Eco-Logical Webinar Series

Eco-Logical in Performance-Based Planning

Presenters

**Egan Smith**, Federal Highway Administration, Office of Planning

**Wood Hudson**, Thomas Jefferson Planning District Commission

**Travis Miller** and **Margo Lindahl**, Ohio-Kentucky-Indiana Regional Council of Governments

August 25, 2014
Eco-Logical and Performance

- Eco-Logical helps consolidate environmental data from partners
- Intended to help anticipate potential environmental effects of projects in advance
  - Connection to transportation planning is critical
  - Data collected through Eco-Logical can be used to develop measures, baseline condition, and targets.
Overview of Performance Management

• Broad consensus that performance management is important for accountability and transparency in the transportation industry
• Most agencies track and report various aspects of system and agency performance
• Need to integrate performance management principles into planning and programming
• May be a requirement for a consistent national approach
Performance-based Planning and Programming

• Key role for planning and programming to influence more performance-based decision-making

• FHWA, FTA, AASHTO, APTA, AMPO, NARC and NADO working informally to:
  – Define key elements of performance-based planning/programming
  – Identify examples of good practice
  – Engage with stakeholders and identify key challenges and opportunities for capacity building
**MAP-21 Background-Performance**

- **National Goals** – Focuses the Federal aid program on 7 goals supported through the statewide and metropolitan planning process.

- **Measures** – USDOT to establish performance measures through rulemaking

- **Targets** - All States, Metropolitan Planning Organizations (MPOs), and public transportation agencies required to establish targets for each of the measures established by USDOT.

- **Plans** – All States, MPOs, and public transportation agencies are required to develop a number of plans to document strategies and investments to address performance needs.

- **Reports** – All States, MPOs, and public transportation agencies are required to report on progress toward the achievement of their targets.
Key Elements of Performance-Based Planning and Programming

- Elements of Performance-Based Planning
  - Goals and Objectives
  - Performance Measures
  - Identify Trends and Targets
  - Identify Strategies & Analyze Alternatives
  - Develop Investment Priorities
  - Investment Plan
  - Resource Allocation
  - Program of Projects
  - Monitoring, Evaluation, Reporting

PERFORMANCE-BASED PLANNING AND PROGRAMMING

PLANNING

Strategic Direction
Where do we want to go?

Goals and Objectives
Performance Measures

Analysis
How are we going to get there?

Identify Trends and Targets
Identify Strategies and Analyze Alternatives
Develop Investment Priorities

Programming
What will it take?

Investment Plan
Resource Allocation
Program of Projects

Implementation and Evaluation
How did we do?

Monitoring
Evaluation
Reporting

Quality Data and Public Involvement
C02: Performance measures for highway capacity decision making

• Performance Measurement
  – Supports collaborative decision-making framework
    Structured around 5 broad topics and 18 planning factors

• Web-based Tool
  – Performance measure database
  – Supporting case studies

• Integrated with Broader Transportation Database

**What:** Framework and web-based tool for selecting performance measures to evaluate major transportation projects. It details how performance measures can be used in long-range planning, programming, and environmental review/permitting (with a heavy focus on environmental/sustainability measures).

**Impact on Practice:** Beyond their analytical value, these performance measures form the basis for transparent and objective decisions that help stakeholders understand transportation problems.
FHWA’s Eco-Logical Process: Uses in Performance-Based planning

August 25, 2014

Charlottesville Albemarle Metropolitan Planning Organization (CAMPO) and The Thomas Jefferson Planning District Commission
MPO Background

• Covers the City of Charlottesville and the urbanized areas of Albemarle County

• Economy centered around the University of Virginia

• Population 122,638 (2010)

• 24,297 Students

• The population is forecasted to grow by 36.8% by the year 2040

• TJPDC encompasses Charlottesville, Albemarle, Nelson, Fluvanna, Louisa, and Greene
The 2040 LRTP is a fiscally-constrained document that outlines the region’s long-range transportation vision.

To receive federal funding, a transportation project must be included in the LRTP’s project list. On July 23rd, the MPO Policy Board approved amendments to the document based on the Route 29 Solutions project package.
Performance Measures

- Map 21
  - Establishes a performance based program
- MPO’s Approach
  - Develop regional specific performance measures
  - 16 measures organized into 4 categories
  - Apply performance measures to a scenario based approach

- Mobility Measures
- Economic Measures
- Environmental Measures
- Community Measures
# Performance Measures

