



Susan Gouveia

From: Lashway, Lisa
Sent: Wednesday, May 08, 2013 3:49 PM
To: Canning, Sean; Susan Gouveia
Subject: FW: Important Resources for Flood Mitigation
Attachments: Flood Mitigation Workshop Summary and Resources.pdf

Lisa Lashway
Mt. Olive Twp. Clerk
973-691-0900 Ext. 7291
FAX 973-691-2080
PO Box 450
Budd Lake, NJ 07828

From: Sara Malone [mailto:sjmalone@ejb.rutgers.edu]
Sent: Wednesday, May 08, 2013 3:44 PM
To: Sara Malone
Cc: Judy Shaw
Subject: Important Resources for Flood Mitigation

Greetings!

The Sustainable Raritan River Initiative recently conducted a flood mitigation workshop at the Raritan Valley Community College entitled, ***Flood Mitigation and Hazard Reduction NOW!*** This event was co-sponsored by the Raritan Millstone Flood Control Commission, the Hillsborough Tree Mitigation Committee, the Manville Shade Tree Commission, and the E.J. Bloustein School of Planning and Public Policy at Rutgers.

We received many inquiries about this workshop and so **we have prepared and attached a workshop summary and a resource list** that will be helpful to Floodplain Managers, Municipal and Professional Engineers, Planning Departments, Departments of Public Works, and Business Administrators (among others) as they deal with stormwater management and risks of storm and flood damage.

Would you **please pass the attached document along** to them and to anyone else who would be interested in this information? You can also point interested parties to our Website at www.raritan.rutgers.edu; there is a link on our home page leading to these materials.

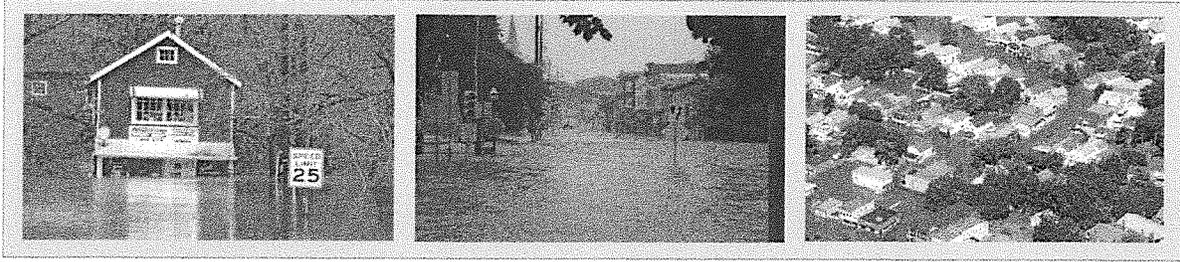
Thank you for your help with this, and let Judy Shaw or me know if you have questions or need additional information.

Best regards,

Sara

Sara J. Malone, MES, Research Associate
Rutgers, The State University of New Jersey
Sustainable Raritan River Initiative
www.raritan.rutgers.edu

Environmental Analysis and Communications Group
E.J. Bloustein School of Planning & Public Policy
33 Livingston Avenue
New Brunswick, NJ 08901
cell: 908.892.0020
simalone@ejb.rutgers.edu



Workshop Meeting Notes and Resources
Flood Mitigation and Hazard Reduction *NOW*
Raritan Valley Community College, Branchburg
March 16, 2013

The Raritan Millstone Flood Control Commission featured the *Flood Mitigation and Hazard Reduction NOW* workshop as the main agenda item for its March meeting. Sponsored by the Sustainable Raritan River Collaborative, the session focused on a wide range of issues related to actions that can be taken today to reduce risk of flooding. The session was co-sponsored by the Hillsborough Tree Mitigation Committee, the Manville Shade Tree Commission and the E.J. Bloustein School of Planning & Public Policy at Rutgers University with support from New Jersey American Water.

What is the Sustainable Raritan River Initiative and who is the Collaborative?

