



# The Geography of Conflict Diamonds: The Case of Sierra Leone

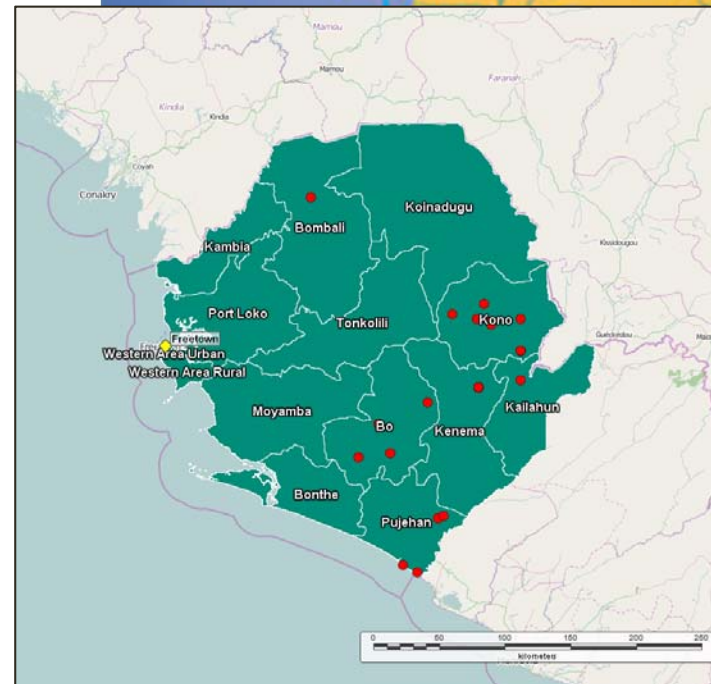
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# Background

- Sierra Leone entered into nearly 10 years of civil war in 1991
- Killed an estimated 70,000 and displaced another 2.6 million
- Endowed with an abundance of diamond resources
- An ABM is developed to explore the role of geography in a resource-driven war



