Utilizing ArcGIS StoryMaps

for Urban Forestry

Photo by Kerry Gray

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Introduction

Urban forests are important to the health of any city. They provide numerous benefits for residents and the surrounding environment. Many residents are unaware of these benefits or why the city government maintains the forest in the way it does.

StoryMaps are an effective way of communicating spatial data in a digestible manner to any audience. StoryMaps use maps, text, images, videos, and other forms of media to convey information in an accessible format.

This guide aims to help cities develop their own StoryMap focused on urban forestry and street trees. By following these steps, city planners, urban foresters, and sustainability coordinators can create a StoryMap that highlights the importance of urban trees and showcases local government initiatives and encourages community involvement in related events.

Groundwork

Groundwork includes collecting data, identifying your audience, and defining your goals.

Research

The most important part of the project is research.

For Livonia, Davey Resource Group was contracted to inventory all the street trees in the city. This happened in both 2000 and 2023. There were many variables collected, including tree species, diameter at breast height (DBH), infrastructure conflict, and many more.

Other research included finding city-specific information, such as the Code of Ordinances. Understanding your city's ordinances regarding tree planting and removal is a crucial step to effectively communicating to residents what they should be adhering to. If your city does not have specific ordinances pertaining to trees, ask your

Department of Public Works or comparable department if they have unofficial documentation residents should follow. Another important document is the Urban Forestry Management Plan. If your city has this document, you can find information on how to manage the urban forest – sharing these best practices with residents may be an effective highlight of the StoryMap.

There are many other sources of information you can pull from, Livonia's StoryMap uses information from the Code of Ordinances and Urban Forestry Management Plan as well as the Planting Permit, Davey Resource Group's report from the 2000 inventory, and the Recommended Species List.

This is not an all-inclusive list, there is much background and outside research that must be conducted as well, such as understanding what tree diseases and pests are most prominent in your city.

Audience

When considering audience, it may be beneficial to understand who you are directing your information towards. If your audience is an elementary school group, then you would create your StoryMap to be far simpler and with different information compared to city residents.

Livonia's StoryMap was tailored toward residents specifically since our goal was to bring awareness to the changes the city's urban forest has undergone since 2000.

No matter who your audience is, its important to set goals for what you want your StoryMap to accomplish.

Goals

Defining specific objectives for your StoryMap to cover will help focus your document and keep from being too broad.

Some objectives for Livonia's StoryMap were to describe the changes in the street tree inventory between 2000 and 2023, communicate to residents why trees must be removed, and overview what the city government is doing to improve the urban forest.

Your goals might be different, but identifying key concepts gives structure to the final document.

ArcGIS StoryMap Logo

Data Collection

Non-Spatial Data

Data collected will not only come from your city's documents. Knowledge on urban forestry is a requirement to create a successful StoryMap. There is a plethora of resources that can utilized for this purpose.

The best starting point for a general education is from the Michigan Department of Natural Resources (MDNR, see Appendix A). This page provides some relevant information; however, this page is especially useful due to the links it contains to other sources. The Vibrant Cities Lab from the USDA Forest Service and partners is an amazing resource to use as background information in your StoryMap (Appendix B). The USDA hosts a publication about Urban Tree Canopy Assessment that was useful for Livonia's StoryMap (Appendix C).

A reference used in Livonia's StoryMap comes from Michigan.gov and details the Michigan Invasive Species Program (Appendix D). While your StoryMap is unique, it is highly recommended to include information on invasive diseases and pests, as this education can have a profound impact.

If your community is in Southeast Michigan like Livonia, SEMCOG has useful information in your area. Livonia's StoryMap utilized the GREEN Dashboard (Appendix E) as it contains data on tree canopy cover. The GREEN dashboard also contains land use / land cover and environmental justice data for each community. For all of Southeast Michigan, there is data on energy efficiency, quality of life, biodiversity, and much more.

Another great source of information is the Environmental Protection Agency (EPA). While the focus may be less localized than Michigan.gov, Livonia utilized information from the EPA for information on Urban Street Trees and Green Infrastructure (Appendix F) and the Heat Island Effect (Appendix G).

Other organizations that are good sources of information include the Arbor Day Foundation and the International Society of Arboriculture (ISA). The Arbor Day Foundation posts articles called 'stories' that are easily readable by any audience (Appendix H). You might also consider becoming a Tree City if your community is fit to do so. The ISA website's 'More Resources' section contains an image database with free to use urban forestry-related images and open-source files on planting details and specifications (Appendix I).

There are more formal sources of education. Scholarly articles can be useful if tailoring your StoryMap to a specific direction. One useful tool is Treesearch – a database that houses

publications from the USDA Forest Service (Appendix J).

