

ONE DROP AT A TIME:

HARVESTING
RAINWATER,
REDUCING
RUNOFF AND
IMPROVING
OUR
WATERWAYS
AND
ECOSYSTEMS



Our most important resource:

- 71 % of the planet is covered in water
- 97% of that water is found in our oceans
- 3% is freshwater
- .3 % is accessible and clean enough for use
- Our body weight is 70% water
- We can survive only 5-7 days without it....

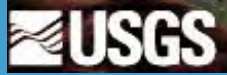
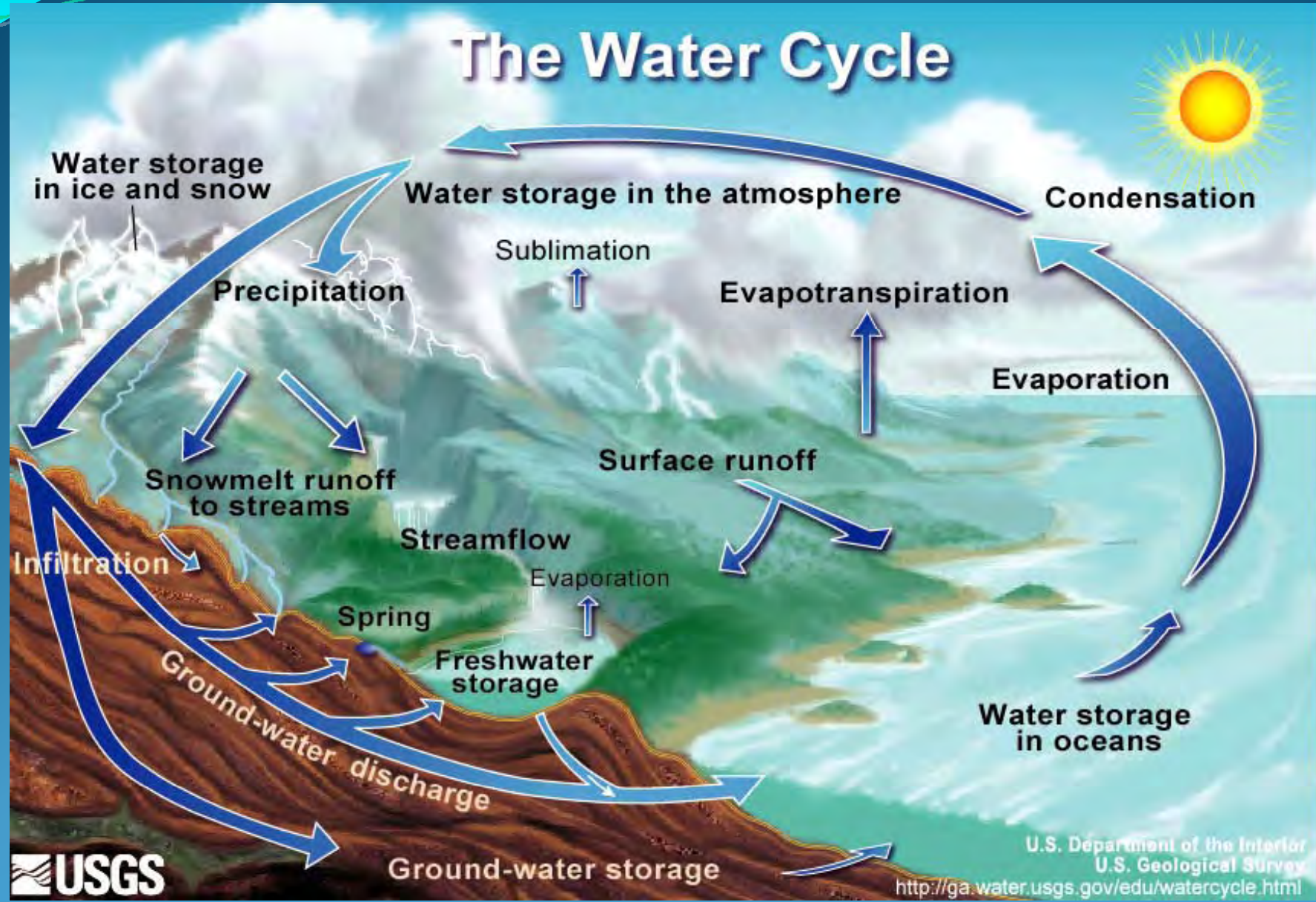
Source: USGS : Ripple effect, Prud'homme, Alex

