GIS Trends in Environment and Natural Resources

Mike Bialousz
Agenda

• Introduction

• Common Patterns of Use

• Pattern Trends and Examples

• ArcGIS Solutions

• Your Feedback/Questions
Environment and Natural Resources Approaches

- Desktop and Client/Server → Web-based GIS
- Custom Development - Waterfall → COTS/Configurable - Agile
- Single app → Integrated/Platform Approach
- Geo-Centric Citizen Science and Crowdsourcing
- Governance and Security
- Systems Integration
- Coordination and Collaboration
Environment and Natural Resources Workflows

- Asset Management and Inspections
- Habitat and Species Management
- Invasive Species Monitoring
- Geo-enabling Sensor Data (ex. Air quality, telemetry, water flow, etc.)
- Promotion of Conservation and Recreation Opportunities
- Private Lands Stewardship
<table>
<thead>
<tr>
<th>ArcGIS</th>
<th>Common Patterns of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mapping &amp; Visualization</strong></td>
<td>Understand locations and relationships with maps and visual representations</td>
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<tr>
<td><strong>Data Management</strong></td>
<td>Collect, organize, and maintain accurate locations and details about assets and resources</td>
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<tr>
<td><strong>Field Mobility</strong></td>
<td>Manage and enable a mobile workforce to collect and access information in the field</td>
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<tr>
<td><strong>Monitoring</strong></td>
<td>Track, manage, and monitor assets and resources in real-time</td>
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<tr>
<td><strong>Analytics</strong></td>
<td>Discover, quantify, and predict trends and patterns to improve outcomes</td>
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<td><strong>Design &amp; Planning</strong></td>
<td>Evaluate alternative solutions and create optimal designs</td>
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<td><strong>Decision Support</strong></td>
<td>Gain situational awareness, and enable information-driven decision making</td>
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<td><strong>Constituent Engagement</strong></td>
<td>Communicate and collaborate with citizens and external communities of interest</td>
</tr>
<tr>
<td><strong>Sharing &amp; Collaboration</strong></td>
<td>Empower everyone to easily discover, use, make, and share geographic information</td>
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</tbody>
</table>
Enabling Departments, Partners and the Public

MI DNR Asset Inventory

SD Game, Fish and Parks Recreation Trails

Pa Game Commission Gamelands & Hunter Access

Colorado Department of Public Health & Environment Air Pollution Sources and Condition
Systems of Record

State Park Boundary Data Management

Forest Health and Treatments Data Management

Environmental Review Documentation for Permits

National Hydrography Dataset (NHD) Data Management
Asset Management, Inspections, and Surveys

Field Operations

Operations Dashboard for ArcGIS

Collector for ArcGIS

Survey123 for ArcGIS

WinFone for ArcGIS

Navigator for ArcGIS

ArcGIS for Desktop, Web Maps/Apps

Permit Inspections and Monitoring

Forest Inventory and Cruising

MO Forestry Inventory Dashboard

PA LWCF Grant Site Inspections
Monitoring Field Data Collection and Real Time Data

Invasive Species Monitoring

US EPA Ozone Monitoring Stations

Live Stream Gauges
ArcGIS includes a Living Atlas of the World
Maps and Layers from Esri and Thousands of Contributors – Many used for EIS Reports

The Collection is growing and changing on a daily basis…

…with Curated Content on Many Topics
Content is Published by Esri, Users, and Partners
Built by the ArcGIS Community and Curated by Esri

- 7cm **nearmap** imagery
- **AccuWeather** Severe Weather
- NOAA Real-time Weather
- **ESDA FSA Imagery**
- EEA Land Cover
Esri Content Portfolio within Living Atlas

Supports Environmental Impact Studies

- Basemaps
- Demographics and Lifestyle
- Transportation
- Urban Systems
- Boundaries and Places
- Imagery
- Landscape
- Oceans
- Earth Observations
Exploratory and High End Analysis

Forest Inventory Analysis

Environmental Impact Analysis Solution

Tracking Citrus Disease - Space Time Cube Analysis

Hazardous Spill Modeling
Planning for New Resources and Understanding Constituents

WHERE are anglers coming from?

