Overview

- Transportation and Land Use Cycle
- Opportunities for Improvement (2 projects)
  - Trail Impact Analysis
    - Ped/Bike Travel Demand
    - User Survey
    - Business Connection
  - Shared-Use Path Development
    - Sustainable Performance Measures
    - GreenPaths Rating System
- Future Research Opportunities
Motivation for Sustainability

Greenhouse Gases Hit Record High Amid Fears of CO2 Saturation Point

Data suggest natural "carbon sinks" may be nearing exhaustion, say some scientists, although others disagree.

By Brian Clark Howard, National Geographic
PUBLISHED SEPTEMBER 03, 2014

New Climate Cycle Marked by Storms, Floods & Drought

02/27/2013

By Pam Radtke Russell

Subway tunnels built for normal weather conditions may be flooded by a superstorm; roads constructed for temperature means are buckling under extreme heat; levees built for one-in-100-year storms are tested for a few years and sometimes fail. Infrastructure built for existing building-code standards is not robust enough for an altered and changing climatic future.

"Clearly, we are not prepared," says Tom Wilbanks, a fellow at the Oak Ridge National Laboratory and coordinating lead chapter author for the Intergovernmental Panel on Climate Change's fourth assessment report and other major policy documents on climate adaptation, including for the recent draft "National Climate Assessment" by a federal advisory committee.

Many engineers and builders are past the point of arguing about why these events are happening; they are focused on ways to rebuild or harden roads, power lines, water systems, military bases.
Transportation and Land Use Cycle

Arterial Improvements

Deterioration in Level of Service

Increased Accessibility

Increased Land Value

Increased Traffic

Land Use Change

Increased Traffic Conflict

Transportation Planning Cycle

HOW DO WE BREAK THE CYCLE??

Greater Bridgeport Regional Council, 2015
Sustainable Land Use/Transportation Research Opportunities

- Mode Shift
- Corridor Efficiency
- Smart Growth
- Freight Logistics
- Fuel Efficiency
- Transit
How can we encourage modal shift through land use changes?
One solution...trails!
Trail Benefits

- Health & Wellness
- Rail to Trail Opportunity
- Network Connectivity
- Economic Revitalization
- Community Identity
- Livability
- Social Interaction
Trail Impact Analysis

Development of RTIAM
(Rail Trail Impact Assessment Method)

GOAL- Determine the impact of rail trail development on communities with a focus on travel demand
RTIAM - Rail Trail Impact Assessment Methodology

1. Define Rail Trail Corridor Study Area
2. Data Collection
   - Automatic Counts
   - Manual Counts
   - Survey/interviews
3. Data Analysis
   - Trail Demand
   - Economic Impact
   - Sensitivity Analysis
4. Summarizing Results
   - Audience
   - Frequency of Monitoring
   - Key Points and Findings
Application: Buffalo Valley Rail Trail

- 9.2 mi. ped/bike trail from Mifflinburg to Lewisburg, PA
- Phase I completed in November 2011
- Infrared trail counters at mile markers measure travel demand

(BVRT.org, 2015)
Automatic Counts

- TRAFx Infrared Counters

Software Program - TRAFx DataNet
Data Collection Part 2 - Manual Counts

- ** Purpose: 
  - Directional split
  - Modal split
  - Error adjustment
  - Two-way trip adjustment
Data Collection Part 3 - User Survey

15. Has the use and/or existence of the trail influenced your spending on any recreational goods in the Susquehanna Valley Area?
   - No 58%
   - Yes
     - Clothing 7%
     - Footwear 1%
     - Bike purchase/rental 24%
     - Bike accessories 11%
     - Car accessories (bike rack, etc.) 3%

17. During your most recent use of the trail, or past use, did you make any stops to establishments near the trail?
   - No 45%
   - Yes
     - Community pool/park 4%
     - Farmers Market 5%
     - Purple Cow 12%
     - Amy’s Tasty Freeze 11%
     - Health Food Store 4%
     - Mifflinburg Sheetz 8%
     - Mifflinburg Weis 7%
     - Vargo 5%
     - Other 24%

14. How did you find out about the trail?
   - Internet 2%
   - Friend/family 23%
   - Advertisement 2%
   - Road signs 1%
   - Newspaper 21%
   - Tourist/visitor information 2%
   - Saw it 7%
   - Local (don’t remember) 37%
   - Other 5%
Travel Demand Results