Water Supply

- As of the year 2000 240 million of 285 million got water from municipal sources
- 45 million Americans used private sources (cisterns, ponds, streams, wells)
- Americans use 387.5 billion gallons/day

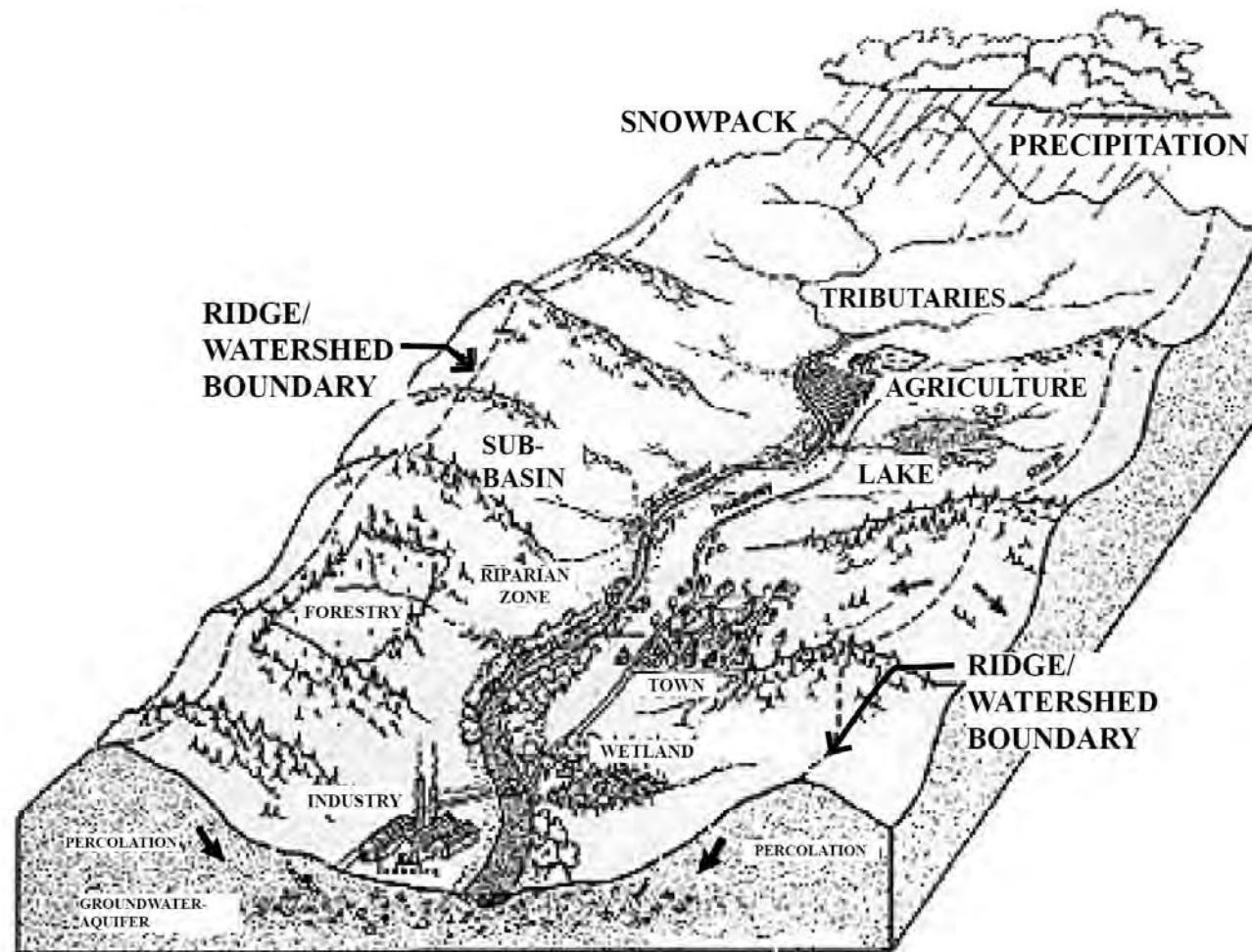


The Water Cycle



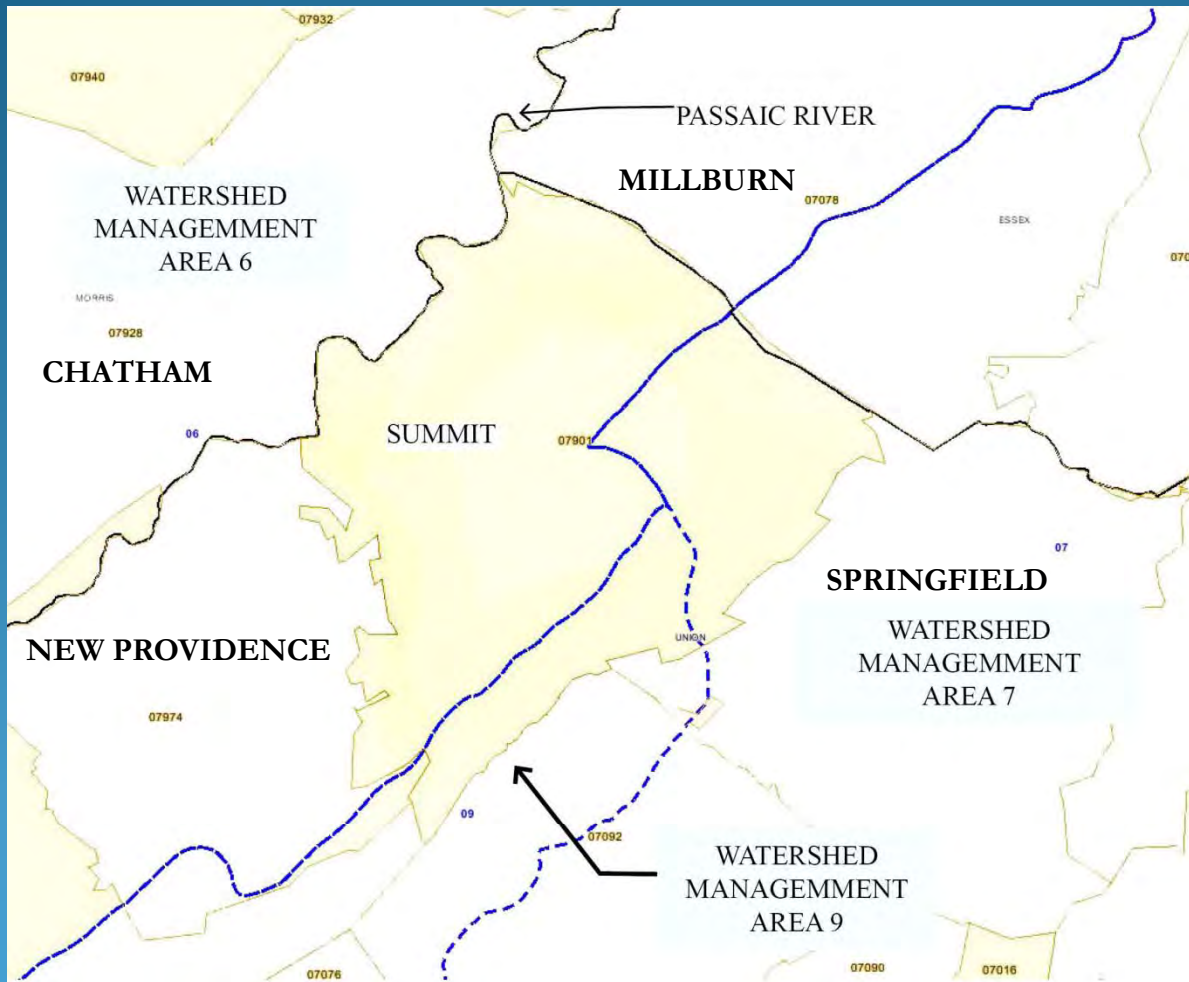
U.S. Department of the Interior
U.S. Geological Survey
<http://ga.water.usgs.gov/edu/watercycle.html>

WHAT IS A WATERSHED ?

