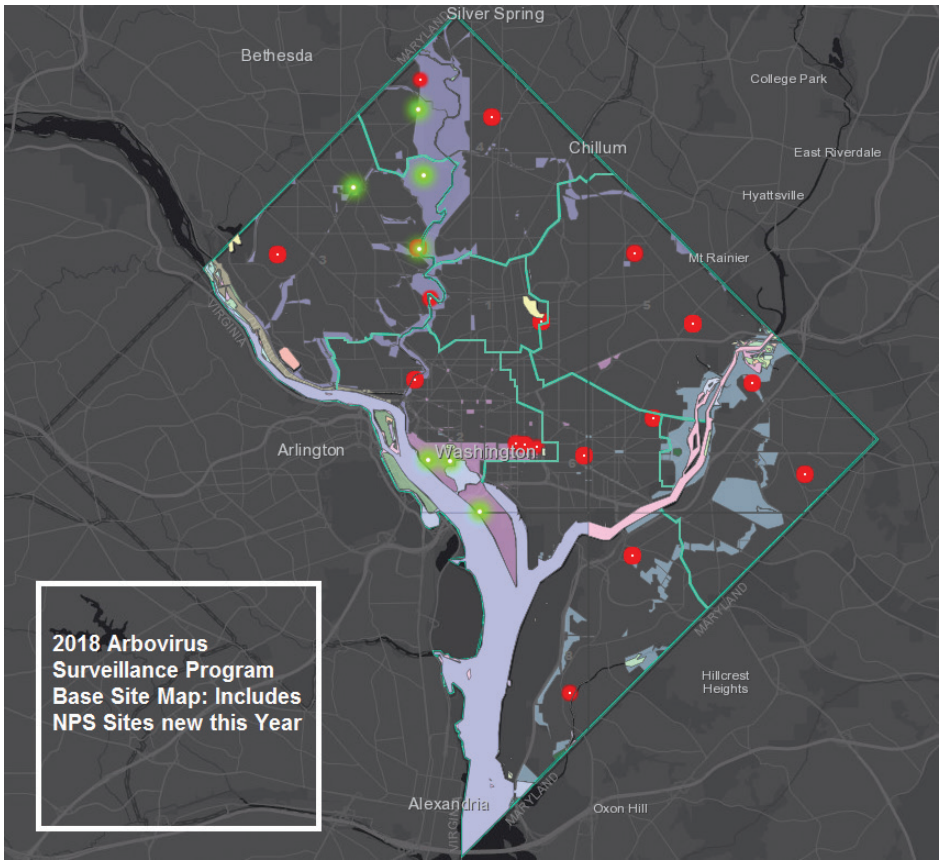
Esri News
for State & Local Government
Winter 2019

DC Health Improves Mosquito Data Collection and Sharing Using GIS

Summary
In 2016, in response to the Zika outbreak in the Americas, the District of Columbia Department of Health (DC Health) substantially increased its mosquito monitoring activities throughout Washington, DC. To identify where disease-carrying vectors live and breed, DC Health turned to technology to improve how it targeted at-risk populations. Geographic information system (GIS) technology was used to assist the arboviral team in its surveillance and mitigation of the mosquito population in support of public health. GIS concepts were used to inform the location, spatial relationships, and the environmental and social issues associated with the areas potentially harboring harmful, virus-carrying vectors.

Early detection is the key to preventing the spread of the disease. DC Health, which is responsible for the investigation and control of reportable diseases within the District of Columbia, works alongside many departments and agencies to test mosquito populations to prevent potential outbreaks.



The Challenge

One of the ways that DC Health collaborates with other agencies is to test mosquito populations for Zika and West Nile viruses by trapping mosquitos throughout the eight wards of Washington, DC. It also partners with the Department of Defense (DoD) to actively share and combine its data with the data DoD collects at Joint Base Anacostia-Bolling (JBAB) and six other DoD sites, creating an extensive map of the mosquito species found in DC as well as their arboviral burden. A recent challenge faced by DC Health was not being able to place mosquito traps in areas administered by the National Park Service (NPS). These areas not only represented a gap in its current surveillance efforts but also included many of the ideal trap placements sites within the district. The analysis of mosquito populations is incomplete and less useful without trap data on sites administered by NPS.

Another challenge was NPS's restrictions on mosquito control methods. The most effective method of controlling

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DC Health Improves Mosquito Data Collection and Sharing Using GIS continued from page 1

mosquito populations is with the combined application of an airborne adulticide and a larvicide at sites with standing water. However, due to district and NPS environmental and health concerns, DC Health is limited to using only larvicides. In the past, manual mapping and tracking of thousands of water basins where larvicide had been applied were difficult to keep updated and often resulted in inaccurate data. Since the larvicide being used was only effective for a month, DC Health staff often found themselves having to repeatedly perform the treatment process and data collection.

DC Health was in desperate need of a more efficient method of mapping and storing data, as well as an effective way to gain the cooperation of NPS.

The Solution

The first step in collaborating with NPS began when DC Health formed a relationship with the National Gallery of Art (NGA). This was significant because NGA allowed DC Health to place traps and operate near the national mall. DC Health used Esri's ArcGIS Online—a software-as-a-service (SaaS) mapping platform—to collaborate with NGA, plan the placement of mosquito traps, and share the measurement results. This work caught the attention of several influential staff at NPS and opened the door to a less restrictive mosquito trapping project with DC Health.

