

DIGITAL TRANSFORMATION

for Environmental and Natural Resources Agencies



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WHERE®

Digitally Transforming Environmental and Natural Resources Disciplines—Putting Your Passion into Practice

Environmental and natural resources professionals have an innate passion for building a sustainable world. The rest of the world is finally catching up to the need to pay more attention to the impacts of development, reliance on natural resources, climate change, and how even the smallest of species can change an entire ecosystem. Your work educates citizens as to how the daily choices we make affect our environment and natural resources.

Technology has helped advance us toward a more resilient way of thinking. Environmental and natural resources professionals were early adopters of geographic information system (GIS) technology. Mapping resources, analyzing impacts, and presenting your findings were part of the conservation movement and took you through your first digital transformation. The question at hand is, Are you ready to take your organization to the next level? The following GIS trends can help you get there.



Working as One—Bringing Together Field Crews and the Office

Most GIS work has been carried out in the back office rather than in the field. With current GIS innovations, there is greater opportunity to integrate and automate field and back-office workflows. This is a drastic shift from manual methods of clipboard and pen.

GIS provides the tools you need to improve coordination and operational efficiency, saving you time and money. You can now perform your work, whether it be asset inventory, inspections, field notes, or work orders, in the field using mobile devices. Crews can automatically capture authoritative information from the field and feed it directly into your back-office systems to support your analysis. This ensures that your entire organization is working with the same authoritative information, leaving less room for error.



Delaware Cuts Time It Takes to Assess Agricultural Easements by 75 Percent

The Delaware Department of Agriculture went from a paper-based, manual process for assessing agricultural easements to a mobile GIS data collection workflow, reducing the work hours required by 75 percent and saving the department thousands of dollars.

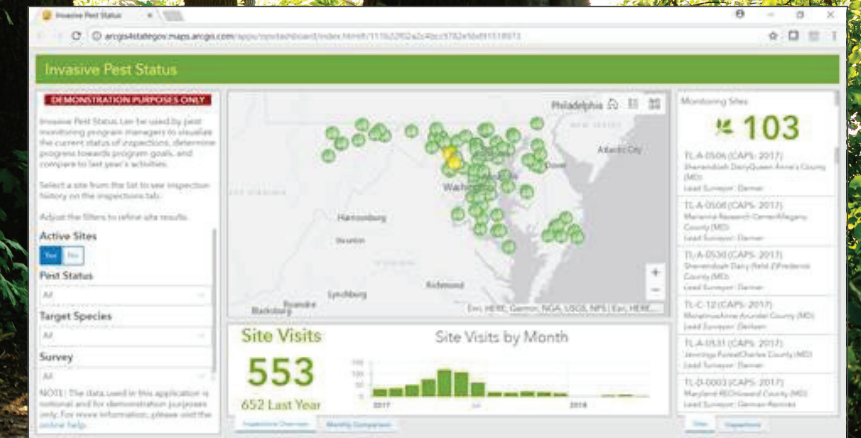
Read the full case study at go.esri.com/enrbookcasestudy.

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Give Yourself an Opportunity to Intervene—Managing Natural Resources in Real Time

While the work that you've performed has taken us to new levels in terms of automated mapping and analysis, the methodologies in place have yet to take advantage of a connected world. Technology advances have given us access to a broader range of information with real-world context, including imagery, data collected from air quality and stream gauge sensors, field notes collected at the scene, and crowdsourced information from citizens, giving stakeholders ample opportunities to make better-informed decisions.

Today's GIS provides the foundation for organizations to fully leverage real-time information as it is collected. Dashboards provide comprehensive views to monitor and actively manage current conditions and course correct when needed. For example, foresters can manage vegetation health and examine invasive species, water quality specialists can record stream levels, and ecologists can track endangered species.