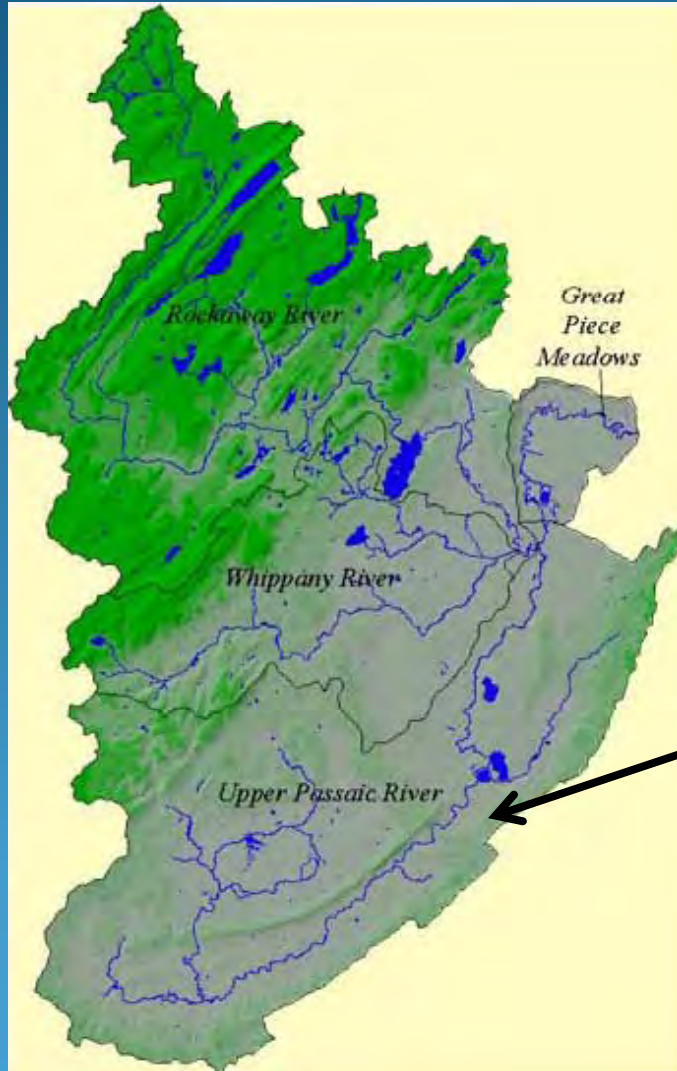


Produced by Lane Council of Governments

LOCAL WATERSHEDS

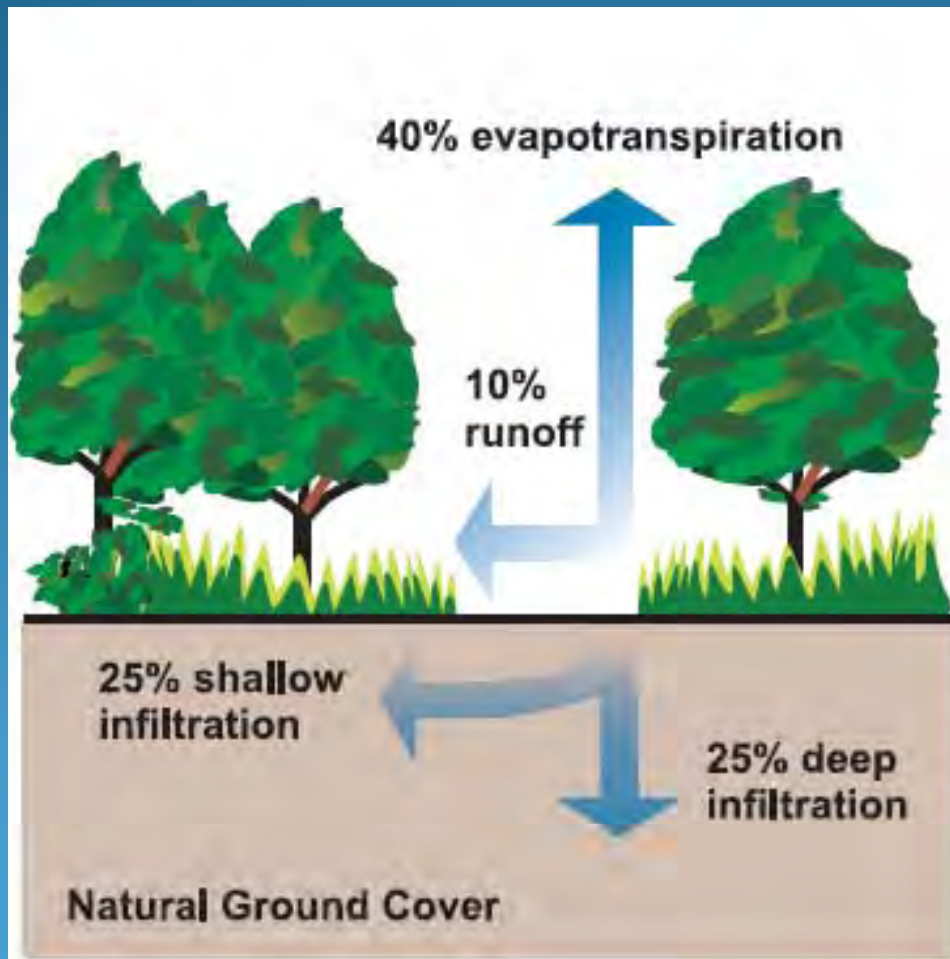


KNOW YOUR WATERSHED



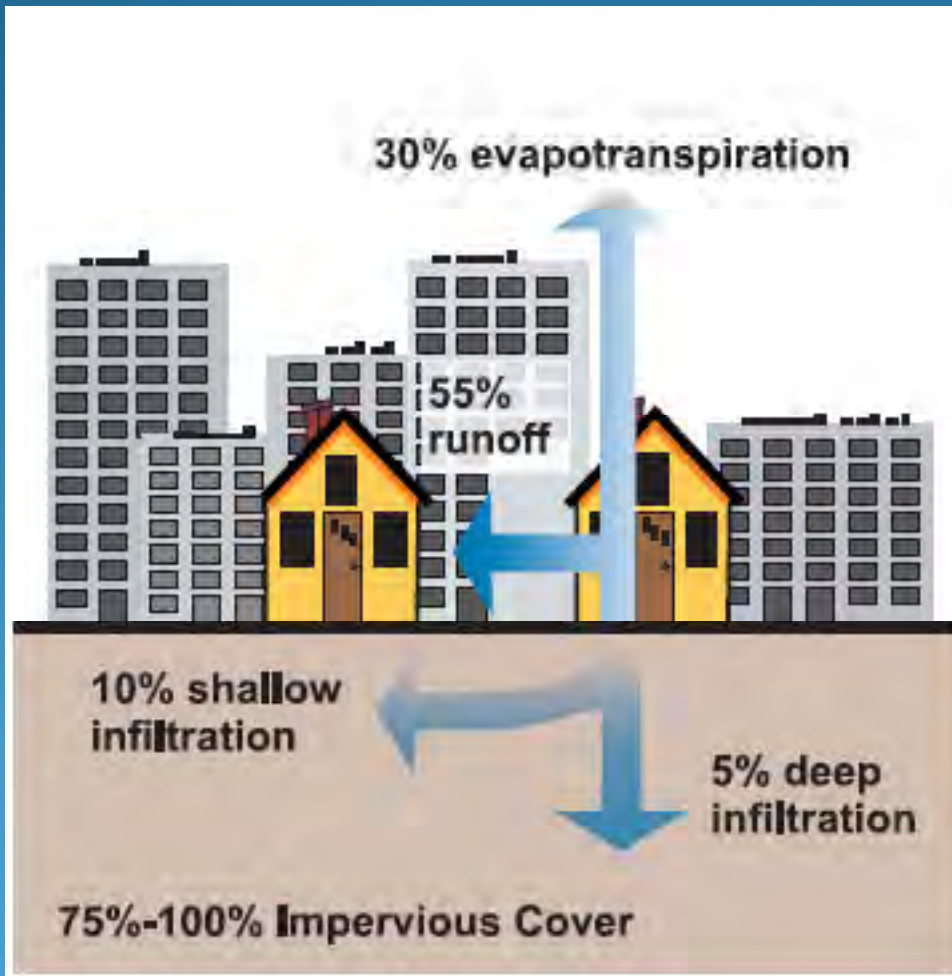
REEVES REED
ARBORETEUM

Before the parking lots....



Source: EPA

After....



Source: EPA

RECENT FLOODING-CUMULATIVE EFFECTS



REUTER/LUCAS JACKSON



REUTERS/LUCAS JACKSON

- ILL -ADVISED PLANNING AND LAND USE
- LACK OF EDUCATION
- CHANGES IN CLIMATE PATTERNS
- LACK OF INNOVATION IN DESIGN

FIRST FLUSH

THE MORE FREQUENT 1" RAIN EVENT



- Intensified by impervious coverage
- A large source of non-point pollution of our surface waters
- Severely inhibits ecosystem vitality
- non-potable

Around the world

