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Disaster Risk Management: Decision Support System

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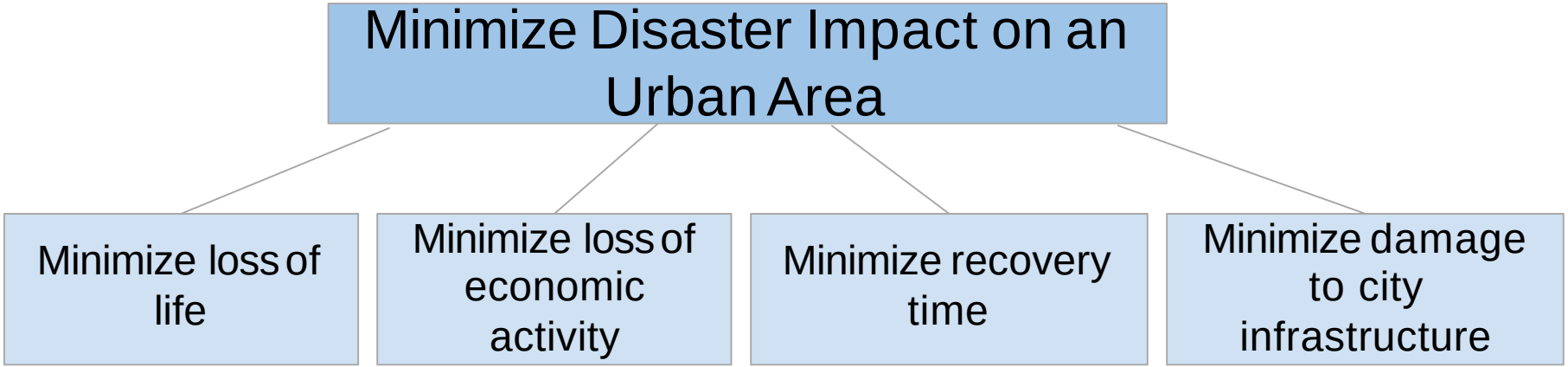
Fundamental Objectives



Area of Study

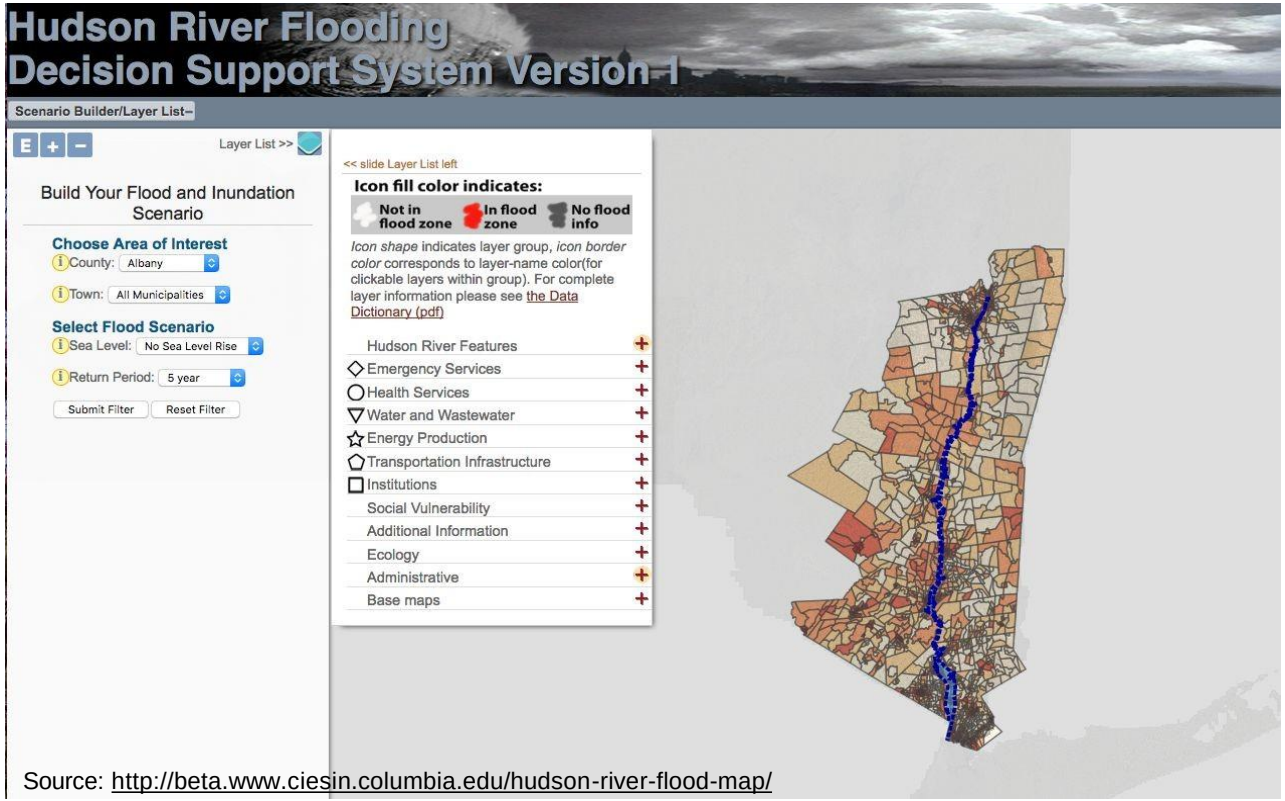
This Decision Support system is a complementary tool for the Flood map the University of Columbia and Stevens Davidson Lab constructed for assessing the consequences of different levels of flooding in the hudson river plain.

