



# THE ROLE OF COMPREHENSIVE PLANNING IN WATERSHED MANAGEMENT

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# Impacts to the Hydrologic Cycle

Development increases imperviousness, preventing percolation and increasing runoff volumes and rates.

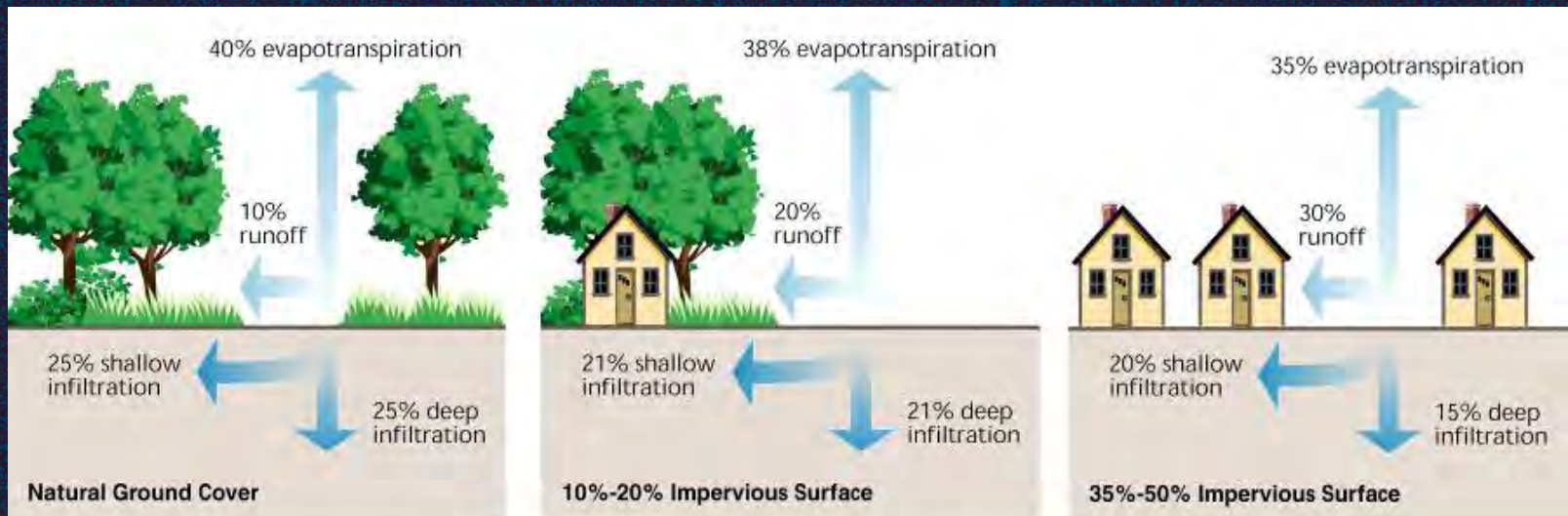
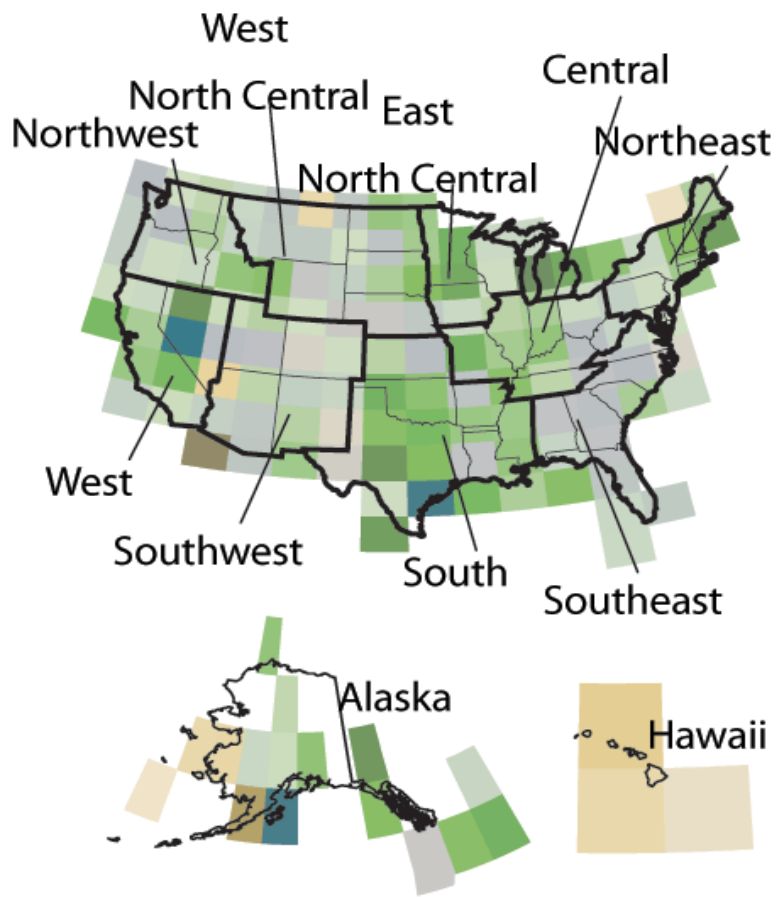


