Sustainable South Bronx:

A Community-based Approach to Mitigating New York City's Urban Heat Island Effect

Rob Crauderueff, January 2006

SSB Mission

- Improve Environmental Quality of South Bronx
- Improve Economic Opportunities for South Bronx residents
- Advocate for the just distribution of environmental burdens and benefits
- Project-based approach

Relevant SSB Projects

- South Bronx Greenway
- Hunts Point Vision Plan
- “We Train, You Hire” Ecological Restoration Job Training Program
  - Green Roof Training Program
- Brownfield Redevelopment

  Includes: Affordable Housing

  Recycling Industrial Park
- Green Roofs and Cool Roofs
  - Demonstration Project
  - UHI Research
  - Smart Roofs Installation Business

South Bronx Smart Roof Demonstration Project Team

Partnership between:

- Majora Carter, SSBx Executive Director
- Rob Crauderueff, SSBx Project Manager
- Kathleen Bakewell, Design Director, Susanne Boyle, Landscape Design
- Joyce Rosenthal, Research Director, Columbia University

Why a South Bronx Smart Roof Demonstration Project?

- Cool and green roofs address multiple local environmental problems
  - One of hottest parts of city
  - 4 power turbines in South Bronx
  - 15 waste transfer stations
  - 60,000 diesel trucks per week through Hunts Point
  - 2nd highest asthma hospitalization rate in country
  - Community of color

South Bronx Smart Roof Demonstration Project

- 1000 ft^2 Green Roof
  1700 ft^2 Cool Roof
- Modular System
- Semi-Intensive Green Roof

Relevant Project Goals:

- Political Advocacy
- Research:
  - New York City policy-based research
  - Evaluate economic benefits
- Education
- Community Resource

NYC UHI Research

- Analyzes air quality, energy, public health problems exacerbated by NYC's urban heat island effect
- Cool roofs and green roofs as mitigation strategies
  - Political and Economic Framework
  - NYC and South Bronx Contexts
  - Other UHI Mitigation Strategies Relevant

Working paper "Urban Heat Island Research and Strategies,"Rosenthal,J., Crauderueff, R., Carter, M. Jan 2006. Columbia Earth Institute; Sustainable South Bronx.

Private and Public Direct Benefits of Green Roofs and Cool Roofs in Relation to their UHI Mitigation Benefits

Benefit	**Private**	**Public**	**Market Value?**
Energy Savings	Yes	No	Yes
Reduced Stress on Grid & other Energy Transmission Systems	No	Yes	No
Reduced Greenhouse Gas Emissions	No	Yes	No
Filtered Air Pollution*	**No**	**Yes**	**No**
Public Health Benefits of Improved Air Quality	**No**	**Yes (GR >CR)**	**No**
Public Health Benefits Associated with Reduced Building Temperatures	Yes	No	Yes

Note: Benefits of only Green Roofs in **Black***
Benefits of Both Green Roofs and Cool Roofs in White

Source: Working paper "Urban Heat Island Research and Strategies,"Rosenthal,J., Crauderueff, R., Carter, M. Jan 2006.Columbia Earth Institute; Sustainable South Bronx.

Private and Public Indirect Benefits of Green Roofs and Cool Roofs in Relation to their UHI Mitigation Benefits

Indirect Benefits of UHI Mitigation (Cooling City)	**Private**	**Public**	**Market Value?**
Further Energy Savings (Due to Lower Ambient Air Temperatures)	No	Yes	No
Further Reduced Stress on Grid & other Energy Transmission Systems	No	Yes	No
Prevented Power Plant Construction/Re-powering	No	Yes	No
Public Health Benefits of Improved Air Quality + Lower Ambient Air Temperatures	No	Yes	No
Reduced Greenhouse Gas Emissions	No	Yes	No

Note: Benefits of only Green Roofs in **Black***
Benefits of Both Green Roofs and Cool Roofs in Black

Source: Ibid.

Other Private and Public Benefits of Green and Cool Roofs

Co-Benefits	**Private**	**Public**	**Market Value?**
Reduced Water Treatment/CSO*	**No**	**Yes**	**No**
Associated Prevention of Water Treatment Facility Construction*	**No**	**Yes**	**No**
Associated Improvement of Estuary Water Quality*	**No**	**Yes**	**No**
Roof Protection	Yes	No	Yes, but long-term
Building Amenity*	**Yes**	**No**	**Yes**
Educational Tool	Yes (GR more than CR)	Yes	No
Aesthetic Value (Potential addition of open space)*	**Yes**	**Yes**	**No**
Urban Agriculture*	**Yes**	**No**	**Yes**
Biodiversity*	**Yes**	**Yes**	**No**

