Hartford Conservation Commission

The disastrous flooding caused by the remnants of Hurricane Irene last August will not soon be forgotten. It may be the first flood some of us have experienced, but it was not the first, nor will it be the last flood in the Town of Hartford. It has been added to a long list of severe floods and storms that have hit Hartford over the past two hundred years.

In this newsletter, we will share information about Hartford's past floods and new scientific information about how rivers react to natural and man-made changes. Learning more about our rivers can help us minimize the damage of the next flood. We'll also take a closer look at Vermont's native bees, pollinators of our food, forests, and flowers.

2012 HCC Events Calendar

April 21, Saturday	**Vernal Pool Salamander Walk**, ***Fun for families!*** (sorry- no dogs). 10:00 a.m. — noon, Hartford Town Forest (HTF) *
April 30–May 7	**Green-Up Hartford Days**, green-up bags available at Municipal Office*
April 28, Saturday	**Post Irene Tree Planting**, Help replant trees along our riverbanks* ***Great project for families***
May 5, Saturday	**Green-Up Day/Arbor Day Celebration**, 9:00 a.m. — noon, Lyman Point Park. Green up bags, tree and shrub sale
June 2, Saturday	**Trails Day**, 9:00 a.m. — noon, Hartford Town Forest*
June 2, Saturday	**Household Hazardous Waste Collection**, 9:00 a.m. — noon, Hartford Recycling Center
June 23, Saturday	**Wildlife Habitat Walk**, Learn about wildlife habitat. ***Fun family event*** (sorry-no dogs). 10:00 a.m.— noon, HTF
Aug. Saturday, TBA	**Irene Anniversary River Clean Up*** Help clean up our rivers*
Sept. 22, Saturday	**Household Hazardous Waste Collection in Norwich**, 9:00 a.m. — noon, Norwich
Oct. 20, Saturday	**Invasive Plant Identification and Removal Workshop**, 9:00 a.m. — noon, Hurricane Forest Wildlife Refuge*
Feb. TBA, 2013	**Wildlife Tracking Snowshoe**, Hartford Town Forest*

HCC members:Jon Bouton, Rebecca Dean, Karen Douville, Kevin French (Chair), and Jim Peters.

* Contact Matt Osborn for information 295-3075, mosborn@hartford-vt.org
We meet the first Monday of the month, 7:00 p.m. at the Municipal Bld.
We are seeking a new member, please contact Matt Osborn if you are interested.

Vermont's Native Bees

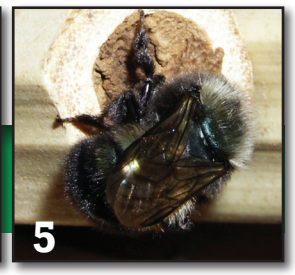
Vermont is home to an estimated 270 native bee species, which can be found throughout the state in gardens and bogs, forests, and farms. Native bees are often specialized for foraging on particular flowers, such as squash and berries which results in more efficient pollination and the production of larger and more abundant fruit. Today, they also play an important role pollinating orchard crops. In addition to pollinating our food crops, native bees are responsible for pollinating many of the plants our wildlife, such as moose, bear, deer, turkey, and birds, require for survival.

European honeybees were introduced to this continent at the Virginia colony in the early 1600's, and arrived in Vermont around 1720. Recently, however, disease and other factors have reduced the number of honeybee colonies, making native pollinators even more important to the future of agriculture. Unfortunately, some of Vermont's native bees face crises similar to the honeybees. Some of the state's most abundant bumble bee species have all but disappeared in the last decade. This impacts not only our ability to produce food for ourselves, but also fruits and nuts that are valuable food for wildlife. In fact, many plant species couldn't reproduce without our native bee pollinators and would die out.

