## **Esri News** for State & Local Government

Fall 2023

## In Florida, Interactive Maps Tell the Story of Modern Risk Mitigation

By Carrie Speranza, Director of Emergency Management Solutions at Esri

The Florida Division of Emergency Management took a new approach to the once-every-five-years state hazard mitigation plan, incorporating interactive maps and decision support tools instead of a 500-page report.

### Key Takeaways

- To meet a FEMA mandate, US states are creating hazard mitigation plans that consider climate and vulnerability.
- Florida created an interactive map and open data hub to better support statewide and local jurisdiction mitigation efforts.
- Benefits of GIS tools include plan usability, loss avoidance reporting, stronger collaboration, and clear risk visibility.

It's time for every US state to update its five-year hazard mitigation plan—now with priorities around community vulnerability



↑ Census Tract 124.10 in Polk County, Florida: The flood risk score of .68 and social vulnerability score of .65 place this tract at moderate to high vulnerability in the 100-year floodplain.

and climate forecasts. Mitigation managers in Florida are meeting this Federal Emergency Management Agency (FEMA) mandate in a new way, via interactive maps to make their plan more user-friendly.

"We met with local jurisdictions, and

they told us they didn't find the previous plan useful, which is a dagger to our heart for this huge five-year effort," said Kristin Lentz, the mitigation planning manager at the Florida Division of Emergency Management (FDEM).

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DAD STATE

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## DEVELOP AN EQUITY STRATEGIC PLAN IN FOUR STEPS

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Operationalizing your plan and workflows

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Butler County, Kansas (population 67,000), is the largest ind county by area in the state and has a diverse mix of land uses, by a

ranging from city suburbs and small towns to rural agriculture and oil fields.

Geographic information system (GIS) technology has been a critical tool for appraisers in Butler County for a long time. With the deployment of ArcGIS® in 2021 and the recent expansion of GIS into other departments within the organization, GIS director Pamela Dunham and county appraiser Debra Studebaker recognized there were additional opportunities to use existing tools to streamline workflows and work more efficiently in the appraiser's department. Working with GIS analyst Mark Schmidt, they developed a strategy for modernizing the way appraisers utilize the county's authoritative property information.

**Navigation of Workflow Challenges** In the past, to visualize neighborhood and sales characteristics outside of the computer-assisted mass appraisal (CAMA) system, called Orion, an appraiser would ask GIS staff to make specific neighborhood or sales maps. These maps were manually created upon

individual request and printed so that they could be reviewed by appraisers. This caused delays for the appraiser, consumed hours of technical staff time to generate, and resulted in static paper maps that were soon out-of-date and needed to be recreated each time new analysis was required.

Another time-consuming issue for Butler County appraisers is that they are mandated to revisit all residential and commercial properties every six years. Also, agricultural property is reviewed every year to verify that no change of land use has occurred. Due to the size of Butler County, it can take over an hour to drive from one side of the county to another. The appraiser needed a better way to manage field staff to ensure that they meet annual statutory requirements.

## Technology That Appeals to Taxpayers and Is Praised by Appraisers

Using ArcGIS to connect to the Orion database, the GIS department configured the Butler County Neighborhood Analysis and Sales Analysis tools. These new Web GIS tools enabled appraisers to visualize property characteristics by neighborhood with data from the CAMA system. Appraisers have access to the tools anytime and have confidence that they are always making decisions based on the current data. These new Web GIS tools not only saved the appraisers time in their initial valuation efforts but also have proved to be valuable during informal appeals and inquiries from taxpayers.

Prior to the new Web GIS tools, the appeals process was very reactionary, with no easy way to prepare data ahead of time and provide metrics to justify or better understand appeal requests. Historically, an informal appeal would be just a review of property characteristics. Any in-depth analysis was performed after a meeting with the property owner. With the Neighborhood Analysis and Sales Analysis tools, appraisers can guickly review comparable properties within the same neighborhood to defend valuations. Studebaker said, "Valuation and hearing decisions were made more timely and efficiently. We have these tools open every day and use them all the time. A visual versus a spreadsheet made all the difference." Residential appraisal services supervisor Paula Self said, "We no longer have to run gueries for every individual hearing; at a glance we can determine comparable sales and identify outliers in homogenous neighborhoods."

### Out with the Old, In with the New

Prior to using GIS-based workflows, the appraisal staff relied on paper forms to record data in the field. Back in the office, supervisors would manually enter the property characteristics into the CAMA system. Once the system was updated, the chief appraiser could run reports on how many properties had been visited. The manual process of converting paper forms into digital reports was inefficient and time-consuming for appraisal and GIS staff and required recalculation every time appraisers needed a progress update. Dunham was familiar with the process and knew firsthand just how time-consuming it was. Knowing there had to be a better way, she turned to Schmidt, who designed a modern GIS solution.

The GIS department used ArcGIS Field Maps to configure a simple mobile application for staff to fill out when they completed a field assessment. Appraisers open the app, which automatically zooms to their location. They determine if a property is residential or commercial, flag the property data collection as complete, and move on to the next property. The information updated in the field automatically feeds a dashboard—created using ArcGIS Dashboards—for appraiser supervisors to track how many properties field staff have visited and how the department is tracking toward meeting the state annual statutory requirement. The capability to have maps with target properties and their status helps appraisers keep track of the properties to visit and has resulted in savings including, at a minimum, one hour of supervisor staff time daily and the cost of producing paper maps. Previously, supervisors would manually check in work performed in the field, measure production per employee, and update spreadsheets to track progress. Now

they use the dashboard to see the progress daily or weekly or as a total.