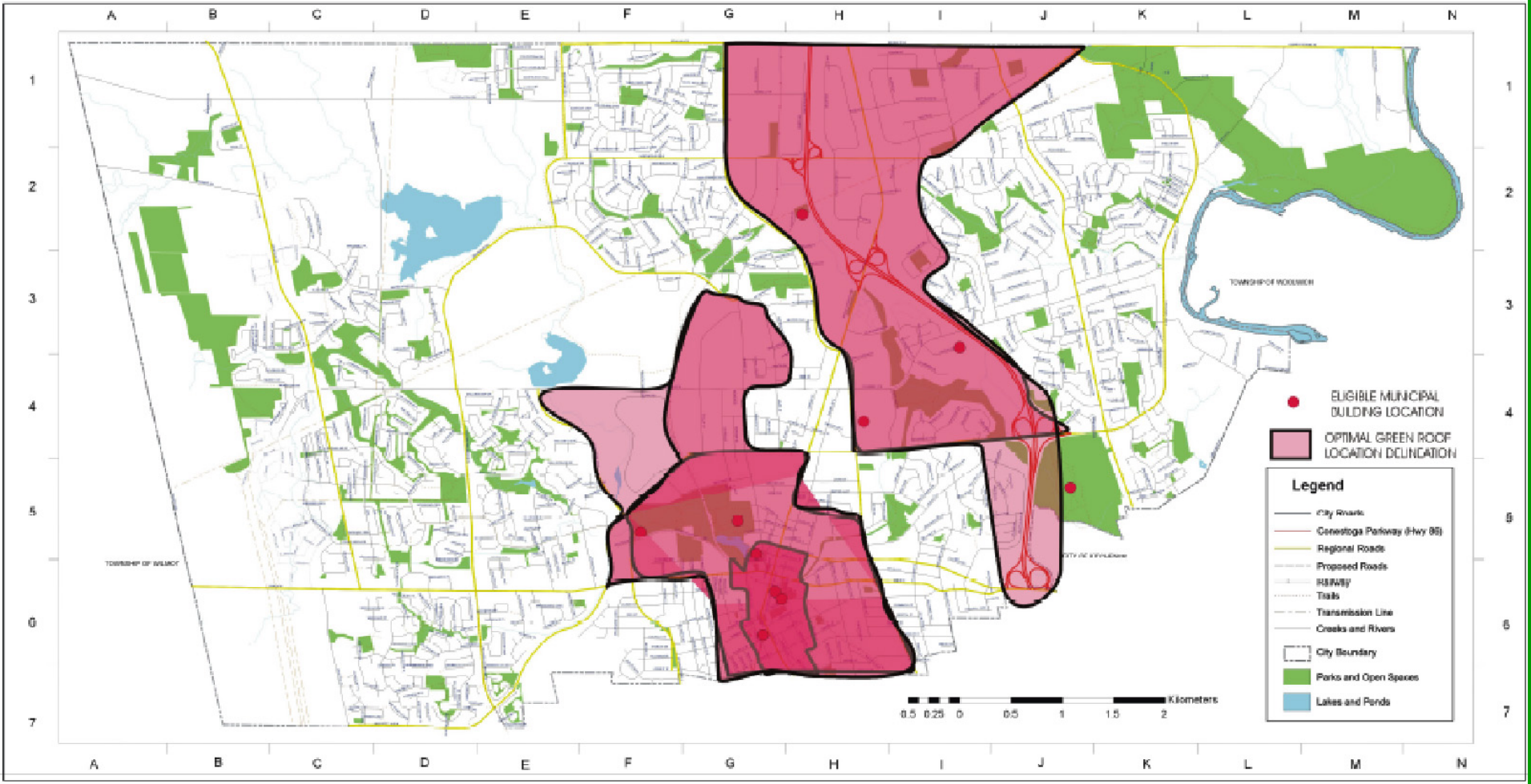
Charts adapted from Hockert, 2004
Note: Benefits of only Green Roofs in **Black***
Benefits of Both Green Roofs and Cool Roofs in Black

Source: Ibid

Key Findings

1. Heat island mitigation strategies should be understood in terms of their multiple benefits
2. Need better understanding of GR benefits in NYC
3. Need better dissemination of CR benefits in NYC
4. Need to assess economic viability in co-benefits of GR's, such as CSO

Geographic and Demographic Based Cost-Benefit Analysis



From City of Waterloo, 2005

Political Framework

- NYC heat island reduction strategy created and implemented by community-based team supported by City departments
  - City Agencies include: Economic Development Corporation (energy), Department of Environmental Protection (water), Department of Health and Hygiene
- All new City buildings should have a green roof
- Create incentives for private building owners based on interests across departments (Energy Reduction, Asthma Hosp. Rate Reduction, CSO Reduction, etc.)
- Incentives should be proportional with public benefits

Future Goals

- Push forward community-based UHI mitigation strategy in NYC
- Cool and green roof installation business
  - Living wage jobs to improve environmental and economic well-being of the South Bronx
  - Launch summer, 2006
- Assess cool and green roof capacity in South Bronx