How Do I Learn More?

TIG's Lead States Team includes representatives with GIS experience in their States who can help you evaluate the use of the technology in your agency. Turn to team members for insight, expertise and advice.

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tig.transportation.org

Environmental Planning GIS Tools

For our Future Generations... can we afford not to?

About TIG

Dedicated to sharing high-payoff, market-ready technologies among transportation agencies across the United States. TIG promotes technological advancments in transportation, sponsors technology transfer efforts and encourages implementation of those advancements.

Achieve the Greatest Environmental Benefit for the Investment

Why Use These Tools?

- *Sustainable Planning*
- *Improved Resource Protection*
- *Watershed Approach*
- *Defensible Decisions*
- *Scalable Solution*
- *Accelerated Project Delivery*
- *Compliance with Existing Regulations*
- *Ease of Integration with Existing GIS Data*

Bridging the gap between Transportation and the Environment

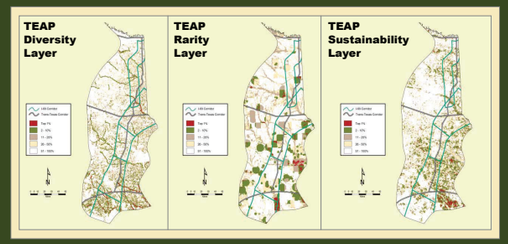
Texas Ecological Assessment Protocol (TEAP)

The TEAP serves as a general screening tool allowing environmental professionals to rapidly assess possible environmental impacts from large scale projects.

Example Use of TEAP I-69 Corridor Study

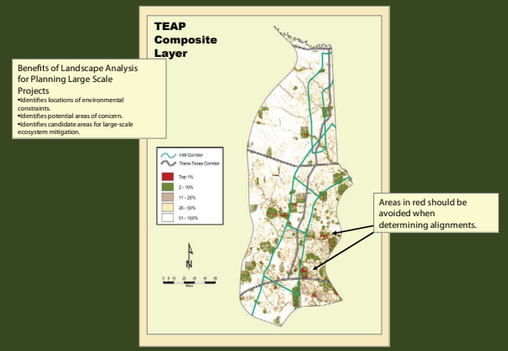
Three Key Model Aspects: Diversity, Rarity, Sustainability

Diversity: Habitats & Landscapes	Rarity: Threatened & Endangered Species	Sustainability: Human Impacts



Composite Layer

Diversity, Sustainability, and Rarity combine into a composite map that shows where ecologically important areas occur in Texas. The top 1% highly ecologically important areas in Texas are highlighted in red.



GIS Screening Tool (GISST)

WHAT IT IS

- **An environmental assesment identification and prioritization tool developed to provide a more systematic approach to considering single media and cumulative impacts in making environmentally sound decisions**
- **A prioritization tool in which given several options, determines which one has the least potential impact or is more vulnerable**

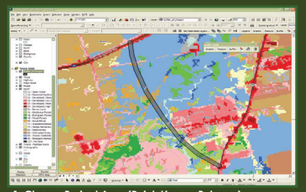
WHAT IT DOES

- **Relays the potential importance of single and cumulative effects and to facilitate communication of technical and regulatory data with industry, the public, and other stakeholders**
- **The scoring structure consists of criteria, using 1 as low concern or vulnerability and 5 as high concern or vulnerability, based on available data sets and expert input**
- **Works for local or region-wide projects; new criteria can be added as needed**
- **Saves time in an environmental review (traditional EIS=62 months, using GISST=26 months)**

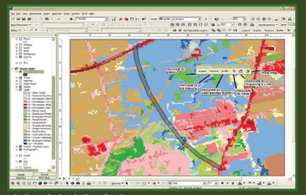
USES THE FOLLOWING MAJOR FACTORS:

- **15 Hydrology-related factors such as surface water use, rainfall, unified watershed assesment, average flow, stream density, distance to water, and aquifier geology**
- **3 air quality factors: EPA regulated facilities, road density, and nonattainment areas**
- **14 socio-economic factors such as population density, age distribution, percent unemployed, percent economically stressed**
- **5 toxicity factors related to the EPA's toxic release inventory**
- **5 land cover factors such as percent wildlife habitat, agricultural lands, wetlands, and land use**

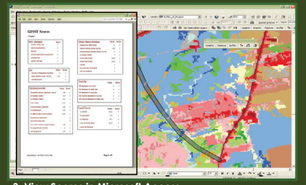
HOW IT WORKS



1. Choose Project Area (Point, Line, or Polygon)



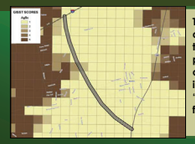
2. Run Calculation Tool



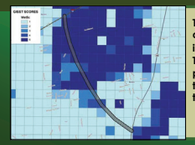
3. View Scores in Microsoft Access

SPATIAL RESULTS

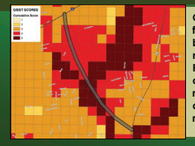
There is a high percentage of wildlife habitat nearby that may be affected by the project. These areas may present mitigation opportunities.