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobility</strong></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>The total percentage of roads that will have a level of service E or F in 2040.</td>
</tr>
<tr>
<td>Delay</td>
<td>The total daily hours of delay that congestion will cause in the year 2040.</td>
</tr>
<tr>
<td>Mode Share</td>
<td>The percentage of trips across the four main travel modes, automotive, transit, bike and walk for 2040.</td>
</tr>
<tr>
<td>Vehicle Mobility</td>
<td>The total system-wide vehicle miles traveled for 2040.</td>
</tr>
<tr>
<td>Vehicle Crashes</td>
<td>The total system-wide crashes per year for 2040.</td>
</tr>
<tr>
<td><strong>Economy</strong></td>
<td></td>
</tr>
<tr>
<td>Access to Jobs</td>
<td>The average travel time to work.</td>
</tr>
<tr>
<td>Transit Accessibility</td>
<td>The percentage of population and the percentage of employed individuals within the MPO with access to transit.</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td>The aggregate impact of projects on natural resources and habitats within 500 foot buffer of project.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>The percent change in air quality gases and particulates in tons per year.</td>
</tr>
<tr>
<td>Water Quality</td>
<td>The percent change in the amount of stormwater pollutants in tons per year.</td>
</tr>
<tr>
<td>Flood Plain</td>
<td>The total acreage of flood plain within a 500 foot buffer of the projects.</td>
</tr>
<tr>
<td>Historical/Archeological sites</td>
<td>The total number of historic or archeological sites within a 500 foot buffer of these projects.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td></td>
</tr>
<tr>
<td>Land Use</td>
<td>The total number of land parcels within a 500 foot buffer of the potential projects by usage: residential, comm./ind., parks, educ./religious/charitable, and agricultural/undeveloped.</td>
</tr>
<tr>
<td>Environmental Justice and Title VI: Transit Access</td>
<td>The total percentage of Environmental Justice or Title VI groups with access to transit: minorities, 65 and older, limited-English speaking, and household income of less than $25,000.</td>
</tr>
<tr>
<td>Environmental Justice and Title VI: Impacts</td>
<td>The total percentage of Environmental Justice or Title VI groups potentially impacted due to projects: minorities, 65 and older, limited-English speaking, and household income of less than $25,000.</td>
</tr>
</tbody>
</table>
REF tool:
The Tool is made up of ten environmental spatial datasets which were included at the suggestion of an advisory committee.

• The tool was built using GIS and is designed to function in GIS
• It consists of a rasterized heat map
• Uses existing GIS functions and tools to conduct analyses.
• Made up of 10 different spatial environmental datasets overlaid spatially
• Datasets and attributes ranked then aggregated to form the heat map

TJPDC Eco-Logical Timeline:
2009 Green Infrastructure Plan
2011 Eco-logical: Integrating Green Infrastructure and Regional Transportation Planning
2013-14 Charlottesville Albemarle MPO Long Range Transportation Plan 2040,
2013-2014 Free Bridge Congestion Relief Project, 2013-2014
Eco-Logical Datasets

• Built with existing datasets
  – Tiered Species Habitat
  – Threatened and Endangered Species Waters
  – Species observations
  – Natural Landscape Assessment Cores and Corridors
  – Priority Conservation Sites
  – Important Bird Areas
  – National Wetlands Inventory
  – VCLNA Watershed Integrity Model
  – Cold Water Stream Survey
  – National Hydrography Dataset

• Numeric Ranking system: 2 – 52
• High scores representing highest value ecosystem
• Prioritizes preservation for ecosystem areas (especially wetlands)
REF Pixel Value Distribution

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Limit</td>
<td>2</td>
</tr>
<tr>
<td>25th Percentile</td>
<td>3</td>
</tr>
<tr>
<td>50th Percentile</td>
<td>6</td>
</tr>
<tr>
<td>75th Percentile</td>
<td>14</td>
</tr>
<tr>
<td>Upper Limit</td>
<td>52</td>
</tr>
</tbody>
</table>

Attribute Scores Used to Form the REF

The table on the left lists the attribute scores used to form the REF. The table also highlights the number of attributes and how they were ranked by the Technical Advisory Committee. The rankings are what drives the color density of the REF.
REF as a Performance Measure

- Quantitative measure
  - Score per mile/per acre
  - Total impact score
- Provides a way to benchmark projects and scenarios
  - Comparable
- Allows for multiple environmental considerations
Eco-Logical as a Quantitative Measure

- Calculated a base score per mile of existing and committed projects
- Compared the change in the base score between scenarios
- Expressed as a percent