The Sustainable Raritan River Collaborative is a group of over 125 concerned parties representing non-profit organizations, government, regional planners, businesses and academics who share a concern for the future of the Raritan River region. In 2009, the Collaborative identified five key goals, outlined in its *Regional Action Plan, Reclaiming the Raritan: a Restoration and Sustainable Reuse Plan*. The five commitments contribute to the restoration and future protection across the 98 municipalities of Raritan River watershed. This program addresses our commitment to stormwater mitigation and infrastructure improvements and detailed in the *Improvements to Water Quality, Stormwater, and Infrastructure Report*. For more information about the Sustainable Raritan River Initiative and how you can participate in activities to improve our regional quality of life, visit our Website at www.raritan.rutgers.edu.

Program:

Panel #1: *What We Can Do Now to Reduce Our Risk*

- Dr. Judy Shaw, Rutgers, Bloustein School of Planning & Public Policy, Moderator
- Dr. David Robinson, State Climatologist
- Jim Waltman, Exec. Director, Stony Brook Millstone Watershed Association

Panel #2: *Regional Hazards and Low Tech Solutions*

- Mark Gallagher, VP, Princeton Hydro, Moderator
- Cynthia Addonizio-Bianco CFM, LEED AP BD+C, Tetra Tech
- Jillian Stokely, FEMA
- Dr. Chris Obropta, PE, Rutgers Cooperative Extension
- Alec McCartney, NJDEP Forestry Program

Panel #3: *Partnerships*

- Joe Ruggeri, NJDEP, Moderator
- David Gentile, PE, US Army Corps of Engineers
- Dr. Stephen Souza, Princeton Hydro
- Kerry Miller, ANJEC

Summary:

Frank Jurewicz, Chair of the Raritan Millstone Flood Control Commission, opened the workshop with a brief overview of the Raritan-Millstone Rivers Flood Control Commission.

- Started in January 2012 and now includes ten municipalities along the two rivers
- A United States Army Corps of Engineers (USACE) feasibility study is in progress. It needs additional funding to move forward
- While waiting for USACE to proceed, the RMRFCC wants to advocate for short-term projects that can be done now, because big projects take time. Education is what this is about; helping us learn how we can act now

Dr. Judy Shaw, Director, Sustainable Raritan River Initiative, thanked everyone for coming and acknowledged displays from various organizations in the back of the room including:

- Somerset County Office of Emergency Management
- Maps of RMRFCC Tree Cover and Impervious Surfaces, Amy Pivak, EJ Bloustein School
- Low Impact Design
- American Red Cross

Dr. Shaw asked the participants to offer their expectations for the workshop so speakers could address their issues in their remarks. Expectations included:

1. Ideas for what towns can do now
2. What we can do personally
3. Information on the future of the Island Weir
4. The importance of realistic expectations about what can and cannot be done
5. An explanation of why the USACE study is so expensive
6. What we might have as a regional structure for watershed management
7. Benefits of retention ponds
8. Contribution of green infrastructure
9. Contribution of wetlands
10. How to reduce the wait-time for blue acres funding
11. Ways to improve our older stormwater systems
12. Debris management
13. How to minimize risk

Before introducing the panels, Dr. Shaw also mentioned **Mary Bruno's book**, *An American River: From Paradise to Superfund, Afloat on New Jersey's Passaic*, and asked those present to mark their calendars for Tuesday, **June 11, 2013** ([register here](#)) for the Sustainable Raritan River Initiative Annual Conference. The NJDEP expects to have new standards (TMDLs or Total Maximum Daily Loads) for pathogens and nutrients that will impact communities' efforts around non-point source pollutants.

Panel #1: What we can do now to reduce our risk

Dr. David Robinson, State Climatologist and Professor, Rutgers University, gave an overview of what is happening with New Jersey's climate. (See his presentation [here](#).)