- Currently in China and Brazil, rooftop rainwater harvesting is being practiced for providing drinking water, domestic water, water for livestock, water for small irrigation and a way to replenish ground water levels. [Gansu](#) province in China and semi-arid [north east Brazil](#) have the largest rooftop rainwater harvesting projects ongoing.
- In [Bermuda](#), the law requires all new construction to include rainwater harvesting adequate for the residents.
- The [U.S. Virgin Islands](#) have a similar law.
- In the [United Kingdom](#) [water butts](#) are often found in domestic gardens to collect rainwater which is then used to water the garden. However, the British government's Code For Sustainable Homes encourages fitting large underground tanks to new-build homes to collect rainwater for flushing toilets, washing clothes, watering the garden and washing cars. This reduces by 50% the amount of mains water used by the home.

Wikipedia reference

Rain harvesting on your property

- Example Property:
 - 80' x 150' or 12,000 sq. ft.
 - 1" Rain Event yields 71,800 gallons
 - 3,446,400 g/year based on 48" annual precipitation
 - 2000 sq. ft. house footprint
 - 1" Rain Event yields 1,200 gallons
 - 57,600 g/year based on 48" annual precipitation

<http://www.braewater.com/calculator>

- Average American uses 50 gallons /day with efficient fixtures= 18,250 gallons/ year

Storage Possibilities

- ABOVE GROUND
- RAIN BARRELS



54 gallons (\$100-\$250)



850 gallon tank (\$650-\$700)

Storage Possibilities

- ABOVE GROUND
- RAIN PILLOWS



1,000 – 40,000 gallons- (\$2,500-\$16,243)

