

# The Land Conservation and Climate Mitigation Nexus: Flood Resilience



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MLC - All  
Welcome.

The project we are highlighting came into being over 10 years ago. It is only through the partnership of the organizations here today and a number of others that it is been completed. We all came to the table with different but complementary goals ..... Each introduce selves and org and why involved.

# Conservation and Climate Mitigation Nexus

- The Nexus
- Why This Project
- What is Flood Resiliency
- Developing the Project
  - Conserving the Land
  - Restoring the Land
- Importance of Partnerships
- Extending the Funding Players

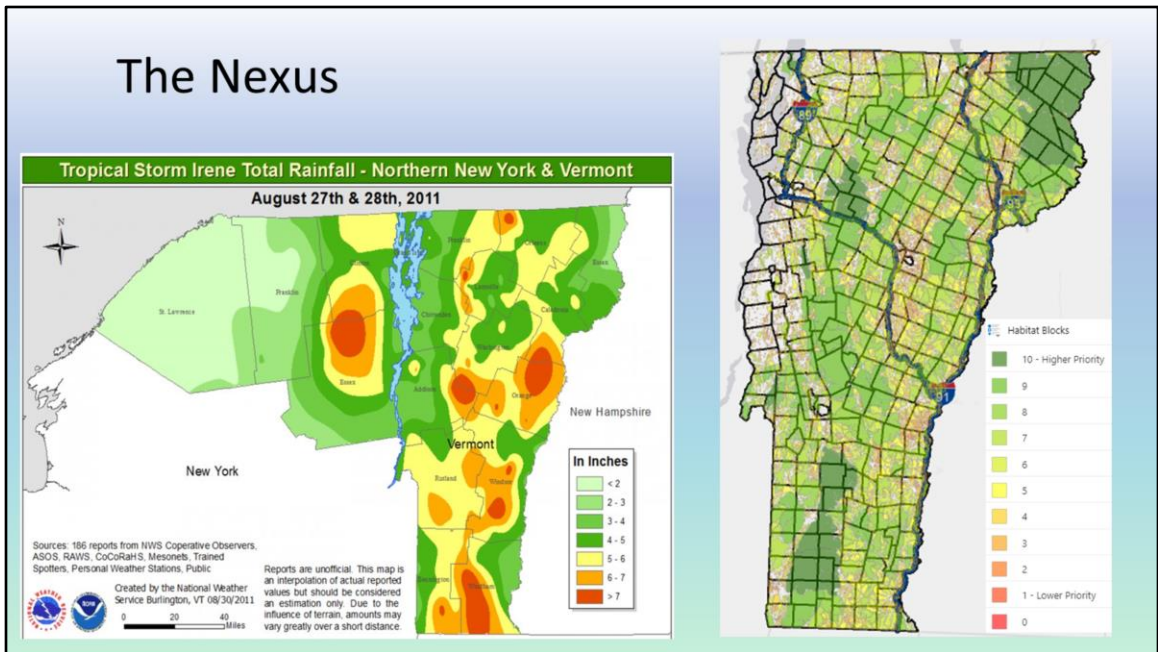
## **WORKSHOP**

How to identify  
nexus projects



MLC -

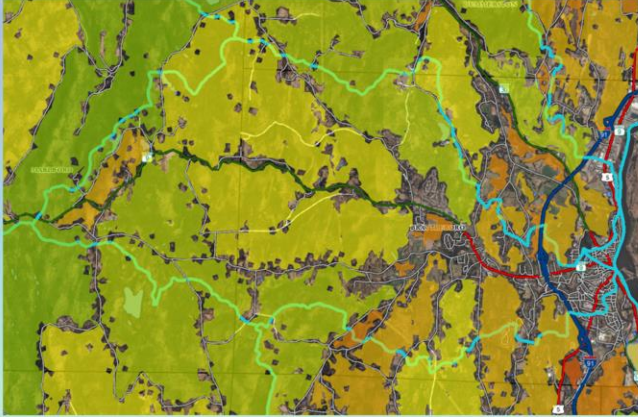
# The Nexus



MLC -

In VT and the region we have faced extreme weather events that are changing the way we look at land for conservation. We have often look uphill to find places that we want to conserve and protect, looking for large habitat blocks of forest land for habitat and corridor protection. We are coming to realize that there is a need to look downhill – to our lowlands – too. These are the locations where land and habitat and people all come together yet are often looked at as having lower conservation values. We've learned the value of these locations and are focusing more of our conservation efforts here.

## Why This Project



### • Whetstone Brook Watershed Corridor Plan (VT DEC 2008)

- First line – “The Whetstone Brook has a history of severe, unpredictable, and disruptive flooding.” back to 1972
- 72% of the reach is developed
- “Segments that are in or close to equilibrium will provide “release valves” for the rest of the watershed, making corridor conservation along these segments the highest priority.”
- Recommends removing berms, restoring the stream channel and conserving open areas as “release values” for flood flows.
- “Segment D has potential for floodplain restoration with berm removal”

