Flood Plain Reclamation
Where do we start?

Rutgers Cooperative Extension
Water Resources Program

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Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.
Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

The Water Resources Program serves all of New Jersey, working closely with the County Extension Offices.
What is a Flood Plain?

Figure 1.20: Hydrologic and topographic floodplains. The hydrologic floodplain is defined by bankfull elevation. The topographic floodplain includes the hydrologic floodplain and other lands up to a defined elevation.
Functions of Flood Plain

• Provides storage during large storm events
• Reduces stream velocities during large storm events
• Buffers development from flooding
• Provides wildlife habitat
• Cleans the water
Building in Flood Plains

- Increases overall flooding by displacing water into other areas
- Greater financial losses through property damage
- Increases risks to human safety
Altering the Flood Plain

• Streams meander causing natural alterations in the flood plain
• Filling of flood plains for farming, building, and roadways
• As flood plains are reduced stream velocity increase causing back erosion
Streams Meander!
Houses in the Flood Plain
• More pavement, more stormwater runoff, more flooding
• NJ has 12.1% impervious cover or 1,055 square miles or 675,200 acres
• 1 inches of rainfall = 18.3 billion gallons of runoff
Too Many Impervious Surfaces
Rescuing Flood Plain Properties
Now What?...What do you do with a rescued flood plain property?

- Remove the homes
- Stabilize the site
- Create a restoration plan that includes:
  - Flood Storage
  - Water Quality Treatment
  - Passive Recreation
  - Wildlife Habitat
  - Open Space

Denville, New Jersey
WE NEED A PLAN!
Map Flood Plain Areas

- Valuable assets for habitat corridors and recreation
  - 78% Urban
  - 6% Forest (~92 acres)
  - 1% Water
  - 15% Wetland (~230 acres)

- Water quality protection
  - Passaic River is northeastern New Jersey’s largest source of drinking water

- Remaining sites are continually threatened by encroachment, over-use, concentrated wildlife populations, and invasive exotics
Make Connections!

• Identify regional open space resources
• Piece together fragmented habitats
• Take advantage of previously underutilized and disturbed sites
• Link to the larger community
• Explore green building, stormwater management and sustainable landscape design
• Create a desire for community awareness and participation
Partner Up!

- Environmental planning and regulatory compliance
- Open space preservation and habitat restoration
- Passive recreation and wildlife observation opportunities by way of trails and interpretive areas
- Restoration and enhancement of wetlands, creeks and river corridors
- Community education and stewardship
Get Community Support!
It’s all about partners
It’s all about relationships
It’s all about future generations
Engage the Community in the Design Process
CREATE A CONCEPT PLAN

SHOW WHAT YOU CAN SHARE

YOUR VISION
Get Funding

- Sell it to FEMA or NJ Blue Acres – flood protection, getting people out of harms way
- Sell it to NJ Green Acres – preserving open space
- Sell it to the Wetlands Mitigation Council – restoring wetlands
- Sell it to NOAA – community based restoration project (habitat)
- Sell it to NJDEP – stormwater mitigation project
- Sell it to local businesses – a feel good way to contribute to their community
- Sell it to Bergen County!!!
Build It!

Use your funding for materials and …

• Get municipality and county to help
• Get the parks department to help
• Get community groups involved
• Get volunteers to help (especially the kids)
Maintain It!

• Everything needs maintenance
• Volunteers can help but someone needs to be responsible for keeping on top of it
FLOOD PLAIN RESTORATION STRATEGIES
Restoring Ecological Function

- Soil erosion control
- Wetland mitigation and restoration
- Streambank and shoreline stabilization
- Stream restoration
- Habitat enhancement
- Greenway and riparian plantings
- Stormwater Best Management Practices (BMPs)
- Watershed restoration
Creating Open Space & Greenways
Developing Passive Recreation Opportunities
CASE STUDIES

Rahway River Flood Plain Restoration
Teaneck Creek Flood Plain Restoration
Hamilton Township Water Resources Plan
Thomas Jefferson Middle School
Rockaway River Flood Plain Reclamation in Denville
Rahway River Urban Flood Plain Restoration Project

- Rahway River Watershed is highly urbanized and subject to frequent flooding.
- FEMA and NJ Green Acres purchased 4 ½ acres of developed flood plain and turned over to City.
- City relocated residents and razed existing buildings.
- Goal was to restore site to natural flood plain, integrate into existing Union County Parks greenway along the river, provide wildlife habitat, and public education/passive recreation.
Primary Partners