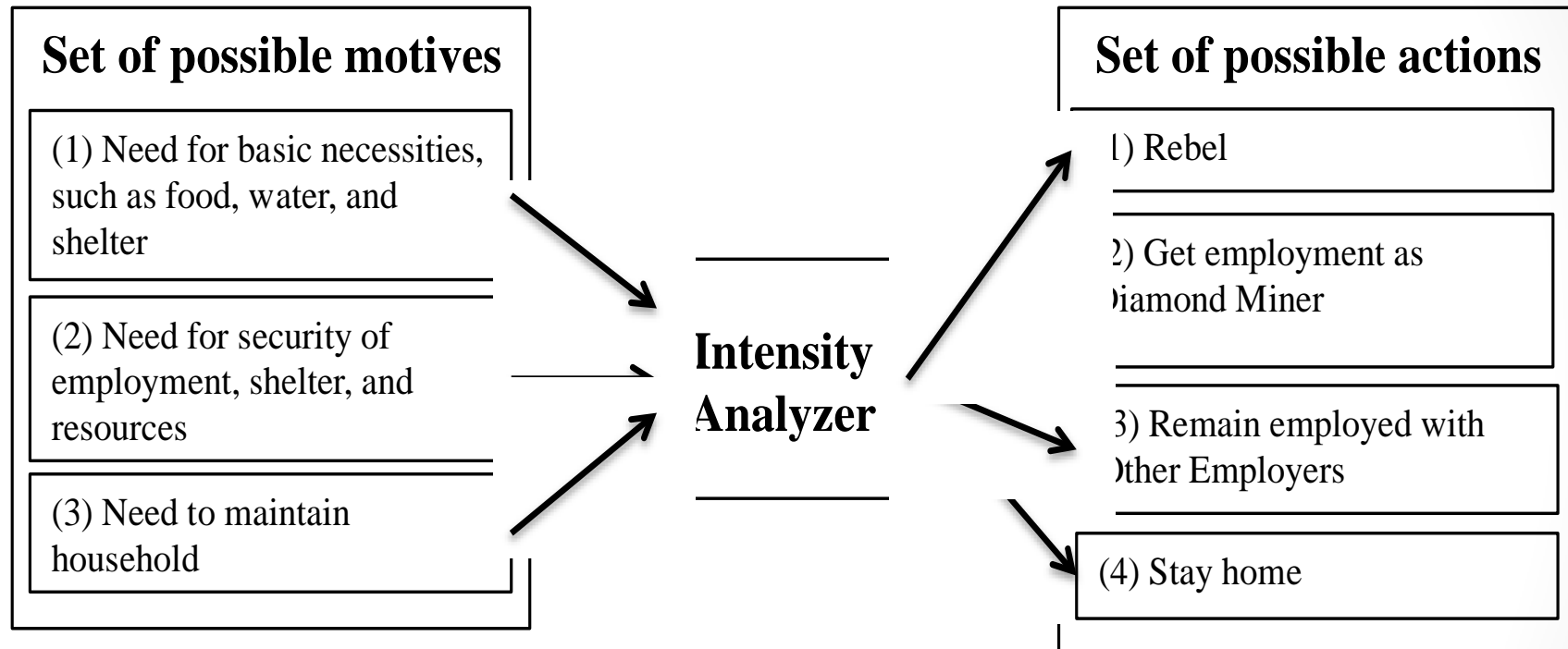
# The Model

- An ABM is integrated with GIS to explore Le Billon's (2001) theory about the spatial dispersion of a

Concentration / Relation to Center	Diffuse	Point
Distant	Warlordism	Secession
Proximate	Mass rebellion / rioting	State control or coup

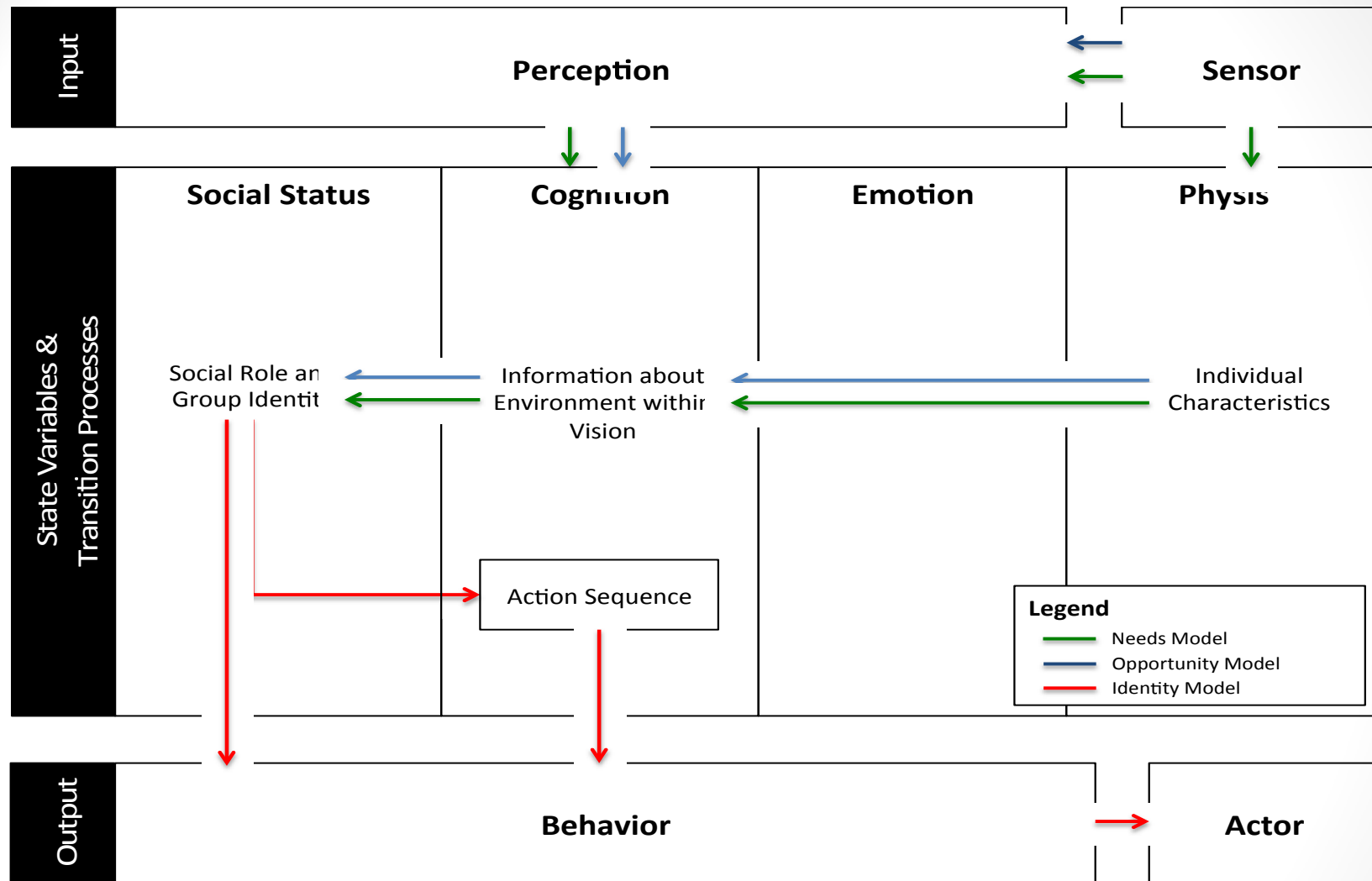
- Modeling world is the country of Sierra Leone
  - Broken down into one km<sup>2</sup> parcels
- Total population is 4.9 million
  - Population within each parcel was reclassified to 1% of total population
- The agents represent individual residents
  - Attributes include age, income level, and employment status