### A Solution for Appraising Agricultural Properties

Every other year, the Butler County appraiser's office is required to review the use of all agricultural properties in the county to determine if there have been any changes to a property's agricultural function that could impact classification or valuation. Prior to using GIS, the appraiser's staff would mail surveys to the approximately 8,000 agricultural property owners and then physically visit all properties that did not return the survey. With only a 40 percent response rate, this meant many properties required field staff to visit every year, resulting in many hours of field time and resources consumed by appraisers. To help save time and costs, the GIS department configured a solution for the appraiser.

Using configurable GIS web applications with two consecutive years' imagery, the GIS department configured a web application to help appraisers determine if there were any agricultural use changes. Staff could then flag properties that needed closer inspection and required field appraisers to visit in person. In the first year of implementing this solution, out of the 4,500 properties that were reviewed in the office with imagery, 4,300 were determined as being consistent with the previous year's agricultural use and did not require a site visit. This in-office analysis determined that only 200 properties needed to be visited, resulting in a savings of approximately five weeks of staff time between the preparation of data, manual tracking, and the actual review of each parcel.

### The Move to Taking GIS and Running with It

With the new web-based maps, mobile applications, and dashboards, the GIS department, Dunham, and Schmidt recognized the need to develop a one-stop-shop repository for all authoritative appraisal workflows and applications. The deployment of the Butler County Appraisers internal web page means that appraisers only have one destination for all their authoritative content and applications. Staff have the confidence that they are always accessing the most current information. The management of the site content is easy for the GIS department because it is the same workflow that staff use for ArcGIS in other departments.

Butler County's growing use of core technology ensures that all users in the county who need access to authoritative data and content, like the appraisal staff, can have it, with the confidence that they are always using the most current information.



For more information on how you can modernize your appraisal workflows using web GIS, scan the QR Code. **go.esri.com/ButlerSLG** 



## How GIS and Lidar Equitably Prioritize Sidewalk Repairs in Lawrence, Kansas

The City of Lawrence, Kansas, is improving the walkability of the city, especially in the downtown areas, where pedestrian foot traffic is high. These areas may have cracks, overgrown vegetation, or no sidewalk at all, impeding pedestrian access to local amenities, businesses, and resources. Sidewalk repairs take time and are costly, and just like other cities, Lawrence needs to prioritize where efforts in its Sidewalk Improvement Program occur. The city quickly realized that to improve walkability, it needed to identify where to begin repairs using GIS technology. To equitably drive their infrastructure investments, Lawrence-Douglas County Metropolitan transportation planning manager Jessica Mortinger and her team are solving the walkability issue of their city by making real-time, data-backed decisions to support their cause and increase transparency on why certain areas in the city are prioritized for sidewalk repairs.

### **Reassessing Sidewalk Repairs**

The Sidewalk Improvement Program assists property owners in meeting

their legal requirements (Kansas Statute and City Code) by helping identify and repair these hazards as well as providing technical and financial assistance (where applicable). However, the costs of these repairs ultimately fall on the property owners.

Darren Haag, asset and innovation manager, helped turn the Sidewalk Improvement Program into a more datadriven process. Before, the city would inform homeowners of sidewalks that needed repair where it saw fit, and that is why it incorporated GIS as an essential business function if it hoped to continue its initiatives for fixing the sidewalks in the most equitable and transparent manner. Haag's GIS expertise allowed him to make a sidewalk network model that helps the city make the informed decisions on which sidewalks to prioritize, ensuring that residents are selected through data and not at random.

"The city understood the demographic characteristics of the surrounding area and how residents may not use automobiles as a source of transportation," said Haag. "However, the challenge of identifying problem areas in the sidewalk infrastructure through data analysis would revolutionize how the city would go about prioritizing their efforts."

### Smart Sidewalk Network Modeling

A GIS-based network analysis built on an existing sidewalk network to help demonstrate the sidewalk connections throughout the city was the first step. In Esri's ArcGIS<sup>®</sup> Pro, Haag identified routes that take the shortest path between identified origins and destinations. This analysis uses custom route prioritization based on path type and other attributes. For example, taking a path with an existing sidewalk is prioritized over a path without a sidewalk, and crossing a street with a crosswalk is prioritized over crossing a street without a crosswalk. Destinations include K-12 schools, park entry points, public attractions, public transit stops, public government institutions, hospitals, day care sites, universities, and businesses, and each is weighted differently. Previously, the city wouldn't have been able to weight these



destinations and then quickly visualize where its prioritized efforts needed to take place. The routes are aggregated to identify sidewalk segments with the highest volume of trips or potential pedestrian demand.

In addition, Haag narrowed down the areas in the sidewalk network using the Transportation Disadvantaged Population layer, which reflects an additional priority to provide an improved means for multimodal trips. This layer adds more context to the area and elevates equity by including households with a person who has a disability, people of color, single-parent households, zero-vehicle households, and those with other disadvantaged characteristics. It is the overlap with the sidewalk network model and the transportation-disadvantaged population where Haag and Mortinger can select prioritization over other areas and hand this information off to city council and other community leaders to make the most informed decision.

Once they were able to identify the priority corridors, terrestrial lidar data forecasted the current conditions of the sidewalk to locate more quickly where exactly the hazards were. Lidar is a remote sensing method that creates 3D models and maps of objects and environments, in this case providing niche insights such as the slope of a sidewalk and its condition. The lidar data was crucial in determining where to send field contractors to inspect the vulnerabilities in the sidewalk network. This saved the field contractors time in their efforts to mark each data point into the GIS, reducing the overall cost of labor.