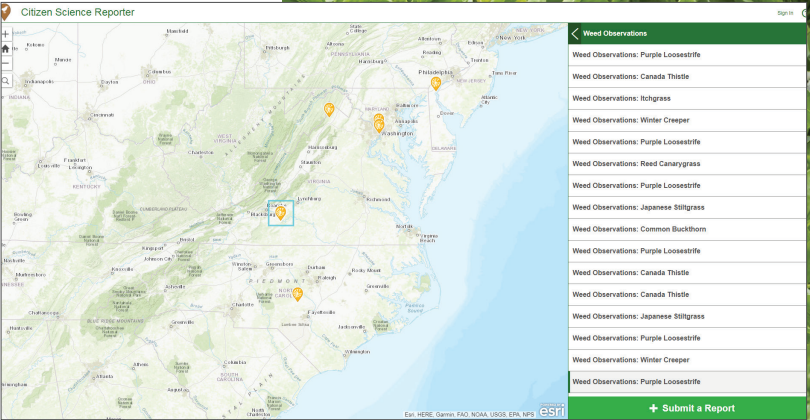
Leverage various real-time data as it is collected from sensors and gauges to help make critical decisions in a timely manner.

Empower Citizen Scientists— Educating the Community through Public-Facing Apps

Keeping the public informed and engaging them in a meaningful way have always been a struggle. Historically, constituents have not been able to easily access information regarding the potential impacts of development and other changes to our infrastructure on the natural environment. In today’s always connected world, people expect to have the same type of open communication they have with their personal networks as they do with their government agencies. This evolution of citizen engagement is replacing old methods for communication and requiring organizations to be more transparent.

With GIS, you can publish apps and dashboards that inform the public as well as provide a two-way data exchange between your organization and citizens. Mobile maps and apps enable agencies to brief executives and decision-makers on potential impacts of projects happening in the region and elicit feedback from stakeholders and constituents.

With GIS, you can empower your citizens to share their findings and feedback through a two-way data exchange app.



South Carolina Department of Health and Environmental Control Uses Web Maps to Keep Citizens up to Speed

"ArcGIS applications have definitely strengthened our outreach with communities—it's in essence been, a form of crowdsourcing some of our data. In fact, other local communities, cities have direct links to some of our applications. In lieu of doing it themselves, they use ours because it was already done so well."

*Phil Weinbach, GIS Program Manager
South Carolina Department of
Health and Environmental Control*



Watch Esri Case Study at go.esri.com/enrbookvideo.

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Better Manage Performance— Doing What Comes Naturally

Embracing the mindset that there's always room for improvement is part of the focus on adopting business intelligence practices. Data-driven decisions are changing the way we

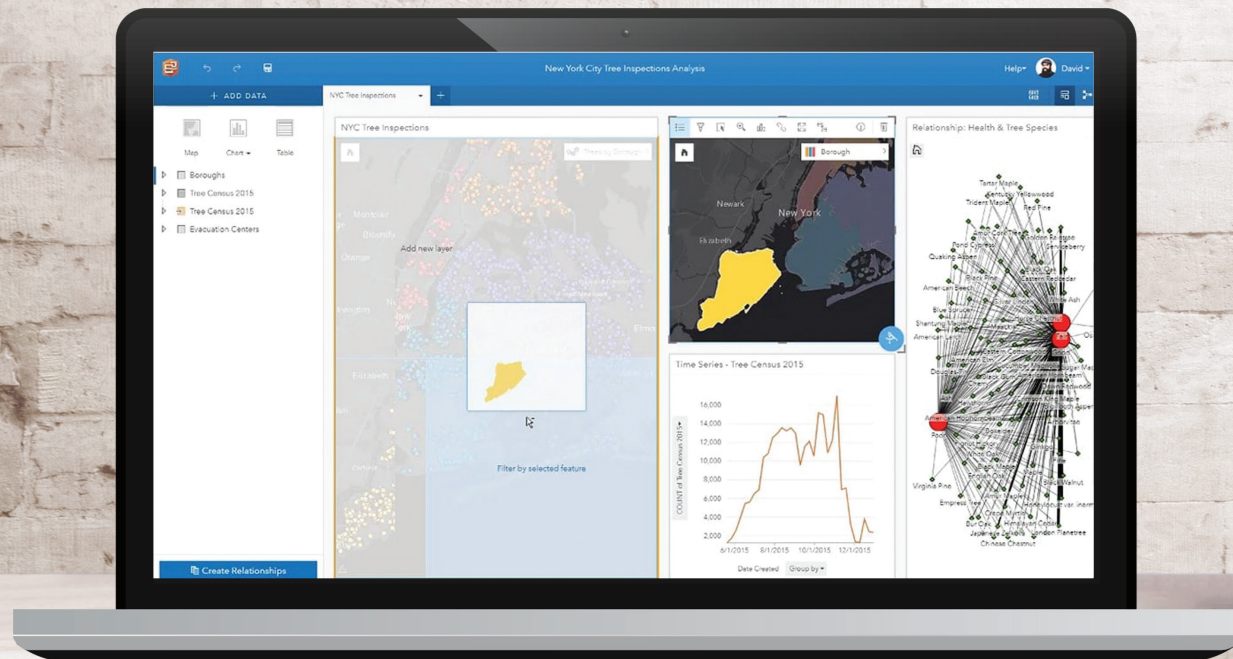
correct information in near real time that modern GIS tools provide. Advances in integrated analysis and operations dashboards are driving improvements in critical areas such as air quality control, wildfire management, and fish and game inspections.