# Agent Behavior



- The PECS framework is used to implement agent behavior
- Intensity analyzer is responsible for determining the action-guiding motive

# Agent Behavior

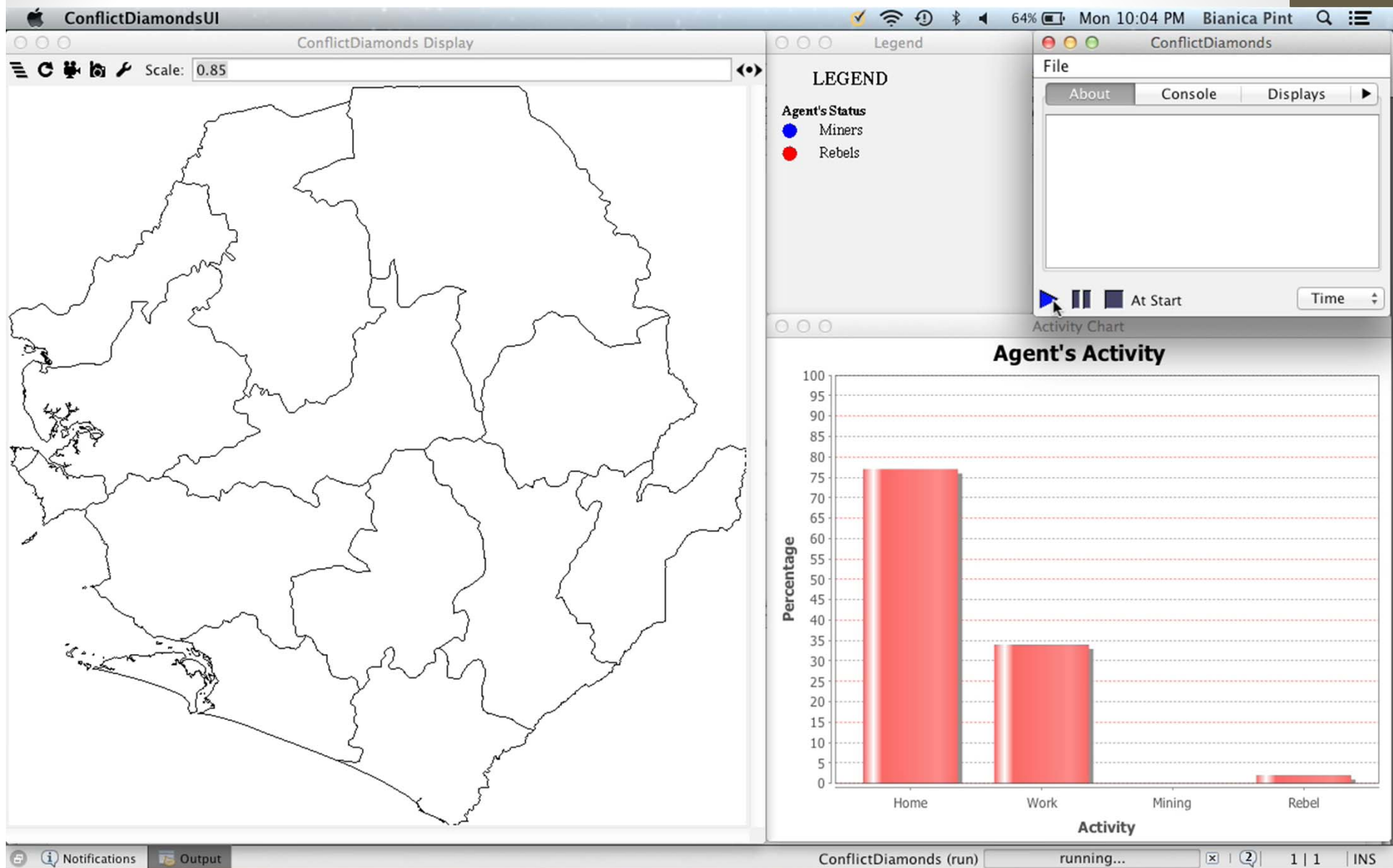


**The Needs Model**  
(Maslow, 1954)

**The Opportunity Model**  
(Fearon and Laitin, 2003; Le Billon, 2005; Lujala et al, 2005)

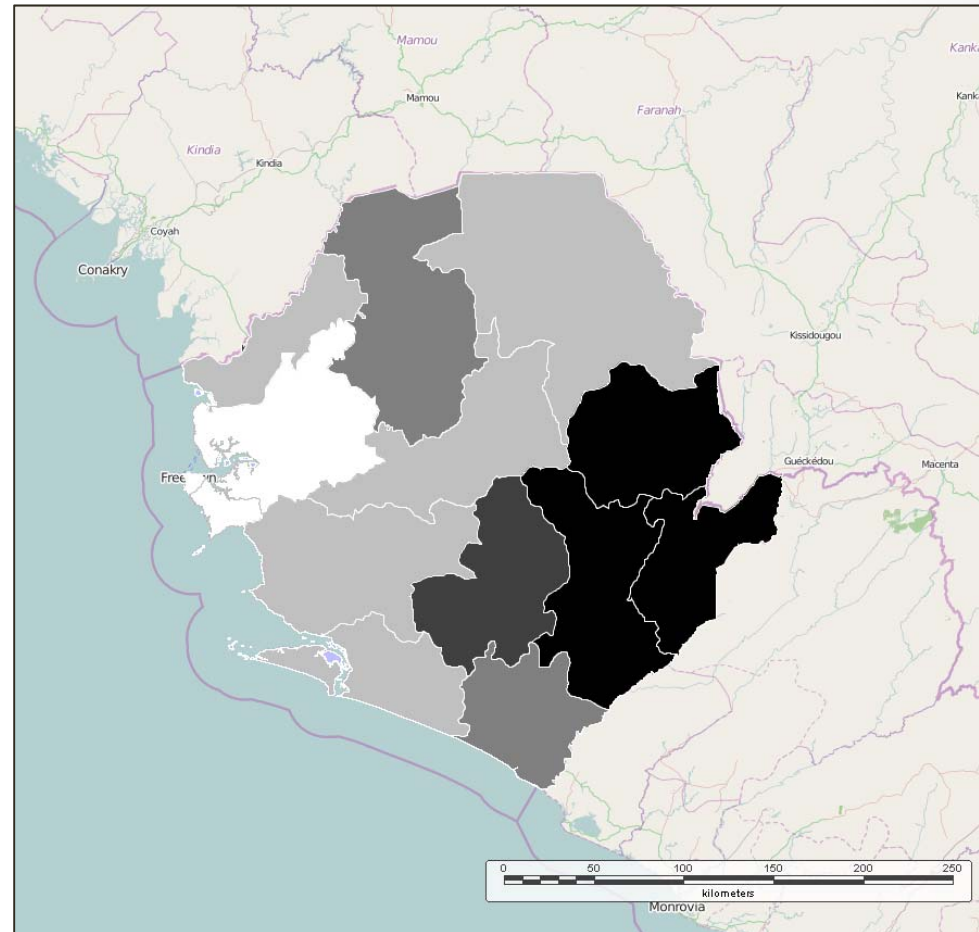
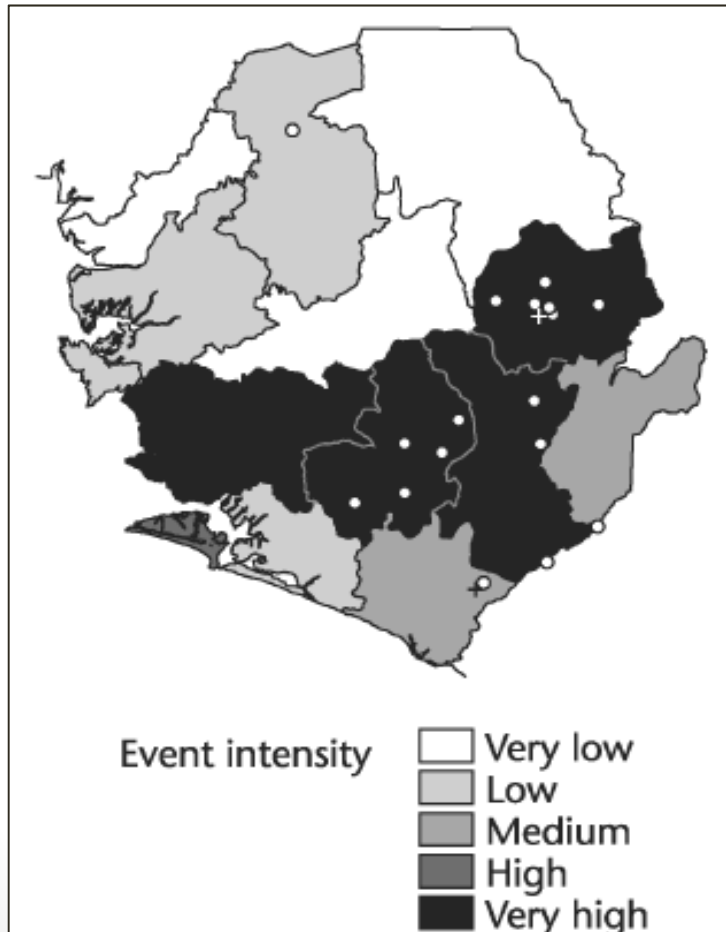
**The Identity Model**  
(Stets and Burke, 2000)

# MOVIE





# Qualitative Agreement of Model Results



# The Impact of the Spatial Dispersion of a Resource

- Experiments were performed seeking to replicate Le Billon's (2001) theory about the spatial dispersion of resources and its impact on the type of conflict

The relationship between the spatial dispersion of a resource and conflict type.

