Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: Town of Arlington
Project Title: Wicked Hot Mystic
Award Year (FY): 2020
Grant Award: $ 186,200
Match: $ 159,940
Match Source: In-kind
One or Two Year Project: Two year project
Municipal Department Leading Project: Planning and Community Development
Project Website URL: https://resilient.mysticriver.org/wicked-hot-mystic

Community Overview:

- What is the population size of your community and where is it located?
    - The Town of Arlington is in eastern Massachusetts and lies at the edge of the Boston Basin (a broad, flat floodplain). Located about six miles northwest of Boston, Arlington's population of 45,304 (2019 American Community Survey) occupies 5.6 square miles or 3,509.9 acres. Arlington is part of Middlesex County and the Greater Boston metropolitan area; its neighboring communities are Lexington, Winchester, Medford, Somerville, Cambridge, and Belmont. The primary commercial corridors of Massachusetts Avenue and Broadway bisect the town and connect it to Cambridge and Somerville on the east and Lexington on the west.

      While the grant was awarded to Arlington, the project benefitted 21 communities across 76 square miles of the Mystic River watershed, which is described in more depth below.

- Do you have any Environmental Justice or other Climate Vulnerable communities? (Think about both those who live and work in your town.)
    - Yes, there are 17 block groups in Arlington identified as Environmental Justice communities. All qualify owing to the minority population. Arlington residents who live in affordable housing are especially climate vulnerable owing to flooding and extreme heat.

      These blocks generally encompass the commercial areas of Town and are in denser residential areas, with multifamily homes and apartment complexes. Neighborhoods outside of the EJ communities are predominately made up of single-family homes. Most residents identifying as a race other than white selected Asian (12.3%), and 4.9% of respondents identified as Hispanic or Latino.

      Another indicator used to identify lower income households was Community Development Block Grant (CDBG) data. The U.S. Department of Housing and

Urban Development (HUD) CDBG program gives grants to more than 1,200 communities throughout the U.S. each year to address critical and unmet community needs, primarily serving low- and moderate-income individuals. Arlington is an Entitlement Community and has received CDBG grants directly from HUD annually since 1975. Block groups that qualify for CDBG program funds largely overlap with the state's designated Environmental Justice communities.

- Other unique traits of your municipality like who the top employers are, geography, history, etc.
    - This project was undertaken in partnership with the Mystic River Watershed Association (MyRWA). MyRWA works to protect the Mystic River area, including Alewife Brook, Mill Brook, and the Mystic River and Lakes. It sponsors a variety of water quality monitoring programs and offers educational and outreach opportunities throughout the year. MyRWA represents a total of 21 towns and cities within the watershed area. The river and much of the land along the waterway is managed by DCR, which completed a master plan for the area in 2009. MyRWA headquarters are located in the former Central School next to Town Hall in Arlington.

      The Town is a member of the Resilient Mystic Collaborative, a partnership among the 21 cities and towns within the Mystic River Watershed and facilitated by MyRWA.

Project Description and Goals:

- Where was the project located?
    - This project focused on Greater Boston's Mystic River Watershed, which spans 76 square miles and the full range of socioeconomic diversity. Its 21 municipalities include Arlington, Belmont, Boston, Burlington, Cambridge, Chelsea, Everett, Lexington, Malden, Medford, Melrose, Reading, Revere, Somerville, Stoneham, Wakefield, Watertown, Winchester, Winthrop, and Woburn. While we collected data from portions of the municipalities that lie beyond the Mystic River Watershed border, and these data are included in the project documentation, findings are primarily focused on the portion of the transects contained in the Mystic River Watershed.

- What climate change impacts did the project address?
    - Extreme heat

- What were the specific goals and tasks of the project as stated in your application?
    - Public education and citizen scientist recruitment
    - Selection of study polygons and transect routes
    - Quantitative and qualitative data gathering

- Modeling ambient temperatures based upon Landsat and transect data
- Creating and analyzing geospatial maps and other visualization products

- Did your project meet the goals set forth in your application in terms of:
  - ~~Employing nature-based solutions~~ (N/A)
  - **Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations**
  - **Providing regional benefits**
  - **Implementing the public involvement and community engagement plan set forth in your application**
  - **Finishing the project on time**
  - This project provided regional benefits for the Mystic River Watershed communities, both for providing zoomable, high-quality, ground-level air temperature and air quality maps, as well as fostering community connections and relationships. These data will be publicly accessible for others to use via the MAPC, MOS, and RMC websites, as well as on individual municipal websites. We will do outreach to and training with municipalities, community-based groups, and other stakeholders to encourage their use of these data in planning and implementation of nature-based solutions to mitigate extreme heat in the most highly urbanized watershed in New England.

    Our project focused heavily on direct community engagement and public involvement. We had over 80 volunteers participate in the data collection in August 2021. Volunteers received $25 gift cards for their participation. Only 15 percent of volunteers were from priority populations, however, despite having partnered with multiple environmental justice CBOs on recruitment and training. Some challenges included our inability to precisely predict when a heat wave would occur; we ended up taking measurements during the work week with little lead time. This may have limited low-income residents from being able to participate. Others may have been on summer vacation, been less interested in participating in a project that did not originate locally, or not have been reached by our engagement efforts.