NATIVE BEES PICTURED ABOVE

	Common Name	Species	Pollinates	Nest*
1	Tri-colored bumble bee	*B. ternarius*	Blueberries	Ground
2	Common bumble bee	*B. impatiens*	Peppers	Ground
3	Squash bee	*Peponapis ssp.*	Squash	Ground
4	Blue-Green Sweat bee	*Augochlora ssp.*	Tomatoes, peppers	Ground
5	Blue Orchard Mason bee	*Osmia lignaria*	Apples, blueberries	Wood

Photos: 1, 2, Leif Richardson: 3, 4, Susan Ellis, Bugwood.org: 5, Xerces.org
Special thanks to native bee expert, Leif Richardson.



LOOK for these common native bees in your yard. If you enjoy observing nature, Vermont Center for Ecostudies is initiating a Bumble Bee Survey this summer and would love your help. For more information and to participate, visit: http://www.vtecostudies.org/vtbees

For an excellent key to identify bees, visit: http://bit.ly/bTT5W

Things landowners can do to improve habitat for our native bees:

Provide a variety of pollen and nectar sources

- Plant flowers that bloom throughout the spring, summer, and fall. Spring flowering plants provide an important food source for bees emerging from hibernation. More flowers early in the season will lead to greater reproduction and more bees in the middle and end of the year. Plants that flower late in the seasons ensure that queen bumblebees build up their energy reserves before winter hibernation. To find Vermont plants important to bees, visit: http://bit.ly/A9eGmx
- Provide plants with different flower colors, sizes and shapes as well as varying plant heights and growth habits to encourage the greatest numbers and diversity of pollinators.
- Native plants will deliver the most benefit to native bees over time, because they are the most likely to resist pests and disease.

Minimize pesticide and herbicide use

- Cut back or eliminate using pesticides on your land. If pesticides must be used, apply them at nighttime when bees are not foraging and directly on target plants to avoid drift to other plants. Avoid using dust pesticides because they easily collect onto the hairs of the bees and are carried back to their nests.
- Leaving weeds along property edges and allowing old fields to repopulate with weeds and wildflowers will provide habitat for healthy populations of bees and ensure that the pollination services they perform in Vermont will continue into the future.

Protect or provide nest sites

- Nest sites are as important, if not more important, as providing flowers. *Please turn to HCC page 4 to learn more.

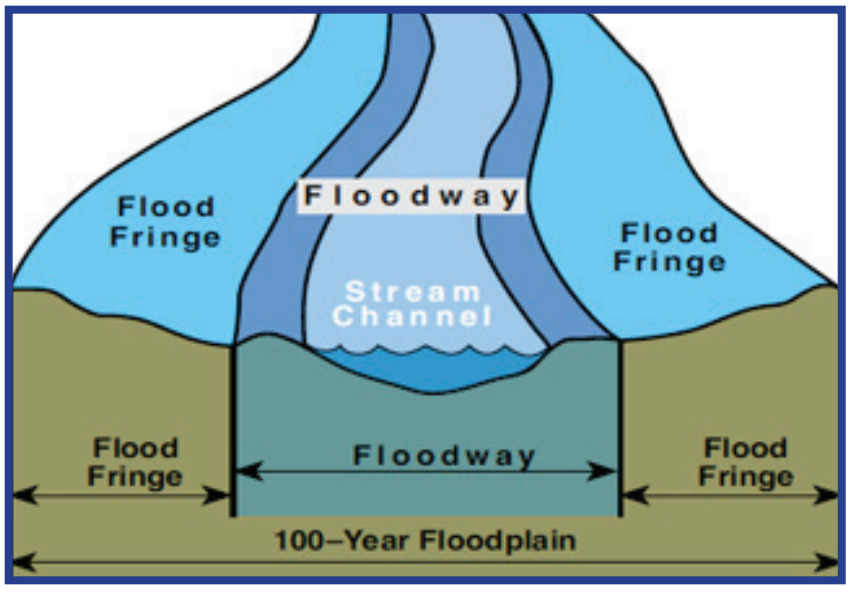
Hartford's Floods

Floods are natural events that have shaped Vermont's landscape over thousands of years. No doubt Hartford's three major rivers: the Connecticut, the Ottauquechee, and the White, (when combined they traverse a whopping 24 miles of our town) have flooded many, many times. The side table lists the severe floods in the Town of Hartford's history. Heavy rains cause most flooding in Vermont but, as we've seen in Hartford, flooding can also be caused by snowmelt and ice jams.