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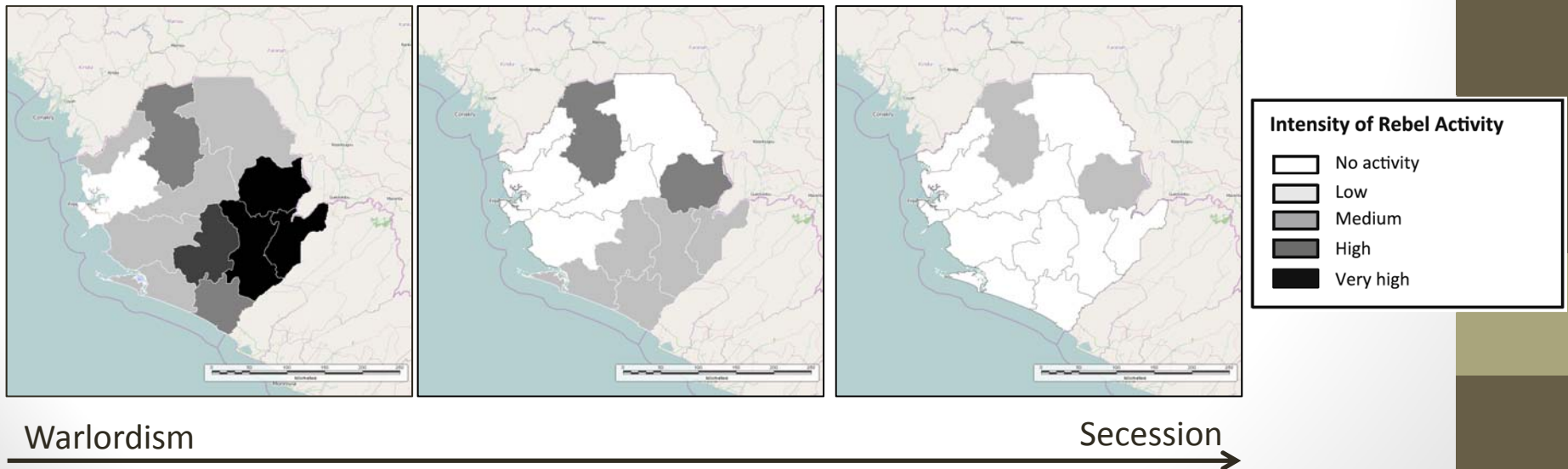
Experiment specifications

Experiment	Parameter	Range	Location of Diamond Mines
Distant	Government Control	[0, 1]	Actual
Proximate	Government Control	[0, 1]	Freetown



# Results – Distant Resources

- No government control
  - Widespread conflict emerged spatially similar to the actual situation of Sierra Leone
  - Spatial dispersion seems to support warlordism
- Increasing government control
  - Displaces the conflict
  - Conflict is contained to the periphery of the country
  - Spatial dispersion looks to support succession