Day of the Week Averages

Number of People

Mon | Tue | Wed | Thu | Fri | Sat | Sun

MM 1.0 (Mifflinburg) | MM 4.0 (Vicksburg) | MM 6.0 (near Purple Cow) | MM 8.5 (Lewisburg)
Yearly Travel - Seasonal Influence

- Use Seasonal Adjustment factors
  - From National Bicycle and Pedestrian Documentation Project
    - Apply to months without data
    - Long winter - short summer
    - Determine yearly travel

<table>
<thead>
<tr>
<th>Month</th>
<th>Adj</th>
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<tbody>
<tr>
<td>Jan</td>
<td>3%</td>
</tr>
<tr>
<td>Feb</td>
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<td>Mar</td>
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<td>Oct</td>
<td>6%</td>
</tr>
<tr>
<td>Nov</td>
<td>6%</td>
</tr>
<tr>
<td>Dec</td>
<td>3%</td>
</tr>
</tbody>
</table>

Alta Design and Planning, 2012
Business Connection

- Built connection to trail (stairs, paths, signage, etc.)
- Relocation to have access to trail
- Tailor business to trail users
- Event sponsors
- Farmer’s Market

- Expansion to Downtown Lewisburg
- New Development!
GOAL - Development of a sustainable rating system (GreenPaths) focused on shared-use pathway development (planning, design, and construction)
Sustainable Metrics/Systems

- Greenroads (Univ. of Washington/CH2M Hill)
- GreenLITES (NYSDOT)
- STARS (NASTC)
- I-LAST (I-DOT)
- Envision (ISI)
- INVEST (FHWA)
- LEED ND (USGBC)
Rating System Development Steps

1. Define criteria for selecting the infrastructure under evaluation.
2. Develop sustainability indicator categories.
3. Develop sustainability indicators.
4. Transform indicators into credits by identifying measurements associated to each.
6. Allocate points.
7. Develop rating scale.

Oswald and McNeil, 2010
# GreenPaths Rating System

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<thead>
<tr>
<th>Credit</th>
<th>Title</th>
<th>AHP Weight</th>
<th>Points</th>
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<tbody>
<tr>
<td>PL-1</td>
<td>Project Goals</td>
<td>0.499</td>
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<tr>
<td>PL-2</td>
<td>Context Sensitive Solutions</td>
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<td>PL-3</td>
<td>Life Cycle Cost Analysis</td>
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<tr>
<td>PL-4</td>
<td>Local, Diverse Project Team</td>
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<tr>
<td>PL-5</td>
<td>Repurposed Land Use</td>
<td>0.988</td>
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<tr>
<td>PL-6</td>
<td>Agricultural Land and Wetland Conservation</td>
<td>0.702</td>
<td>7</td>
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<tr>
<td>PL-7</td>
<td>Scenic, Historic, and Cultural Enhancement</td>
<td>0.662</td>
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<tr>
<td>PL-8</td>
<td>Compact Development</td>
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<tr>
<td>PL-9</td>
<td>Mixed Land Uses</td>
<td>1.000</td>
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<tr>
<td>PL-10</td>
<td>Diverse Communities</td>
<td>0.455</td>
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<tr>
<td>PL-11</td>
<td>Access Points</td>
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<td>PL-12</td>
<td>Multimodal Connectivity</td>
<td>0.718</td>
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<tr>
<td>PL-13</td>
<td>ADA Accessibility</td>
<td>0.761</td>
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**AHP weights** - based on pairwise comparison survey

**Point scale** - based on LEED ND breakdown

<table>
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<tr>
<th>Certification Level</th>
<th>Points Required</th>
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<tbody>
<tr>
<td>Certified (36-45%)</td>
<td>66-82</td>
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<tr>
<td>Silver (46-54%)</td>
<td>83-99</td>
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<tr>
<td>Gold (55-72%)</td>
<td>100-132</td>
</tr>
<tr>
<td>Platinum (73-100%)</td>
<td>133-182</td>
</tr>
</tbody>
</table>
BVRT Case Study Results

- Achieved Silver at 99 points
  - (close to Gold)
Future Research

- Continuing to identify mode shift opportunities
  - Ped/Bike Infrastructure Impacts
    - Recreational/Commuting
    - Business Connection
  - Sustainable Metrics/Rating Systems for Development
    - Promote sustainable transportation and land use connections

- Other Research Needs
  - Smart growth planning tools
  - Connection to wellness
  - Technology and ped/bike data
  - Collaboration between agencies
  - Economic impact of land use choices
  - Transportation justice and equity
Thank you!

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