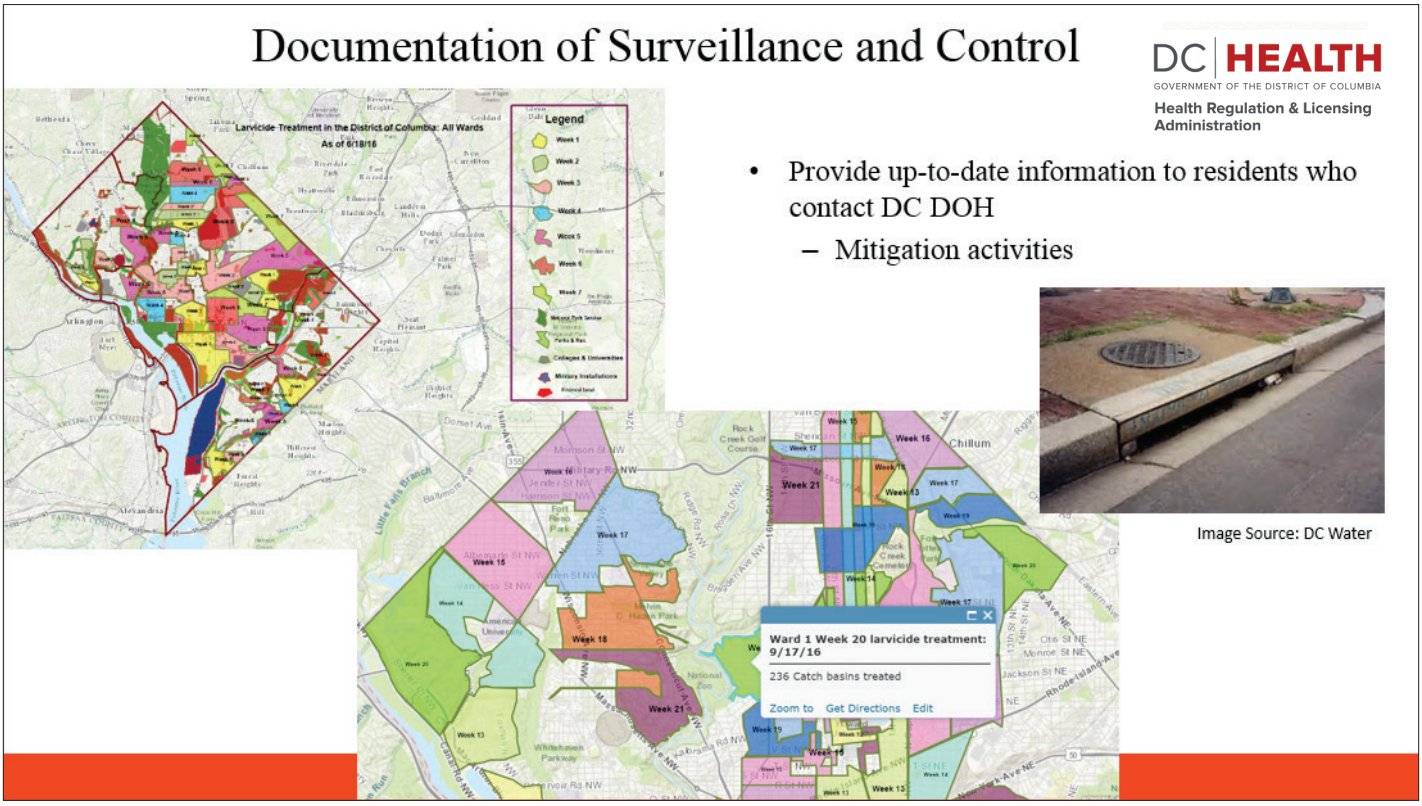
DC Health is also starting to use Esri's Survey123 for ArcGIS—a mobile, form-based mapping system included with ArcGIS Online—to collect more information that addressed the inefficiencies of the larvicide-only program. This app made it easier for fieldworkers to accurately gather information at data collection locations and automatically share that information back to ArcGIS Online, where analyses are performed and maps are created then shared with all collaborating agencies. This will be launched at full scale next season.

The Results

The success of the DC Health and National Park Service collaboration resulted in improved mosquito data gathering in the District of Columbia. Trap sites and mosquito breeding grounds were accurately mapped. NPS permits helped DC Health evenly spread the mosquito traps across the district, which led to a more thorough reading on mosquito populations and potential health risks in the area.

Online and mobile mapping replaced DC Health's manual mapping methods, which increased efficiency and made it easier to share information with other agencies and stakeholders. The data collected with Survey123 enabled DC Health to justify a higher quality of larvicide that remains effective in water basins for up to six months. DC Health and NPS are now also working together to prevent rabies outbreaks.

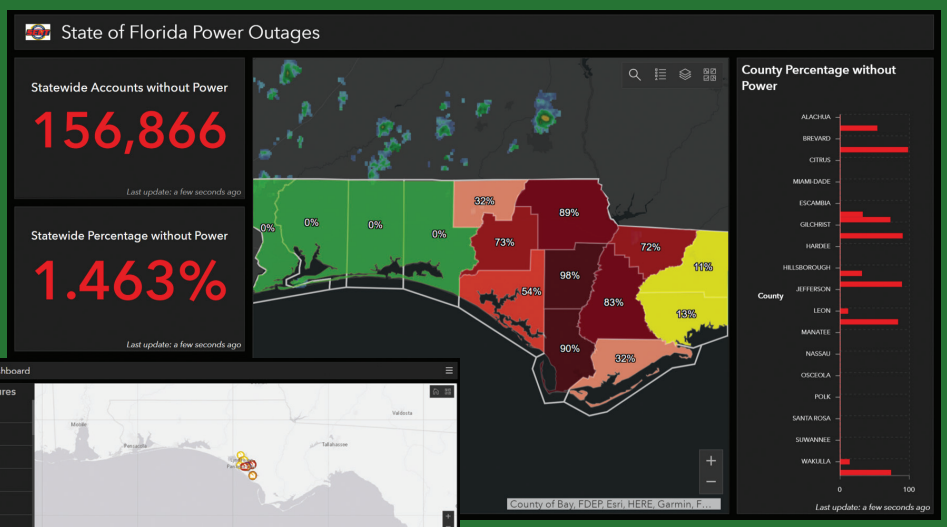
To learn more about how to use GIS for health and human services, please go to **go.esri.com/DataCollection**.