In August, we learned that floods do not follow precise boundaries on a map, especially flash floods associated with sudden, heavy downpours. In fact, in Vermont, two-thirds of flood damage occurs outside the mapped flood areas. In flash flood events, even structures near upland streams may be susceptible to flooding. It is important to know that standard homeowner's insurance policies do not cover flood damage.

The Basics of Flooding

As stormwater rises, it leaves the stream channel and enters what is called the floodway. The floodway is most prone to flooding. It is the area the river will cover once it goes over its banks and where there is dangerous, swiftly moving current. As water continues to rise it enters the flood fringe area where the floodwaters are able to spread out, slowing the current. The floodway and flood fringe areas on either side make up what is known as the 100-year floodplain. See diagram below.



Source: Dave Orr, ODNR Division of Soil and Water Resources

100-year Floodplain

If the 2011 flood was a 100-year flood — that means we shouldn't expect another major flood for 100 years, right?

Unfortunately, NO!

By definition, the 100-year floodplain is the area adjacent to a stream that has a one in one hundred (1%) chance of being inundated by water **EACH** year.

In fact, some Vermont towns have had two 100-year floods in the same decade and, as seen in the chart at right, a homeowner in the 100-year floodplain has a 26 percent chance of being flooded during the life of a 30-year mortgage.

Hartford's Raging Rivers

1815 – Hurricane added to the woes of the early settlers enduring "the Year without a Summer".

2/8-9/1867 – Ice Jam in West Hartford from rain and snowmelt pushed up the river ice. Large ice chunks took out the covered bridge, the entire village of West Hartford was flooded, and 16 families were left homeless.

3/27/1913 – Flood from three days of rain forced logs over the Sharon Log Boom and ultimately into the Bridge Street Covered Bridge and into the Railroad Bridge.

11/3/1927 – Flood took out the West Hartford and Hartford Village bridges. In West Hartford, a new channel carved through the village and all buildings between the road and the river were destroyed; many others were severely damaged. All rivers were out of their banks and damage was sustained throughout town. Several feet of silt were left behind.

3/19/1936 – Flood from several days of rain forced over 100 families to be evacuated. Maple Street and the South End were hit hardest. Mud and high water caused most damage.

9/28/1938 – Hurricane hit just after 6pm. Record high winds toppled trees all over the region; WRJct was especially hard hit. Power lines were down, causing a few fires, but the floodwaters only flooded basements.

3/5/1964 – Ice Jam from a combination of snowmelt and heavy ice cover deposited ice blocks, some six feet thick, on the valley floor between the Railroad Bridge in West Hartford and WRJct. The piled ice, measuring up to 15 feet high, moved the Hartford Bridge off it's foundation and took out the foundation and 2 of the 3 spans of the Bridge Street Bridge. All utilities went out and the town was declared a disaster area.

6/30/1973 – Flood & washouts from heavy rains caused roads in Jericho District, Route 14, and Route 4 to wash out.

1/26/1990 — Ice once again took out the Bridge Street Bridge.

8/29-30/2011 – Flood due to heavy rains from the remnants of Hurricane Irene took out the entrances to the Quechee covered bridge and the West Hartford Bridge, damaged many buildings in West Hartford, flooded many properties in Quechee, Hartford Village and WRJct., and left several inches of silt. It also undermined the piers of the Railroad Bridge across the White River in WRJct.

NEXT FLOOD?