Spatial Data

In a StoryMap, spatial data is a central feature of the document. Spatial data can be gotten through many different methods. The Forest Inventory and Analysis page from the USDA Forest Service compiles databases and data analysis tools related to forestry (Appendix K).

Many of the above agencies such as the EPA and MDNR host their own data repositories as well (Appendix L and M, respectively). Livonia's StoryMap utilizes a layer from the Department of Environment, Great Lakes, and Energy (Appendix N).

These sources have many data layers for use, be sure to use the most up-to-date data and convey the information in the clearest manner possible to your audience.

Pre-processing

When using non-spatial and/or spatial data, pre-processing is necessary for successful, clear storytelling. ESRI, the parent company of ArcGIS, has many tutorials free of charge to learn how to use the ArcGIS software including how to pre-process data, format, and integrate it into StoryMap (Appendix O).

Photo by Kerry Gray

Pre-processing Best Practices

- Ensure accuracy and completeness in datasets

- Standardize units of measurement, potentially rounding numbers

- Uniform formatting across datasets

- Define symbology including color schemes, symbols, and more

- Validate data accuracy and consistency

- Create and maintain metadata of new layers

Creating the StoryMap

When you have finished collecting and processing data, you can begin creating the StoryMap. Livonia's StoryMap was built using ArcGIS's StoryMap webapp, but you may choose a different software. This portion of the guide will be tailored specifically toward ArcGIS StoryMaps.

The first step is to create an ESRI account and purchase a license. To use ESRI products, you must have an account and license.

You can choose to start with a sidecar, guided map tour, or explorer map tour. Livonia's StoryMap starts from scratch, but it is worthwhile to experiment with all the options to see what is the best fit for you.

There are many built-in templates to choose from. You may want to choose one consistent with your city's branding guide. You can create and upload your own theme to follow or there are publicly available themes created by other users.

Content
The strength of ArcGIS StoryMaps is its diversity of content. StoryMap supports more than text, maps, images, and videos.
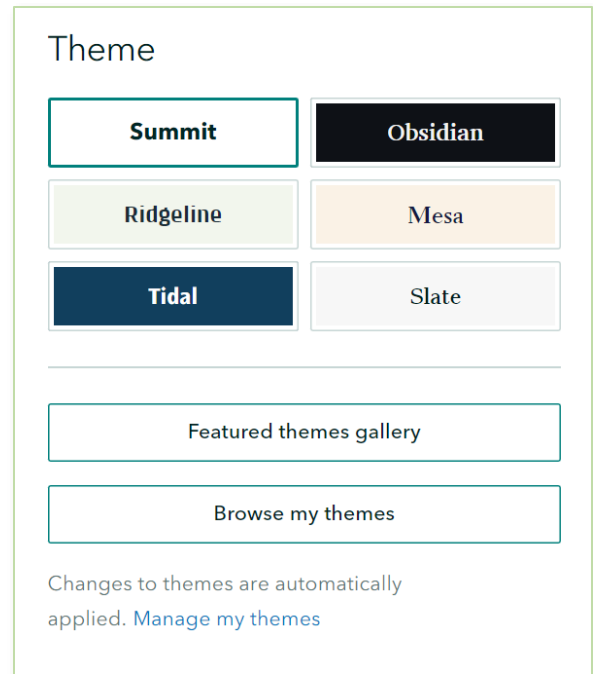
There are options for buttons and tables, which serve similar purposes text does, however it breaks up the monotony of a block of text and is much more visually appealing. Buttons in StoryMaps function as links – Livonia's StoryMap utilizes a button to link to SEMCOG's website.

There is an option to add audio that plays while viewing the Story, which may be useful if there is a podcast segment related to your section.

Livonia's StoryMap utilized the Swipe feature which allows for 2 maps to exist side-by-side and users to switch between them.

There are more options than this, be sure to experiment and find what is most eye-catching while preserving clarity and flow.

Structure

The structure of your StoryMap is dependent on which sections you want to include. An introduction is strongly recommended and should include what the document contains and where supplemental information was found.

Livonia's StoryMap audience is primarily city residents, who we concluded is most interested in what trees do for the city financially before anything else. Thus, the first section is 'Finding Your Tree' where financial information regarding trees can be found. This includes specific amounts of pollutants removed as well as tree species and size – allowing for residents to zoom in on their location to see information relevant to them.

Photo by Fatimah Bolhassan

After detailing the economic benefits, it was logical to talk about the environmental benefits in the following section dubbed 'Tree Benefits'. This gives a broad level summary of how trees are important entities in a city's ecosystem.

This then flowed smoothly into 'About Livonia's Street Trees and Tree Canopy', which describes the changes between the two street tree inventories. The green text are highlights and the red text are lowlights. We wanted to be transparent with residents and describe the data in an accessible way with text definitions accompanying the data.