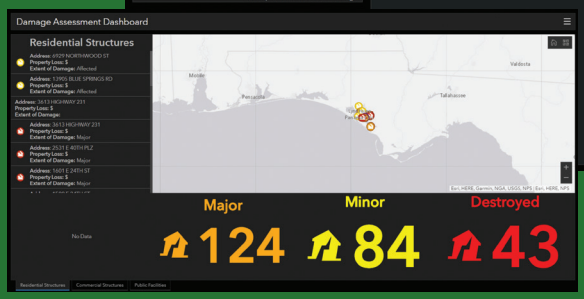


Using GIS in the Aftermath of Hurricane Michael

By Keith Cooke, Esri

On the afternoon of Friday, October 12, Hurricane Michael struck the Florida Panhandle as a category 4 storm with sustained winds of 155 miles per hour. The storm immediately impacted the coastline of Bay County. The massive storm surge, in excess of 10 feet, cut barrier island Cape San Blas in two and devastated the small town of Mexico Beach. Resources and personnel from around the state poured into the Bay County Emergency Operations Center (EOC) to begin the long process of response and recovery.





GIS played an immediate role in these efforts. Urban Search and Rescue (USAR) teams' work was tracked and mapped to ensure that they were covering all impacted areas of the county. The Florida Division of Emergency Management provided up-to-the-minute updates on power outages across the state through an operations dashboard. Bay County GIS staff—supported on-site by Escambia County, Florida, and Esri personnel—began to produce digital information products to meet the increasing demand from incident command, field crews, and the public. Within 72 hours of the storm's making landfall, the Center for Disaster Risk Policy at Florida State University had produced video and images obtained from drone flights above the areas in Mexico Beach that were particularly hard-hit. Will Meyers, a solution engineer at Esri, used Drone2Map for ArcGIS to process the large amount of content and provide the imagery as a service to a wide audience. Bay County staff put together multiple dashboards and story maps to outline the points of distribution (PODs) and feeding stations and used an integration with WebEOC software to report and update information on the capacity and status of emergency shelters in the county.

In addition to endangering people and demolishing residences, the storm was devastating to area businesses. After the USAR teams' preliminary damage assessments rolled in, the GIS team used spatial analysis to identify concentrated areas of destruction. Building on that, the teams used data enrichment services to populate maps of these areas with information including the number of businesses, the number of employees, and the amount of revenue these businesses produced. This provided an early view of the impact on the business community. Finally, this information was summarized in an operations dashboard and displayed during the Sunday evening briefing. The analysis revealed that at least 17 percent of the businesses, 18 percent of jobs, and 23 percent of the to-date revenue for the county were likely lost to this hurricane. To the hundreds of people working in the EOC, the analysis told a powerful story about the extent of the devastation in the county.

On Monday, October 15, Esri and Bay County staff trained county personnel on using mobile damage assessment tools Survey123 for ArcGIS and disconnected maps in Explorer for ArcGIS (as much of the cellular infrastructure was wiped out). By that afternoon, these crews were out in the field performing detailed damage assessment, which was recorded on a live operations dashboard in the EOC briefing center. Bay County and the rest of the Florida Panhandle have a long road ahead to recovery, but they are using GIS to monitor and quantify these recovery efforts so that decision-makers at the county, state, and federal levels can stay informed.

To learn more about how GIS can be used in emergency management, check out **go.esri.com/HurricaneMichael**.

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Keep Up with the Trends

Five Tech Trends That Public Works Professionals Need to Embrace

Public works organizations have always led the way with successful integration and adoption of new technologies. This includes the use of global positioning systems (GPS); automatic vehicle location (AVL) tracking; enterprise resource planning (ERP); and, most importantly, GIS technology. Today, technology is rapidly changing, and keeping pace can be difficult. However, definite trends have emerged and are driving the digital transformation of public works. This report focuses on five strategies that will help your organization rise to the new expectations of citizens and IT-savvy community leaders.

Download the e-book to learn about these five tech trends:

- Shifting to real-time operations
- Embracing the new field mobility
- Evolving your civic engagement
- Leading through advanced data and analytics
- Achieving success through performance management

To learn more, visit **go.esri.com/TechTrends**.

Utilizing GIS Precision and Mapping to Assess Property and Tax Revenue

In land records management, assessors play a foundational role for local; state; and, ultimately, national governments. Many parts of society rely on land records information. It has always been vital to local government operations though historically undervalued and underused. By integrating GIS in the assessor's office, staff's work not only increases in importance but also is made easier. Simplifying daily tasks that assessors face will not only increase productivity within your organization but also allow you to devote more time to analyze tax revenue from one neighborhood to another, defend assessment values, value property with precision, and engage taxpayers.

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- Optimizing field operations
- Diving deeper into assessors' data
- Leveraging industry-standard workflows

Check out our e-book, *Five Targets of Modernization: Quick Wins for Assessors Using GIS*, to further your knowledge of the key function that GIS has in managing land record systems.