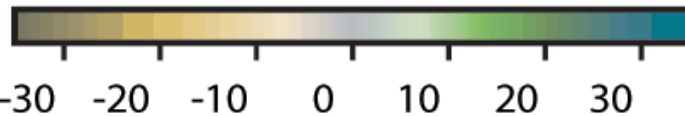
Fig. 3.21 – Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface runoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.  
In Stream Corridor Restoration: Principles, Processes, and Practices (10/98).  
By the Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the U.S.)

# Precipitation and storms are increasing

- Observations compiled by [NOAA's National Climatic Data Center](#) show that over the contiguous U.S., total annual precipitation increased at an average rate of 6.1 percent per century since 1900, although there was considerable regional variability.
- The greatest increases came in the East North Central climate region (11.6 percent per century) and the South (11.1 percent).
- Much of this increase came in more frequent heavy downpours.



Change in precipitation (% per century):



*Annual  
Precipitation  
Trends 1901-  
2005. Data  
courtesy  
[NOAA's  
National  
Climatic Data  
Center.](#)*



# What is Floodplain Management

## FEMA Definition:

“Floodplain management is the operation of a community program of corrective and preventative measures for reducing flood damage. These measures take a variety of forms and generally include requirements for zoning, subdivision or building, and special-purpose floodplain ordinances.”