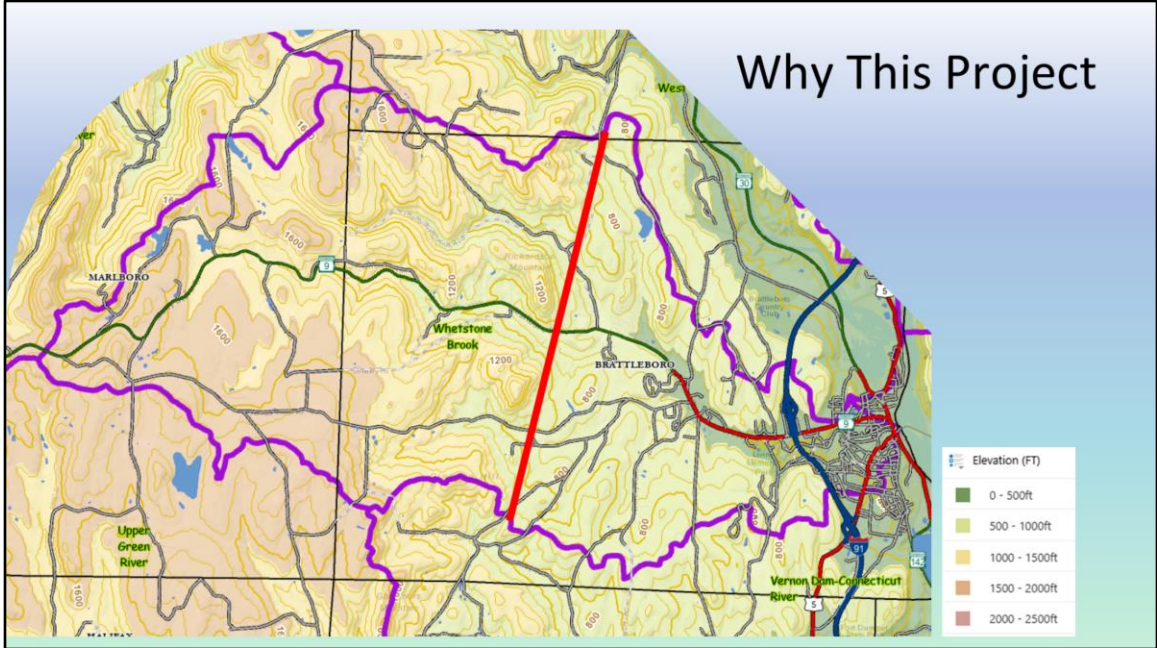


MLC -

Upland habitat blocks are key but access to them needs to connect the whole landscape not just the ridges. Waterways are often the connection routes. Riparian buffers are wildlife corridors that provide the connection.

Even before the major flooding we knew that the Whetstone Brook watershed had flooding issues and had done a geomorphic assessment of it in 2007. We knew there was a problem, and the community did too.





MLC -

The upper watershed is very steep, the lower very flat.

The brook drops from 1988' elev. to 219' over it's 13 mile course. There is a very distinct slope break above Brattleboro center. Water flowing off the mountain hits the flats at speed and we see impacts from that point all the way to the Connecticut River.



BB -

The Whetstone Brook was heavily impacted by flooding from top to bottom. The town received over \$2,000,000 in insured damages to public structures including roads, culverts, bridges and sewer and water lines. Private individuals suffered over \$1,000,000 in insured losses. Most flood damaged properties and businesses were uninsured and suffered uncompensated losses. 19 homes were destroyed with many low income homeowners displaced. An 85 unit low income elderly complex received such extensive damage that it was not fully re-occupied for a year. Recovery and redevelopment efforts spanned over 10 years.

## Why This Project

- **Vermont Economic Resiliency Initiative** (VT Agency of Commerce and Community Development 2015)
- **High Priority Specific Project Recommendations:**
  - **Conserve Remaining Undeveloped Floodplain to Protect the Downtown Area and Businesses (Site 16):** The community should conserve eight acres of remaining undeveloped floodplain upstream of the downtown near Williams Street.
- There are 43.6 acres of floodplain in the downtown and all but 10 acres are developed.

[https://outside.vermont.gov/agency/ACCD/ACCD\\_Web\\_Docs/CD/CPR/Planning-for-Tomorrow's-Flood/CPR-VERI-Brattleboro-CommunityReport.pdf](https://outside.vermont.gov/agency/ACCD/ACCD_Web_Docs/CD/CPR/Planning-for-Tomorrow's-Flood/CPR-VERI-Brattleboro-CommunityReport.pdf)

