Living Narrative of Water: GIS Curation Through a Story Map

Overview

The Alliance for the Mystic River Watershed's Living Atlas is an online resource pairing environmental data and mapping layers with an array of cultural resources to help people understand the watershed. The goal of this project is to make environmental data accessible to the community through GIS curation and storytelling for the web-based collection of the Living Atlas. The project encompasses mapping environmental data, curating a narrative with GIS layers, and incorporating an ArcGIS StoryMap to assist the community in understanding the watershed's landscape. This report outlines the project goals, methods, StoryMap design, and recommendations for future growth. Curating spatial environmental data, the StoryMap tells a compelling story about human relationships with the watershed to identify how we may better care for our land and waterways, and subsequently ourselves. The purpose is to support ecological and environmental justice for the four member towns, Stonington, Groton, Ledyard, and North Stonington, and the two tribal nations, Eastern and Mashantucket Pequot Nations, within the Mystic River Watershed. It addresses environmental challenges of the disproportionate climate impacts in the watershed and aims to support climate resilience and adaptation for Mystic River, engaging the audience to think about relationships with the watershed. Ultimately, embedding maps into an interactive ArcGIS StoryMap translates data into an accessible format for a resource that engages community members in understanding and protecting the watershed.

Methods

Data Collection & GIS Mapping

This project focuses on data related to water in the context of climate equity, spanning CT DEEP designated water quality classifications, impaired waterways, toxic release inventory (TRI) locations, and FEMA flood zones. With the guidance of the Alliance's GIS expert, Cam McClure, I collected and compiled spatial data such as CT DEEP water quality classifications data for both surface and groundwater. Preliminary ArcGIS Pro maps were uploaded to the shared spatial data layers Google Drive, and once we compiled the sources for map layers, I continued on to curate a narrative to tell the story of water in the watershed, overlaying the data with the four town boundaries and two tribal reservations and editing the maps for more legibility.

StoryMap

With the support of Maggie Favretti, Z Grabowski, Cam McClure, Watson Njoku, Gretchen Klens, and Cary Chadwick from CLEAR, I worked on curating environmental data. To aid in the data visualization process and build off the existing maps on the website that are currently static images that readers cannot interact with, I created an ArcGIS StoryMap based on the map layers listed above as well as the existing maps from the Alliance's website. Drafting a document to develop the StoryMap's narrative, which explores water in Connecticut's Mystic River Watershed through themes of relationships between the water, land, and people, I carried the narrative over to the StoryMap. The goal of using a StoryMap was to create an engaging, interactive format for community members to understand and interact with the data and map layers through stories and maps.

Exploring the integration of maps into the ArcGIS StoryMap, I experimented with ways to present the elements in a cohesive story with digestible data and map layers. The questions in

the StoryMap allow for participatory engagement with science. Other than working on these deliverables, the final stage necessary for this project involved transferring the StoryMap to the Alliance's ArcGIS account, so the team has access to it and has the option to embed it in their Living Atlas website alongside the work of Sydney and Monica, the other Climate Corps students working with the Alliance this semester.

StoryMap Design

The first section provides an overview of the Mystic River Watershed, including resources such as Land Grab Connecticut, Native Land Digital, and Mashantucket Pequot Museum's Battlefields of the Pequot War Story through embedded links. The StoryMap then introduces the Living Atlas, the Alliance's web-based collection of cultural resources and environmental data. The section thereafter covers the changing story of our waterways. I overlaid maps of the watershed's four towns, tribal reservations, and the watershed boundary to help visualize the boundaries of the watershed, modifying the symbology and including a sketch to highlight each section's name. The surface water quality classifications section asks the viewer what each of the colors in the map represent. On the side, I listed explanations for each class of water quality classifications for surface water. Doing the same for groundwater, I ask the viewer if we can drink this water and depict color-coded explanations of each classification shown in the map.

Following the water quality classifications, the map asks community members if the water is safe as they explore different locations in the map. This map portrays the impaired waters of rivers, lakes, and estuaries in Connecticut and specifically the Mystic River Watershed. I ask the viewer: What do you notice about where impaired waters are located in relation to tribal reservations and watershed towns? This guides them to notice the impaired waters located within

the towns and tribal reservations, especially on the edges of the towns as well as Wyassup Lake in North Stonington and the mouth of Mystic River in Stonington.

After the impaired waters, I ask community members: What's in Our Air, Water, and Land? This section represents the Toxic Release Inventory (TRI), which illuminates where certain factories and facilities are releasing harmful chemicals into the environment. I explain what each point represents, raising the question: Is there a relationship between where toxic release sites are located and where the tribal reservations and watershed towns are? The reader will notice that the toxic release sites are located on the left side of the watershed towns, which can have harmful implications affecting the watershed's water quality and health of the environment and people.

The next section includes a map of FEMA flood zones, with color explanations from the map floating on the left in the sidecar. The map is interactive, allowing community maps to find where they live and zoom to understand the flood risks there. Originally, the Model My Watershed resource on the Alliance's Maps & Data webpage appears as a static screenshot with text linking out to the Model My Watershed website. To make this more dynamic and intuitive without having to click on the separate link, I embedded Model My Watershed in a sidecar, encouraging people to explore human impacts on the water quality in their watershed. Other maps from the website were the state and federal environmental justice maps. I carried over the question: Can you spot the mapping problem in these state and federal maps used as the basis to determine which communities qualify for grants to support communities experiencing hardship? Beneath this question I wrote out a hint saying that Environmental Justice block groups are more likely to qualify for grants, prompting the reader to think about: Are all the reds overlapping with the orange? What does that mean? Zoom in and out using the + and - buttons on the right to find Eastern Pequot Tribal Nation. Is Eastern Pequot included in the red or orange? Why does that

matter? Community members can switch between state and federal environmental justice maps with the media action I implemented.

One of the final sections in this project was incorporating EPA's How's My Waterway? resource that is currently on the Alliance's website as well. I added the description: *The dashed outline on the map shows our watershed. Water quality is monitored for physical, chemical and biological factors. The monitoring results are assessed against EPA approved water quality standards or thresholds. Water can be impaired, meaning it is not able to be used for certain purposes.* I prod the reader to click on the map to explore and learn more about the quality of our waterways, asking which waterways are marked as impaired, and which have not been assessed at all? What could that say about priorities or gaps in environmental monitoring in our watershed? Finally, I included a photo of the drawn map with a link to explore the actual EPA website's resource if the reader clicks on the image.

Recommendations

The StoryMap leaves off with a section titled: What Can We Do? Recommendations for future growth could include synthesizing map priority areas in the watershed and allowing community members to do so where they live to explore regenerative interventions. To build on the StoryMap, the historical context of the watershed can be expanded through multimedia storytelling. More spatial data on land cover and change, including historical maps and aerial imagery, can be collected, and the Citizen Science app and Watershed Family Album can be integrated to invite users to explore those resources and understand how we can care for our water. Combining these into a single atlas could tell a comprehensive story to make engagement even more accessible.

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