# What is a Watershed

A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place - USEPA

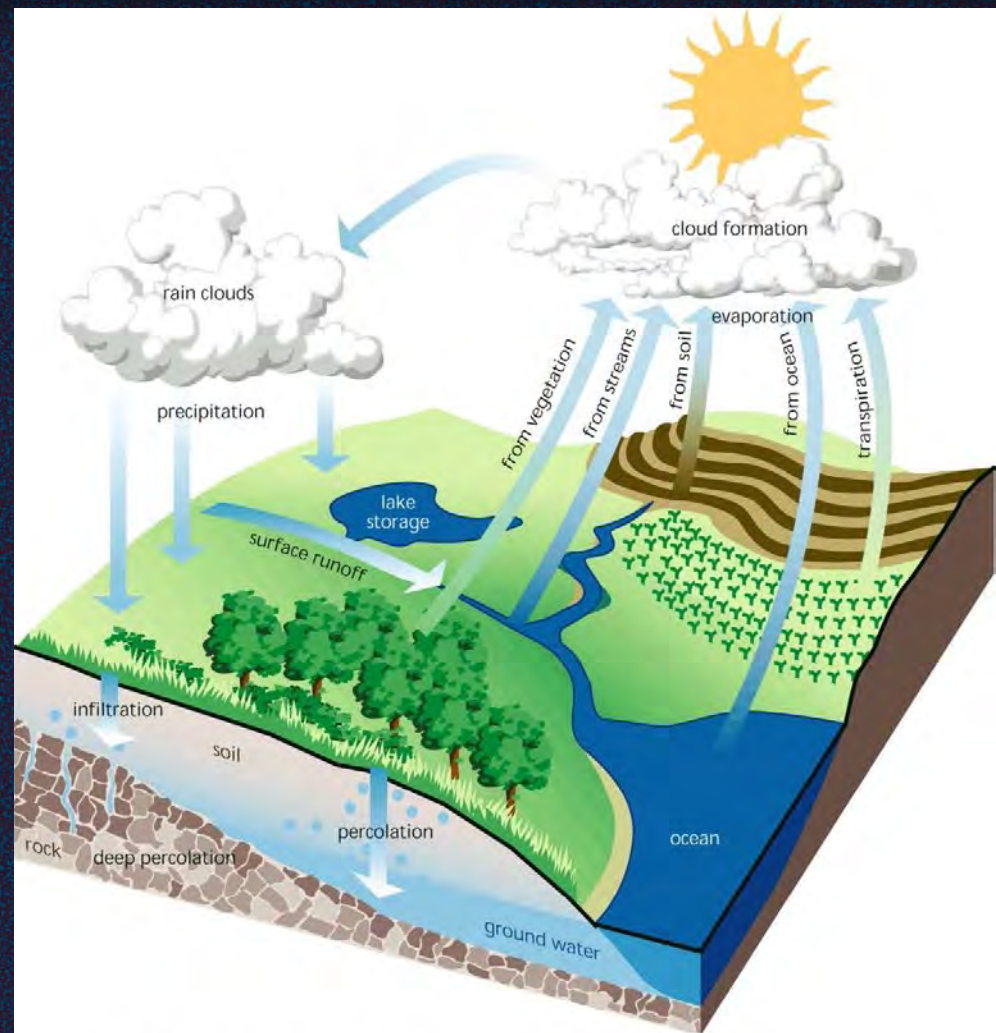
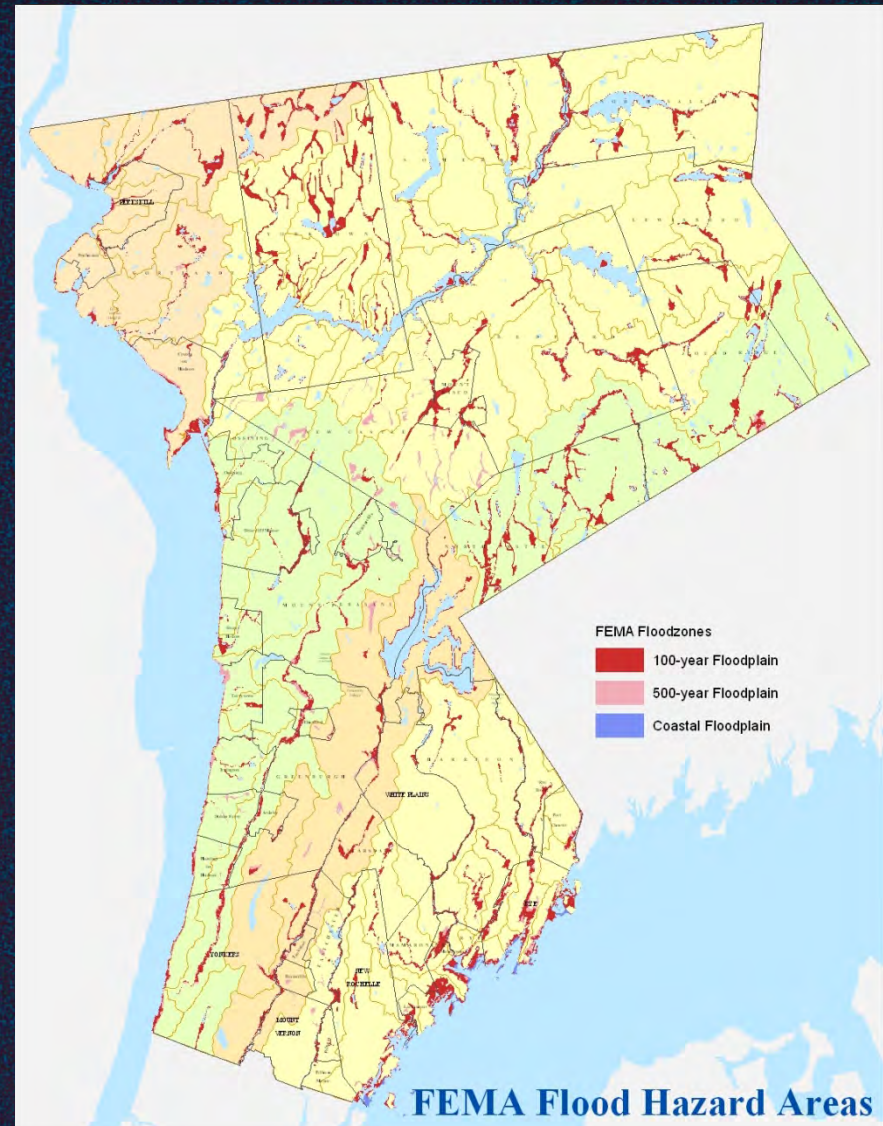