- Dr. Robinson's spoke about the impact of climate in the region and recommended several websites for climate data: [Office of New Jersey State Climatologist](#) and the [New Jersey Climate & Weather Network](#) (hourly data)
- The Raritan is a precipitation rich basin. January and February are generally the driest months, but can still have rain events such as the historic February, 1896 flood in Bound Brook. July and August are generally the wettest months with between 4.5 to 5" of rain but are also months of highest evapotranspiration

- He reviewed historic flood data for the region noting that floods have been common in the last century but the biggest floods have been in the past decade:
 - 1972-1989 14 of top 50 floods
 - 2002-2011 9 of top 50 floods
 - 2002-2011 5 of top 25 floods
 - 2002-2011 3 of top 10 floods
- From an historic prospective, New Jersey is getting wetter and warmer. Impacts from storm events are influenced by pre-storm conditions; Hurricane Floyd was preceded by drought while Hurricane Irene was preceded by high average rainfall. Where the rain and wind are concentrated further define a particular event.
- We can expect rising temperatures, increased and steady precipitation, and increased energy in weather systems that intensify both variability and extremes including storms, floods, drought and heat.
- We are responsible for climate change
- Invited volunteers to help with weather observations by visiting the Website www.cocorahs.org, obtaining a special rain gauge, and reporting measurements

Jim Waltman, Executive Director of the Stony Brook-Millstone Watershed Association

introduced the work that the SBMWA does in the Raritan region. They work with the 26 municipalities in the Stony Brook-Millstone watershed to promote municipal excellence on broad range of water quality and water quantity issues.

- Project for municipal excellence was funded by the Geraldine R. Dodge Foundation
 - Studied Municipal Master Plans to identify goals and visions – and made recommendations to municipalities to help them accomplish their goals
 - It also promoted and guided Citizen Science – involvement of citizen in gathering information about the quality of the their communities' natural resources
- Hurricane Irene was a wakeup call!
 - **Hightstown** – need to help residents stay out of harm's way. Move out of the floodplain and limit/reduce harm in other areas. Municipalities have the authority to take action above and beyond state reach
 - Flood hazard and stormwater protection measures such as those adopted in **Cranbury** – 200' banks and **Hopewell** – 150' buffer. These measures regulate disturbance in flood ways and help people/businesses stay out of harm's way
 - Blue Acres money is designed to pay people to move out of flood zones, but the program is underfunded
 - It is critical to control commitment to such programs and citizens need to ask the state to reauthorize Garden State Preservation Trust bond issue
- Flooding – Tragedy of the Commons
 - We have intensified our development in the region and it has shifted the balance of the water cycle; we can't manage our water systems the same way we used to when the area was mostly farms
 - Rain barrels, green roofs, rain gardens collectively help maintain water quality and reduce the impacts of storms across the basin and support/promote community thinking about how to reduce risks
 - A major way to limit harm is to protect woodlands (**Princeton/Hopewell**). Your communities can adopt ordinances on number of trees that can be cut and require mitigation. In Princeton and Hopewell, anyone who removes a tree must replace 150% of trees that are more than 4 ½ feet tall or pay into mitigation fund for planting of new trees

- **Hightstown:** After much discussion, they lowered the threshold for new development and disturbances which obligates developers to undergo greater review and to assess non-structural strategies for minimizing their impact on water quality
- Most problems precede regulation – need to fix mistakes we made in the past
- **Princeton** – Harry’s Brook: Headwater Lake is now the basement of a parking garage and the stream is in pipe. Clearly projects like installing rain gardens, rain barrels, or rain bladders (which fit under decks) are important. They created a Citizens Stormwater project for businesses/residents with modeling exercise from Rutgers
- Use redevelopment as opportunity to fix problems and mitigate stormwater; reduce impervious surfaces, retrofit and opportunities for recreation. Municipalities can adopt policies to require or incentivize this. Volunteers are willing to clear rivers of debris – paddlers, etc.
- Community collective action can resolve many of our storm problems

Representative Rush D. Holt, Jr., joined us briefly and spoke highly of the work being done by the Watershed Association as he was once Chair of the Board for SBMWA.