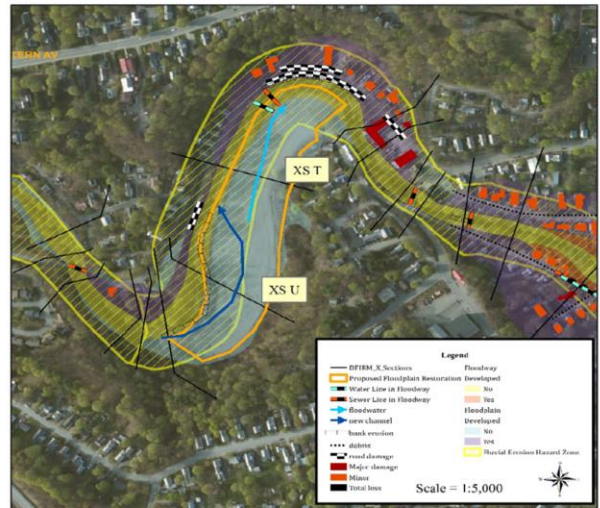


Figure 12: Eight acres of floodplain upstream of downtown

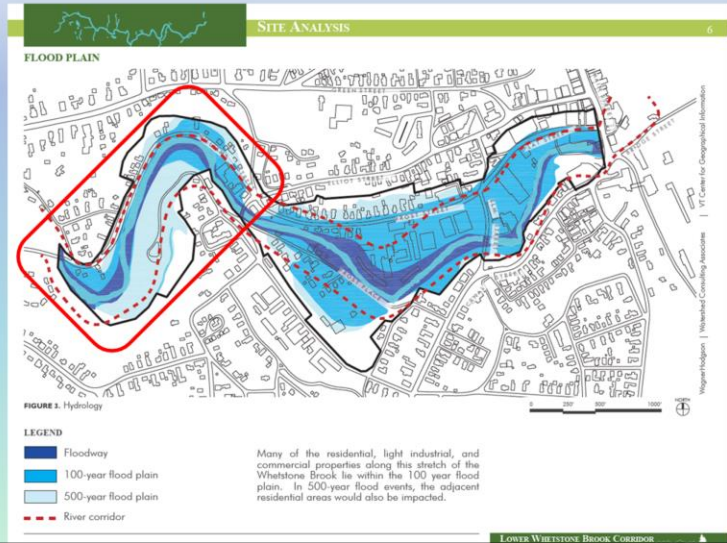
BB -

The 250 Birge Street Floodplain Restoration was first identified as a potential project in the 2009 Whetstone Brook Stream Geomorphic Assessment and was then incorporated into the Basin 12 Tactical Basin Plan. Tropical Storm Irene in 2011 hit Vermont hard. The response from a planning perspective was to look at why we had so much damage and how we could do better in future floods. The Brook reach had been straightened, armored, and disconnected from its floodplain. As a result, the erosive forces in the reach were immense and caused extensive erosion damage. A number of studies were done that gave us a lot of information on what needed to be fixed. The Vermont Economic Resilience Initiative looked at potential mitigation strategies in the most heavily impacted communities, including Brattleboro. The report identified 250 Birge Street as a potential floodplain restoration site that would protect downtown Brattleboro and its traditional neighborhoods.



# Why This Project

- [Resilience in Brattleboro's Lower Whetstone Brook Corridor](#) (EPA 2017)
  - “Creation of a major flood storage and stormwater management facility on a 12-acre site upstream from the downtown.”
  - “Connect residents and visitors to the Whetstone Brook through a series of open spaces that provide recreational opportunities.”



BB -

The town of Brattleboro worked with the EPA Sustainability Initiative to examine potential mitigation projects in the most heavily developed reaches of the Whetstone Brook, proposing a transect of interventions ranging from a naturalist floodplain restoration at 250 Birge, to hardscaped floodshelves downtown. Even though the site is only 12 acres, all of these planning efforts justified funding from state and federal agencies for the project.



## Birge Street Floodplain Restoration



BB -

The restoration site has been in industrial use since the mid-18th century with a weir at the westerly, upstream tip of the site, a sluiceway spanning the site, and a mill at the easterly, downstream portion of the site. The site was filled overtime, raising it by up to 6 feet, deepening flood depths in the Whetstone channel, thereby increasing erosive force.

## Birge Street Floodplain Restoration

12 acre unused industrial site in the floodplain.

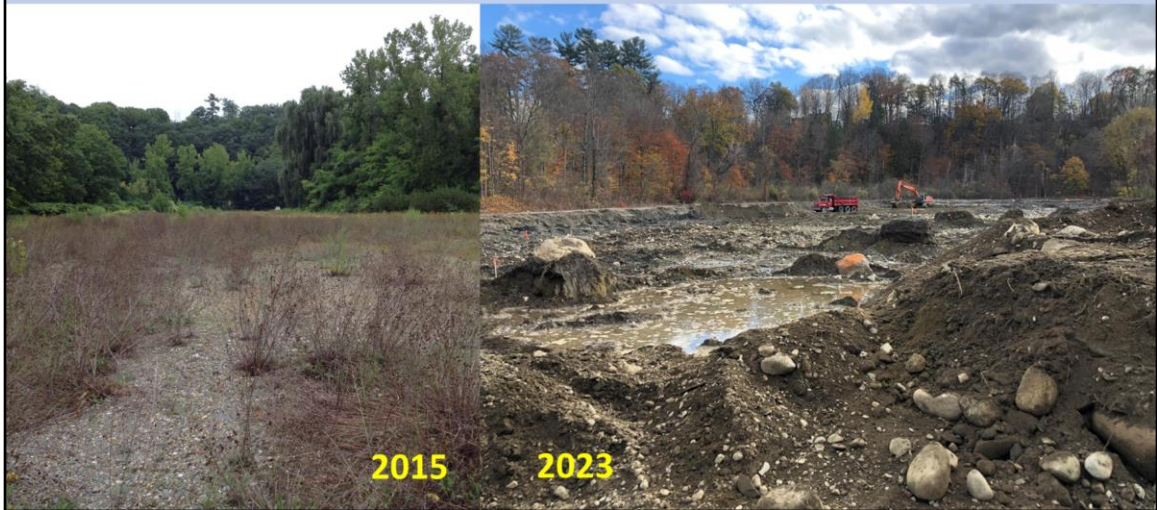


BB -

When this parcel floods it means a lot of downtown Brattleboro will also flood. There are 442 properties in Brattleboro at risk of flooding.