Fig. 2.2 – The hydrologic cycle. The transfer of water from precipitation to surface water and ground water, to storage and runoff, and eventually back to the atmosphere is an ongoing cycle. In Stream Corridor Restoration: Principles, Processes, and Practices (10/98). Interagency Stream Restoration Working Group (15 federal agencies)(FISRWG).

# Westchester County Floodplains & Watersheds

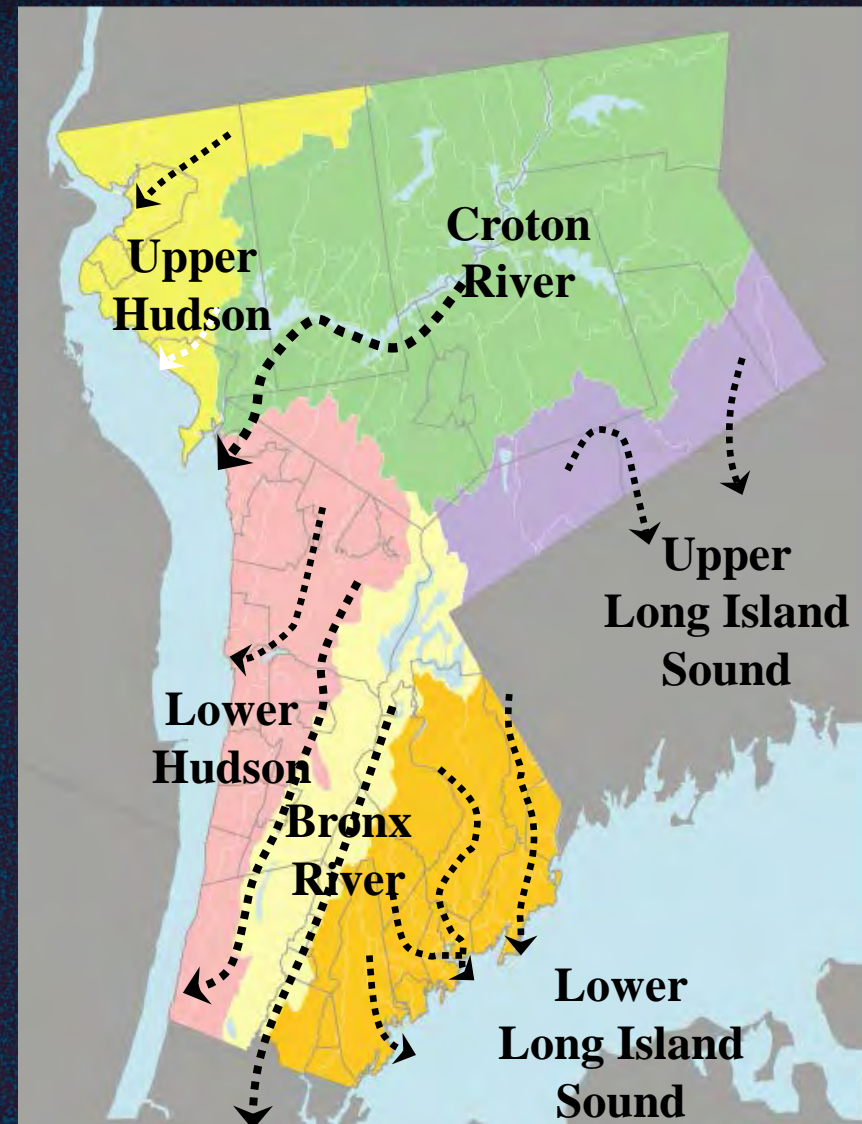
- Watersheds in Westchester County extend beyond both Municipal, County and State boundaries
- The overlap of governmental boundaries creates a need for intermunicipal cooperation