• City of Rahway - Current Property Owner
  – Grant administration
  – Significant in-kind construction contribution
• Union County Parks - Future Property Owner
  – Grant administration
  – Significant in-kind construction contribution
  – Coordinate volunteers
• NY/NJ Baykeeper - Grant Administration, Habitat Restoration, Coordinate Volunteers,
• Rahway River Association - Recruit Volunteers, Long-Term Monitoring
• TRC Omni Environmental Corp. - Design, Grant Writing, Permitting, Construction Mgt., Training and Supervising Volunteers
Additional Contributors

- Wetlands Mitigation Council - Funding for design and construction
- NOAA - Funding construction
- NJDEP - Funding construction
- Fish America Foundation - Funding construction
- Merck Foundation - Funding for construction
Riparian Flood Plain Wetlands

- Provide flood buffering and storage.
- Provide wildlife habitat.
- Natural filtering of overland runoff.
- Hydrology:
  - Overland, near surface flow, groundwater
  - Inundation from river
- Soils typically stratified alluvial drift with layers of sand, silt or clay.
Timeline

• 1996  Decision to pursue buyout
• 1997  Green Acres FEMA Application
• 1998  Purchase, develop vision
• 1999  Build support, begin demolition
• 2000  Write grants, remove houses
• 2001  Design, permits, more grants
• 2002  Initial construction, planting
• 2003  Complete construction, planting
• 2004  Begin Long-term monitoring
Conclusions

• A successful flood plain reclamation project is a long, complex process
• Requires a strong partnership with “can do” attitude and strong vision
• Must be willing to be flexible and pursue diverse funding opportunities
• Doesn’t happen by itself - takes a lot of hard work
Teaneck Creek Flood Plain Wetland Restoration

- Partnership between Teaneck Creek Conservancy, Rutgers University Water Resources Program, and Bergen County to prepare a flood plain wetland restoration project including passive recreation, flood storage, and habitat enhancement.

- Partnered with US Fish and Wildlife Services for invasive species (*Phragmites australis* & *Polygonum cuspidatum*) management.

- Reconnected stream channel to existing flood plain wetlands.

- Managed stormwater runoff to minimize flooding.
Wetlands Research & Restoration Design

EXISTING WETLAND AREAS
(26 acres)

PROPOSED RESTORATION ZONES

A
B
C
D
Hamilton Township (Mercer County)

In June 2011, the Rutgers Cooperative Extension (RCE) Water Resources Program partnered with Hamilton Township (Mercer County) to evaluate watershed and stormwater management issues and to develop recommendations for improving and protecting water resources in the community. The partners are working together to complete a Township-wide evaluation of water resource management needs and to set forth priorities and recommendations for actions needed to address hydrologic issues.
The recommended actions will support a series of goals established for Hamilton Township in its ongoing efforts to address water resources. These goals include:

- Engage the community in water resource protection
- Manage water quality
- Minimize localized flooding
- Implement Phase II stormwater controls
- Improve stormwater facility maintenance
Hamilton Township
(Mercer County)

- Development of hydrologic model
- Inventory and assessment of stormwater management basins
- Development of comprehensive GIS database of stormwater infrastructure
- Prepare a stormwater mitigation plan
- Complete an impervious cover analysis
- Develop site suitability analysis (for stormwater BMPs)

- Conduct riparian investigations with Environmental Commission
- Develop and implement property owner education program
- Complete a second rain garden demonstration project
- Continue stormwater basin pilot maintenance program
- Implement stormwater basin retrofits and repairs
Teaneck Creek
Riparian Restoration

Project Location:

Thomas Jefferson Middle School
Teaneck, NJ
Partner: Teaneck Board of Education
Project Summary

- Partnered with Teaneck BOE to complete stabilization and restoration along 100 feet of stream at Thomas Jefferson Middle School
- Completed restoration design plans and permits to reestablish a native “Floodplain Forest” riparian buffer
- Successfully installed in summer 2008
- Partnered with US Fish and Wildlife Services for invasive species (Japanese Knotweed) management
- Required a combined engineering and landscape design approach
Thomas Jefferson Middle School
Fycke Lane, Teaneck, NJ
“Owners of 11 homes on Denville’s Riverside Drive have finalized agreements to sell their houses to the township, which will demolish the structures under a program administered by Morris County. The vacant land will be permanently preserved as open space…”