We knew that if we protected and restored the floodplain so it accepted more floodwater, it could help lower flood levels in town. This whole flood area is zoned as residential, mixed use or urban center, allowing for dense development. State River Corridor regulations and town flood hazard regulations limited possible redevelopment of the site, helping to free it up for restoration. With funding from DEC, working with partners including the WCNRC, ToB and VRC purchased a RCE in 2016 and bought the parcel outright in 2017. The town and VRC picked up the restoration work to take it thru remediation and restoration being completed in 2024.

Soils contaminated with toxic industrial chemicals were removed, archeological resources were protected, berms along the brook were removed and the land elevation was lowered to enable it to take on and store MORE floodwaters.



EDV -

This turned out to be a very complex project – issues not usually encountered on forestlands or even ag land conservation.

The site was found to be contaminated with toxic chemicals from old industry which had to be removed, an archeological assessment showed some areas that needed to be protected, and to make the site able to take on and store MORE floodwaters berms along the brook had to be removed and the elevation had to be lowered. So this involved significant excavation and regrading.



## Birge Street Floodplain Restoration



Restoration plantings were put in for soil stability, wildlife habitat, and recreation. Future flood waters will be able to spread out over 12 acres, drop sediment, lose velocity, and be less destructive downstream in the town center.

EDV -

Finally, this spring, restoration plantings - a mix of large native trees and shrubs were planted and the site work completed.

Hopefully, the next flood won't come before the plants get established. But even if it does, the flood waters will be able to spread out over 12 acres, drop sediment here and be less destructive downstream in the town center. These are types of projects we are looking to do all over the state. These will act as pressure relief valves along our rivers and streams and make our communities safer and more resilient for everyone.

This 12-acre site is predicted to lower the flood level in downtown Brattleboro by 1-2 feet. Increase in flood storage capacity by approximately 4-feet locally.

So, this project was identified in 2007 and got it done in 2024 – land conservation and restoration is an exercise in patience and persistence!



## What We Do Matters

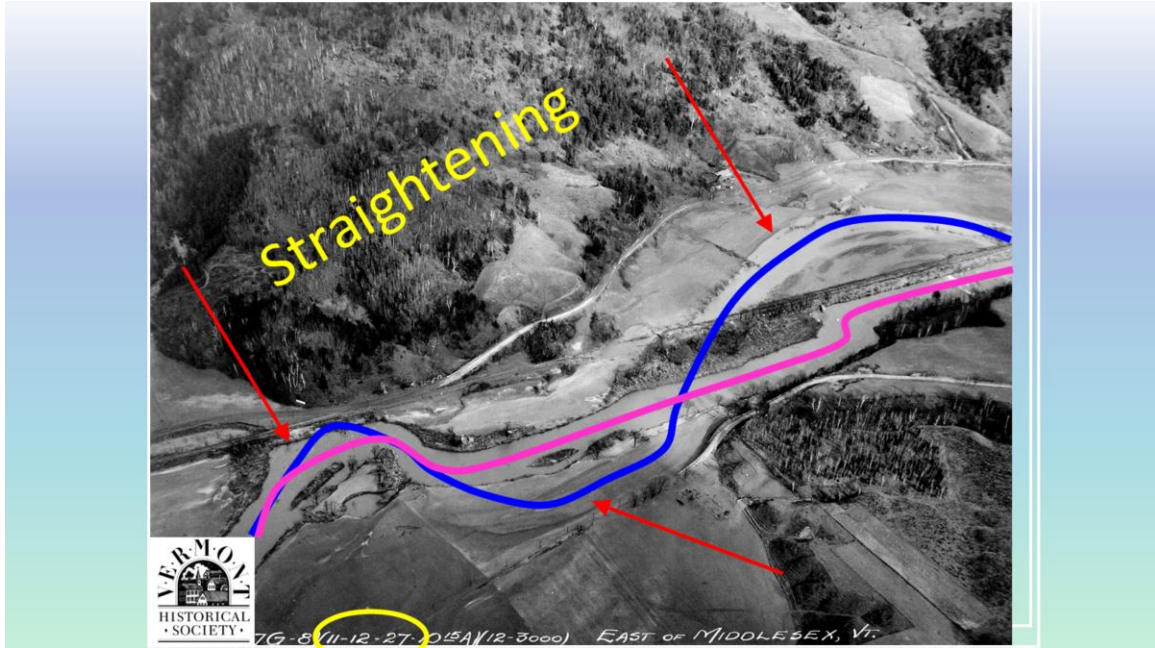
We have  
been  
manipulating  
our rivers for  
centuries



MLC -

What brought us to look at land conservation as a flood resilience strategy is the understanding that what we do on the landscape matters.