# Westchester's Watersheds

NAME	SQ. MILES
Croton River Lower	183
Hudson Lower LI	67
Sound	65
Bronx River	48
Upper LI Sound	45
Upper Hudson	43

One square mile (almost 29 million square feet) equates to over 17.3 million gallons of water for every inch of rain. A one-inch storm will result in over 695 million gallons of water in a 40-square mile watershed. Almost 8.5 billion gallons of rain fell in the Lower Long Island Sound watershed in April of 2007 (7.5-inch storm).





# Planning Process

- **Comprehensive Plan**
  - Natural Resources
  - Watershed Management
  - Floodplain Management
- **Land Use Regulations**
  - Zoning Code
  - Flood ordinances
  - Development Regulations
  - Site Plan process
  - SEQR
  - Capital Budget/Plan
- **Municipal Actions**
  - Hazard Mitigation Planning
  - Watershed Planning
  - Intermunicipal Agreements
  - Capital Budget/Plan



# Comprehensive Plan

## Goals

- Protect health, safety and welfare of municipality
- Protect the natural resources
- Make land use patterns consistent with the protection of watersheds
- Promote sustainable development patterns based on natural resources

## Policies

- Promote Natural Resources preservation
- Promote Open Space preservation
- Promote partnerships within the community and within watersheds
- Promote low impact and sustainable zoning tools

## Identify Natural Resources

- Watersheds
- Waterbodies, Wetlands and Streams
- Stormwater , Drainage and Flooding
- Plants and Wildlife



# Land Use Regulations

- Land Use Regulations
  - Zoning Code
  - Flood ordinances
  - Development Regulations
  - Site Plan process
  - SEQR



# Municipal Actions

- Municipal Actions
  - Hazard Mitigation Plan
  - Watershed Management Plan
  - Intermunicipal Agreements
  - Capital Budget/Plan

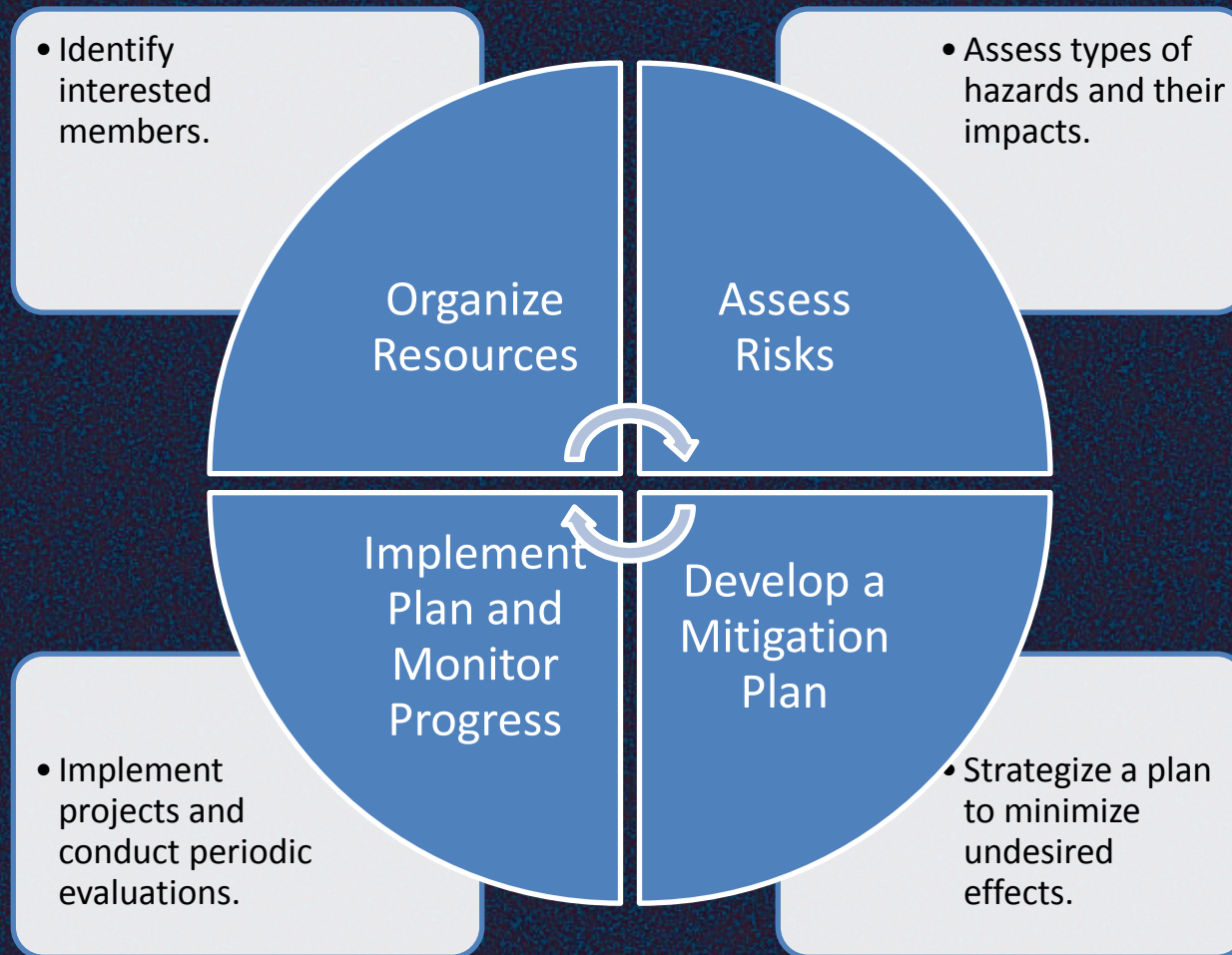
# Hazard Mitigation Grant Program (HMGP)