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Base</th>
<th>Scenario 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Measures</td>
<td>Value</td>
<td>Value</td>
</tr>
<tr>
<td>Habitat</td>
<td>1,775.5</td>
<td>1,786.9</td>
</tr>
<tr>
<td>Air Quality</td>
<td>13,321.0</td>
<td>13,211.0</td>
</tr>
<tr>
<td>Water Quality (% change in stormwater pollutants) (tons per year)</td>
<td>1,079.1</td>
<td>1,168.3</td>
</tr>
<tr>
<td>Flood Plain (acres of 100 year flood plain affected)</td>
<td>99.1</td>
<td>120.2</td>
</tr>
<tr>
<td>Historical (designated historic sites within 500 ft. of projects)</td>
<td>1,141</td>
<td>1,171</td>
</tr>
<tr>
<td>Archeological (designated archeological sites within 500 ft. of projects)</td>
<td>264</td>
<td>299</td>
</tr>
</tbody>
</table>
Outcomes and Lessons Learned

• Required more outreach and education than some other performance measures
• Limited resolution (30x30 meter)
• Easy to use and replicate results
• Worked well for bigger projects and not so well on small road improvements
• Interest and understanding among local partners has increased
Questions?

Links:
2040 LRTP: http://www.tjpdc.org/LRTP/index.asp
TJPDC Eco-Logical Report and Process:

Contact Information:
Wood Hudson
Sr. Environmental Planner
Thomas Jefferson Planning District Commission
whudson@tjpdc.org
Natural Heritage Data

Supplemental Information for
OKI Environmental Consultations in Regional Transportation Planning

OHIO-KENTUCKY-INDIANA
REGIONAL COUNCIL OF GOVERNMENTS
The OKI Region

Eco-Logical Uses in Performance Based Planning

August 2014
OKI Environmental Consultations

Process
- Compare draft plan & environmental resources
- Engage stakeholders

Purpose
- Improve transportation & development decision-making
- Reduce negative & costly environmental impacts

Eco-Logical Uses in Performance Based Planning
Intended Results of OKI’s Environmental Consultations

- Better decisions for improving transportation
- Better decisions about how development occurs
- Transportation improvements and development processes that more fully account for their environmental effects and financial consequences
Five Resource Categories

Regionally Significant Environmental Resources

- Regionally Significant Streams
- State Conserved Areas
- Wetlands
- Endangered, Threatened, or Rare Species
- Prime Farmland and Agricultural Districts
Endangered, Threatened, and Rare Species

• 165 local species are listed at federal or state levels as Endangered, Threatened, or Rare (20 of these are also federally listed)
• Nearly 2/3 of the 104 animal species depend on aquatic habitat for survival
• Nearly half of these aquatic species are “critically imperiled” or “imperiled” globally
Developed agreements with each Natural Heritage Database authority:

- Ohio Dept. of Natural Resources
- Kentucky State Nature Preserves Commission
- Indiana Dept. of Natural Resources
Natural Heritage Data -
Data consistency

- Distance of records from OKI borders
  Data: 5 miles
  **Map: \(\frac{1}{2}\) miles**

- Starting Date of records
  Data: 1800s, 1912, 1970
  **Map: 1965 (50 yrs)**
Aquatic vs. Terrestrial

- Enables some detail on species type without identifying species
- Relevant for bridge or culvert projects
- Enhances map value for conservation planning (habitats)
Area with Aquatic Sites in the Natural Heritage Database*  
*Sites with occurrences of federal or state endangered, threatened or rare species, or locations of significant natural communities or animal aggregations

in Butler, Clermont, Hamilton & Warren Counties, OH

Area with Terrestrial Sites in the Natural Heritage Database*  
*Sites with occurrences of federal or state endangered, threatened or rare species, or locations of significant natural communities or animal aggregations

in Butler, Clermont, Hamilton & Warren Counties, OH

Legend

Number of NHD Records per square mile section**

0
1
2 - 3
4 or more

Records since 1992

Legend

Number of NHD Records per square mile section**

0
1
2 - 3
4 or more

Records since 1992

The map includes data provided by the Ohio Department of Natural Resources Division of Wildlife. These data are not based on a comprehensive survey, and the symbols do not necessarily indicate that a natural feature, species, or community is present. The state of Ohio is not responsible for any inaccuracies in the data and does not necessarily endorse any interpretations or products derived from the data.
# Project Scoring Process

Environmental Impact is 1 of 7 general criteria evaluated

<table>
<thead>
<tr>
<th>Avoids environmentally sensitive area(s)</th>
<th>5 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any impact(s) will be mitigated</td>
<td>3 points</td>
</tr>
<tr>
<td>Impact(s) will not be mitigated</td>
<td>0 points</td>
</tr>
</tbody>
</table>
2014 and Beyond...

- Launch of interactive Environmental Resource website
- Integrate Historic Resources Inventory
- Advancing Strategic Regional Policy Plan - Model Ordinance and Best Practice Sharing