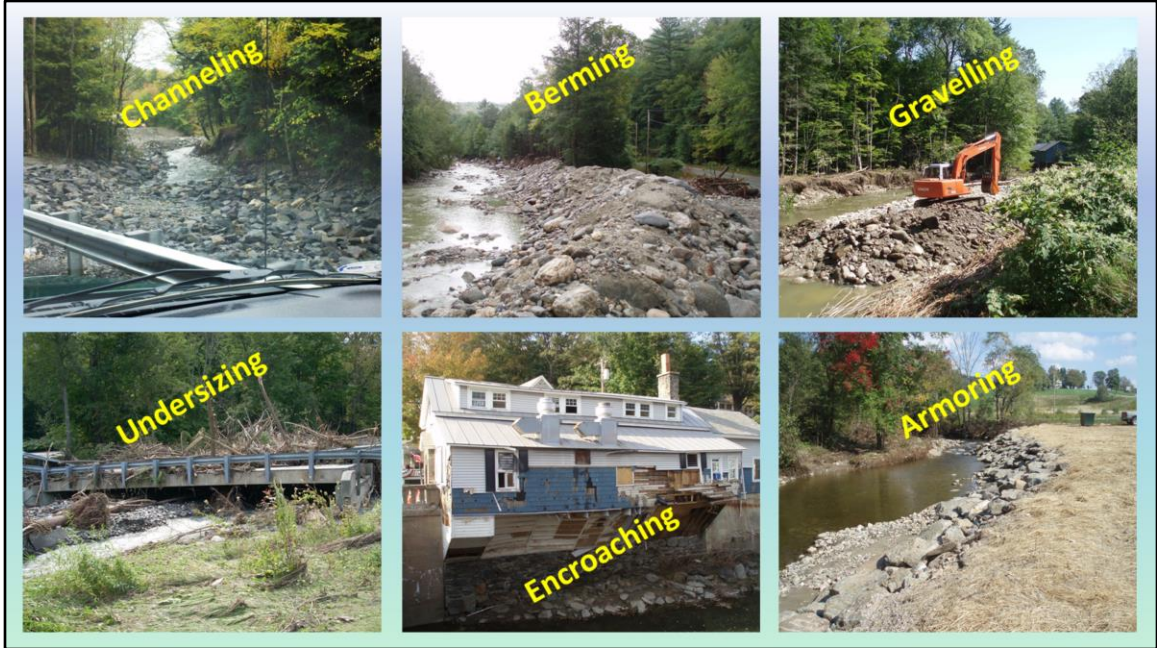
We have been manipulating our rivers for centuries, putting them where we think they should be.



MLC -

This aerial is from after the flood of 1927. It illustrates the impact of manipulating our rivers. Think of meanders bends like hiking trail switchbacks – the trail is longer and has less slope. Longer rivers store more water and fewer slopes means less velocity & power.

- Red arrows = cut off or filled channel
- Blue path = original channel length
- Pink = shortened channel length due to straightening
- Everything done to this river was done over 100 years ago. We are still paying the costs.



MLC -

We have been manipulating our rivers for centuries by Channeling – Berming – Gravelling – Undersizing – Encroaching – Armoring

All of these have impacts on how our rivers and floodplains function - and they are negative impacts.

Knowing these practices make our rivers more vulnerable to flooding, we now focus on flood resiliency not just flood recovery.

## What is Flood Resiliency

- The landscape is managed to minimize damage caused by flooding
- Rivers and streams have room to move through the landscape in a natural way
- Floodplains are open and available for water storage to reduce downstream flooding
- Streambanks and lakeshores are protected from damage by riparian vegetation
- Communities are not threatened by flooding because they are not in harm's way



MLC -

What I mean by flood resiliency speaking from a planning perspective is a long-term vision. ....

Unless we start looking at how to make things better we stay in this disaster mode.



## Not in the Floodplain



According to FEMA maps, this house is **NOT** in a hazardous area.

MLC -

Being in harm's way is not so easy to define! According to FEMA maps, this house is NOT in a hazardous area because it is not in the floodplain.

FEMA maps only look at inundation flooding – waters that rise, spread out over flat lands and then recede.

What we have more of is fluvial erosion hazard and that impacts floodplains differently by taking out the land and washing it downriver.



These were in the floodplain below the hills.