Download your free copy today at **go.esri.com/Modernization**.

Three Ways That GIS Can Strengthen Our Nation's Infrastructure

How can state and local governments address aging infrastructure to truly make a difference today and in the future? The answer lies in not just rebuilding our infrastructure but in reimagining the possibilities for future infrastructure as well. GIS technology can help organizations better understand where and how they should invest in their transportation systems as well as water, sewer, and other utilities. With GIS, organizations can see the areas that are most affected by aging infrastructure, understand where demand levels are not being met, and recognize shifts in demographics, then target dollars to deliver the greatest impact.

Partnering with Microsoft and GovLoop, this industry perspective outlines a smart strategy to address your infrastructure needs. To learn more, visit **go.esri.com/Infrastructure**.

Digitally Transforming Environmental and Natural Resources Agencies

Environmental and natural resources professionals were early adopters of GIS technology. Mapping resources, analyzing impacts, and presenting findings were part of the conservation movement, and these tasks took environmental and natural resources agencies through their first digital transformation. Now the question is, how do these professionals take their organizations to the next level? This new e-book explores the GIS trends that can help them get there:

- Working as one—Bringing together field crews and the office
- Giving yourself an opportunity to intervene—Managing natural resources in real time
- Empowering citizen scientists—Educating the community through public-facing apps
- Better managing performance—Doing what comes naturally
- Simplifying powerful analysis—Discovering the answers within your data

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Key Facts about Chicago, Illinois, Infographic

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To learn more about the features and capabilities of ArcGIS Business Analyst, go to **go.esri.com/Features**.

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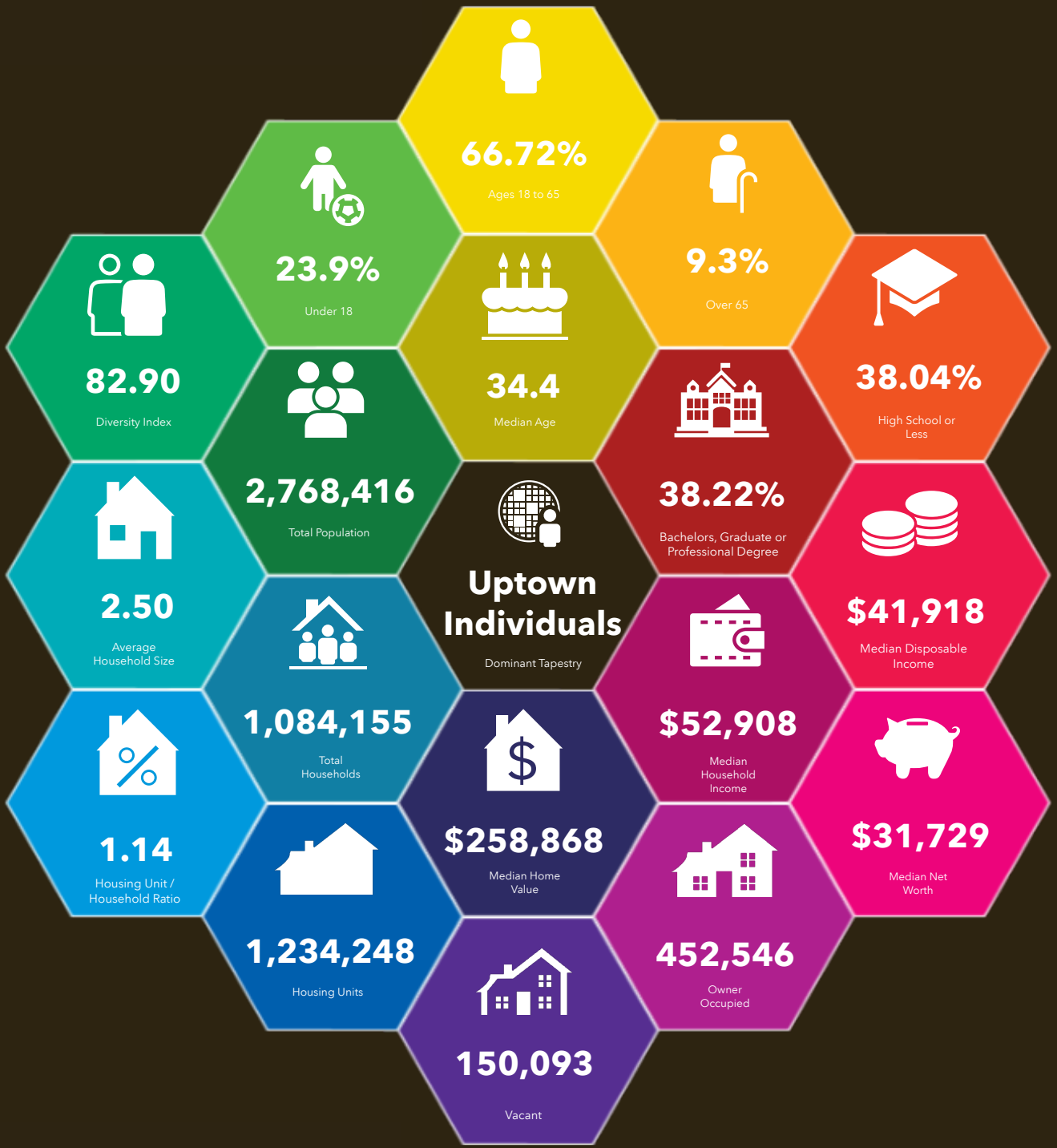

