**Project Report**

**Incorporating waterborne disease dynamics in the Urban Vulnerability model**

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**Motivation and Research Question**

Andres Baeza et al. have developed an agent-based socio-hydrological model that simulates the coupling between the decision-making processes of influential actors and infrastructure-related hazards. The focus is on the emergent feedback that is an outcome of the interplay between the decisions of the water authority and a socio-political factor defined as resident protests, which is driven by their exposure to flooding and scarcity. Our objective was to incorporate spatially-explicit infectious disease dynamics in the current model, and further expand the decision-making algorithms to include disease incidence as a criterion.

**Description of changes to base model**

* No new entities
* New global variables:

*total-pop* ; total human population in the model landscape

*total-infected* ; total infected individuals in the model landscape during a time step

*total-prev* ; average prevalence in the model landscape during a time step

* New patch variables:

*num-sus*  ; number of susceptible individuals on a patch

*num-inf* ; number of infected individuals on a patch

*prop-infected*  ; proportion of infected on a patch (patch prevalence)

*cumul-infected*

*cumul-infected-100*

*cumul-flood-100*

* New procedures:

*to patch-pop-density*  ; procedure to populate neighborhood patches

normally distributed with an average of 3000 and SD of 375

*to outbreak*  ; simulates SI model, once a time step

*to outbreak-dynamic* ; simulates SI model, 30 sub-steps every time step

*to spillover* ; simulates disease spillover to neighboring patches

* New Interface elements

**Model exploration (scenarios/experimental design, parameter settings, etc.)**

**Results**

**Reflections on results and exercise**

***Please include your Netlogo code***