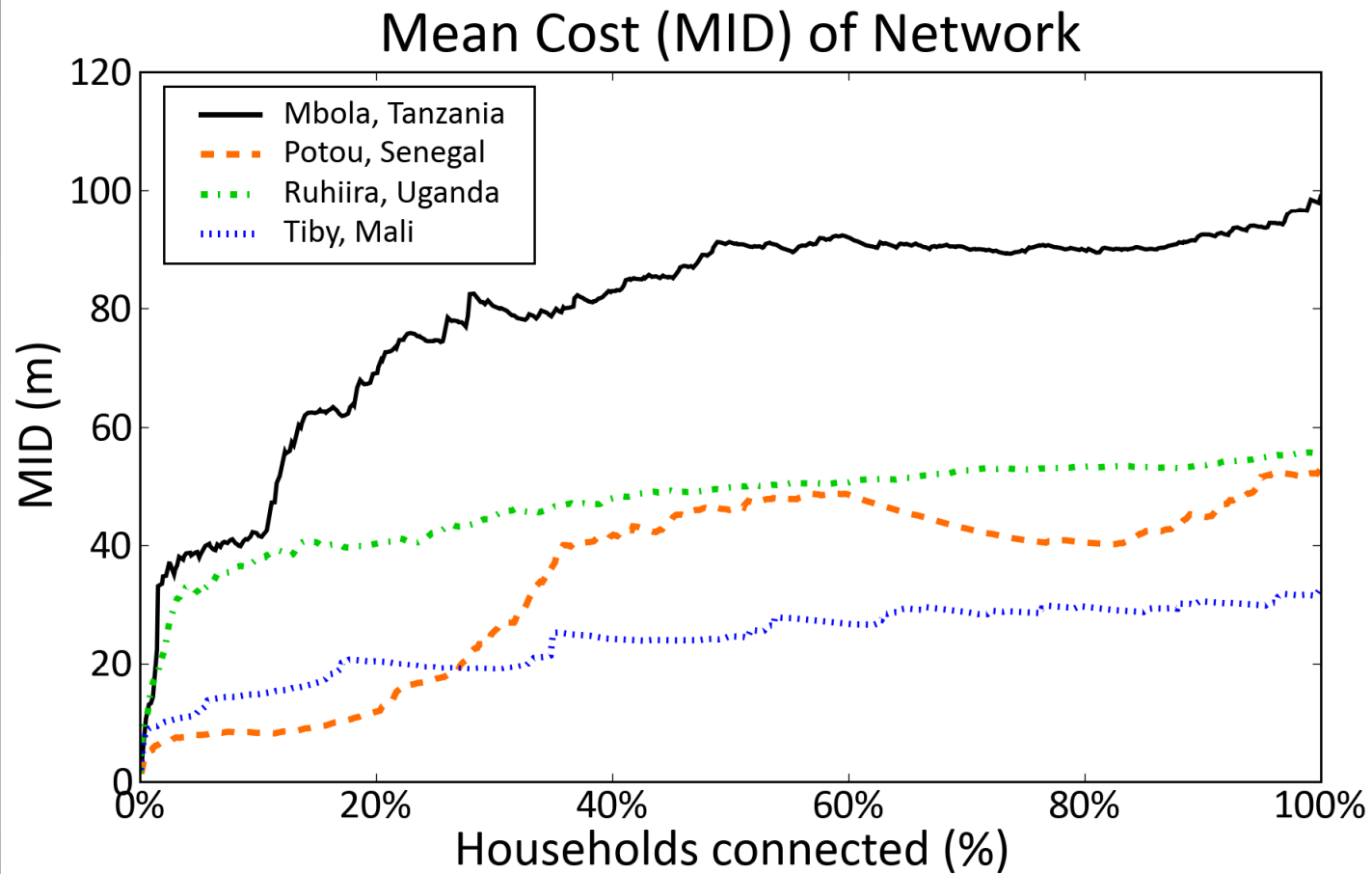
*MDVI=4.376594*

*Max. Possible MID=303*

*H-Index: 0.24*

*Estimation for Actual MID  
=0.24\*303= 72.2*

# Results-Composite Prim's Algorithm



# Acknowledgements

- Dana Pillai
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