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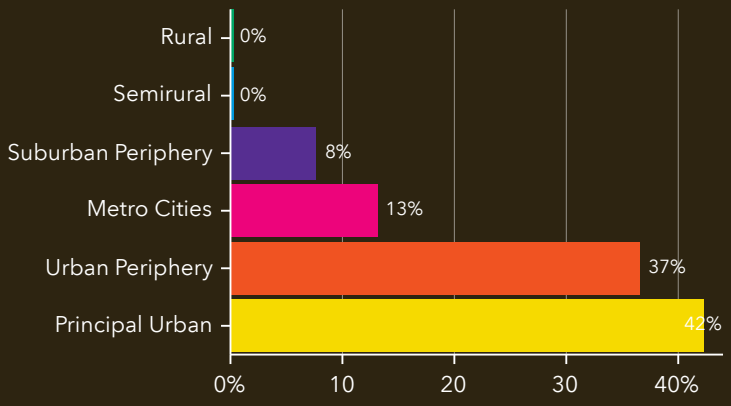
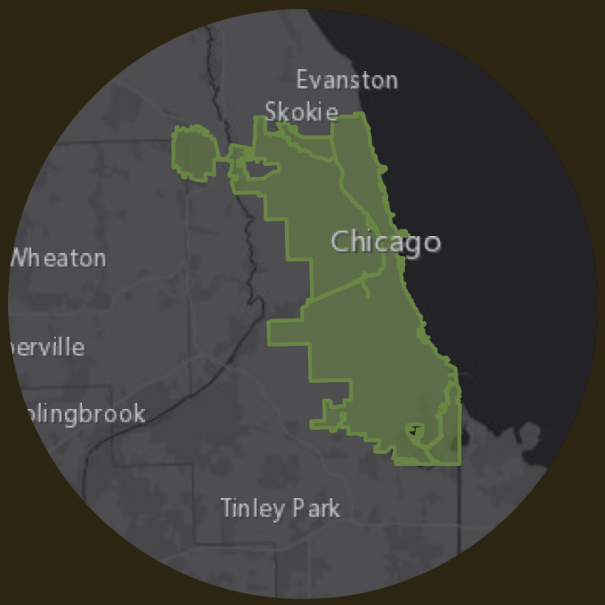
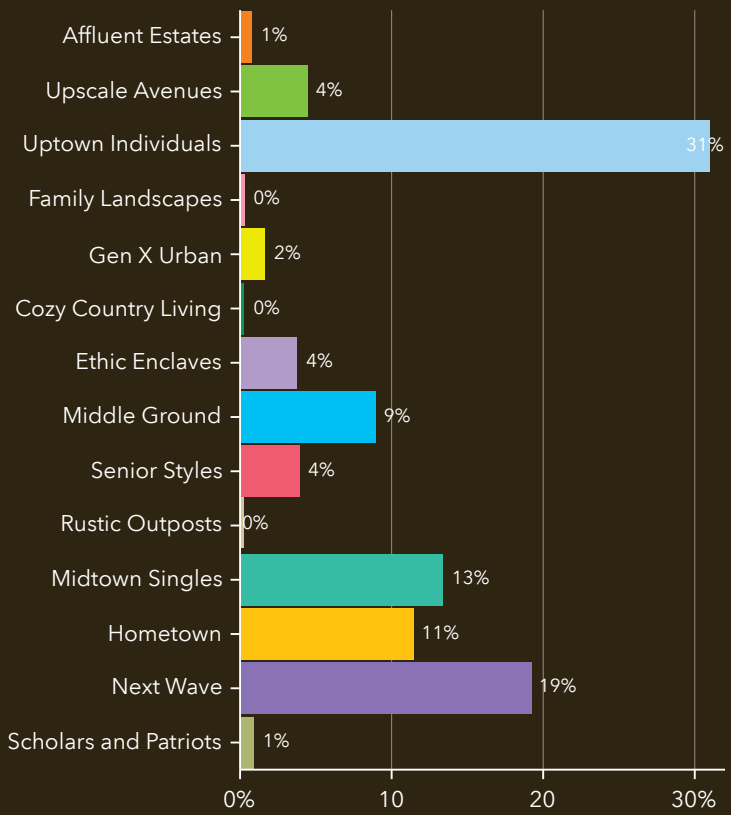
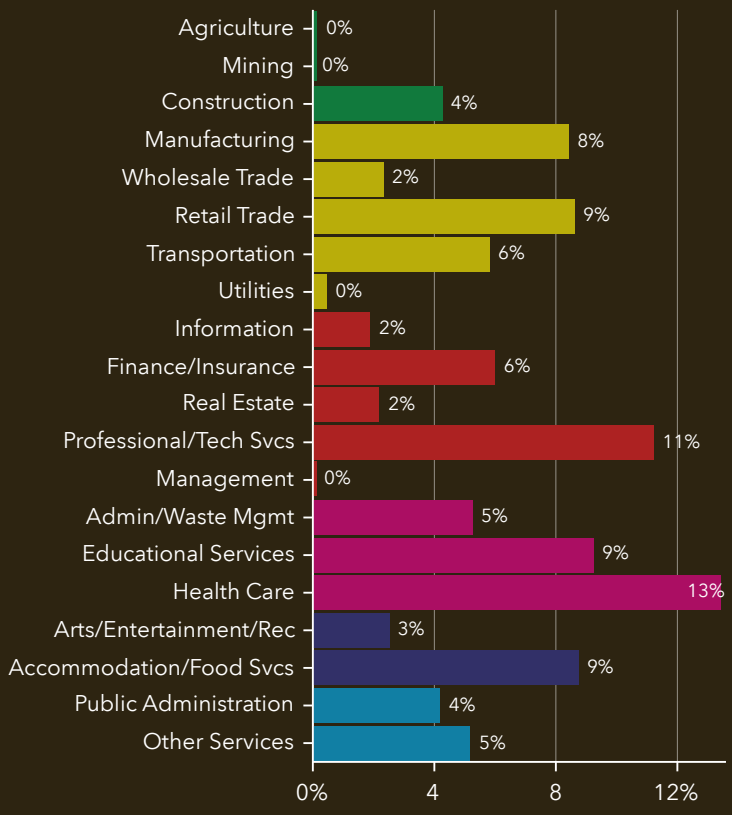