- Justified with close proximity with USACE – needed to hear it
- Regrets that parties like the Koch Brothers misinformed the public on climate change
- Congressman Holt involves local students in these issues through Sustainable Jersey
- We need to reduce carbon emissions and pursue it in stages that are readily attainable

Panel #2: Regional hazards and low tech solutions

Moderator **Mark Gallagher, Vice President, Princeton Hydro**, commented that most communities usually approve *minimum* standards for developers. The problem with this is that the minimum standards don’t alleviate existing stormwater and flooding problems and may push one community’s problems downstream to another community. He urged municipalities to adopt higher standards. He stressed the importance of a watershed-based, holistic approach.

Dr. Chris Obropta, Water Resources Extension Specialist, Rutgers Cooperative Extension, spoke next about low tech solutions that reduce impacts of stormwater (see his presentation [here](#)).

- A one-inch rainfall event in New Jersey can produce 18.3 billion gallons of stormwater from an estimated 675,200 acres of impervious surfaces in the state – enough rain to fill Giant’s Stadium 38 times
- Need low-tech solutions that work and are cheap
- Examples are pervious surfaces such as porous concrete, dry wells, rain gardens that capture the first inch of rainfall and keep it out of stormwater runoff
- Dr. Obropta presented an example of a 33-acre development of 127 homes on quarter acre lots in a rain event of 1.25” in 2 hours. He showed a progression of how much water can be removed from the storm system if drain spouts were disconnected from the sewers and redirected to rain barrels, rain gardens, dry wells, and combinations of these. He also showed higher rate storm events and improvements if roadway runoff was also captured. It can cost \$10K to \$100K per acre for improvements for pervious surface, but the savings in water runoff and contributions to flooding are significant
- We need to take responsibility for stormwater – think regionally. We have resources/ability to deal with nuisance flooding – 10 year design storm – contact **Rutgers Cooperative Extension** for assistance
- These are quick things communities can do:
 - *De-pave it* – eliminate impervious surfaces
 - *Reduce it* – enhance the ability of water to infiltrate on-site
 - *Disconnect it* – redirect stormwater away from sewers

- *Intercept it* – slow it down and/or direct to bioswales (e.g.,)
- Look at a local High School fundraiser car wash: used water collected in cistern for washing/rinsing cars can be released thorough a bioswale or a rain garden and totally control that water discharge on site

Jillian Stokely, Grants Specialist, FEMA, covered the FEMA grants programs related to Hazardous Mitigation. These are annual mitigation grants with 75% grant and 25% non-federal monies match ([see presentation here](#)).

- FEMA grants monies to states to administer and they to sub-grantees (state, county, local government agencies and tribes)
 - *Individuals* wishing to fund mitigation of their home need a subgrantee to apply on their behalf
- 5% of grants go towards initiative projects, e.g., flood warning
- 7% set aside for flood/hazard mitigation planning including identifying where hazards are, and what the community wants to do about it
- If you use [FEMA Map Service Center](#), you can see the Flood Insurance Rate Maps (FIRM). Just enter the address and it will take you to right map
 - “A” zone is in flood zone (previously called a 100-year flood, it really means that *any year* there is a 1% chance of flooding to levels shown on the FIRM)
 - “X” zone might flood (previously called a 500-year flood, it really means that *any year* there is a 0.2% chance of flooding to the levels shown on the FIRM)
 - “V” zone is in flood zone and is also a 1%-chance-flood, but is in a coastal area and incudes hazardous velocity with potential for 3 foot or higher waves
 - You need to know base elevation of a building to determine impact. FIRM map shows the water height above sea level, so you need to know base elevation of building *above sea level* and calculate flooding potential from there¹
- If flood/storm damages exceed 50% of the building’s market value, it is considered *substantially damaged* (declared by the local municipality’s floodplain administrator)
 - This designation requires the homeowner to meet current building requirements and flood regulations when rebuilding in order to receive a *certificate of occupancy* and *may* require elevating the building above the base flood elevation shown in the FIRM
 - This declaration also entitles homeowner to use their Increased Cost of Compliance (ICC) coverage -- up to \$30,000 -- to demolish, elevate, or relocate the substantially damaged home so long as the maximum pay out of flood insurance funds does not exceed the maximum coverage of \$250,000²
- Any property acquired with FEMA funds must be permanently deeded as open space - under 44 CFR 80.19
- Funding can include restoration of the site once it’s acquired and all buildings are demolished
- Much damage to buildings is caused by *hydrostatic pressure* – foundations can collapse when the ground water pressure is too much and pushes in basement walls. Homeowners are encouraged to 1) check their home base elevation relative to the base