The field contractors logged the sidewalk hazards using ArcGIS® Survey123, a dynamic form and survey builder for data collection efforts, to pinpoint the exact location of the hazards, collect additional sidewalk condition data, and measure the area of the hazard to determine project cost. This information was then

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### How GIS and Lidar Equitably Prioritize Sidewalk Repairs in Lawrence, Kansas continued from page 7

fed into a web map in real time, where Mortinger and team could visualize the scope of the project and all the collected data. After inspections, the web map was then made available for the public to view.

Mortinger was thrilled to know that with the help of GIS, the City of Lawrence could make the most informed decisions possible to meet the needs of the people it serves. Although the automation streamlines the processes of getting the sidewalks fixed, the human element of decision-making was still an important measure when evaluating the success of the project overall. "There are human factors that we also have to consider in our decision-making that we may not know just based on the model, but the model gives a neutral approach to making equitable decisions in our community," said Mortinger. "These same tools can be used for other investment decisions, which will be a constant evolution of the workflow."

The GIS-based methodology behind the sidewalk network analysis can also be attributed to the city's wider-scale Americans with Disabilities Act (ADA) Transition Plan initiative. Haag and his team are also using a similar workflow to keep track of ADA-compliant curb ramps throughout the city. Improving walkability for all residents is the goal, but accessibility is another key driver to attain a multimodal network for all residents.



For more information on how you can use artificial intelligence capabilities in GIS, scan the QR Code. go.esri.com/LawrenceSLG



 $\uparrow$  Lawrence has historically maintained inventory of its sidewalk infrastructure. The red dashed lines indicate travel paths with no sidewalks.



## **Design with Data-Driven Plans**

Today's planners face a greater number of challenges than they did just 10 years ago. And these challenges are more complex–from overseeing housing capacity and affordability to managing pressing comprehensive plans to tackling zoning reform–all while ensuring that decisions meet the changing needs of the community. Planners need tools that help them to

- Understand and analyze neighborhood characteristics.
- Derive business intelligence from permitting to identifying trends and patterns.
- Determine and promote sustainable and equitable policies.
- Support civic inclusion to hear all the voices of a neighborhood.
- Empower scenario planning and design to meet the needs of residents.

Esri's geographic information system (GIS) technology provides the software, solutions, services, and training to enable planners to leverage a geographic approach in designing sustainable and thriving communities.

Download your copy of the ebook. go.esri.com/GIS4WC



#### Santa Ana

Irvine

Garder

ountain

Costa

## Orange County Leverages GIS Technology to Address Social Determinants of Health

Orange County, California, is known for its tourist destinations and is the thirdmost populous county in the state. This means that the Orange County Health Care Agency (HCA) is responsible for the health of thousands of residents and must analyze social determinants of health (SDOH) to ensure that services and resources reflect each community's needs.

Long Beach

The HCA, a leading health-care provider, has adopted a geographic approach to first analyze the county's health-care needs, find which communities require the most assistance, and then tailor programs and outreach based on its findings. Adopting a geographic approach allows health organizations to apply targeted solutions to make sure they are responding to their communities' most critical health needs.GIS technology provides organizations with the tools to execute their targeted location-based solutions. GIS layers community data to locate hot spots, provides organizational transparency, and allows you to target at-risk communities. The HCA leveraged GIS software to enhance its workflows and connect internal departments to holistically address the following:

- Life expectancy trends
- Tobacco use
- · Drug and alcohol mortality

#### Unveiling Life Expectancy Trends

Average life expectancy has improved since 1990 at the national, state, and county levels. However, this upward trend dramatically reversed during the COVID-19 pandemic. Orange County, California, and the US as a whole all lost roughly a decade of improvements in longevity in just 2 years of the global pandemic. Specifically, the US lost a full 3 years, California lost 2.7 years, and Orange County lost 2.4 years. Leveraging ArcGIS<sup>®</sup> Dashboards, the HCA analyzed life expectancy trends by age; gender; and notably, race. Findings from the HCA identified which groups were largely impacted by COVID-19 and systematically disclosed the leading cause of death within each community.

To enhance response efforts, the HCA developed a tool to score a city's social determinants of health. The HCA's Social Progress Index (SPI) based scoring on a city's life expectancy, so the higher the life expectancy age, the higher the SPI score.

Location intelligence uncovered that Santa Ana, the second-largest city in Orange County, has the lowest SPI score, while the city of Irvine received the highest SPI score. Santa Ana underperformed in 9 of the 12 SPI measures including basic human needs (e.g., nutrition and basic medical care, housing), foundations of well-being (e.g., health and wellness, access to basic knowledge, access to info and communication), and opportunity (e.g., personal rights, personal freedom and choice, inclusiveness, access to



↑ HCA map highlights the cities in the southern part of the county that have higher life expectancy rates.



↑ The city with the lowest SPI score is compared next to the city with the highest SPI score.

advanced education). This location intelligence allows the HCA to target resources and education to cities with lower SPI scores.

A social determinant of health that the HCA sought to address was tobacco use in the city of La Habra, a predominantly Hispanic/Latinx community.

### Applying a Geographic Approach to Prevent Tobacco Use

The HCA layered demographic, community, and health data in its GIS to identify where it should target tobacco prevention programs. The HCA identified 20,000 housing units, with 33.2 percent being multiunit complexes, and that 93 percent of La Habra stores sold tobacco products. The Tobacco Use Prevention Program (TUPP) highlights these findings and analyzes the results, with the hope to pass regulations that prohibit smoking of any kind in multiunit complexes and limit the sale of tobacco products within the city.

The HCA is currently collecting community feedback and observing whether there is less tobacco product waste and active smoking than what was observed at baseline. However, not only has tobacco use increased over time, but alcohol and drug mortality are also on the rise.