Lifemodes



Labor Force by Industry



Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2018 and 2023

Real-Time GIS

Today, state and local governments use real-time GIS technology to help them make better decisions, in the moment, so that they can respond faster and more effectively in their day-to-day work.

Smart devices, like smartphones and tablets, and smart sensors that transmit data over the internet are facilitating this capability.

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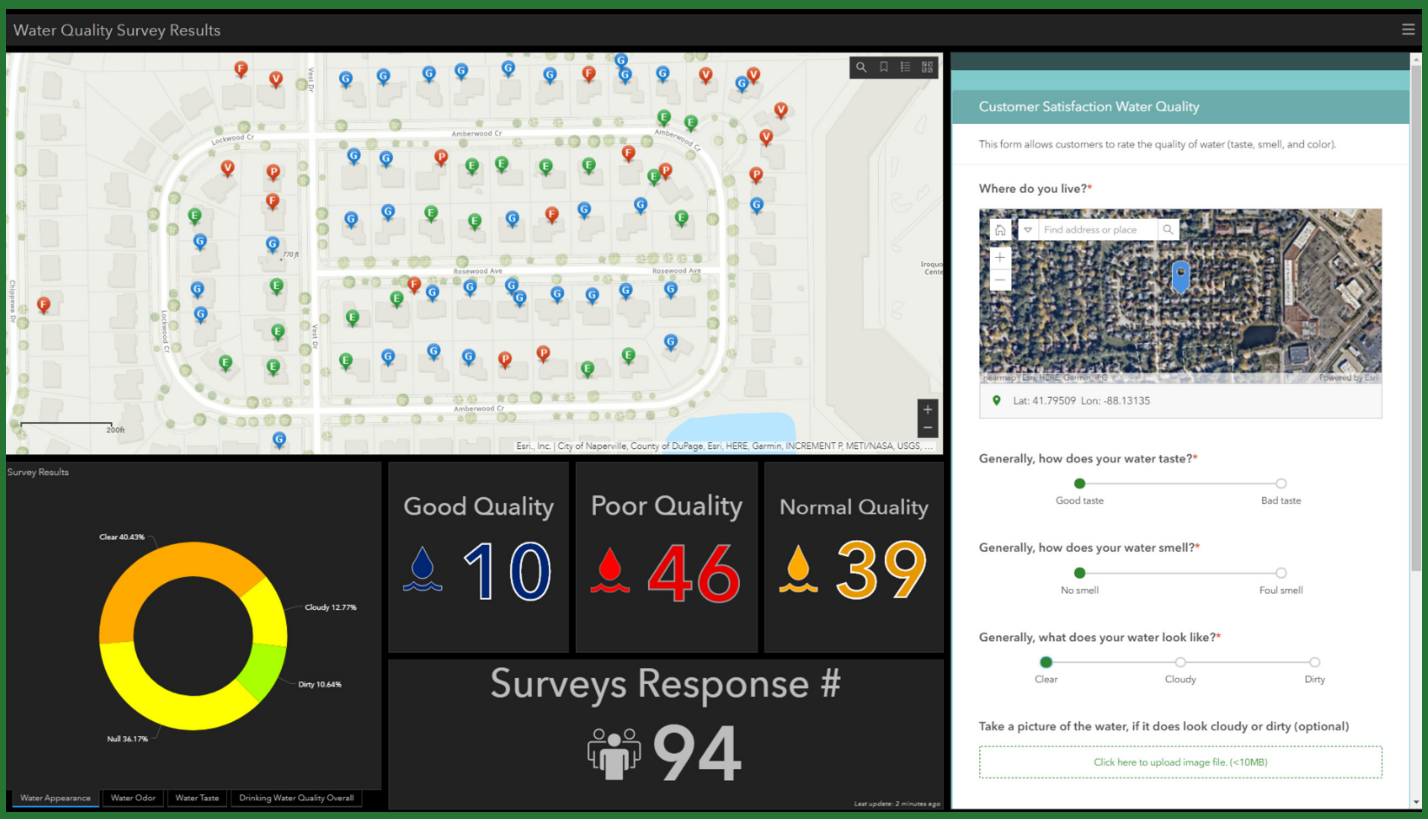

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City of Salem Public Works: How to Protect a City from Flooding

by Keith Mann, Esri

In 1996, floods killed eight people and caused millions of dollars of damage to public property, infrastructure, businesses, and homes. Willamette University alone suffered $1.2 million in damage to its law library and eight other buildings. Five thousand residents were forced to evacuate, and 200 houses suffered flood damage. Treatment plants failed, and raw sewage flowed into the river, surged up through manholes, and seeped into homes. Afterward, the city created its first Stream Crew—an initiative that evolved into the internship program.