Planning for New Parks, Easements, and Management Areas

Understanding Constituent/Community Demographics and Social Aspects
Reacting to Operational Data and Citizen Feedback

DE Agriculture Easements Dashboard

Agriculture BMP ArcGIS Hub Solution

Citizen Problem Reporter Solution Dashboard

FL Agriculture Invasive Species Situational Awareness App
Providing Information to the Public

SD Game, Fish and Parks Story Map Blog

TN State Parks

Smartphone Apps – Easy2Hike Example

PA DEP – Oil and Gas Report Story Map

Florida DEP – Water Quality Web Mapping Apps
Obtaining Feedback and Information from the Public

Citizen Science Solution – Animal Observations

AZ DEQ - Citizen Science for Water Quality

ME Dept. of Inland Fisheries Wildlife, Heron Observation Network of Maine (HERON)

Crowdsourcing for Recreation Opportunities

https://www.esri.com/arcgis-blog/products/arcgis-online/field-mobility/citizen-science-resources/
Openly Sharing Data with Partners and the Public

MI DNR Open Data

WY Game and Fish Open Data

ArcGIS Hub Environment Dashboard (Prototype)
Return on Investment
Maximizing the ArcGIS Platform

Utah DNR Example

Delaware Agriculture Inspections ROI

GIS Project ROI and Benefits Report

Project Name: Monitoring Agriculture Easements with ArcGIS Collector
Department: Delaware Department of Agriculture - Land Preservation and Planning Section
Project Manager: Jimmy Kroon - GIS Coordinator, Delaware Dept of Agriculture
Project Completion Date: February 2016

<table>
<thead>
<tr>
<th>Previous Workflow Costs:</th>
<th>Enhanced Workflow Costs</th>
<th>Enhancement Production Costs and Savings</th>
<th>Calculated ROI</th>
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</thead>
<tbody>
<tr>
<td>Hours to complete previous workflow</td>
<td>$300.0</td>
<td>$81.0</td>
<td>$36.9</td>
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<tr>
<td>Hourly wage rate*</td>
<td>$62</td>
<td>$52</td>
<td>$28</td>
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<tr>
<td>Annual occurrence of workflow</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Other annual costs (Voice phone plan)</td>
<td>$75</td>
<td></td>
<td></td>
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<tr>
<th>Previous workflow cost</th>
<th>Enhanced workflow cost</th>
<th>Enhanced annual cost</th>
<th>Initial Year ROI</th>
<th>ROA-Savings minus Enhancement Cost divided by Enhancement Cost plus Enhanced Annual Cost Future Annual ROI</th>
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</thead>
<tbody>
<tr>
<td>$17,188</td>
<td>$4,314</td>
<td>$9,232</td>
<td>169%</td>
<td>213%</td>
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* Hourly wage rate includes benefits and overhead.

Maximizing the ArcGIS Platform
ArcGIS Solutions
Implementing the Common Patterns of Use for Environmental Agencies
Solving business problems
To support organizational initiatives
EXTENDING THE PLATFORM WITH SOLUTIONS

Ready to use workflows and apps that make implementation easier and sustainable.

ArcGIS for State Government

... https://solutions.arcgis.com/
Every day challenges

• Heightened Demand for Business Outcomes

• With Reduced
  Budgets
  Personnel
  Time
ArcGIS Solutions

• Free
• Simple
• Configurable and extensible
• Supported and maintained
State Government Solutions – Environment and Natural Resources

Agriculture
- Monitor & Report Invasive Pests
  - Invasive Pest Reports
  - Invasive Pest Status
  - Invasive Pest Surveys
  - Invasive Pest Viewer

Natural Resources
- Protect Water Quality
  - BMP Dashboard
  - BMP Reports
  - BMP Surveys

Fish and Wildlife
- Analyze Environmental Impact
  - Environmental Analysis
  - Environmental Impact Briefing
  - Environmental Impact Public Comment
  - Environmental Screening

  - Monitor Water Quality
    - Water Quality Inspections
    - Water Quality Status

  - Engage the Public
    - Engage the Public

- Engage Citizen Scientists
  - Citizen Science Reporter
  - Citizen Science Manager

- Permit Status
  - Permit Inspection
  - Permit Status

- Engage the Public
  - Wildlife Photo Survey
  - Wildlife Management Area Locator
  - Hunting License Locator
  - Park and Recreation Locator
  - State Trail Locator

https://solutions.arcgis.com/
UC Events

• ArcGIS Solutions for State Government Sessions
  • Several tech workshops / demo theatre sessions

• Solution Island
  • Focused conversations / support
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”