Source: Hartford Historical Society

CHANCE OF FLOODING OVER A PERIOD OF YEARS

Time	Flood Size			
Period	10-year	25-year	50-year	100-year
1 year	10%	4%	2%	1%
10 years	65%	34%	18%	10%
20 years	88%	56%	33%	18%
30 years	96%	71%	45%	26%
50 years	99%	87%	64%	39%

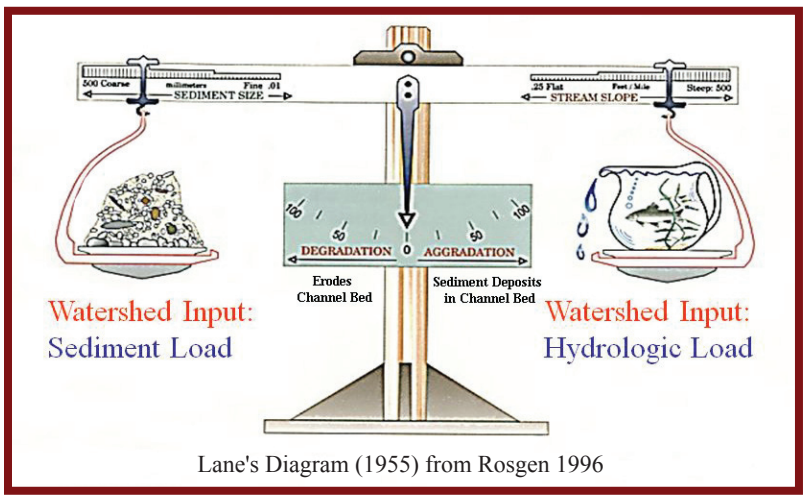
Source: FEMA

How Rivers Work

For the past twenty years scientists have been studying rivers and flood events across the country and a new field of science has emerged. River Science, or more correctly **fluvial geomorphology**, provides scientific information about how our rivers move through the landscape and how they respond to natural and man-made changes.

We all know that water moves from higher elevations to lower elevations collecting in our larger rivers and ultimately reaching the ocean. But water is not all rivers carry — rivers also transport sediment, organic debris, gravel, and boulders. Sediment transport is most obvious after a heavy rain when our rivers turn brown. Even when our rivers look clear and clean they are in a constant dynamic equilibrium transporting both water and sediment. The diagram below illustrates how water volume and sediment volume are naturally balanced.

If water is added to the river (or gravel is removed) it responds by picking up more sediment, and when the river reaches the point where there is excess sediment, it will deposit the sediment in the river channel. If the balance is tipped, the channel responds by either building up sediment on the channel bed (aggrading) or eroding the channel bed (degrading).



Lane's Diagram (1955) from Rosgen 1996

75% of Vermont's Rivers Are Unstable

Over the last century, Vermonters have manipulated river channels by armoring, dredging, gravel mining and channelization trying to force rivers to stay in the stream channel. The rivers respond by trying to reestablish stable stream channels and floodplains (see right). In response, we armor and dredge the river to protect infrastructure and property. It's an ongoing, and very expensive cycle.

Today, 75% of Vermont's rivers are classified as unstable, in the ***incision, widening,*** and ***stabilizing*** stages. Failure to protect and preserve the rivers' access to their floodplains is responsible for much of the conflict we see today between human investments and river system dynamics. A stable river system with access to its floodplain holds more water, slows floodwaters as the water spreads out, and reduces erosion and property damage.

To learn more the check out these short videos:

- http://www.youtube.com/watch?v=RQ6oyf9C8Lc&feature=related
- http://www.youtube.com/watch?v=0tb5may-Ghw
- http://www.youtube.com/watch?v=0Va7E7KOz94

The Six Stages of Simon's Channel Evolution

When a stable stream channel is disturbed (straightened, dredged, or armored with riprap) the river seeks to regain equilibrium within its floodplain. It is a slow process—often taking decades—but the river will progress through a series of distinct physical adjustments until it regains stability.

Stage I: The waterway is a stable, undisturbed natural channel.