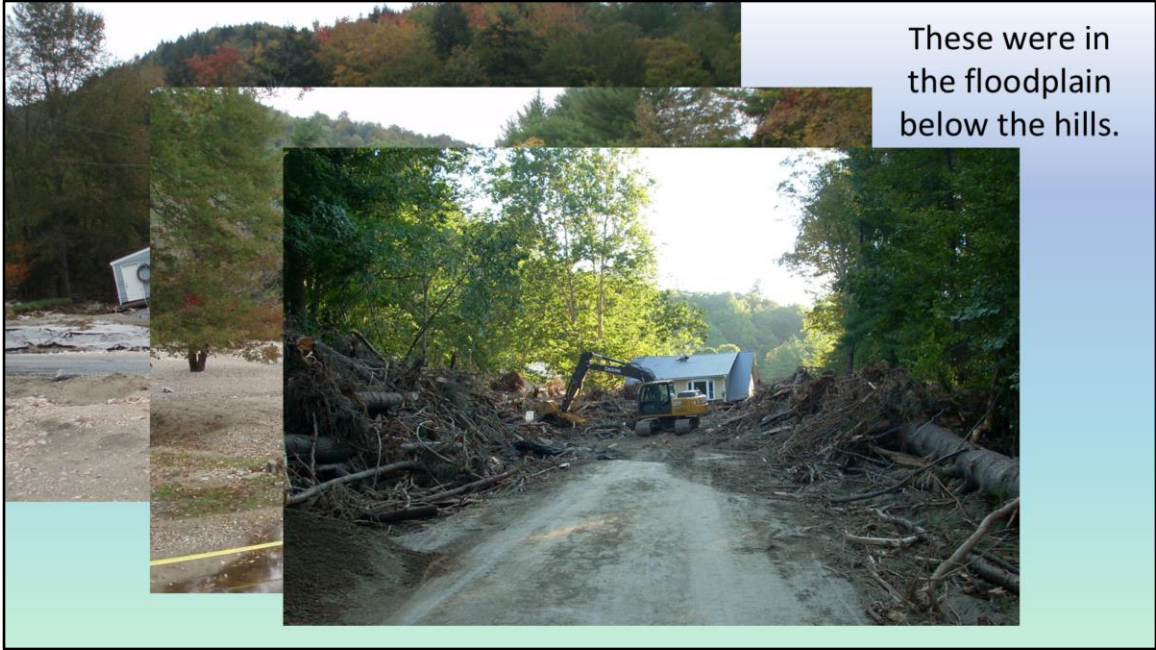
MLC -

These were in the floodplain. What we do have in our floodplains is important because they get the brunt of what comes off all the hills and mountains. It is not just the housing but the access to all it that get damaged.



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MLC -

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MLC -

These were in the floodplain. All of them are gone. What we do have in our floodplains is important because they get the brunt of what comes off all the hills and mountains. It is not just the housing but the access to all it that get damaged.

Learning all of this the very hard way, led us to selecting this project to work on.

## Developing the Project

- Restoring the Land
- Finding Funding
- Conserving the Land
- Challenges and Co-Benefits
- Creating Partnerships



EDV -

## Developing the Project - Restoring the Land

- Land Restoration & Land Conservation go hand in hand.
- Analyses & many discussions activated the project.
- Mutual Goals: Acquire the property, restore the floodplain, and conserve the land.
- Build the partnerships to find the funding.

EDV -

Land Restoration and Land Conservation go hand in hand.

If we are spending public funds to mitigate fluvial/river hazard conditions we need to protect the newly created floodplain from development.

As some folks in the audience might know, acquisition of property by a land trust is one step to “conserve” land. Acquiring a conservation easement on the same land provides increased protections on the land in perpetuity. Conservation Easements are different than deed restrictions - they have more teeth to them, so to speak.

A Conservation Easement has rights and restrictions placed on the land that limits development and certain activities that would interfere with the purpose of protection which in this case is flood storage and flood resilience for downtown homes and businesses, among other co-benefits I’ll share later.

Analyses & Discussions between 2007 and 2015 activated the project.

Reports, studies and assessments like the Whetstone Brook Watershed Corridor Plan (2008), a Tropical Storm Irene damage analysis (2012) by the Windham Regional Commission, and the VT Economic Resilience Initiative (2015) a study on Tropical Storm Irene impacts in various towns in Vermont.

These analyses along with regional and local discussions activated led to a conversation between DEC, the Town of Brattleboro, and VRC about purchasing 250 Birge property.

Our mutual goal: acquire the property, restore the floodplain, and conserve the land in perpetuity.

Build the partnerships to find the funding.

We had established partnerships with state agencies that helped us find funding for our mutual goals. **Without their support this project would not have been achievable.**



## Developing the Project - Restoring the Land

- Federal & State funding applications galore!
- Town and VRC collaborated on each aspect of the project:
  - EPA Phase 1 and Phase 2 Environmental Assessments (before purchase)
  - FEMA Archeological Resource Assessment and historic structure analysis
  - Preliminary Design to Final Design of Floodplain Restoration
  - EPA Analysis of Brownfields Cleanup Alternatives (ABCA)
  - State permitting process
  - Selection of contractors
  - Community engagement, Media outreach
  - Additional funding requests and much more...

EDV -

In order to develop the restoration project, Vermont River Conservancy and the Town had many conversations with state and federal partners to determine all of the various phases of not only a Brownfields Cleanup, but a Hazard Mitigation Restoration, Flood Resilient Communities, and Conservation Easement project.

Each agency has its own unique application, requirements, and timeline. VRC began submitting applications in 2015.

Vermont River Conservancy learning curve was steep, this was our first time managing a restoration **and** conservation project. **It taught us all the important of bringing in partners with different skill sets.**

## Finding Funding

For a project this large, it takes a lot of funding sources to achieve.

- Acquisition (property and easement - VHCB and DEC)
- Brownfields Cleanup (Vermont and EPA Brownfields Program)
- Hazard Mitigation - Floodplain Restoration (Vermont Flood Resilient Communities Fund and FEMA)
- Project Management Expenses (FEMA)
- Conservation Easement Supplemental Expenses (VHCB)
- Stewardship Endowment (VHCB and DEC)

EDV -

Numbers are still coming in, but the total project cost is roughly \$2 million dollars.

## Developing the Project - Conserving the Land

- Acquisition of a Conservation Easement is tied to property acquisition.
- Development of a Conservation Easement takes time:
  - property acquisition → site visits, easement boundary agreement →
  - survey, baseline documentation report, title reports, title insurance →
  - conservation easement drafts →
  - co-holder sign-off and closing on property transfer and easement →
  - **celebration!!**
- Expect delays and if you are lucky it will take two years from start to finish.

EDV -

As I said early, land restoration and land conservation goes hand in hand. As VRC and the Town were developing the restoration project, VRC was simultaneously developing the conservation easement that would be placed on the land after restoration.