¹ For example, if FIRM indicates a base flood elevation for a 100 year flood of 12 feet above sea level, and a building sits on land that is 8 feet above sea level, then the building’s base elevation is 4 feet below the base flood elevation (12 ft. minus 8 ft. equals 4 ft.) and will likely be flooded 4 feet deep above the ground floor in a 100 year flood event. Further, these calculations help determine how high a building should be raised to prevent flood waters from inundating the home.

² That is, if the owner of a substantially damaged home receives \$240,000 from their original flood claim, the ICC claim will be reimbursable up to \$10,000.

flood elevation and 2) take steps to mitigate (e.g., elevating their home or installing flood vents)

- Trying to create incentives to encourage property owners to move out of flood zones. This takes community action to collectively help rate payer, each action recorded to minimize risk can gain points toward Community Rating System (CRS) for entire community
- More information: www.Fema.gov/library and www.Fema.gov/grants

Certified Floodplain Manager (CFM) **Cynthia Addonizio-Bianco**, is also an expert in green buildings (she is **LEED AP BD+C**) with **Tetra Tech, Inc.** She is updating the 2008 Somerset County Hazard Mitigation Plan and discussed the merits of these plans in her talk (see her presentation [here](#)).

- Hazard Mitigation Plans (HMP) are designed to reduce damages from natural hazard events
- Somerset County is developing an HMP – Stacy Murphy – Somerset County OEM Hazard Mitigation Officer – is county contact to support mitigation and provides information and support on mitigation grant program and municipal hazard mitigation planning
- Common sense – plan to reduce effects of natural hazards before an event – deal with hazards such as flood, storm, wildfire, earthquake, etc.
- Who is floodplain administrator? Usually this is your Building Code Official. This person is instrumental in ensuring floodplain projects comply with municipal floodplain ordinances and provides input in the planning process
- Somerset has 21 communities that need to work together on hazard mitigation – all are participating in HMP and are eligible for mitigation funding
- Phases of mitigation planning include:
 - Public and stakeholders outreach and coordination
 - Risk and vulnerability assessments for each municipality
 - Mitigation studies to identify and develop projects and set priorities
 - Implementation procedures for mitigation plans
- Plans are collaborative effort between
 - State – administration and overall guidelines
 - County – administration, planning and input
 - Municipality – input
 - General Public – input
- Hazard maps provide basis for vulnerability assessment and ultimately for prioritization of projects, zoning, planning, and mitigation programs
- The six types of mitigation projects include: structural, prevention, property protection, public education, awareness and emergency services
- HMPs should be part of *capital improvement plans* because they have many *grant eligible projects*. Likewise, the HMP strategies have projects that should be included in capital plan to ensure funding
- City of Roseville, CA, ranked #1 in the Community Rating System (CRS), TetraTech supported them in attaining this rank – resulted in maximum flood insurance discount of 50%. Valuable program and all flood-prone communities should consider participation
- Raritan-Millstone Flood Commission was created as a result of the Manville plan – a mitigation initiative in the Manville annex of the plan, and one example of mitigation action implementation
- The Community Rating System (CRS) provides incentives to reduce flood vulnerability in participating communities including utilization of open space, to provide natural and beneficial floodplains, higher regulatory standards for construction and development,

and provision of flood warning and response plans, etc. to increase synergies in flood mitigation

Alec McCartney, Forester, from the **NJDEP Community Forestry Program**, talked about trees and stormwater management as integrated management. He covered the following points (see his presentation [here](#)):