### Combating Drug and Alcohol Mortality Rates with GIS

Leveraging ArcGIS® StoryMaps<sup>™</sup>, a tool that helps you tell remarkable stories with custom maps that inform and inspire, the HCA analyzed drug and alcohol mortality rates to see which communities were impacted the most.

"Geographically, certain cities were hit harder than others, and certain demographic groups were also hit harder than others. GIS technology has been a great way to highlight these disparities and provide departments like social services with this information so they can tailor their response efforts accordingly," said Curtis Condon, PhD, HCA research manager.

Report findings illustrated that alcohol and drug-related deaths increased from 2019 to 2021. Notably, drug-related deaths consistently occurred in greater numbers compared to alcohol-related deaths. Further analysis found that opioid-related overdoses rose sharply in 2020, with an 86.9 percent increase from 2019. GIS tools like ArcGIS StoryMaps allow organizations to easily share crucial data and findings with other internal departments to ensure health programs and resources directly reflect the needs of their communities. The HCA is now working with OC Navigator, a resource hosted by the HCA's Mental Health and Recovery Services Transformation Innovation Project, which provides a

central site to locate health, well-being, and other supportive services within the county.

### Applying a Geographic Approach Moving Forward

The HCA research team and stakeholders determined that responding to social determinants of health is far more effective when a geographic approach is

applied. Utilizing GIS technology allows you to analyze your communities, identify where greater health disparities are occurring, and tailor response efforts accordingly. Moving forward, the HCA anticipates expanding its GIS use and will be leveraging ArcGIS Insights to explore death rates by homicide and suicide.



For more information on how you can use GIS technology to address social determinants of health, scan the QR Code. go.esri.com/OCHCAsIg

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### CLIMATE MAPPING FOR RESILIENCE AND ADAPTION MAP

## If you knew where railroad tracks are most likely to buckle, what would you do?

Railroads are essential for getting food onto our grocery shelves and packages to our front doors. Freight rail moves millions of tons of goods across state lines every day, ensuring that critical goods get to where they need to go, such as supplies to clinics and hospitals. Railroads often offer the most efficient way to move freight over land. Passenger trains, which individuals rely on to get where they need to go, use the same tracks.

But here's something you may not know:

- Railroad tracks start to buckle around 109° Fahrenheit.
- Extreme heat events are predicted to increase significantly.

Like many materials, steel expands and curves when heated. Also, the way some tracks are currently laid, there is little room to expand, causing tracks to push against each other and resulting in warps, commonly called "sun kinks." Trains cannot safely run at the current volume on warped tracks and if left unrepaired, trains can derail.

This map is based on Climate Mapping for Resilience and Adaption (CMRA) portal data and shows the maximum projected days with temperatures exceeding 105 degrees throughout the coming midcentury (approximately 2036–2065) time frame. As you can see, there will be several areas of the country that will be too hot for railroads to operate as they currently do, potentially putting trains out of commission for three weeks, if not more.

To explore this map in more detail and drill down to your community, go to **go.esri.com/CMRArailroad**.

### What maps will you make with this data?

This map uses the extreme heat measures, but this layer also contains similar attributes on other aspects of temperature—such as consecutive dry days, consecutive wet days, frost days, and sea level rise—that you can attain from the CMRA portal. The new CMRA portal features data relevant to making decisions and projections about climate conditions. The data can be searched by address to help communities adapt and respond to future climate threats.



To learn more about the CMRA portal, scan the QR Code. **go.esri.com/CMRAslg** 



By mid century there will be 36–71 projected days with a maximum temperature of 105 degrees F, assuming the high emissions scenario.

#### Census Tract 9400 in Yellowstone County, MT

By mid century there will be 0–13 projected days with a maximum temperature of 105 degrees F, assuming the high emissions scenario.

### Census Tract 9601 in Barton County, MO

By mid century there will be 0–17 projected days with a maximum temperature of 105 degrees F, assuming the high emissions scenario.

#### Census Tract 311 in Oconee County, SC

By mid century there will be 0–21 projected days with a maximum temperature of 105 degrees F, assuming the high emissions scenario.

#### 21+

1

Annual number of days with a maximum temperature greater than 105 degrees F by cenus tract

### In Florida, Interactive Maps Tell the Story of Modern Risk Mitigation continued from cover

So Lentz and her team at FDEM used GIS technology to build a more engaging experience. What was once a 500-page PDF is now a website with data-rich maps and insightful narratives.

To meet FEMA's directive by the August 2023 deadline, the FDEM team applied GIS analysis of hazards, climate, and social vulnerability. Then, to make the plan more intuitive, Lentz worked with Dan Rydl, GIS manager at FDEM, on incorporating digital maps. They built the site using ArcGIS Hub to organize information and ArcGIS StoryMaps for narratives. They will continue to update the site's open data and analytical guides for counties and municipalities.

### Mitigation Projects through a Lens of Vulnerability

Hazard mitigation projects encompass retrofitting critical facilities such as schools and hospitals to better withstand hazards such as high winds, flooding, and extreme heat. The work entails hardening infrastructure such as electric and telecommunications networks to uphold power and internet connections. Other eligible projects include stormwater mitigation to increase drainage and, in some cases, elevating homes in areas that experience repeat flooding.

After a major event, FDEM assesses damages to determine how mitigation projects reduced property loss and saved people from harm.

"The loss avoidance reports help us with storytelling and getting buy-in for more projects," Lentz said. "In mitigation, projects utilize effective resilience techniques to improve future outcomes, which can be highlighted through these reports."

In a similar way, FDEM uses maps to show communities in need of more help and the areas where hazard risks are highest.

"We mapped risks and hazards and draped social vulnerability on top of that," Rydl said. "Almost everybody that looks at the hazard vulnerability map pauses



↑ This map shows Florida data from the Centers for Disease Control and Prevention's Social Vulnerability Index, which uses data including socioeconomic status, household composition, race and language, housing type, and transportation access.