Acquisition of a conservation easement is tied to the acquisition of the property. What I mean by that is, in order to receive \$ to purchase a property, VRC agrees to “acquire” a conservation easement on the property. A landowner can’t own the land and have an “interest” or “hold” the easement.

To **Acquire** the property it took conversations with the LO to buy time for an appraisal of the property and then negotiation of the purchase and sale agreement.

VT Housing & Conservation Board, a state funded housing and conservation organization that works to ensure affordable housing and conservation of farmlands, forests, and recreational assets for Vermonters - Provided the property acquisition dollars.

To Acquire a **River Corridor Conservation Easement** on the property VRC applied for funds from the Dept. of Environmental Conservation. They also supported the preliminary design of the floodplain restoration.



## Challenges - Time, Money, and Buy-In

- Multiple funding source timelines and expenditure deadlines
- Permitting process and costs
- Design to Implementation is not straightforward.
- Contractor costs increase.
- Buy-in from town and public
- Federal requirements and bureaucracy can be daunting.
- Pandemic
- Institutional knowledge loss
- Legal documentation errors
- Boundary line adjustments
- Project Management Expenses
- Stewardship Endowment Expenses

EDV -

A project of this size comes with complexities and challenges. This an extensive list of the challenges we experienced throughout the length of this large-scale restoration and conservation project.

What's important to note is that these challenges were overcome and that is a success.

## More than a Conservation Project

- Co-Benefits
  - **Flood Resilience**
  - Water quality improvement
  - **Habitat improvement**
  - **Public Access to brook**
  - Open Space & Recreation
  - **Environmental Justice - ADA accessible path**
- Extended
  - Increase property values
  - **Protected homes and businesses**
  - **Educational space**
  - Job creation

EDV -

However, one of the main reasons this project was so successful, supported, and valuable is all the co-benefits it provides.

One of the co-benefits that neighbors and visitors are seeing first-hand is habitat improvement and use. There have been sightings of sleeping fawns, romping rabbits, a bald eagle flying upstream from downtown, great blue heron.

Co-benefits can open up more options for partners and funding.

## Creating Partnerships



EDV -

This project and the following Brian and Marie will share - involved hard discussions and decision-making, many different partners and funding sources.

It is not just the housing or the environmental organizations at the table but the community as well. Each one of these projects impacts the whole community – where people live, where they will shop, how they will travel, what the neighborhood will be like before – during – after.

Everyone needs to be at the table so we can get it right and across the “finish line” to my favorite part - the celebration!

Before I pass the baton, I’d like to share a few photos of our partnerships in action.



EDV -

Over the years, we have learned how to make things better together!

This project is a tremendous success because of People and Partnerships.



## Melrose Terrace Buy-out & Floodplain Restoration



BB -

There are two other floodplain projects along the Whetstone.

Melrose Terrace was the first public housing development for elderly citizens in the State of Vermont.

Constructed on a filled floodplain in 1965, before the Army Corp had mapped floodplains in Brattleboro, the complex flooded for the first time months after being occupied. Being in the floodplain of the Whetstone Brook it regularly had to be evacuated during storms events because the first thing to go under was the power supply. TS Irene overwhelmed the site flooding many of the buildings, sixty of the eighty apartments were damaged.

A 4.5-acre flood mitigation project for flood storage was created through a demolition of a portion of the housing.

The Housing Authority and the State of Vermont worked together to build a new facility at a more secure site in town and Melrose was closed and most of the buildings have been removed.

The floodplain was planted and is being accessed by high water helping to protect downtown Brattleboro and all the properties along the brook.

The property was found to be an historic property under the National Historic

Preservation Act. This is memorialized by the installation of an interpretive panel discussing the history of the area and its historic flooding concerns.

The project was completed in December of 2022; it was accessed by the floodwaters of a 10 year storm weeks later on December 24; where over 100 dwelling units for low income elderly and disabled persons would have been evacuated before the project, everyone was able to stay in their homes and no structures were damaged. Over the course of 2023, the floodplain was accessed by two 10 year and one 25 year storm, avoiding evacuations and road closures.

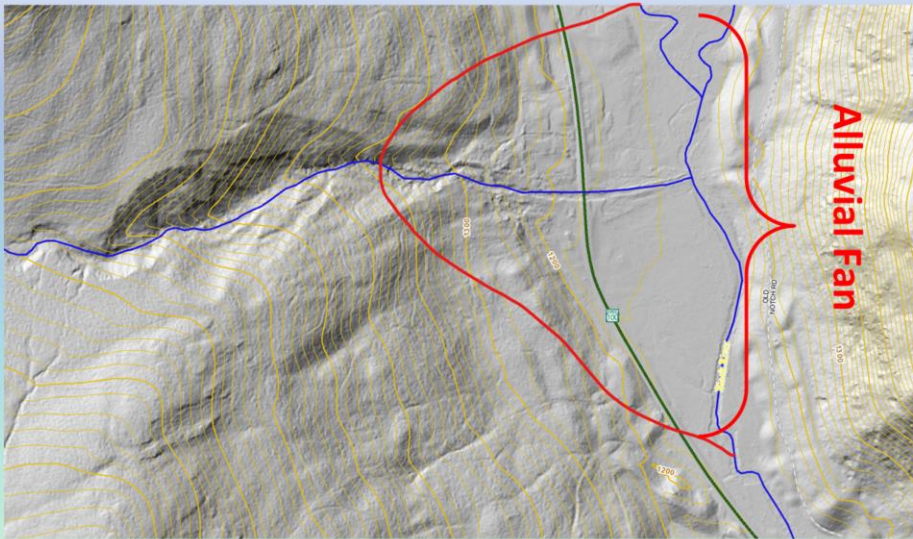
## Westgate Open Space Floodplain Conservation