- He spoke of “Trees in Crisis” because trees are failing and new trees are needed
- Trees are infrastructure and require management but they have a strong return on investment; the life of a stand is region specific – maybe 1000 years in Colorado – much more frequently in New Jersey
- \$500,000 in grants are available to communities for *Forestry Management Plans*
- With an approved FMP, you can receive Community Stewardship Incentive Program (CSIP) grants
 - To plant trees
 - To implement methods outlined in program
 - To do assessments of the project
 - Become part of the state website for other communities to use as examples
 - Required to quantify savings
- Leaf litter is an essential ingredient for soil restoration; without it soils become depleted
- Soil compaction creates the same problem as impervious surfaces and needs to be addressed for health of trees and to reduce run-off
- Engineered soils – soil with sand and/or gravel – can help move water and help trees breath in urban (generally compacted) settings
- Trees intercept water – *a mature red maple can manage 400 gallon/hour; cypress up to 800 gallon/hour*
- Included numerous examples of how to do this: trees in planters, rain gardens, sidewalk plantings, etc.
- References for Urban Forestry
 - *Rain Garden Manual of New Jersey*, http://water.rutgers.edu/Rain_Gardens/RGWebsite/rginfo.html
 - *Managing Stormwater for Urban Sustainability Using Trees and Structural Soils*, http://www.greenthisway.com/web/Installations_files/Managing%20Stormwater%20Using%20Trees%20and%20Structural%20Soil.pdf
 - *Urban Watershed Forestry Manual, Part I: Methods for Increasing Forest Cover in a Watershed*, <http://www.treearch.fs.fed.us/Document#NA-TP-04-05>
 - *Urban Watershed Forestry Manual, Part II: Conserving and Planting Trees at Development Sites*, <http://www.treearch.fs.fed.us/Document#NA-TP-01-06>

Panel #3: Partnerships

Joe Ruggeri, PE, CFM, Supervising Engineer, NJDEP Flood Control, moderated the 3rd panel. He is a member of the “Silver Jackets “, which brings together federal and state agencies to review any permit requests that cross boundaries among New Jersey, New York, Delaware, Pennsylvania, FEMA, USACE, USDA Forest Service, NOAA and others.

David Gentile, PE, Project Manager, US Army Corps of Engineers, started with an overview of the planning process the Corps goes through for its projects (see his presentation [here](#)).

- Corp employs 6-step planning process
 1. ID problems and opportunities
 2. Inventory and forecast conditions

3. Formulate alternative plans
 4. Evaluate alternative plans
 5. Compare alternative plans
 6. Select a plan
- The following are alternate plans formulated for Manville to mitigate Millstone flooding:
 - Detention of floodwater – but no upstream natural detention area
 - Culvert and pipe around town – but Raritan would back into Millstone
 - Channel modification (deepening, e.g.) – still viable option
 - Modify or remove existing structures, possibly in conjunction with channel modifications – still viable option
 - Levees to hold back floodwater – still possible solution
 - *Non-structural measures (such as flood proofing, buyouts, modify existing warning systems – county has good system)*
 - “No Action” alternative
 - Constraints to consider:
 - Proximity of structures to each other and river
 - Topography of study area
 - Environmental concerns
 - Railroads
 - Evaluate alternative plans
 - Will it reduce flooding?
 - What are socio-economic impacts?
 - What are environmental impacts?
 - Is it consistent with applicable policies, guidelines, laws, etc.?
 - Compare alternate plans through a cost/benefit ratio; the cost needs to be at least a small percentage below the benefit to qualify. Has to be below 1:1 to qualify
 - This is where Corp is now with project

Stephen Souza, President, PrincetonHydro, illustrated how regional perspective approaches to flooding and stormwater management relate to regulations (see his presentation [here](#)).