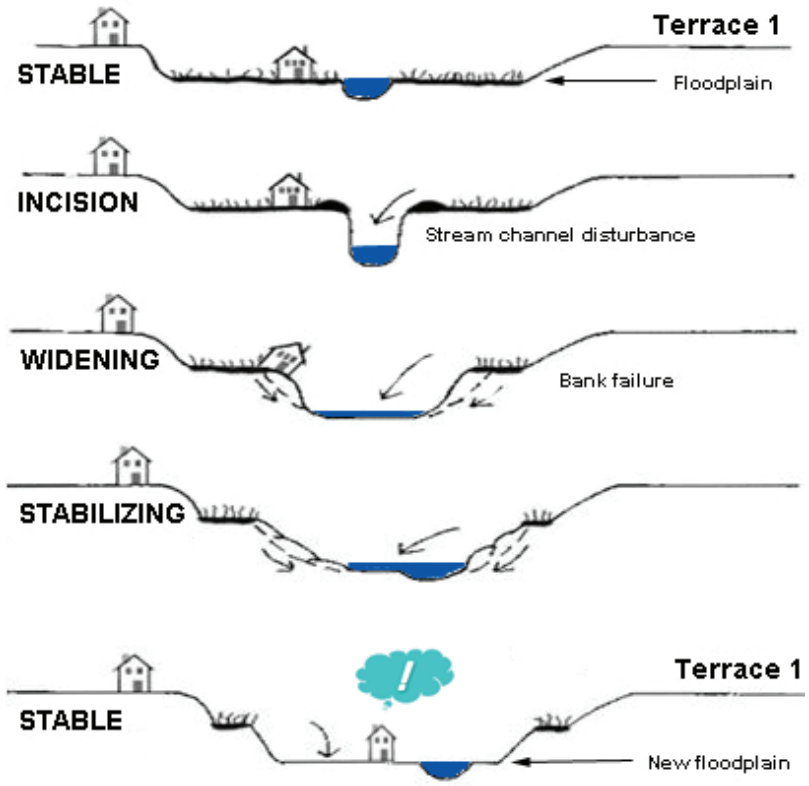
Stage II: The channel is disturbed by some drastic change such as channel dredging.

Stage III: Instability sets in with scouring of the bed.

Stage IV: Destructive bank erosion and channel widening occur by collapse of bank sections.

Stage V: The banks continue to cave into the stream, widening the channel. The stream also begins to aggrade, or fill in, with sediment from eroding channel sections upstream.

Stage VI: Aggradation continues to fill the channel, equilibrium is re-established, and bank erosion ceases. Riparian vegetation once again becomes established.



Modified from Hupp and Simon, 1991

Reducing Future Flood Damage

Understanding the dynamic equilibrium of our river systems can help us make better decisions, and reduce property loss in the 21st century. Some things to consider:

- Stop further encroachments in floodplains and river corridors. New encroachments alter the water flow and can lead to bank failure both upstream and downstream.
- Allow rivers to regain access to floodplains where possible
- Minimize stream bank and streambed disturbance
- Avoid altering stream channel or restricting flow of water and sediment
- Discourage the practice of filling floodplains to elevate planned land uses above "design" flood stages

CONSERVATION

CONSERVATION

Keeping Hartford's Rivers and Streams Clean

Hartford's rivers and streams provide scenic beauty, wildlife habitat, and a myriad of recreational activities such as swimming, canoeing, kayaking, tubing, and fishing. Maintaining clean water is vitally important for general public safety and to preserve the health of our wildlife.

In the aftermath of Irene's flooding our riverbanks were strewn with propane tanks, and empty household gas, oil, and solvent cans. We can only surmise the amount of pollutants that entered the river during the storm and were washed to the sea. But it's not just flood events that can pollute our rivers and jeopardize water quality. Stormwater runoff from normal rain events can also carry pollutants into our rivers, these include:

- Oil, gas, and salt from roads, driveways, and parking lots
- Pesticides, herbicides, and fertilizers from lawns and gardens
- Fecal coliform (pathogenic bacteria) from animal manure

To ensure the long-term protection of water quality for Hartford's residents and wildlife the Town adopted "Shoreline Protection" regulations in 2007. The regulations establish and protect riparian buffers along our rivers and streams, a minimum of ***100 feet*** from the top of the bank of the Connecticut, Ottauquechee and White Rivers, and at least ***30 feet**** from the edge of streams.