Storage Possibilities

- **BELOW GROUND**
 - **CISTERNS (CONCRETE & POLYETHELENE)**



Storage Possibilities

- **BELOW GROUND**
- **CISTERNS (POLYETHELENE)**



Storage Possibilities

- BELOW GROUND
- FIBERGLASS TANKS



INSTALLATION FOR FIRE SUPPRESSION- MENDHAM, NJ

Storage Possibilities

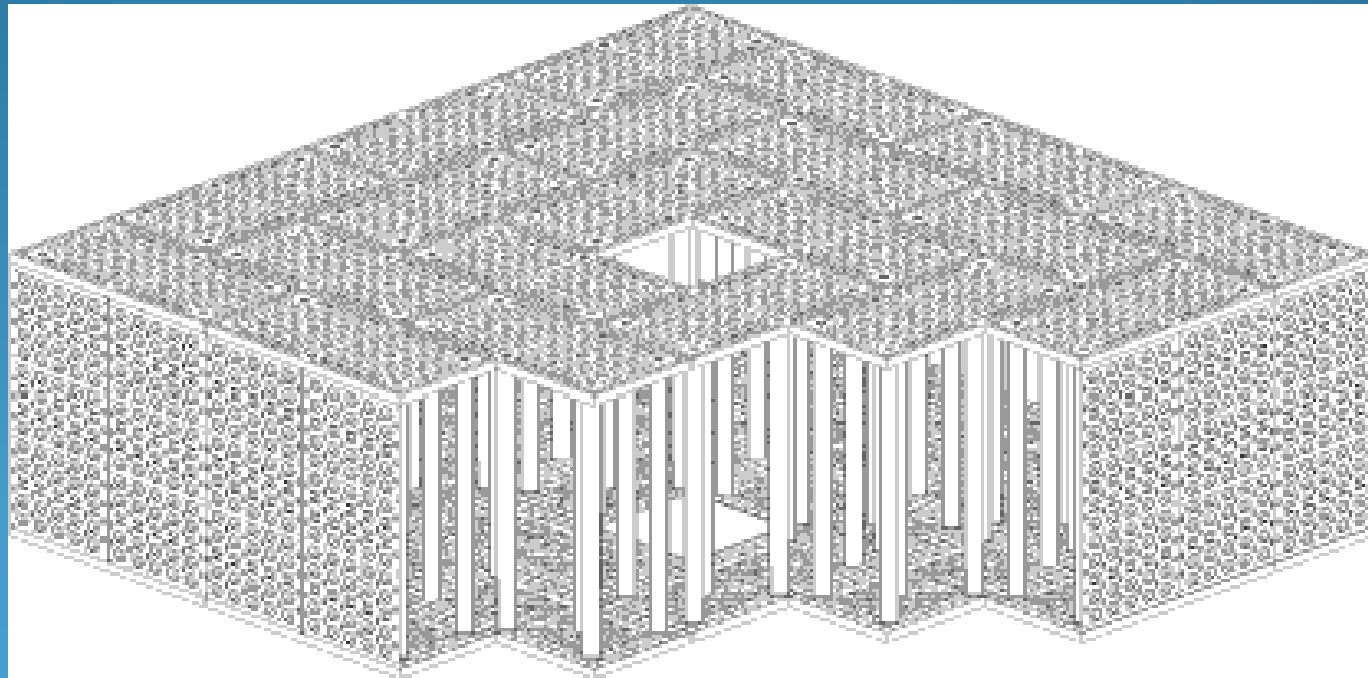
- **BELOW GROUND**
- **FIBERGLASS TANKS**



INSTALLATION FOR FIRE SUPPRESSION- MENDHAM, NJ

Storage Possibilities

- BELOW GROUND
- RAIN CAVERNS



(98 g/module- size unlimited)

Filters, Pumps, Sterilizers

- Pre-Filters
- Treatments (carbon/UV)
- Pumping
- Measurement & Control
- Backup

Uses:

- IRRIGATION (PRE-FILTRATION)
- FILLING PONDS OR POOLS (PRE-FILTER)
- FLUSHING TOILETS (PRE-FILTER, CARBON FILTER)
- SHOWERING, WASHING MACHINES
(PRE-FILTER, CARBON FILTER, UV STERILIZER)
- DRINKING
(PRE-FILTER, CARBON FILTER, UV STERILIZER)

Other Great solutions to reduce runoff and enhance your property's habitat

- Bio-Swales
- Constructed Wetlands
- Rain Gardens
- Vegetated Roofs
- Permeable Pavers