- *NJAC 7:8. Subchapter 3. Regional Stormwater Management Planning (RWSMP)* includes:
 - Drainage area water quality, recharge and quantity objectives
 - Flood control focused on regional solutions
 - Strategies for implementing and evaluating management plans
 - Quantity and quality concerns don't stop at political boundaries
- *New Jersey Stormwater Best Management Practices (BMP) Manual – Chapter 3*
 - Stresses regional – span boundaries of municipalities/counties
 - Addresses the need to anticipate and plan for future problems
 - Identifies regulations and action steps
- *Administrative Code NJAC 7:15* ties together all other related acts with a regional focus:
 - How to coordinate/integrate WQM plans with Federal, state, regional and local comprehensive land use
 - Encourages, directs and aids in coordinating state, regional and local conservation and protection plans
 - Encourages regional wastewater management planning
- *Tier A Municipal Stormwater Guidance Manual Chapter 11* has additional measures :
 - Addresses RSWMP, existing water quantity and quality, and localized flooding
 - Plan may address problems caused by future development
- *7:13 Flood Hazard Rule* highlights:

- 7:13-11.12 sets specific design and construction standards to any flood control project in any regulated area
- Speaks to:
 - Constructing regional stormwater management basins upstream from flooding
 - Developing regional plan to preserve existing flood storage in drainage basin
- Main points:
 - Legal framework exists to adopt and implement regional stormwater management
 - We have means to create meaningful partnerships and stop managing stormwater on parcel by parcel basis
 - Until DEP and municipalities get on board and work together – it won't happen
 - Municipal and board engineers continue to rely on approaches that got us into these problems in the first place
 - Stop designing to meet minimum standards – design for improvements
 - Need to make “award winning” stormwater projects the norm
- “Award winning” projects go above and beyond
- We have legal framework – need partnerships and guts to do more and move forward

Kerry Miller, Assistant Director, Association of NJ Environmental Commissions, gave a slide presentation showing which of the municipalities in the Raritan-Millstone Flood Commission network had Environmental Commissions (see her presentation [here](#)) and urged *all of them* to use the power of citizen engagement to both stretch their dollars and improve their environmental quality.

- Environmental Commissions (EC) have 5-7 members who serve 3 year terms and are appointed by the Mayor
- ECs are not mandatory; they are advisory – most towns do have them and see value in them
- Duties include Environmental Resource Inventory (ERI) and Site Plan Review and Planning Board Member
- Milburn EC – Rahway Corridor Study 2010
 - Explored impervious surface runoff, open space, flood hazard and riparian boundaries, and riparian restoration, www.twp.maplewood.nj.us/documentcenter/view/41
- **Cranford** EC – Township Committee Resolution 2013
 - Reduce impervious surface of municipal properties by 10% by 2025
 - Set good example, www.mygreencranford
 - Did online survey to show support for project
- **Hightstown** EC – 2012 Enhanced Stormwater Ordinance
 - Lower threshold to 250 s.f. new impervious or 1000 s.f. disturbance
 - Triggers review by EC on permits and development applications
 - Nonbinding recommendations by EC
 - Then \$10K funding for stormwater demo project, dry well, rain garden, by end of Spring- workshop will be there
- **Somerville** with NJWSA - \$200 rebate for rain barrel installations
- Raritan Valley Habitat for Humanity, **Bridgewater** project – rain barrels, stormwater retention basin, gravel drives – even solar panels! If low-income housing can do it why can't everyone?

Discussion:

- Importance of a soil health rule – how to respond when developers push back
- Need for a regional watershed association
- Clarification about quality recharge quantity – not just peak flow but overall volume
- Cited examples from Maryland and Virginia
- At minimum, rework retention basins
 - Remove concrete and low flow channel
 - Address sediments in the bottom
 - Plant with rain garden plants and mow only once a year

Resources on following pages...

Resources

Association of New Jersey Environmental Commissions

<http://www.anjec.org/>

Community Collaborative Rain, Hail & Snow Network – “Because every drop counts”

<http://www.cocorahs.org/>

Dam Removal in New Jersey: Background, Regulatory Guidance and Practical Aspects

www.raritan.rutgers.edu/resources/2012NJDamRemovalGuidance.pdf

Dealing with Disasters Fact Sheets & Bulletins, New Jersey Agricultural Experiment Station,
Rutgers, The State University of New Jersey

<http://njaes.rutgers.edu/pubs/subcategory.asp?cat=9&sub=62&order=DocumentID+DESC>