*Streams are identified on Hartford's GIS Natural Resources Map.

A riparian buffer is the area of land and wooded vegetation along waterways; it provides many benefits, including filtering pollution and sediment from surface runoff to keep our waterways clean, stabilizing streambanks to reduce erosion, regulating water temperatures vital for fish, and controlling floodwaters by limiting runoff and slowing water velocity.

To keep our rivers clean, for swimming, boating, fishing, and wildlife, it is important to keep toxic chemicals and pathogenic materials out of the riparian buffer so that rain and runoff do not carry these pollutants into the river.

The following should be kept at least 30 feet away from streams and 100 feet away from rivers:

- **Livestock**
- **Manure**
- **Piles of salt, soil, sand**
- **Storage of herbicides, pesticides, fertilizers**
- **Storage of oil and gas**
- **Vehicles and machinery that can leak oil and gas**

To protect our health: we need to protect our rivers and streams

How to Build Native Bee Nesting Boxes

Native Bee Nest Sites

- It is estimated that 70% of native bee species are ground nesters, that nest in bare or partially vegetated, well-drained soil. Landowners can help by simply providing patches of undisturbed, untilled bare ground adjacent to crop fields and gardens.
- Most bumble bees nest in small cavities (softball size), often underground in abandoned rodent nests or under clumps of grass, but can be in hollow trees, bird nests, or walls. Brush piles, fence or hedgerows and stonewalls also provide habitat for bumble bees.
- An estimated 30% of bee species, including mason bees are wood nesters. Many nest in abandoned beetle tunnels in logs, stumps, and dead standing trees, and a few excavate nests within the pith of stems and twigs.
- For wood nesting bees, purchased or homemade nest boxes (sometimes called bee condos) can be set out.

- The nests can be any height from the ground, but between three and six feet is convenient.
- Attach them firmly to a building, fence, or stake so they don't shake in the wind.
- For information on box maintenance, visit: http://bit.ly/bCN5ZA

Bumble Bee Boxes:

- A simple wooden box, with internal dimensions of about 7" by 7" by 7", made from preservative-free lumber will work.

- Drill a few ventilation holes near the top (covered with door screen to deter ants) and some drainage holes in the bottom.
- Make an entrance tunnel from 3/4" plastic pipe, marked on the outside with a contrasting color, and fill the box with soft bedding material such as short lengths of unraveled, soft string.
- The box must be weather tight; the larvae may become cold in a damp nest, and mold and fungus will grow. Place the box in an undisturbed site, in partial or full shade, where there is no risk of flooding. The box should be on or just under the ground. If you bury it, extend the entrance tube so it gently slopes up to the surface.
- Put your nesting box out when you first notice bumble bees in the spring, or when the first willows and other flowers are blooming, and be patient. There is no guarantee that bees will use your box. Only about one in four boxes get occupied. If it has no inhabitants by late July, put the nesting box into storage until next spring.

It's easy to make Bee Nesting Boxes:

Wood Nest Boxes

- Drill nesting holes between 3/32" and 3/8" in diameter, at approximate 3/4" centers, into the side of a block of preservative-free lumber (for mason bees use 5/16" and 7/16" holes).
- A range of hole diameters will encourage a diversity of species, providing pollination services over a longer period of time. The holes should be smooth inside, and closed at one end.
- The height of the nest block is not critical—8" or more is good—but the depth of the holes is. Holes less than 1/4" diameter should be 3–4" deep. For holes 1/4" or larger, a 5–6" depth is best.
- The blocks should be placed where they are sheltered from the worst of the weather, with entrance holes facing towards east or southeast, so they get the morning sun.

Source: Xerces Society. For more pollinator conservation information, go to www.xerces.org

Photos: Block with bee Shannon Jones