Following this were sections titled 'Tree Removal' and 'Tree Planting', where its described why trees are removed and what the city government is doing to remedy this.

The final sections in Livonia's StoryMap are called 'Local Government' and 'How to Get Involved'. These sections go hand in hand as the local government section describes specifically what the city is doing to promote sustainability and urban forestry – which includes ways for residents to get involved.

Your StoryMap may include different sections depending on your goals. For example, if your audience is primarily government or post-secondary educated individuals, you might omit some of

these sections or add more technical sections.

The choices you make regarding formatting should revolve around clarity and flow, prioritizing accessibility for users.

Common Difficulties

When creating your document, there are many issues one can run into. This section will act as a guide to help mitigate pitfalls:

- As previously stated, a logical flow is important to keep readers engaged. Utilizing section headings gives users an idea of what to expect from your StoryMap.
- Tailoring your content to your audience's needs is crucial. This includes using appropriate language and defining technical terminology.
- Overly relying on interactivity should be avoided. Interactional content may not be as intuitive to others, using text to guide users how to use the StoryMap is good practice.
- View StoryMap on different browsers and devices to ensure robustness. Test all links and interactive features.
- Provide context to content when necessary.

Publishing

When preparing to publish – garner feedback from team or peers. Livonia's StoryMap had a team of 6 from different specializations reviewing and suggesting ideas. While feedback might lead to a broader Story and more work overall, refining is important as the reviewer acts as your test user.

It is worthwhile to determine whether your StoryMap will require updating. Establishing an update/maintenance cycle is a vital part of your StoryMap's influence.

Determining whether your StoryMap needs community feedback is significant as well. This can be done through any method, either embedding a survey, hosting an interactive session, or others. Livonia's StoryMap links an email at the bottom of the document where users can ask questions or leave comments.

Photo by Kerry Gray

Conclusion

Urban forests are important to the vitality of any city. Trees offer numerous economic and environmental benefits to residents. Many people are unaware of the importance urban trees have in a city. StoryMaps are an excellent tool to convey this important message while being accessible for any audience. This guide provides cities with the tools to develop their own StoryMap guided around street trees and urban forestry.

The creation of the StoryMap can be a tedious, arduous process. Planning the document before beginning any work will save valuable resources. Classifying your audience and identifying your goals will focus the project, enhancing the final StoryMap's clarity.

When undertaking a StoryMap project, it is essential to gather data from various sources. Non-spatial data might include local government documents, urban forestry management plans, or external sources like from the MDNR or EPA. Spatial data sets StoryMaps apart from other forms of communication and can be gotten from a variety of sources including the USDA Forest Service and EGLE. The pre-procession of data before use ensures accuracy, consistency, and clarity.

After ensuring ownership of a license for use and an account, the creation of the final document can begin. Experimenting with templates and features such as maps, images, videos, buttons, and audio can enhance the StoryMap's appeal. Paying special attention to the structure of your document is critical to maintaining the audience's engagement.

Avoiding common difficulties includes ensuring logical flow, content tailored to audience, avoided over-reliance on interactivity, various device testing, and necessary context provided.

Before publishing, gather feedback from team or peers to get user's perspective. Formulate an update schedule that can realistically be kept to and determine if community feedback is necessary. If so, decide how to obtain this feedback.

This guide is not all encompassing, and your StoryMap is your own. By following the outlined steps, cities can create effective StoryMaps that educate the public on urban forestry, fostering greater community outreach and support.

Acknowledgements

A. Urban and Community Forestry: https://www.michigan.gov/dnr/managing-resources/forestry/urban

B. Vibrant Cities Lab: https://vibrantcitieslab.com/

C. Urban Tree Canopy Assessment: https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/Urban%20Tree%20Canopy%20paper.pdf

D. Michigan Invasive Species Program: https://www.michigan.gov/invasives

E. GREEN Dashboard: https://maps.semcog.org/green/

F. Urban Street Trees and Green Infrastructure: https://www.epa.gov/water-research/urban-street-trees-and-green-infrastructure#:~:text=Municipal%20street%20trees%20are%20trees,green%20infrastructure%20in%20many%20cities

G. Heat Island Effect: https://www.epa.gov/heatislands

H. Stories: https://www.arborday.org/stories/

I. More Resources: https://www.isa-arbor.com/Online-Learning/More-Resources

J. Treesearch: https://research.fs.usda.gov/treesearch

K. Forest Inventory and Analysis: https://research.fs.usda.gov/programs/fia#data-and-tools

L. EPA Geospatial Data: https://www.epa.gov/geospatial/epa-geospatial-data

M. DNR Maps and Open Data: https://gis-midnr.opendata.arcgis.com/

N. Environmental Maps and Open Data: https://gis-egle.hub.arcgis.com/

O. ESRI Academy: https://www.esri.com/training/catalog/search/