“Township officials have met with members of the Rutgers Cooperative Extension Service, who are helping plan the new community gardens with plants that "absorb the water" and serve as a "buffer" to "mitigate future flooding…”

(nj.com, 2012)
Flood Plain Restoration Project Existing Conditions
Township of Denville, New Jersey

The existing properties currently consist of single-family residential structures with several outbuildings, playsets, and typical suburban landscape vegetation. When these properties are cleared, effort should be given to protect large existing healthy trees (mainly oak and maple) adjacent to the Rockaway River as well as any healthy vegetation along perimeter property lines that will help to buffer the new open space areas from adjacent residential properties.
Flood Plain Restoration Project Proposed Conceptual Plans
Township of Denville, New Jersey

In March, Morris County freeholders set aside $16 million from the county's open-space fund to buy flood-prone residential properties as it established its flood mitigation program. The program is now moving forward with the N Denville purchases finalized and 66% more approved and in negotiations on Lincoln Park, Parsippany, Peapack and Riverdale. "It's impressive how responsive the town has been on behalf of the residents," said Jennifer McCullough, coordinator of the program. "We've already encumbered half the funding," she said, reporting that $7.5 million of the $16 million has been allocated. Meanwhile, the Federal Emergency Management Agency's commitment to frame purchases as part of the program presently totals $11.56 million, according to data provided by McCullough. "We still have applications coming in," she said.

Township officials have met with members of the Rutgers Cooperative Extension Service, who are helping plan the new community gardens with plants that "absorb the water" and serve as a "buffer" to mitigate future flooding," Wand said.

Wand said the township will also be seeking input from neighbors on plans for the vacant land, which might also include nature paths.

Ben Horowitz, The Star-Ledger (December 16, 2012)

PROJECT DESCRIPTION
With the purchase of several flood-prone properties located in the floodplain of the Rockaway River, the Township of Denville has the opportunity to enhance open space resources available for its residents and protect the community from future flood damage. The residential properties purchased along Riverside Drive are located within the 100-year flood plain and recently suffered significant damage from flooding. When the Township takes possession of these properties, existing structures will be demolished and removed and the remaining landscape will become part of the open space infrastructure of the Township. This preliminary concept plan for the end uses at each of these properties will enhance the community's ability to appreciate and enjoy the Rockaway River while improving flood storage. Once demolition and clearing of the properties is complete, a series of improvements will be made that will improve access to the River as a recreational resource while improving flood storage. The plan shown here propose several improvements including:
- Canoe/kayak launch access to the Rockaway River
- A series of rain gardens to provide stormwater management & increase flood storage
- A small porous pavement parking area for visitors with canoes and kayaks
- Seating
- Planting of native vegetation

PLANT LIST
<table>
<thead>
<tr>
<th>Key</th>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Description/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>P.J.M. Rhododendron</td>
<td>Rhododendron x 'Ward'</td>
<td>Evergreen foliage, showy pink flowers early spring</td>
</tr>
<tr>
<td>BN</td>
<td>River Birch</td>
<td>Betula nigra</td>
<td>Ornamental bark year round</td>
</tr>
<tr>
<td>CF</td>
<td>Flowering Dogwood</td>
<td>Cornus florida</td>
<td>Red fall fruit, white blooms in early spring</td>
</tr>
<tr>
<td>IC</td>
<td>Inkberry Holly</td>
<td>Illex glabra</td>
<td>Evergreen leaves and dark fruit</td>
</tr>
<tr>
<td>CS</td>
<td>Creeping Phlox</td>
<td>Phlox subulata</td>
<td>Dense-growing groundcover with pink or purple spring blooms</td>
</tr>
<tr>
<td>LS</td>
<td>Little Blue Stem</td>
<td>Schizachyrium scoparium</td>
<td>Blue-tinted grass blades in spring that turn red in fall</td>
</tr>
<tr>
<td>BT</td>
<td>Butterfly Milkweed</td>
<td>Asclepias aspera</td>
<td>Yellow/orange blossoms early summer through fall; attracts hummingbirds, bees, butterflies &amp; other insects</td>
</tr>
<tr>
<td>HF</td>
<td>Witch-hazel</td>
<td>Hamamelis virginiana</td>
<td>Yellow/red flowers in the winter</td>
</tr>
<tr>
<td>MV</td>
<td>Sweetbay Magnolia</td>
<td>Magnolia virginiana</td>
<td>Evergreen foliage, fragrant white summer blooms</td>
</tr>
</tbody>
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Questions?

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