Expanding Ecosystem Services Using a Network Based Approach to Green Infrastructure



Julie Ulrich 12.10.2014



Protecting nature. Preserving life."





**Ecosystem services** 

Resilience from climate change = natural infrastructure

Watershed approach

Scaling up

Bringing ecology back into the equation







## Infrastructure Exposure Development



## **Ecosystem Exposure**

Protection

#### **Flood Hazard Composite**

1Hazard 2Hazards 3Hazards 4Hazards 5Hazards 6Hazards

#### Development

High Intensity Developed Medium Intensity Developed Low Intensity Developed **Open Space** 

Natural Areas and Open Space Wetlands

Other Natural Areas and Open Space

Beaches and Dunes



### Natural Areas and Open Space



**Ecosystem Exposure** Potential Pollution Sources





# Opportunities

### Green stormwater infrastructure + small scale brownfield sites =

A way to expand ecosystem services in communities along the Delaware River while simultaneously addressing two legacy issues in our cities

### **\*\*** Strategic prioritization of green infrastructure

- Flood reduction + stormwater management
- Water quality
- Neighborhood improvements
- A new methodology to help revitalize communities



## Ecosystem Service Connectivity Example









### North Camden Existing Land Use

**41**% Brownfields 32% Residential

Over one mile of brownfields along riverfront and no public access to either river

EPA report, 2011, found that brownfield redevelopment reduced stormwater runoff by 47-62%

Map created by Xinlin Huang











Source: Baltimore Ecosystem Study

# **Project Goals**

- Strategic prioritization of green infrastructure
- Incorporating a multiple benefits, ES approach
- Measuring impact, help build a portfolio of regional data
- Bridging different world views
- A new methodology to help revitalize communities
- Influence urban decision making



#### **Camden Contaminated Sites and Vacant Housing Units**







Home	News	Sports	Entertainment	Business	Food
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Collections - Demolition

### Camden plans to demolish nearly 600 houses



Vacant house on Sheridan St. The first demoiltions are funded by a \$970,000 U.S. grant. (RON CORTES / Staff)



By Julia Terruso, Inquirer Staff Writer POSTED: October 15, 2014





#### GIS analysis will deliver:

- Location of Camden's small scale neighborhood brownfield sites & ownership
- Community –scale analysis to determine which specific neighborhoods to select for pilot study

#### Hydrologic analysis of Camden and the Cooper River Watershed will deliver:

- A relative quantification of local versus upstream stormwater contributions to understand flood patterns
- Critical areas of flooding and stormwater hotspots in Camden neighborhoods. People affected vs. feasibility
- Identification of areas where GI projects could be clustered to have the most impact both within a neighborhood as well as across a watershed if possible
- Per parcel, the potential impact of site-specific green infrastructure applied to brownfield redevelopment to reduce stormwater runoff and if feasible, to reduce flooding

#### Economic and Social Valuation will deliver:

- A dollar value for flood reduction and stormwater capture per square foot or acre (scale to be determined) of green infrastructure redevelopment on small scale brownfield sites
  - List of potential neighborhood benefits that could be gained from conversion of network parcels into green infrastructure demonstration sites. Existing flood and economic data will be used in this determination.

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Apply ecological filter Apply social filter Select pilot neighborhoods Use SWMM + CUENCAS models Design + construction + monitoring on selected pilot sites





Work across the rural-urban gradient to incorporate a watershed approach





## **Project Outcomes**

- Investigating a new approach + developing new tools
- Creating a model for replication in Urban Waters partner cities
- Ecosystem service valuation for flood reduction, SW mgmt, economic revitalization, habitat and water quality benefits of test sites
- Locally relevant data collected
- Additional phases of concept designs and green infrastructure redevelopment for a pilot group of parcels



# **Moving Forward**

•This is the first phase of a multi-phase initiative

•Initial results due in February 2015, community engagement begins

•Begin incorporating needs of Urban Water partner cities to develop an effective tool to be shared

•Collaborating With: NJ DEP, CCMUA, CRA, Cooper's Ferry, Camden SMART, NJCF, NJIT, NOAA, USFS, USEPA



# **Final Thoughts**

- Encourage municipalities to maintain better data or work with civic tech groups to make it more accessible
- Stress the need for regional data and comparisons of similar research – we need more case studies incorporating multiple benefits of GI & natural infrastructure
- How to simplify the methodology not every city can run models for every neighborhood



## Thank you, please be in touch!

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