↑ The bivariate risk map for Florida's 2023 State Hazard Mitigation Plan relates the Social Vulnerability Index from the Centers for Disease Control and Prevention, overlaid with flood risk to reveal where help is needed most.

and wants to talk about it because they understand hazard risk in a new way."

With more mapping, a more comprehensive picture of risk in Florida emerged. For instance, analysis of some natural hazards, such as extreme heat, revealed social vulnerability in the central area of the state. "Diving deeper to ask, 'Why is that?' was helpful for us on the planning side," Lentz said.

"Regardless of the hazard, it opens your eyes to the more challenged and impoverished areas," Rydl said. "People assume that the coast is the most vulnerable, but that's not always the case."

### Forecasting and Collaboration Mark a Path Forward

On the previous five-year plan, Rydl and the FDEM GIS team provided maps. This time, he taught Lentz and her mitigation planning team how to make maps. They met every week for two years. Rydl trained Lentz's team members on GIS basics,



 $\uparrow$  The flood risk map in the 2023 State Hazard Mitigation Plan corrects mapping errors made previously and shows FEMA-designated special flood hazard areas.



↑ *The Local Mitigation Strategy Map* directs counties and municipalities to their own hazard mitigation plans, which are required by FEMA to receive funding for mitigation projects.

and they applied the technology to all of FEMA's requirements.

Along the way, talents emerged within the combined GIS and planning teams. Some members were more comfortable making maps, others focused on narratives, and a few took on web development. "We picked up on that and built a really fun collaborative environment," Rydl said.

One area of focus was climate vulnerability. Florida currently feels increased impacts from more frequent and intense natural hazards. These hazards include wildfires, extreme heat, drought, storms, heavy precipitation, and sea level rise.

Florida sees more natural disasters than

most other states, particularly during hurricane season, which runs June 1 through November 30. For 2023, forecasters expect less activity than normal for the first time in seven years. If that holds true, it will pause an upward trend as extreme hurricanes have been on the rise over the last six years.

Hurricane Ian, which devastated parts of southwest Florida in September 2022, is a sobering example. It caused \$113 billion in damages and 152 deaths. A recent report ranks it as the third-costliest storm in US history. Without existing measures to mitigate damage, it could have been worse. And the damage that was felt is now guiding further mitigation.

While many states have considered climate forecasts in past hazard plans, the FDEM team knows how tightly mitigation aligns with climate resilience.

"We've done the research to understand impacts, but I think we can improve on visualizing what future conditions will look like here in Florida," Lentz said.

Rydl is looking into risk forecast models to understand what's coming. Meanwhile, Lentz and her staff are on their way to becoming GIS experts. "I think the GIS team has become a little more mitigation-y, and I think mitigation got a little more GIS-y," Rydl said.

This year, the FDEM team is confident it has built a product that's more useful to the counties and municipalities that design mitigation projects.

"We created a tool that allows local jurisdictions to ask where dollars will best be spent," Lentz said. "They can look at how successful projects are, but also at where they haven't yet implemented mitigation."



For more information on how GIS is used to understand risk and design strategies for mitigating future impacts, scan the QR Code. go.esri.com/FDEMslg

## **Finding a Pathway to Federal Funding**

A State Health Department Uses Federal Funds to Develop a Statewide Recreation Database

By Sunny Fleming, Environment and Natural Resources Industry Specialist, Esri

A question I'm often asked is, Is there federal funding for my GIS? The short answer is yes!

The more complicated answer is that you won't be able to search "GIS" to find it. However, you will be able to find grants that support your organization's mission. Additionally, the language of the grant requirements can be key to aligning your GIS use with the purpose of the grant. For example, many grants have language around data-driven decision-making, stakeholder collaboration, equity and transparency, public engagement, innovative research, and more. These are all supported by GIS. Consider, too, that the goals that these grant programs seek to achieve require interagency and interdepartmental cooperation, paving the way for greater understanding and adoption of an enterprise-wide GIS system.

When I worked for the State of Tennessee in its Department of Environment and Conservation (TDEC), we were just getting a park-wide GIS off the ground. One of the datasets that

was in the highest demand was a trails dataset for the entire state. Every five years, the Statewide Comprehensive Outdoor Recreation Plan was reviewed and revised. To reach communities and gather information about their recreational assets, a spreadsheet was sent out. This spreadsheet didn't provide a trail or greenway track, and the information that it did provide was often incomplete and inconsistent. This meant that someone was stuck with translating and synthesizing this information into a single source before any analysis or planning could ever be done, without any way to identify community gaps.

Out of the blue one day in 2017, John Vick with the Tennessee Department of Health gave me a phone call asking about a statewide trails dataset. They had an idea to be able to provide a website where doctors could query a database of trails for their patients and "prescribe" them exercise based on their needs, accessibility, and physical abilities.

According to County Health Rankings,

36 percent of adults in Tennessee are overweight or obese, and 24 percent of adults don't participate in recreational physical activity. For high schoolers, the rate is even higher at 38 percent who are overweight or obese. While Tennessee boasts incredible outdoor recreation opportunities, it can be difficult to know where to go or what you might be getting into when you get there. It is also difficult to know what's closest to you immediately. While there is at least one state park within an hour's drive of every Tennessean, what about within a short walk? The greenways or city and county trails? And are there disparities in access to outdoor recreation? While I was in love with the idea, I had a well-practiced script about the limitations of the existing dataset, and I agreed to participate in the first roundtable discussion. In addition to lengthy discussions on what defines a trail or greenway, we also discussed logistical challenges to collect the data. These included a lack of staff to collect the spatial information and



 $\pmb{\uparrow}$  The Tennessee TREC map helps users clearly identify where outdoor spaces for physical activity are lacking.

communities that lacked the resources for GIS tools. I proposed using a site created with ArcGIS® Hub<sup>s™</sup> that would allow us to provide these tools to volunteers and to have a built-in schema so the data would come to us clean. Yet, we still didn't have funding-the biggest logistical issue of all.