Federal Emergency Management Act, FEMA Grants

<http://www.fema.gov/grants>

Federal Emergency Management Act, FEMA Library

<http://www.fema.gov/library/index.jsp>

Federal Emergency Management Act, FEMA Map Service Center,

<https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1>

Major State Programs Affecting Land Use, 2009, Association of New Jersey Environmental
Commissions

<http://www.anjec.org/pdfs/StateProgramsAffectingLandUse2009.pdf>

Managing Stormwater for Urban Sustainability Using Trees and Structural Soils, 2008

<http://urbanforestry.frec.vt.edu/stormwater/Resources/TreesAndStructuralSoilsManual.pdf>

Municipal Options for Stormwater Management, 2001. Association of New Jersey
Environmental Commissions, <http://www.anjec.org/pdfs/Stormwtr.pdf>

NJDEP, Division of Parks and Forestry, Community Forestry

<http://www.state.nj.us/dep/parksandforests/forest/community/>

NJDEP, Flood Control

<http://www.nj.gov/dep/floodcontrol/index.htm>

New Jersey Weather & Climate Network

[Rutgers, New Jersey Agricultural Experiment Station,](http://climate.rutgers.edu/njwxnet/)

<http://climate.rutgers.edu/njwxnet/>

NJ Stormwater Best Management Practices Manual, 2004, revised 2009, NJDEP

http://www.njstormwater.org/bmp_manual2.htm

Office of New Jersey State Climatologist at Rutgers University

<http://climate.rutgers.edu/stateclim/>

Rain Garden Manual of New Jersey

http://water.rutgers.edu/Rain_Gardens/RGWebsite/rginfo.html

Raritan-Millstone Rivers Flood Control Commission

<https://www.facebook.com/RMRFCC>

- Sustainable Raritan River Collaborative and the E.J. Bloustein School of Planning and Public Policy, *Improvements to Water Quality, Stormwater, and Infrastructure*
<http://www.raritan.rutgers.edu/agenda/Water.pdf/>
- Sustainable Raritan River Collaborative and the E.J. Bloustein School of Planning and Public Policy, *Reclaiming the Raritan: a Restoration and Sustainable Reuse Plan. The Sustainable Raritan River Initiative Action Plan*, December 2009
<http://www.raritan.rutgers.edu/agenda/finalplan.pdf/>
- Rutgers, The State University of New Jersey, New Jersey Agricultural Experiment Station. Fact sheets, bulletins, and courses on forestry management.
<http://njaes.rutgers.edu/environment/>
- Somerset County All Hazard Mitigation Plan Draft
<http://www.co.somerset.nj.us/hazard/draft.htm>
- Stony Brook-Millstone Watershed Association, <http://www.thewatershed.org/>
- Stormwater Management (Webpage), Water Resources Program, New Jersey Agricultural Experiment Station, Rutgers, The State University of New Jersey,
http://www.water.rutgers.edu/Stormwater_Management/Default.htm
- Sustainable Raritan River Initiative, E.J. Bloustein School for Planning and Public Policy, Rutgers, The State University of New Jersey, <http://www.raritan.rutgers.edu/>
- United States Army Corps of Engineers, FACT SHEET-Millstone River Basin,
<http://www.nan.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/11241/Article/8261/fact-sheet-millstone-river-basin.aspx>
- Urban Watershed Forestry Manual, Part I: Methods for Increasing Forest Cover in a Watershed,
<http://www.treesearch.fs.fed.us/pubs/19916>
- Urban Watershed Forestry Manual, Part II: Conserving and Planting Trees at Development Sites,
<http://www.treesearch.fs.fed.us/pubs/19936>
- Weather Center, Rutgers, The State University of New Jersey,
<http://synoptic.envsci.rutgers.edu/site/>

For More Information

The Sustainable Raritan River Initiative

Rutgers, The State University of New Jersey
Environmental Analysis and Communications Group
E.J. Bloustein School of Planning & Public Policy
33 Livingston Avenue
New Brunswick, NJ 08901
www.raritan.rutgers.edu
848.932.2711

Photo sources: Sandra Siegel/East Millstone Flood, Flickr User Jay Greinsky, Andrew Mills/The Star-Ledger