    In order to continue with community engagement in the Watershed, we used an online community science platform called ISeeChange, where participants documented and learned more about the changing environment around them. We had an extreme heat page for the Mystic River watershed, where anyone within the area could post their observations about heat, while also being able to interact with other community scientists. Posts included highlighting areas that were hotter in the city, areas that had trees or water features to cool down, or how community members were dealing with the heat. This tool is free to use, can be used anywhere in the world, and was used in order to increase engagement in places we couldn't reach.

We were more successful in community engagement for improving equitable outcomes for and fostering strong partnerships with EJ and other climate vulnerable populations with our data sharing and community feedback events. We partnered with GreenRoots in Chelsea and the City of Everett to host two outdoor, family-friendly events during April's Earth Month, ending with a Heat and Health Fair at the Museum of Science. We chose Chelsea and Everett as partners because they are cities with extreme heat temperatures and we wanted to prioritize them for additional community outreach.

During these events, we partnered with the Art+Bio Collaborative to create collaborative art pieces and individual pieces of art. These works were led by 10 artists and contributed to by 85 community members. We asked community members "What do you do in the summer to keep cool?" and encouraged them to draw their answers, and these are included in the project documentation. These events helped set the groundwork for future work under "Wicked Cool Mystic," funded by grants from the Takeda and Fidelity Foundations and hopefully through a 2022 MVP grant that will focus on engaging priority residents in designing cooling solutions in Everett, Chelsea, Malden, and Arlington.

The only task we did not complete on time was Task 8.3. Although we could have completed a pro forma solution by the end of FY2022 and we have already built interactive maps that were publicly available within the original timeline, we asked for and received two more months to develop and post a more user-friendly online heat viewer in collaboration with our project partners at MAPC, similar to the flood viewers multiple cities have already developed.

Results and Deliverables:

- The Wicked Hot Mystic datasets provide nationally recognized, high-resolution models of hyperlocal heat vulnerabilities, in an accessible format that can help to inform community resilience planning.

  The raw data were collected by community volunteers who drove or cycled over 20 routes (also referred to as "transects") in and around the communities in the Mystic River Watershed at four data collection times (6 AM, 3 PM, and 7 PM on August 12, 2021, and 6 AM on August 13), gathering geospatial data for ambient temperature, relative humidity and particulate matter.

  These transect data were then modeled by researchers at CAPA Strategies and the Museum of Science to produce spatial models of temperature, heat index, and air quality for the communities in the watershed.

  We found differences of up to 10 degrees Fahrenheit among communities at multiple

data collection times. The warmest communities included Somerville, Chelsea, Revere, Everett, and East Boston.

A major finding is that changes in land use can cause major differences in modeled and measured temperatures even across relatively small distances of a few hundred meters. For example, the highest modeled temperatures in the watershed occurred along Mystic Street, which is a major commercial corridor with a high density of buildings and a lack of vegetation. The coolest temperatures occurred in communities such as Belmont and neighborhoods with abundant green space or near water.

The use of small mobile sensors provided an opportunity to sample fine particulate matter (PM2.5) concentrations. One major finding of interest in the transects, is that some of the highest concentrations of PM2.5 in the region were located in the areas where Interstates I-93 and I-95 intersect, near communities such as Woburn and Stoneham. Other areas with high levels of particulate matter based upon the transects and the predictive model include East Boston, Chelsea, Charlestown and Everett.

Lessons Learned:

Stakeholder and volunteer engagement was key at all points of the project: making meaningful transect routes, volunteer recruitment, and outreach for results.

This type of volunteer science is not accessible to everyone. Volunteers need access to a car or bike, have time to watch the one-hour training, need to be able to adjust their schedule to participate when called upon, and need to be comfortable with technical equipment.

Some other barriers to volunteer accessibility included our inability to precisely predict when a heat wave would occur, the campaign taking place during the summer when children are not in school, and volunteers may not have participated due to summer vacation, less interest in participating in a project that did not originate locally, or they may not have been reached by our engagement efforts.

Some ideas for improving volunteer engagement if we were to conduct this campaign again are: putting the compensation amount on the volunteer ad and reducing the signup to one form (rather than an interest form followed by an official sign up form).

Striking a balance between gathering robust data and broad community engagement was tough. It is important for other project leaders to identify which of those two objectives they want to prioritize first.

We had hoped that ISeeChange would provide an opportunity for those who could not participate in the data collection campaign to still be a part of documenting heat for the Wicked Hot Mystic project; however, we found that engagement with the ISeeChange platform was low. This could be due to a number of factors including: lack of time or interest in learning how

to use a new platform, difficulty in representing extreme heat through photos, and/or perhaps not enough incentives to post on ISeeChange.

This type of heat mapping campaign can produce high quality data for air temperature. While collecting ambient temperature, humidity, and air quality data during the same heat wave allowed the creation of a comparable model that can assess cumulative vulnerabilities in a powerful way, it would be good to get sustained data collection across a longer period of time to increase understanding of the air quality.

