**Municipal Vulnerability Preparedness Program Action Grant Case Study**

**Municipality:** Andover
**Project Title:** Shawsheen River Watershed Land Conservation Planning and Prioritization for Climate Resilience and Environmental Justice
**Award Year (FY):** 2022
**Grant Award: $** 131,700.00
**Match: $** 46,800.00
**Match Source:** In-kind town staff hours, In-kind volunteer hours, and Town cash.
**One or Two Year Project:** One
**Municipal Department Leading Project:** Sustainability
**Project Website URL:** Shawsheen River MVP Project Experience

**Community Overview:**

- What is the population size of your community and where is it located?
    - The City of Andover has a population of approximately 36,500 and is located in Essex County, approximately 20 miles north of Boston.
- Do you have any Environmental Justice or other Climate Vulnerable communities? (Think about both those who live and work in your town.)
    - While Andover is one of Massachusetts' wealthier communities, as noted in the Town's Summary of Findings, 17.45% of Andover households (over 2,100 households) have incomes below $50,000. Andover also contains a large mapped environmental justice community north of I-495. This EJ community has a median household income of $176,645 (well above the state median of $85,843) but is mapped as having a 48.3% minority population, with 5.0% of households with language isolation. Portions of this EJ community also overlap with the FEMA floodplains for the Merrimack River and Fish Brook. The EPA's EJScreen tool identifies additional areas in Andover as meeting demographic indicators of EJ communities. The neighborhood South of 495 in Shawsheen Heights near the Shawsheen River is mapped as having 13% of its population under the age of 5, putting it at the 94th percentile nationally for this vulnerable population. The EJScreen tool also indicates that the flood prone area along the Shawsheen River south of the Stevens St bridge is mapped as having 29% of its population over the age of 64 (92nd percentile); a similarly mapped area occurs just west of North Main Street along the Shawsheen (over 25% of residents over the age of 64; 87th percentile). One additional area in the same vicinity (along High Street) is mapped as 11% linguistically isolated (85th percentile).
    - There are three high-density, low-income housing communities along the Shawsheen River at an elevated risk from flooding: Andover Commons (50% of units are reserved for residents with incomes less than 50% of AMI), Marland Place (senior housing), and Frye Circle (a 96-unit Andover Housing Authority property that houses elderly and disabled residents). Marland Place, in particular, is recognized as having extreme flood risk by the First Street Foundation's Flood Factor Tool.
    - Furthermore, resilientma.org indicates that the neighboring downstream community of Lawrence is mapped entirely as EJ communities based on the percentage of minorities, with many areas also mapped for English isolation and/or income. The median household income for one mapped EJ community in the downtown Lawrence area is $18,882, with a 98.5% minority population, and 50.8% of households with language isolation.

- Other unique traits of your municipality like who the top employers are, geography, history, etc.
    - Andover is an inland City with significant waterbodies including the Shawsheen River, Fosters Pond, Pomps Pond, Haggetts Pond, and the Merrimack River forming the Northern border. Architecture found in Andover reflects the Town's historic past as a mill town. The region's first powder mill was established in Andover in 1775, and shortly after followed paper manufacturing and several textile mills.