- Constructed Wetlands



- Rain gardens

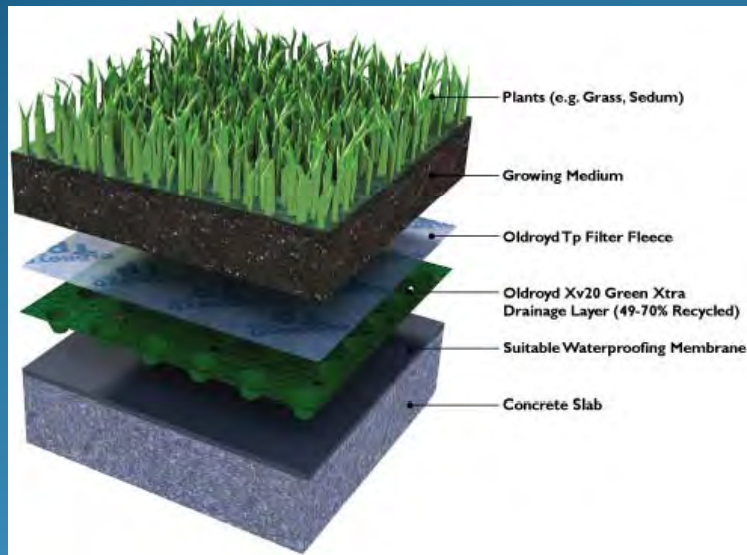


Photo from nrcs



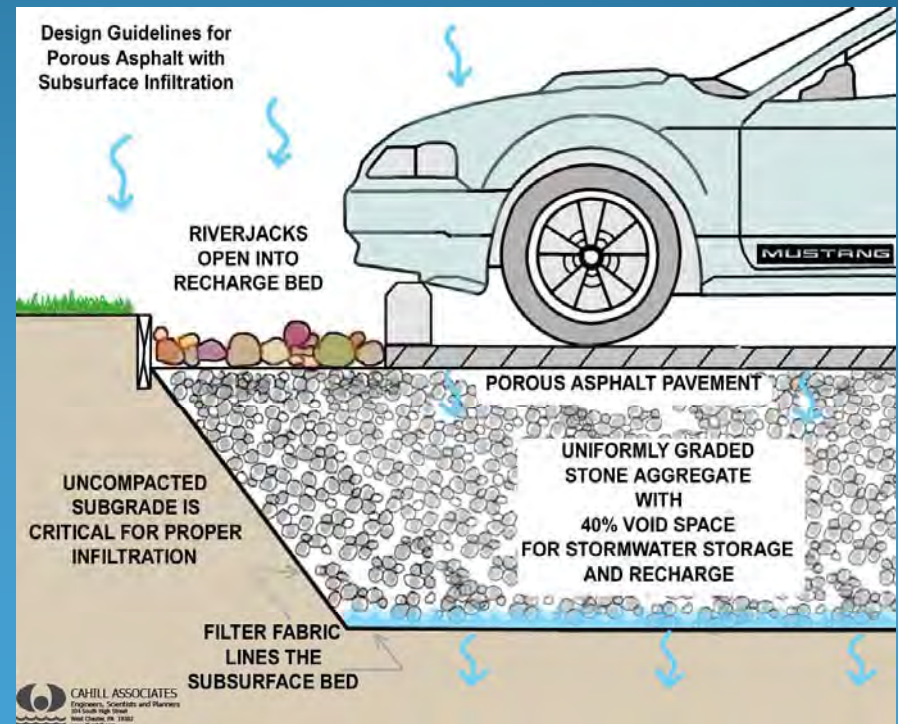
Photo from Maplewood, MN rain gardens

- Vegetated Roofs



Windsor, Ontario

- Permeable pavers/porous pavement



Why Harvest Rain

- Relief of strain on the water supply
- Cleaner water
- Increased independence and water security
- Reduced flood flows
- Reduced topsoil loss
- Improved plant growth
- Greater sensitivity to and connection with natural cycles

Ref: Water Storage, Art
Ludwig



Scoured stream banks.

Channelized brook in Passaic



Every drop counts

Linking Business to Life

"The natural world offers myriad forms of value in education, exploration, aesthetic experience, and irreplaceable products and services."

- E.O. Wilson

RESPECT
PLANNING
MAKING
MAINTENANCE



Reference & Reading

- Water Storage, Art Ludwig
 - <http://www.oasisdesign.net/water/storage/>
- Ripple Effect: The Fate of Freshwater in the Twenty-First Century, Alex Prud'homme, 2011
- Rutgers Rain Garden Manual of New Jersey
- <http://www.usgs.gov/> (US geological survey)
- www.braewater.com
- <http://www.conservationtechnology.com/>
- <http://www.nature.org/> (Nature Conservancy)
- <http://www.nj.gov/dep/gis/depsplash.htm> (NJ i-map)