BB -

The first conservation parcel acquired on Whetstone Brook was a 5-acre field listed for sale just as flooding problems were becoming a serious community concern. The local community did not want to see further development and land taken out of floodplain storage. WCNRC, VTDEC and VRC teamed up to purchase the parcel which is now open space for a housing community across the road. The parcel is located where the Whetstone Brook descends from the steep hills and forms an alluvial fan with unconsolidated alluvial soils and an extreme risk of channel migration. The parcel is slowly reverting to wetland. During flood events, waters spread across the site, slowing velocity and depositing sediment and debris. Due to this, homes located downstream have been relatively protected from damage with reduced channel migration.

## Floodplain Protection

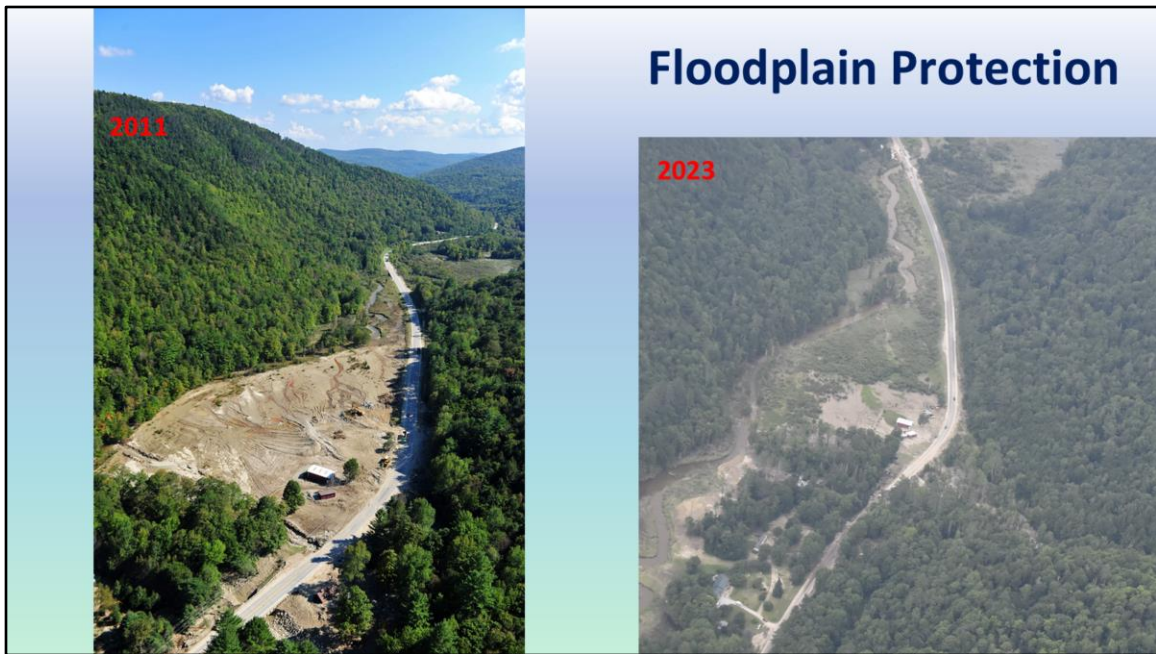


MLC -

Another successful acquisition is the Pingree Flats project.

Alluvial fans are places where one stream flows down onto the flatter floodplain of another river and spreads out over the level ground. These can be some of the most dangerous places during floods.





MLC -

The Pingree Flats in Plymouth is the alluvial fan where Money Brook plummets over 1400 feet down off Bear Mountain to meet the Black River. Route 100 and the flats were smothered by feet-deep sediment, gravel and car-sized boulders during Tropical Storm Irene. The house and sugarhouse were destroyed but the barns remained standing. Despite the damage, the floodplain functioned just as it was meant to. It allowed the water to spread out over the land and slow down capturing massive amounts of sediment and preventing it from entering the Black River. Partnering with the Vermont River Conservancy and purchasing a River Corridor Easement the flats have been permanently protected to prevent development in this hazardous location. Since the purchase the lower half of the field has regrown into wetland providing even more sediment storage and creating important habitat for a variety of wildlife.



MLC -

The transition has been impressive. From the damage - that has re-occured to the condition of the floodplain as a functioning wetland.

These floodplain projects are the nexus. Conserving lands at these junction points is providing flood protection, water quality protection and habitat creation and connection.

We are hoping to do a lot more like this throughout Vermont.

QUESTIONS ? ? ?



WORKSHOP





**Group discussion:**

- Do you see an application for these types of projects in your region?
- What other goals have you included to broaden a project's scope?
- Have you tapped into "outside" partners or funding?
- What EJ issues do you think can be addressed by these projects / how can a project be adapted to offer EJ benefits?

**Wrap-up:**

Importance of bringing in the co-benefits -

- opening up funding sources
- bring community to the table

Ability to look at the landscape for areas that offer co-benefits?