Operations dashboards are becoming the standard for monitoring and adjusting work efforts in real time. This real-time data can be derived from various data streams and sensors including citizen input, real-time location of equipment and personnel, weather information, enterprise resource planning, and work order management solutions, presenting a more holistic view. This complete spatial view enables staff to identify where to assign field crews, make necessary adjustments based on natural resource depletion, and shift work efforts to the locations that need attention most.



Operations dashboards deliver a common operating view of key performance indicators, including real-time feeds, allowing everyone to easily understand what is working well and what needs attention.

operate. Understanding employee output, managing materials and costs, and monitoring progress can be achieved by combining systems of records—visualized, analyzed, and presented through a geographic lens. The static analysis and reporting tools of the past do not present the same opportunities to intervene and course



You can perform advanced spatial analysis using a guided drag-and-drop workflow, allowing you to uncover significant patterns and relationships in your data.

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Powerful Analysis Made Simple— Discover the Answers within Your Data

Analysts and scientists working on environmental, fish and wildlife, and forestry management have long used computerized modeling to analyze and predict the impacts of both naturally occurring and man-made activities on our natural resources, such as human encroachment on species and vegetation, hurricanes and other detrimental weather phenomena, and real estate development. GIS has played a major role in modeling our world, and we have been presented with opportunities to intervene, develop new policies, and shift our approach to conservation or head off issues before they become problematic.

Like so many areas of GIS, performing powerful analysis is going through a major transformation. The new

framework allows you to draw from multiple data systems that take modeling to the next level, allowing you to perform advanced spatial analysis and gain insights into these disruptive activities and their effects on ecosystems. These tools allow you to explore spatial and nonspatial data at the same time, with a simple, guided drag-and-drop workflow. Working in an environment where visualization and analysis happen at the same time allows you to uncover patterns, trends, correlations, and relationships helping you to answer questions you didn't even know to ask. You can now take a simple approach to advanced analysis methods such as regression, variable prediction, density, and aggregate calculation.

As social consciousness around environmental issues continues to evolve, there is a growing awareness that we need to understand the daily choices we make and the impact they have on our natural resources. As we continue to research and analyze ecological challenges such as climate change, poor air quality, severe drought, and devastating hurricanes, we realize the need for and the power of everyday scientists. Two-way communication with the public on environmental issues will create more educated citizens that are empowered to do their part to preserve and protect our resources. With our Internet of Things (IoT)-connected world enabling a constant stream of real-time data from sensors, crews in the field, and the community at large, it can be a challenge to process and analyze all this valuable information. GIS provides the operating system needed to translate this data into actionable intelligence.

Environmental and natural resources agencies were some of the early adopters of GIS, using it as a means to preserve and protect the earth through automated mapping and analysis. As the technology continues to grow and evolve, agencies are now challenged to take their GIS work to the next level by utilizing real-time performance management capabilities, predictive modeling, and other advanced mapping and spatial analysis tools. The next wave of digital transformation is among us, and it is time to act.

Esri's solutions for environment and natural resources challenges provide the software, training, and guidance you need to take your organization to the next level.

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About Esri

Esri, the global market leader in geographic information system (GIS) software, offers the most powerful mapping and spatial analytics technology available.

Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world.

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