**Project Description and Goals:**

- Where was the project located?
    - The project was located along the Shawsheen River in Andover, including adjacent and surrounding parcels. The project also addresses potential flooding impacts to neighboring communities, namely downstream environmental justice communities in neighboring Lawrence.
- What climate change impacts did the project address?
    - During the Town's MVP planning process in 2019, stakeholders identified flooding as a particular hazard of concern following serious flooding events. In May of 2006 and March of 2010, the Town endured significant flooding after heavy rainfall events, which caused many roads to close, schools to cancel classes, and residents to evacuate their homes. Climate projections analyzed during the project indicate total annual precipitation is expected to increase by 2.34 inches from 2020 to 2049 over historical averages from 1971-2000, while the annual days with precipitation greater than 2 inches is expected to increase by 23%. Additional climate analysis indicates 265 properties in Andover will have a greater than 26% chance of being severely affected by flooding over the next 30 years, which represents 11% of all properties in the Town. The Action Grant project addresses the Town's #1 priority action identified through its Community Resilience Building Workshop process, which is to undertake a strategic program of land acquisition/conservation and adaptation projects along waterways (i.e., river/stream corridors and floodplains) to provide additional flood storage and reduce the impacts of larger storm events and increased runoff. Multiple climate change impacts are addressed in the project with primary impacts including increased temperature and increased precipitation, and secondary impacts including heat waves, intense storms, flooding, and wildfires.
- What were the specific goals and tasks of the project as stated in your application?
    - The MVP Action Grant project focused on prioritizing parcels of land for potential restoration and/or acquisition based on factors related to existing environmental and social conditions, and the potential for community enhancement and climate resilience through the following tasks:
        - Task 1: Assessment and Identification of Parcels for Acquisition and Preservation
            - Task 1.1: Development of Climate Adaptation Goals
            - Task 1.2: Review of Existing Protected Land
            - Task 1.3: Desktop Site Screening Using Climate Data
            - Task 1.4: Field Assessments
        - Task 2: Public Involvement and Community Engagement
            - Task 2.1: Project Progress Meetings
            - Task 2.2: Print, Digital, and in-person community engagement activities

        - Task 3: Climate Adaptation Land Acquisition and Adaptation Prioritization Plan
            - Task 3.1: Prioritize Parcels for Acquisition
            - Task 3.2: Development of Climate Adaptation Land Acquisition and Adaptation Prioritization Plan
- The project has met the goals set forth in the Town's grant application in terms of:
    - Employing nature-based solutions
        - The first of three climate adaptation goals developed through this project is to reduce vulnerability to flooding and intense rainstorms by increasing the capacity for flood storage and mitigation through nature-based restoration and active management, especially in areas with vulnerable populations and community assets (including those downstream).
        - Parcels that were evaluated through in-person field assessments were rated for their existing natural flood resiliency characteristics (e.g. intact riparian buffers) and assessed for potential use of adaptive nature-based solutions to increase flood storage or otherwise increase flood resiliency.
        - Nature-based solutions for restoration and climate resilience site improvements include expanding the stream network to increase flood storage capacity, flow diversion practices to protect the riverbank from erosion, habitat enhancement to connect noncontiguous areas and provide travel corridors for animals, and naturalizing the river corridor to reduce surface runoff and improve water quality.
    - Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations
        - The Washington Park Condo Board meeting on February 28, 2022, provided an opportunity to inform and engage climate vulnerable residents of the Washington Park Condos in the project
        - The Andover Climate Summit on April 8-9, 2022 engaged community members from neighboring Lawrence and Tewksbury – in addition to youth from Andover High School, Phillips Academy, Pike School, and Abbot Lawrence Academy
        - The focus on the Shawsheen River corridor has the most immediate resilience benefits for those frontline residents in the downtown area, where repetitive losses have occurred, such as the multi-million dollar property damages suffered during the 2006 Mother's Day Flood. This vulnerable downtown area houses a significant senior population.
        - Critically, any flood resilience and flood storage projects implemented in Andover will ultimately also have downstream benefits for neighboring EJ communities in Lawrence. The specific focus on flooding resiliency has direct positive impacts on the climate vulnerable and EJ communities in Andover and Lawrence that are located within the floodplain of the Shawsheen River, with additional indirect flood resiliency and water quality benefits to downstream neighborhoods in Lawrence along the Shawsheen and Merrimack Rivers.
    - Providing regional benefits
        - Through this project, Andover serves as a pilot community for the climate-based conservation land planning and prioritization approach. The methods and protocols developed as deliverables in this project will be made available to the other communities along the 26-mile river corridor—Bedford, Billerica, Tewksbury, Wilmington, and Lawrence. When applied to the other watershed communities along the Shawsheen River, the approach will have tremendous collective resilience value for the