- The **Robert T. Stafford Disaster Relief and Emergency Assistance Act** (Public Law 93-288) requires that local governments develop hazard mitigation plans as a condition receiving certain types of non-emergency disaster assistance including HMGP.
- **Disaster Mitigation Act of 2000** amended the Stafford Act by requiring natural hazards to be evaluated, preparation of mitigation plans to address mitigation of the hazards and close coordination with state and other agencies.

# Multi-Hazard Mitigation Planning

- Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses.
- Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage.
- Mitigation includes activities such as:
  - Complying with or exceeding NFIP regulations.
  - Enforcing stringent building codes, flood-proofing requirements.
  - Adopting zoning ordinances that steer development away from areas subject to flooding, storm surge or coastal erosion.
  - Acquiring damaged homes or businesses in flood-prone areas, relocating the structures, and returning the property to open space, wetlands or recreational uses.

# Hazard Mitigation Planning Overview





# Steps in the Watershed Planning and Implementation Process

## 1. Building Partnerships

- Identify key stakeholders
- Identify issues of concern
- Set goals

## 2. Characterize the watershed

- Gather and analyze data
- Identify causes and concerns



# Steps in the Watershed Planning and Implementation Process

3. Define goals and Identify solutions
  - Identify critical areas of concern
  - Develop management measures
4. Design and Implementation Program
  - Develop schedule, milestones and evaluation process
  - Identify technical and financial assistance needed
5. Implement watershed plan
6. Measure progress and Make Adjustments

# Level of detail in watershed planning

## Watershed Plan

- Provides watershed-wide policy and direction
- Evaluates regional plans and constraints

## Sub-watershed Plan

- Details specific goals such as surface water quality, quantity management
- Outlines derivatives for stormwater management

## Site Management Plan

- Presents project specific drainage plans, BMPs
- Demonstrates compatibility of designs with sub-watershed recommendations
- Includes permits and construction approvals



# Intermunicipal Agreements

- Watershed Management Plan
- Hazard Mitigation Plans
- Comprehensive Plan
- Land Use Controls

# Capital Budget and Plan

- Potential Areas of Funding
  - Hazard Mitigation Plan
  - Stormwater Management Plans
  - Land Acquisitions