Partners and Other Support:

This project was generously supported by Massachusetts' Municipal Vulnerability Preparedness Program, the National League of Cities, and the Barr Foundation. Grants were awarded to the Town of Arlington on behalf of the Resilient Mystic Collaborative. This project was led by the Town of Arlington, Museum of Science, Mystic River Watershed Association, Resilient Mystic Collaborative, CAPA Strategies, ISeeChange, Metropolitan Area Planning Council, and GreenRoots, along with dozens of volunteer community scientists.

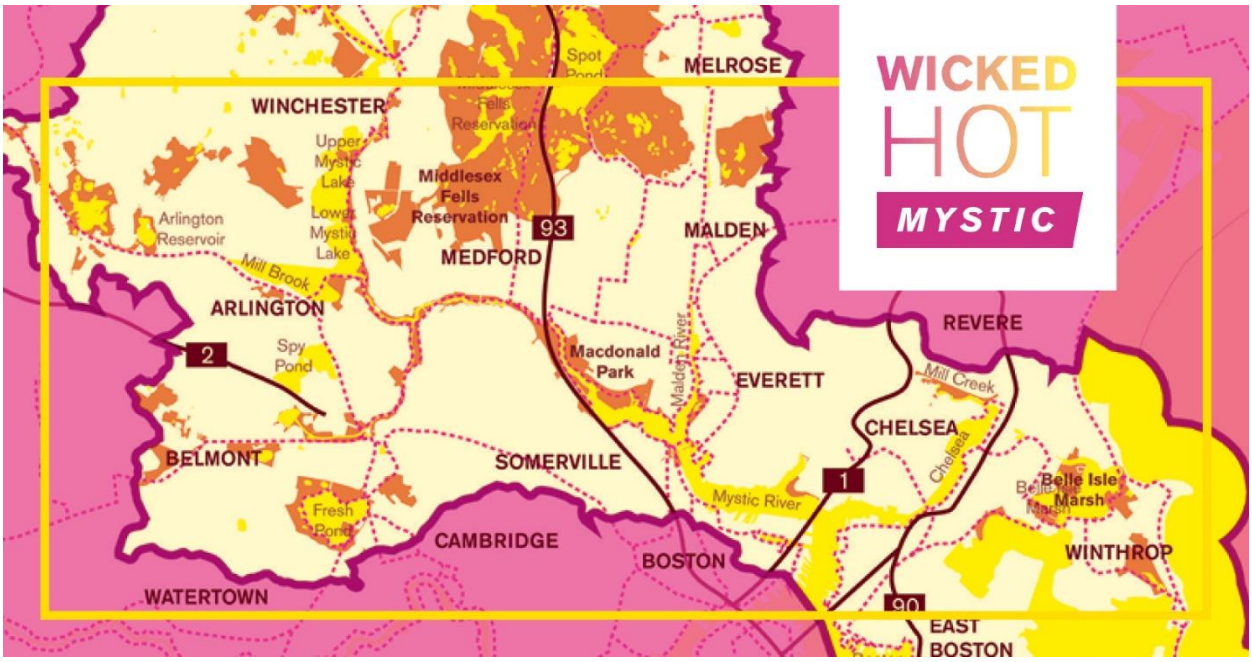
The City of Everett, City of Malden, Friends of the Mystic River, Barr Foundation, Boston Harbor Now, Paddle Boston, Conservation Law Foundation, GreenRoots, Town of Arlington, Charles River Watershed Association, Amy Shen and others shared our call for volunteers on social media. NOAA Climate shared our Wicked Hot Mystic Sneak Peak and did a social media takeover for us on Instagram.

GreenRoots helped with volunteer recruitment, co-hosted Cool Down Chelsea, and did outreach for the C-HEAT project. Friends of the Malden River/City of Everett hosted us on Earth Day. Many Helping Hands 360 hosted us at their Throwing Shade on Cambridge's Heat Island event and posted our work on the "Cloudhouse" shade pavilion. NWS was essential in helping us accurately predict when a heatwave would arrive.

The Art+Bio Collaborative was a great partner in connecting the public to the project through art. Finally, MassDEP allowed us to put a test AirBeam sensor in Chelsea.

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.
- In addition to the attached, all Wicked Hot Mystic promotional assets can be found here.


WICKED
HOT
MYSTIC
MELROSE
WINCHESTER
Upper Mystic Lake
Middlesex Fells Reservation
Arlington Reservoir
Lower Mystic Lake
93
MALDEN
MEDFORD
Mill Brook
ARLINGTON
REVERE
2
Spy Pond
Macdonald Park
Malden River
EVERETT
Mill Creek
CHELSEA
BELMONT
SOMERVILLE
Chelsea
1
Belle Isle Marsh
Mystic River
Fresh Pond
CAMBRIDGE
WINTHROP
BOSTON
WATERTOWN
90
EAST BOSTON


WICKED HOT
MYSTIC
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