The Stream Crew combines hard work with mobile apps and the latest technology to care for Salem's streams. The team of 14 interns removes trash, clears debris jams, tracks invasive species, collects data, and reports illicit discharges such as leaky sewage pipes that might pollute the water. During the 2017 season, the team removed 5,531 pounds of trash, unblocked 122 stream jams, and filled six dump trucks with vegetation debris. This work mitigates flood risk by preventing stream backups, improves water quality by removing trash and pollutants, and enhances the city's storm response by collecting data that informs future planning.

"There's not a resident in the city, I don't think, who doesn't love their backyard stream," says Peter Dalrymple, storm water monitoring program coordinator at the City of Salem's Public Works Department.

Dalrymple observes that balance is key to marrying the competing priorities of civilization and environment—removing debris but preserving the tree canopy above the river to regulate the temperature for fish survival, protecting against flooding but not seeking to prevent it entirely, and planting helpful species while removing invasive ones.

"The interns cover a lot of stream miles. We teach them how to understand what they're seeing and how to report that back," says Derek Godwin, a professor at Oregon State University who helps train the Stream Crew. By tracking problems and debris jams over time, the city can see patterns and trends that influence plans for the future.

Marking and tracking specific locations are done using GIS technology, which allows the team to store vast amounts of information, visualize the situation, and analyze the data to compare changes over time. The GIS syncs up in real time with a mobile data collection application called Collector for ArcGIS. Interns can update the app while standing in the middle of a stream—adding new data fields on the fly to log whatever they encounter.

With the mobile app, data collection is more accurate, adaptable, and fast. The 2017 Stream Crew cleaned and collected data on 22 creeks and streams, covering a total of 47.8 miles. As proof of their impact, the total amount of trash removed visibly decreases each year—progress clearly shown by the data collected.

"I originally thought of my Stream Crew internship as simply a chance to get field knowledge. But then I realized that a lot of employers were looking for students that had experience working with GIS. So, I did a few more GIS internship programs after Stream Crew before returning to work for the City of Salem full-time."

The Stream Crew's work collecting data and clearing streams has proven to reduce flooding, helping Salem meet state and federal requirements. It's also produced cost savings for the city by making it eligible for discounted Federal Emergency Management Agency (FEMA) flood insurance.

In the future, Salem plans to expand the program. A Stream Crew Symposium has recently been added as an outreach program, educating and engaging Salem's citizens on the city's efforts and how they can help.

To read the full article, check out **go.esri.com/CityofSalem**.

Mobile Solution Increases Valve Exercising Efficiency by 65 Percent

Since its inception in 1960, the Henry County Water Authority (HCWA) has been committed to providing and protecting an efficient water supply system. Constantly striving for advancement, the authority implemented ArcGIS solutions to maintain the system and better serve customers. With over 21,000 valves to inspect, the Valve Maintenance Program was the first area identified to benefit from the use of Esri software.

The Challenge

At the start of each day, the valve maintenance foreman mapped out the daily work area for inspection. Crew members traveled to the site and completed a paper form with 22 fields for every valve inspected. Once they were finished, they returned to the office and manually entered the information into a database. To keep track of any monthly totals, each form had to be counted by hand. Due to the large number of in-line water valves that require inspection on a regular basis, a new, more efficient process that would optimize field workflows was needed.

The Solution

Henry County Water Authority deployed its first mobile ArcGIS solution to support the valve maintenance team using Esri's Valve Exercising solution. The GIS team made a few adjustments to the solution and deployed the Collector for ArcGIS web map in HCWA's existing ArcGIS Online organizational account. The web map used a combination of ArcGIS Online hosted feature layers and secure feature layers in ArcGIS Server. Within just a few hours, the technicians had a great new mobile tool to easily use on their Android tablets. The solution combined using Collector for the fieldworkers and Operations Dashboard for ArcGIS for the office staff. The technicians were able to see which inspections had been completed and which were still needed as well as valves that required repair. They could also work offline, eliminating the need for a mobile hot spot or Internet connection. In addition, the new solution enabled workers to upload pictures to include with the valve data, showing where any repairs were needed. Operations Dashboard increased efficiency in workload review, future planning, and cost analysis.

The Result

Deployment of the ArcGIS platform and implementation of Esri's Valve Exercising solution and Operations Dashboard have greatly increased productivity. Technicians no longer have to write everything down on paper and enter the information manually in a database. Staff enter the data one time on their tablets, and inspections are finished at a much faster pace. Staff can also view their entire inspection area instead of looking at a paper printout of just one location. As time permits, they can complete additional maintenance throughout the day. Data gathering has also been vastly improved. Operations Dashboard has enabled staff to visualize the valve exercising progress, provide counts for reporting, and pinpoint valves that need repair. Other benefits are the ease of use and the ability to repurpose the Valve Exercising solution by configuring it for additional workflows. Since the solution's launch, over 1,400 more valves have been inspected than in the same time frame the previous year, resulting in a 65 percent increase in the number of valves being exercised and an overall productivity increase, ranging from 10 to 17 percent. The use of ArcGIS and ArcGIS Solutions for Water Utilities have made a huge difference in the efficiency of ensuring a healthy water system for Henry County Water Authority customers.

Learn about mobile workforce solutions at **go.esri.com/MobileWorkforce**.

Leading with Location Intelligence

By Stephen Goldsmith, Harvard Kennedy School

Imagine making policy for a major retailer like Starbucks. Where would you start? You'd need a map of the city, perhaps, as well as traffic counts, other coffee shop locations, street infrastructure information, rush hour driving patterns, and disposable-income indicators. Each time you saw more information layered on the map, your insights would become more profound, helping you make better decisions.