region. The intent is for this first phase pilot project to lead to a larger coordinated regional effort at both prioritizing parcels for flood resiliency and land preservation and to perform a coordinated modeling study of the Shawsheen River to model the efficacy and quantify benefits and costs associated with different implementation project options such as floodplain restoration or reconnection projects.
        - The land acquisition prioritization plan developed through this project will ultimately result in positive benefits for the entire region through increased flood resiliency, recreation and river access opportunities, and more.
- Implementing the public involvement and community engagement plan set forth in your application
    - The community engagement activities conducted for this MVP project are embedded within a larger community process that is being initiated around Andover's Shawsheen River Master Plan process and the Town's Climate Action Plan development
    - The Town organized a project Steering Committee who represent key community groups and residents from EJ communities in Andover. The Steering Committee was involved in the development of the climate adaptation goals and the following steps of the Plan from the beginning, offering feedback on the project process and objectives through a series of progress meetings.
    - A GIS-based mapping/public comment tool provided residents and stakeholders the opportunity to shape the project team's understanding of current needs associated with the river, as well as goals and desired future uses focused on both environmental and social sectors.
    - Citizen scientists assisted with the in-person field assessments, Task 1.4. Citizen scientists are members of the Andover community who, prior to assessments, received training, and their field protocols were based around and adapted from the Center for Watershed Protection's Unified Stream Assessment Manual. Professional assessment by Fuss & O'Neill's floodplain and restoration specialists supplemented the citizen efforts.
    - Additionally, a website was created to be the digital home of the Town of Andover's climate resilience projects. The web portal offers an overview of the Town's climate resilience projects, including the FY 2022 MVP Action Grant Project, and will be the home of the digital Shawsheen River Master Plan once complete. Summaries of the FY 2022 MVP Action Grant Project tasks offer a snapshot of the project process, and are supported by full technical memorandums which go further into detail. A flyer advertising the web portal was developed and distributed by the Town. This flyer was also translated into Spanish as part of the equitable engagement strategies for this project. As the Town continues to carry out resilience-related projects, the web portal serves as a place to provide updates to members of the Andover community.
    - In April of 2022, the project team led a workshop with members of the Andover community at the Town's inaugural Climate Summit, aimed at identifying key climate resilience and social justice priorities. During the workshop, community members were provided with:
        - A one-page information sheet, including definitions of climate resilience and climate justice, Andover's primary hazards of concern and the top three recommendations developed during

the 2019 Community Resilience Building (CRB) workshop , and two discussion guiding questions
- Three poster-sized tables displaying the high priority community resilience recommendations identified during the 2019 CRB workshop
- A map of the Town of Andover showing the location of Environmental Justice (EJ) communities, FEMA flood zones, as well as other identifying features within the community
- Print outs of maps and tables showing the initial list of locations of priority parcels for land acquisition and restoration projects along the Shawsheen River in keeping with Recommendation #1 and the focus of Andover's FY22 MVP Action Grant project

Climate Summit attendees discussed which priority recommendations previously identified during the 2019 CRB workshop remain a high priority, and suggested additional priority activities that need to be considered moving forward. The input from community members helped shape the recommendations made in the Climate Adaptation Land Acquisition and Adaptation Prioritization Plan.