On that day in 2017, we had no way of knowing that a global pandemic was around the corner and that Vick's question and interest were about to be more relevant than ever. Through the years, the group worked on the concept for the trails database, but again, funding always remained elusive. When the pandemic hit, one of the earliest things we understood was related to risk factors for hospitalizations and deaths related to COVID-19—which included obesity. Suddenly, Vick had an aha moment.

"We wanted to look way upstream and identify these risk factors [for COVID-19] and find solutions to mitigate them," said Vick. "Addressing obesity, heart disease, and other chronic conditions are important for preventing severe cases of COVID. We also know that parks and other outdoor spaces were a lifeline for people during the pandemic, giving them a way to stay active, support mental health, and safely be around their family and friends." His original vision for the database was suddenly rooted in an immediate, global emergency.

Vick turned to the Centers for Disease Control and Prevention's (CDC) COVID Health Disparities grant, funded through the 2021 Coronavirus Response and **Relief Supplemental Appropriations** Act. The grants provide funds to states to specifically reduce health disparities related to COVID-19, and they provide support to directly address these issues in communities that need it most. The goals were to discover where outdoor spaces for physical activity were lacking so they could help mobilize resources to increase access, provide a resource for communities to find places for outdoor recreation, and promote their health benefits.

The Tennessee Department of Health was collaborating with Tennessee Strategic Technology Solutions (STS) for technical implementation. The grant funding not only supplied STS with the funds to merge multiple data sources and develop a standardized geodatabase of parks, greenways, and trails for the state, but also supported the purchase of Esri professional services to help strategize, advise, and prototype the initiative via ArcGIS Hub Premium. Now, in 2023, nearly seven years after we first began discussing it, the Trails Recreation Environment Community (TREC) website is about to be released this fall.

It would be a mistake to think that this is the final culmination of this journey,

however. The TREC will be a living database, supported by a community of users throughout Tennessee. It not only supplies information on Tennessee's recreational opportunities but also provides the tools that communities need to fill in gaps in the data. While the grant helped facilitate the purchase of the ArcGIS Hub Premium subscription for this particular initiative, the fact that it can be used to deploy an unlimited number of initiatives means that any department throughout the State of Tennessee can benefit from the platform.

For trails, the data can be leveraged by any stakeholder, including TDEC, who is tasked with updating the Statewide Comprehensive Outdoor Recreation Plan (SCORP) every five years. No longer scraping together Excel spreadsheets that provide only a limited view across the state, TDEC now will have a dynamic, authoritative resource to pull from when assessing Tennessee's SCORP. This resource will benefit not only other state agencies but all Tennesseans seeking a more sustainable, healthier future.

There may not be a dedicated federal fund for GIS, but there are numerous opportunities to align your GIS to program missions. Right now, through the American Rescue Plan Act (ARPA), the Bipartisan Infrastructure Law, the Inflation Reduction Act, and more, unprecedented funds are available that can be used to support outdoor recreation, conservation, and environmental initiatives. The relationship between our environment, our economics, and our social systems is more recognized than ever before, and GIS is uniquely positioned to see all three at once across a landscape. As GIS practitioners, we have a great opportunity to align our GIS needs with our program missions to take full advantage of these funds and to help create a more sustainable world.



For more information on how to find funding opportunities, scan the QR Code. Go.esri.com/SLGFundEbook



### Winners Announced at 2023 Esri User Conference

Esri acknowledged the achievements of several domestic and international organizations with the Special Achievement in GIS (SAG) Award ceremony at the annual Esri User Conference (Esri UC) in San Diego, California. The SAG Awards acknowledge innovative and intelligent applications of GIS technology. Esri users are nominated by Esri leaders and distributors, and finalists are selected by Jack Dangermond. These organizations set new standards throughout the GIS community.

Organizations from around the world are honored at the Esri UC. They span industries including agriculture, public works, economic development, education, transportation, health and human services, law enforcement, emergency response, and utilities.

"The SAG Awards highlight extraordinary achievements and efforts to improve our world," said Esri president Jack Dangermond. "Each year, I look forward to being part of this ceremony. It is a tradition that means a great deal to Esri and to GIS professionals."

Here are the US state and local government users recognized this year. See the full list of SAG Award winners at go.esri.com/2023SAG-Gov.



### US State and Local Government SAG Award Winners

- Allen County, Indiana
- BGE, Inc.
- Butler County, Kansas, GIS Department
- California Air Resources Board
- Capital Area Regional Planning Commission
- City and County of Missoula, Montana
- City of Ashland, Oregon
- City of Bethlehem, Pennsylvania, Health Bureau
- City of Carlsbad, California
- City of Duluth, Minnesota, and W.S.B. & Associates Inc.
- City of Edmond, Oklahoma
- City of Fayetteville, Arkansas
- City of Franklin, Tennessee, and True North Geographic Technologies
- City of Frisco, Texas
- City of Hattiesburg, Mississippi
- City of Lexington, Kentucky
- City of Phoenix, Arizona
- City of Quincy, Massachusetts, and Woodard & Curran
- City of Riverside, California, Community and Economic Development Department
- City of Salem, Oregon, Public Works
- City of San Jose, California
- City of Sarasota, Florida
- City of Tacoma, Washington
- City of Wilmington, Delaware, Department of Public Works
- Colorado Attorney General's Office, Division of Community Engagement