Cities are predominantly about places—where people live, work, walk, drive, and play. However, city governments organize themselves around functions, not places. There is no department of Tenth and Main Streets, but rather public works, transportation, and parks departments—all of which work at the corner of Tenth and Main from time to time. As a result, policies and operations need to be driven by insights from layered maps that show the connectedness of systems that affect places.

Yet senior municipal officials too frequently do not rely on spatial insights in their policy development. Even the agency heads—who often see maps showing their department's performance—don't think about the power of mapping as part of decision-making.

Pete Buttigieg, the data-savvy mayor of South Bend, recently harnessed the power of mapping by demonstrating how to use location intelligence to drive a major public initiative. After announcing a $40-million-dollar park investment, the largest in the city's history, the mayor utilized mapping to determine where and how to invest.

Much like a Starbucks real estate executive might, the mayor and his talented chief innovation officer, Santiago Garces, began the discovery process. With the aid of The Trust for Public Land, they began to examine both site access and asset quality. These highlights spurred the city's planning and parks departments to think more broadly and creatively and ask the right the questions: Where are the current parks? What is their condition? How does each park rank in terms of access? Do the parks need improvements in terms of parking or walkability? How does neighborhood wealth relate to accessibility?

Equally impressive, though, was how the city did not simply rely on professional analysts; it used these maps to reach out to the community and ask people to share their reactions to the master plan. Signs were posted in the parks to invite citizens to share their comments via My SB Parks & Trails. Their responses were connected to the proposed plan, thus increasing localized spatial input about the average park user's age and whether park visitors thought equity and design were being adequately addressed.

Considering the role of data visualizations through mapping, public officials should create more locational intelligence to accomplish the following goals:

- Using storytelling and campaigns for better services—Maps can create a compelling narrative about change. One important job of a senior leader is to create a narrative that drives public action, and well-visualized maps can help raise public awareness and therefore the willingness to act. A crowdsourced story map to celebrate lost loved ones depicts the enormous personal cost of opioid addiction and serves as a way of driving action. A San Francisco map of wealth division helps build the case for affordable housing. And a Redlining Louisville map illustrates Louisville's move to catalyze corrective action.
- Communicating in a common language—Community meetings and planning sessions are often driven by different interpretations of the data, but maps create a common understanding. For example, a map that clearly shows the differences in sanitary conditions among neighborhoods, such as in Los Angeles, will drive corrective action through a shared understanding.
- Creating maps that serve as virtual scaffolds—Cities that operate vertically need to think horizontally. By way of geotagging, Los Angeles allows one department to see the work that others are doing in the same area, helping to reduce infamously difficult sequential street cuts, for example.
- Having a platform for collaboration—The visualization of 311 data, organized by neighborhood, allows residents to understand trends in their area and to offer informed suggestions. These visualizations further the open data movement by making data accessible and actionable, but utilization does not occur automatically. Government needs to provide data, tools, and training to neighborhood intermediaries. For instance, New Orleans and Detroit documented local blight—pictures of vacant or vandalized homes were uploaded by city residents, and this input added better information to existing maps.
- Finding out about the people who live in the city —An official making an important policy or operational decision needs to ask the right questions on behalf of the residents. Each of the answers to those questions should be visualized and mapped. That, in turn, will yield layered insights, which is why data visualization produces better policies. Inclusive thinking can lead to specific insights on subjects such as park infrastructure or broad policy concerns—equity, for example. Mayors have tools at their disposal and should instruct their agency heads, performance managers, and data analysts to develop spatial intelligence.

As I was leaving an office in New York City earlier this week, the map on my phone became a lot more valuable to me. I was looking for the nearest Starbucks, and it generated both the travel time and the best route. Layered map information provides context in the retail and city services sectors, and context is what drives better decision-making.

To see the full article with map examples, visit **go.esri.com/leading-location-blog**. Or to get started making effective policy decisions today, explore the new Esri Maps for Public Policy site at **go.esri.com/leading-policy-site**.

Navigating Your Role as an IT-Savvy Executive

As an executive, are you asking yourself, what percentage of my operations and workflows are using technology to improve efficiency? And do I have a plan to raise the digital proficiency of every employee? Better yet, how do I compare to my peers?

As an executive, how closely are you paying attention to the constant advances in technology? Are you asking yourself, what percentage of my operations and workflows could be using technology to improve efficiency? Are you using a digital twin to model what your community will look like? Or are you leaving it to others, saying, "I've got people for that."?

The attention that executives have paid to technology has always come in waves. But now, we are faced with a society that is sensor-driven, autonomous vehicles that are on the road, and consumer apps that are driving behavior more than government mediums. Executives can no longer ignore these technology drivers. The following resources will help you make sense of seemingly unrelated trends from technology, policy, and digital transformation to change the way you solve real-world problems.

Six Ways to Lead a Digital Transformation (e-book)
In our experience, GIS capabilities allow IT leaders to accelerate the modernization of an organization. This e-book will outline six repeatable patterns that will lead you to the path of success. To download, visit **go.esri.com/DigitalTransformation**.

2019 Public Sector CIO Summit (event)
Join us April 10–11, 2019, to see how your peer IT executives (CIOs, CDOs, CTOs, etc.) are inspiring, discovering, and leading what's next in GIS. Last year, we heard from organizations like Forrester, Microsoft, State of Michigan, and City of San Francisco, California. Thought leaders spoke on topics ranging from the Internet of Things (IoT) to social inequities to artificial intelligence. To request to attend, visit **go.esri.com/CIOSummit2019**.

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