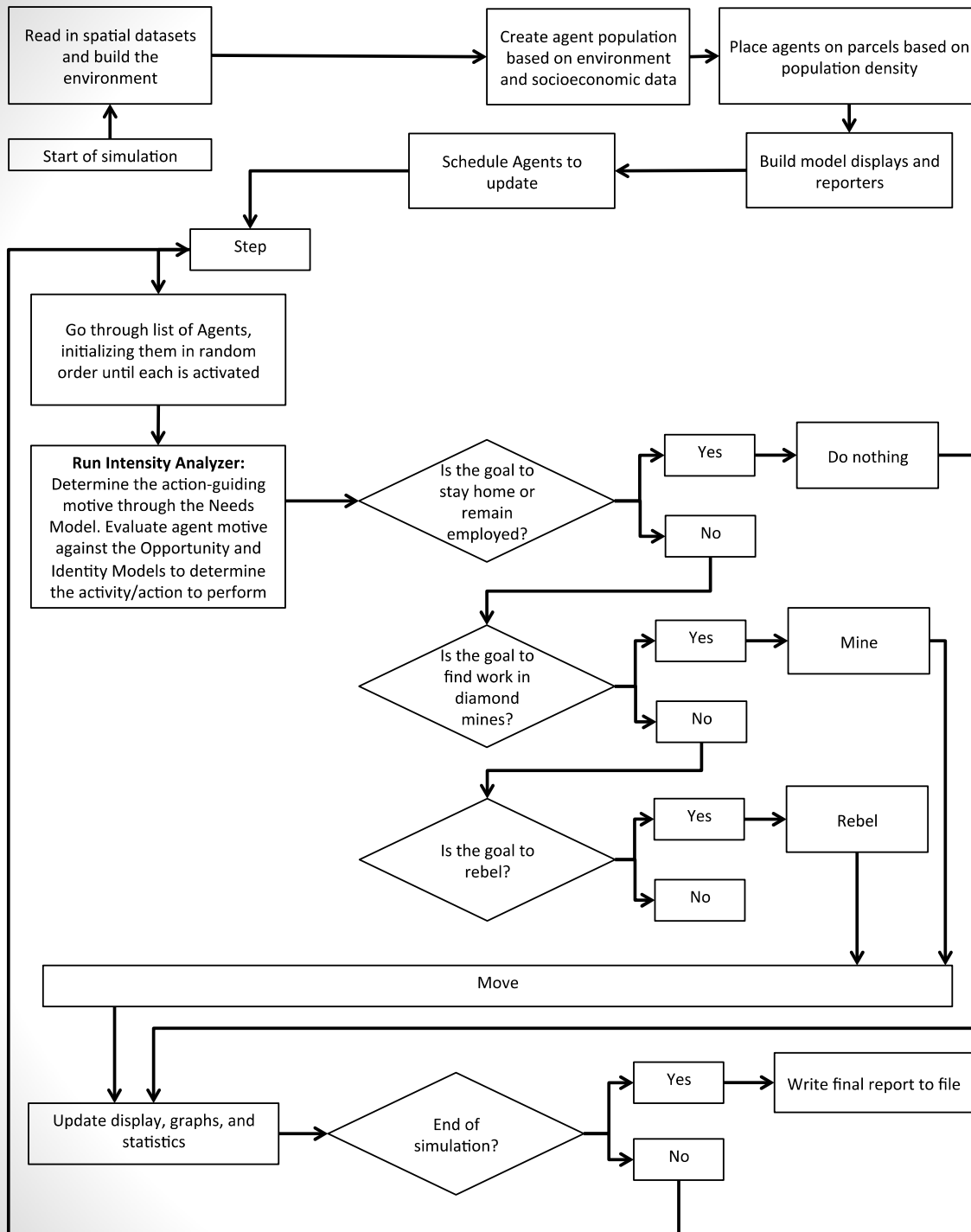
# Results – Proximate Resources

- When the resource moves to the city so does the violence
  - Conflict is contained, even with no government control
  - Minimal control is sufficient to prevent rebellion
  - Difficulty in supporting the case of state coup



# Summary

- Through the integration of ABM and GIS, the model explores Le Billon's theory and the impact that the unique socioeconomic attributes of a region and its population can have on the onset of conflict
- Spatial dynamics were observed as diamond mines were made more secure and moved near city centers
- Model results support Le Billon's argument for distant resources
  - Warlordism is associated with diffuse and distant resources
  - Secession is associated with point and distant resources
  - Model results do not support or reject the argument for proximate resources
- When an environment is ripe for conflict, this type of model could potentially provide insights into the locations most prone to conflict and the characteristics of the conflict



## The Agent-Based Model

Figure 5-4. Flow diagram of key processes.