- A youth art contest was also incorporated as part of the program for the Climate Summit, and the promotional flyer for this activity was translated into Spanish as part of Andover's plan for equitable engagement

- On June 18th, the Town participated in SummerFest 2022, a free community event in Lawrence, MA, in partnership with Greater Lawrence Community Boating. Town staff set up a vendor table with a display of information on the MVP action grant project. This provided opportunity for the Town to engage with neighboring residents, and share how they can stay involved and updated through the project website.
    - Sustainability Coordinator Joyce Losick-Yang, Conservation Director Bob Douglas, and Conservation Intern Diya Ganesh met with members from the Andover/ Lawrence community. Nearly 200 residents of the Merrimack Valley had a chance to discuss plans for decreasing flooding along the Shawsheen and Merrimack Rivers. Young visitors enjoyed an interactive exhibit, which demonstrated the benefits of restoration projects to localized flooding.
- Guided public "walk-shop" with AVIS (The Andover Village Improvement Society), Shawsheen River Watershed Association, and Merrimack River Watershed Council to discuss the benefits of open space preservation and nature-based solutions to climate change; coupled with virtual tour highlighting the high-priority sites identified through the project.

- Finishing the project on time
    - All project deliverables were completed on time.

**Results and Deliverables:**

- Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created, increase in tree canopy coverage, etc.). Report out on the metrics outlined in your application.
    - The project application outlined three key milestones of success:

1. Completion of the prioritization tool
    - After completing the review of 835 existing protected parcels during Task 1.2 of the project, a desktop site screening (Task 1.3) was also conducted on 1,455 protected and non-protected parcels along the Shawsheen River. All 1,455 parcels were screened using GIS and a standardized protocol to determine measures of terrestrial resilience, physical diversity, local connectedness, biological conditions, social vulnerability, and trail/recreation opportunities.
    - Once screening for these attributes was completed, a subset of 52 parcels was selected for inclusion in additional field assessments based on:
        - A range of scores for terrestrial resilience and/or ecological integrity, which might indicate that a parcel has a higher restoration potential
        - Low-lying land area (based on land contours) near FEMA flood zones, and proximate to downstream development, which might indicate that a parcel has a higher flood storage potential
        - Ability to access the parcel easily and safely for in-person field inspections
    - Due to restrictions regarding access to a private parcel, a total of 51 parcels were assessed in-person using the field assessment protocol developed by Fuss & O'Neill.
    - Data from Tasks 1.2, 1.3, 1.4, and community engagement activities were used to develop a prioritization tool to guide the Town in the prioritization of parcels for acquisition in accordance with the climate adaptation goals identified in Task 1.1.
    - Variables used in the prioritization tool to score measures of existing environmental conditions, existing social conditions, community enhancement potential, and climate resilience potential include:
        - Intact Biological Condition
        - Terrestrial Resilience
        - Social Vulnerability Index (SVI): Socioeconomic
        - SVI: Household Composition
        - SVI: Minority
        - SVI: Housing/Transportation
        - Educational Potential
        - Recreational Potential
        - Flood Storage Potential
        - Restoration Potential
    - The prioritization tool was developed to provide a systematic, consistent, and transparent method of prioritizing parcels for acquisition based on factors related to existing environmental and social conditions, and the potential for community enhancement and climate resilience potential. The tool allows for future updates of the land acquisition list, should priorities shift, or additional factors need to be accounted for.
2. Compilation of a list of priority acquisitions
    - A key project deliverable, the summary memorandum describing Task 3.1, includes tables showing the results of applying the

prioritization tool to the data collected on the 51 parcels assessed during Tasks 1.3 and 1.4 of the project.
    - Of the 51 parcels assessed, 18 were private parcels, while the remaining 33 were existing preserved parcels.
    - In addition to tables ranking the 51 parcels by prioritization, maps were created to represent how these ranked prioritized parcels are geographically distributed across the study area.
3. Successful long-term implementation of the plan through strategic land acquisition
    - Land acquisition and preservation in itself is a very low-tech, low-maintenance approach to climate resiliency. Maintenance may be required for recreational amenities, such as trails, that provide co-benefits to Town residents, but the climate mitigation and adaptation benefits of preservation are largely self-sustaining, making preservation a cost-effective investment for the Town's future.
    - The deliverables developed through this project will support several ongoing planning efforts in the Town, most notably:
        - The Shawsheen River Master Plan process
        - Andover's Climate Action Plan
        - The work of the new Open Space Task Force.