For this project we only choose Columbia county with 7 municipalities affected by flooding in the Hudson River.

Assess Flood Severity

For the flood probabilities, we use the rate of return for floods with 5, 10, 20 , 50, 100, 200, 50, 1000 rate of return.

The rate of return of 5 means the probability of a storm of ⅕= 20% of that severity in one year



Source: http://beta.www.ciesin.columbia.edu/hudson-river-flood-map/

Consequence Table Attributes

1. Population affected
2. Value of assets affected
3. Level of flooding
4. Estimated time of implementation
5. Value of critical infrastructure affected
6. Budget
7. Severity of storms

Alternatives

1. Relocation of affected population
2. Flood Barriers to contain the damage
3. Backup power plants
4. Deploy Community Emergency Response Team (CERT)
5. Deploy Emergency transportation (Helicopters,Boats etc.)
6. Supply Food and Clean water

Mathematical Model

1. Multi-Attribute Utility Theory
2. Certainty equivalent approach to assess utility functions
3. Swinging weights
4. Probabilities are assessed based on Risk of Return range(5-1000).

Model Assumptions

- The current model assumes the independence of our Attributes.
- The range of our Attributes for each severity level is based on real dataset collected for each severity level in seven towns of Columbia County.

Functionality

- User is asked to select the following:
  - Location: [One of the seven towns in Columbia County, NY]
  - For each town, there are two attributes the user is asked to enter : [Population Affected and Time for implementation].
  - The data of each attribute for each Risk of Return per town, which is between (5-1000), is picked up from database using Vlookup Excel Function.
  - The Consequence table is updated based on this data.

User Interface

Disaster Risk Management Decision Support System

Columbia County

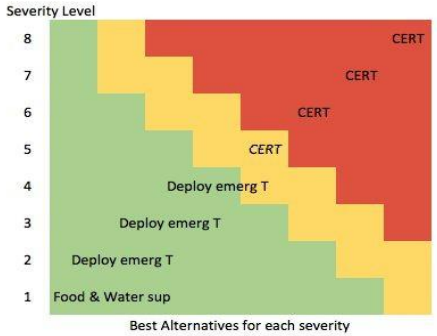
Location	Clermont
Population affected	6,999.00
Time (hours)	5

Clermont
Germantown
Greenport
Hudson
Livingston
Stockport
Stuyvesant

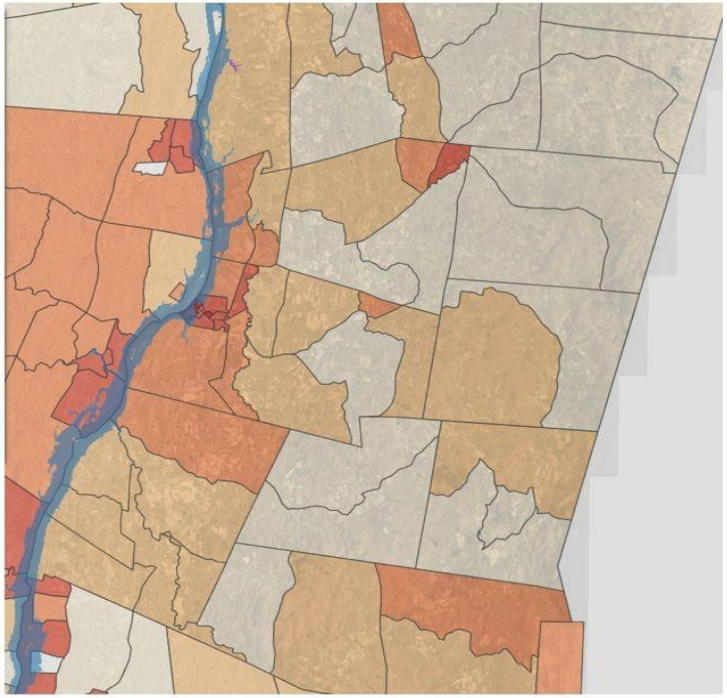
Mitigation Startegy

Flood Barriers	A specific type of floodgate, designed to prevent a storm surge or spring tide from flooding the protected area behind the barrier.

Risk Matrix



Columbia County - Hudson Riverline flood Map



Scope of the Design

- The DSS helps the decision maker to choose an emergency action based on the time they have till the disaster hits (weather forecasts) and how many people are in the area (dynamic). This system can be extended to other locations (reusable).

Questions and Suggestions