- County of Cuyahoga, Ohio
- County of Douglas, Nevada
- County of Forsyth, Georgia
- County of Frederick, Maryland
- County of Henrico, Virginia
- County of Sarpy, Nebraska
- County of Stark, North Dakota
- Dalton Utilities
- Florida Division of Emergency Management and Florida GIO Office
- Illinois State Police—Statewide 911 Division
- IT Services, Executive Office of the Governor, State of Idaho
- Kansas Water Office
- Lebanon Water Works
- Los Angeles Homeless Services Authority
- Louisville Metro Department of Public Works
- MED-Project
- MetroCOG
- Michigan Department of Environment, Great Lakes, and Energy
- Missouri Geological Survey and Missouri Office of Geospatial Information
- Mobile County, Alabama, Health Department
- Nashville Metropolitan Transit Authority
- National Railroad Passenger Corporation
- New Mexico Energy Minerals and Natural Resources
  Department
- North Jersey Transportation Planning Authority
- Office of the Chief Information Officer, State of Iowa

- Orange County, California, Sanitation District
- Parish of Saint Charles, Louisiana
- Philadelphia Fire Department
- Port of New Orleans
- Providence Health & Services
- Rhode Island Department of Transportation and Rhode
  Island Department of Administration
- Rick Husband Amarillo International Airport
- San Bernardino Valley Municipal Water District
- South Carolina Office of Regulatory Staff Broadband Office
- South Dakota Department of Revenue, and Axiomatic
- State of Alaska
- State of Hawaii Division of Forestry and Wildlife
- State of South Dakota Bureau of Information & Telecommunications
- Town of Tonawanda, New York, Engineering Department and Geocove
- Utah State Historic Preservation Office
- Village of Pinehurst, North Carolina, Information Technology Department
- Wasatch Front Regional Council
- Washington County, Oregon
- Washington State Department of Health
- Washington State Recreation & Conservation Office
- WSSC Water
- West Virginia Region VII Planning and Development
  Council
- York County, South Carolina, Economic Development



## Improving Efficiency and Prioritizing Investments for Mom-and-Pop Shops in Chinatown

For over two centuries, Chinatowns across the United States have provided Chinese immigrants with the opportunity to build thriving businesses for their communities. New York's Chinatown in Manhattan stands as one of the largest in the nation, consisting of 1,600 small businesses and 900 professional offices providing medical, legal, and tax services. However, the impact of the pandemic along with inconsistencies in public records and aging infrastructure created a growing need for restoration. In 2022 New York's Chinatown received a \$20 million grant from the state's Downtown Revitalization Initiative (DRI) to begin creating valuable change.

The first challenge was ensuring that the business archive was accurate. The New York nonprofit Chinatown Partnership supports this culturally rich hub spot by preserving and promoting the community as a destination for residents and tourists. The Chinatown Partnership must conduct a yearly audit of active businesses to determine the condition of storefronts and which storefronts need assistance. With the recent government grant, Chinatown Partnership is collecting and visualizing real-time data to give internal staff and city decision-makers the information they need to approve proposed projects. Special projects manager Rosie Derong Li from the Chinatown Partnership determined that GIS technology would be the most suitable tool based on her previous experience with another organization. The nonprofit opted to use GIS to

- Collect storefront and business data from the hub spot.
- Map and visualize where businesses needed support or resources for restoration.
- Monitor the exterior status of historical storefronts.
- Visualize business data.
- Compare existing city agency data with the data collected in the field by staff.

## Streamlining Collaboration with Local Government

Chinatown Partnership uses data from the NYC Open Data portal collected by the local city government, including the New York Department of Transportation and the New York Department of Planning. It crossreferences this data with real-time data it collected in the field. However, a lack of uniformity between data collected by each department made it challenging to decipher differences. The organization also needed to visualize data on a central platform to improve efficiency. A successful alternative has been using thorough data and maps available in ArcGIS® Online.

By using ArcGIS Online, Li can access Esri's ArcGIS Living Atlas of the World. ArcGIS Living Atlas contains a plethora of data and content from the US Census, US Bureau of Labor Statistics, Centers for Disease Control and Prevention (CDC), and many other authoritative sources. Li can easily search the New York Department of Buildings data for specific locations and cross compare the data her team collected in the field.

Li shares, "It has been the best option to use ArcGIS Online because the datasets and maps we have accessed are the most accurate and reflective of the community businesses I have used." By using web-based maps, the organization can streamline collaboration with local



↑ As interns collect the data from local businesses in GIS, Li can color code the types of businesses and start analyzing information much faster.

government.

### Understanding Where to Intervene with GIS

With over 1,600 locally owned small businesses, Chinatown Partnership needed to make data-informed decisions to help stakeholders determine where to allocate \$20 million in funding. The nonprofit needed to apply a geographic approach to understand which areas need restoration and how many restaurants, businesses, parks, and cultural institutions should be prioritized for revitalization.

Over the last year, Li has begun to train the organization's interns to use ArcGIS Field Maps apps and ArcGIS Survey123 to manually collect business data for the entire Chinatown. By using these GIS tools, the team can capture real-time photos of each storefront. Once the interns have collected all the data, Li can upload the data to ArcGIS Online and cross compare it with data from the Department of Buildings and other city agencies. By doing this, she can identify discrepancies and confirm accuracy. The ability to toggle between multiple dataset layers on the map provides her with a geographically based perspective.

A long-term goal of Chinatown Partnership is to promote the businesses to the public in a story created in ArcGIS StoryMaps. Photos captured by the interns can be used as assets. This process typically requires several months to complete, but by using GIS, it has become much more manageable for Li due to the ability to visualize the data through maps. Ultimately, this will help community stakeholders and the Chinatown DRI Local Planning Committee (LPC) to better implement the DRI projects selected by New York State.