          These existing and ongoing efforts will keep local resilience work moving forward and will lead to future acquisition and implementation projects.

    - This project is also envisioned to feed into a hydraulic modeling study of the Shawsheen River. High priority parcels identified in the project deliverables will be the subject of modeling and preliminary design efforts to quantify flood reduction benefits and further narrow in on the most cost-effective and productive solutions to reduce flooding in Andover and protect its most climate vulnerable citizens. This in turn will allow for full cost-benefit analysis of these options, setting the Town and larger region up for successful grant opportunities through the FEMA BRIC program and other state and federal funding programs.

- Provide a brief summary of project deliverables with web links, if available.
    - Key project deliverables include:

        - A summary memorandum describing the development of climate adaptation goals
        - A summary memorandum describing the review of existing protected land, and identifying gaps between existing Town plans and climate adaptation goals
        - Development of a Desktop Site Screening Protocol and maps visualizing the screening results
        - Detailed field data sheets completed during the in-person field assessments
        - A summary memorandum describing the prioritization method used to prioritize parcels and spreadsheet of prioritized parcels
        - A final Climate Adaptation Land Acquisition Plan

- All of these deliverables will remain available to the public via the project webpage, another key project deliverable: Shawsheen River MVP Project Experience

**Lessons Learned:**

- What lessons were learned as a result of the project? Focus on both the technical matter of the project and process-oriented lessons learned.
  - Andover is a highly engaged community committed to the success of this project and leading by example and sharing knowledge/information on land acquisition and nature-based solutions to providing flood resilience with neighboring communities.
  - There are several opportunities to improve the climate and flood resilience of the Shawsheen through the future implementation of priority projects identified during this planning process.
- What is the best way for other communities to learn from your project/process?
  - Share out information publicly via the project webpage
  - Continue to engage neighboring communities in events like the Andover Climate Summit and invite them to be active participants in future public engagement activities, such as the stakeholder meetings and design charrettes planned for the FY23 MVP Action Grant project

**Partners and Other Support:**

- Include a list of all project partners and describe their role in supporting/assisting in the project.
  - Town of Andover Project Team
    - Joyce Losick-Yang, PhD Sustainability Coordinator
    - Robert Douglas, Andover Director of Conservation
    - Jeff Cary, Andover Geographic Information System Coordinator
  - Project Team Roles
    - As the project lead for the Town, Joyce Losick-Yang has provided project management, grant oversight and administration, and leadership of the project team and coordination of the work done by the project's Steering Committee. Jeff Cary provided the consultant team with archived photographs used in project deliverables, and GIS assistance as needed. Robert Douglas participated in project progress meetings and provided valuable input on the project process as representative members of key conservation partners, Andover municipal staff, and residents.
  - Fuss & O'Neill Consultant Team
    - Julianne Busa, PhD, Project Manager
    - J. Alexander Maxwell, PhD, Resilience Planner
    - Chelsea Zakas, AICP Candidate, Environmental Planner
    - Michael Soares, Wetland Scientist
  - Collectively, the project team has extensive expertise in conservation, land preservation, climate resiliency planning, development of prioritization tools, public engagement, and engaging diverse stakeholder populations to address issues of justice and equity. The project's consultant team developed the core methodology and protocols and collaborated with the Town's existing organizations and dedicated base of community volunteers to carry out the protocols through a combination of expert professional assessment and citizen science.

**Project Photos:**

- In your electronic submission of this report, please attach (as .jpg or .png) a few high-resolution (at least 300 pixels per inch) representative photos of the project. Photos should not show persons who can be easily identified, and avoid inclusion of any copyrighted, trademarked, or branded logos in the images. MVP may use these images on its website or other promotional purposes, so please also let us know if there is someone who should receive credit for taking the photo.