## Surveying the Community for Beautification Murals

In addition to collecting data about locally owned small businesses, Li and her team have also used GIS to determine where to paint new murals. Using ArcGIS Survey123, they documented the walls most visible to the public, the walls with existing murals, and places where new murals could have the greatest impact. "That's the beauty of using GIS—we had an initial purpose for using Survey123 and Field Maps, but we kept adding to it. We found other ways our community can benefit from it," shares Li.

### Raising the Bar for Community Partners

While new to using GIS, the Chinatown Partnership has started to transform its data collection process to thoroughly understand its community.

"We want to make this community a safer place for everybody," explains Li. "We want our community to understand that we need to have authoritative data to help us reach that point. For example,



↑ Results from the ArcGIS Survey123 form pinpoints possible locations of where they can install art murals in the community.

when community members need to know about a [safety] incident that occurred at a specific business, we need to be able to provide the exact location so our local government can know where to intervene. ArcGIS can help us think spatially and make data-informed decisions in the future."

This vision of this nonprofit's implementation of GIS will begin to serve as an example for neighboring partners, such as Little Italy and the Lower East Side, so that they can efficiently communicate and engage with community stakeholders. By prioritizing GIS, the Chinatown Partnership can also understand, document, and clarify to decision-makers where restoration is needed. Together the organization and local government can intervene to preserve the neighborhood's unique culture while ensuring it continues to thrive.



To learn how GIS empowers nonprofits of all sizes to better communicate their cause, understand their community, and act on their mission, scan the QR Code. go.esri.com/chinatownslg



## A Forward-Thinking Municipality Implements High-Accuracy Maps for Program Management

In Michigan, the City of Saline serves over 8,000 residents with water, wastewater, and stormwater utilities. Saline's systems have their roots in assets installed over 100 years ago. The director of the Department of Public Works (DPW), Larry Sirls, says that, until recently, the city's record-keeping system seemed about as antiquated. "We had what I call a 'somewhat map,'" Sirls said.

Before Sirls came on board, the city's plot plans, as-builts, work orders, and other records were stored in various facilities in the form of paper and notebooks. The city had a geographic information system managed by a third party. None of the employees had access to it. Sirls wanted to change this.

Saline Routine Hydrant Work						
Saline Hydrant Flushing Dashboard Created by OHM Advisors for the City of Saline					Flushing Status All Features	Flushing Date No date selected
Hydrant List		Flushing Overview		Hydrants Flushed		
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Flushing Status: Complete				SEMCOG, Esri, HERE, Garmin, GeoTechnologies	, Inc., USGS, EPA	Powered by Esri

↑ Night workers and office staff can launch this dashboard, created using ArcGIS Dashboards, to see what routine work, such as flushing or winterizing, was done overnight. This allows instant visibility into that work so that daytime workers can pick up right where the night crew left off.

### **Technology and Data Capture**

Sirls recommended that Saline bring its GIS in-house and digitize decades of paper as-built drawings. To guide the project, Sirls brought in Esri partner OHM Advisors, an approved city contractor and Michigan-based consultancy proficient in both utility and GIS services.

Joel Radenbaugh, a 20-year veteran maintenance worker helped digitize paper records and a GIS intern created polygon features in the GIS with a hyperlink to the scanned documents.

Staff used an Arrow Gold® Global Navigation Satellite System (GNSS) receiver from Esri partner Eos Positioning Systems and ArcGIS Field Maps on their phones or tablets to update the location of assets, perform visual inspections, and collect related attribute information.

The ease of use was a big factor in these choosing these technologies. "It all starts with the mobile workers," Murawski said. "If [they] think the technology is too hard to use, that lack of trust works its way up the chain of command and comes back down. So, any solution that was going to work for Saline needed to support the mobile workers first."





↑ The Water Main Break dashboard summarizes live crew locations, a repair log of each main break, and which assets were inspected.



↑ Today, every public works department employee at the City of Saline can view accurate digital, maps of the city's water and wastewater systems using an ArcGIS Online web map viewer like this one.

summarizes work that night-shift workers do on hydrants so that the next worker can resume in the right spot. The Water Main Break dashboard allows decisionmakers to see trends in the causes of main breaks.

DPW staff also created an internal web page using ArcGIS® Experience Builder.

### Looking toward a Utility Blueprint

A comprehensive plan will allow Saline to thoroughly analyze its systems, its weaknesses, and its budget—and get ahead of repairs and rework. Sirls anticipates that GIS will help the city start planning public works investments for years into the future.

"The utility blueprint and GIS go hand in hand," Sirls said. "In order to receive accurate bids and deliverable materials from contractors, we have to know what we have, how much of it there is, and where it is."



For more information on GIS can modernize small and rural water utilities, scan the QR Code. go.esri.com/SalineSLG

### **Benefits Abound All Around**

To date, the water and sewer systems have been mapped. Every DPW employee can access GIS data that supports the work they do every day:

- Plant workers can view asset information without having to drive to another facility to find a paper record.
- Mobile workers can view system blueprints without having to go back to the office.
- New employees quickly come up to speed about asset histories.
- Administrative map requests are completed at no cost.
- A holistic view of the systems has resulted in more diligent maintenance.
- Modeling the sewer system has resulted in reduced inflow and infiltration.

### **Dashboards for Decision-Makers**

ArcGIS® Dashboards was used to create dashboards that summarize specific information from the GIS into project overviews. A dashboard tracking sanitary jetting has transformed the turnaround time for contractor deliverable materials. The Saline Hydrant Flushing dashboard



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