There is a low density of agriculture lands for the proposed project area. This can aid in determining "prime farmland" for NEPA purposes.



There is a high density of wetlands in the project area. There is a high potential for impact to fish, photosynthesis, etc.



Cumulative scores for the project area based on the 15 major factors. Proposed project area should be reconsidered according to grid results.

NEPAssist

An innovative tool that assists with the review of Environmental Assessments and Environmental Impact Statements

What It Is

NEPAssist is a GIS application that automates and Web-enables the collection and coordination of information inherent in the environmental review process mandated by the National Environmental Policy Act (NEPA).

What It Does

NEPAssist provides immediate screening of environmental assessment indicators in accordance with regional decision rules for a user-defined area of interest. These features contribute to a streamlined review process that potentially raises important environmental issues at the earliest stages of project development.

Special Features:

Users can digitize features directly from Web-based digital aerial photography

Decision rules based on implementation of policy can be automated and Web-enabled

Green Infrastructure Implemented in Maryland

Strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem functions, and provide associated benefits to human populations.

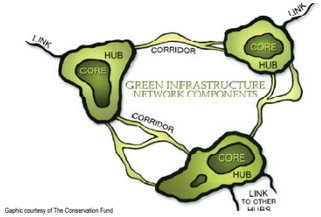
Network Components

Cores are important wetland, stream and forest habitats of regional and statewide significance with at least 100 acres of interior conditions.

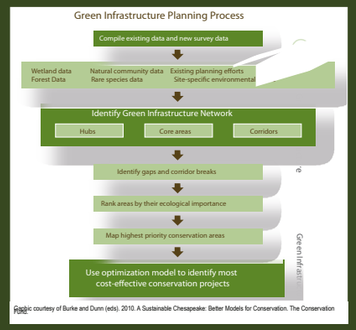
Hubs are groupings of core areas bounded by major roads or unsuitable land cover and result in large contiguous forest blocks or wetland complexes that support rare or sensitive species locations, biologically important rivers and streams, and existing conservation lands managed for natural values.

Corridors link hubs and allow animal, water, seed and pollen movement between hubs.

Green Infrastructure Network



Gaphic courtesy of The Conservation Fund



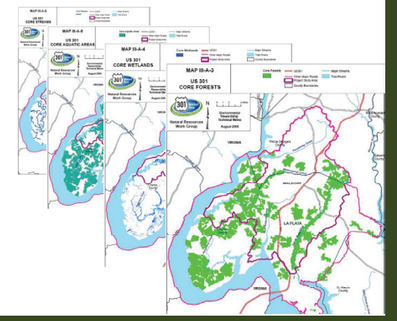
Radial courtesy of Burke and Dunn (eds). 2010. A Sustainable Chesapeake: Better Models for Conservation. The Conservation Fund.

US 301 Case Study

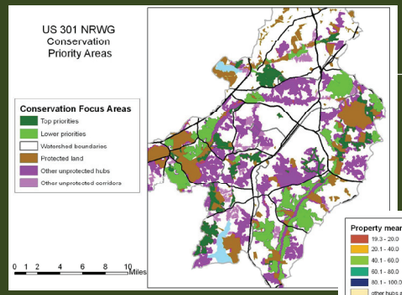
Problem: **Improving traffic congestion in an environmentally constrained landscape.**

Solution: **Conduct a Green Infrastructure Assessment to identify ecologically important resources and to guide environmental stewardship and mitigation efforts in a way that achieves ecosystem-scale protection and restoration.**

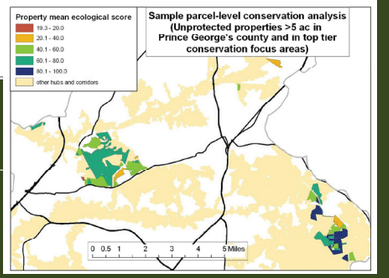
US 301 Core Areas



Selecting Mitigation and Environmental Stewardship Projects Based on Landscape-Scale Green Infrastructure Values



Identify potential conservation projects within high ranking hubs by analyzing ownership patterns.

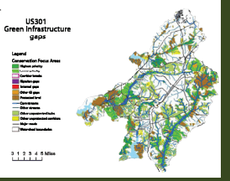


Sample parcel-level conservation analysis (Unprotected properties >5 ac in Prince George's county and in top tier conservation focus areas)

Once parcel and ownership information is collected, parcels can be scored to determine their ecological value.

Repairing the Network & Restoring the Chesapeake Bay

- Gaps may be suitable for restoration activities
- Restoration benefits achieved at local and regional scales
- Hub and Corridor rankings can be used to prioritize restoration sites



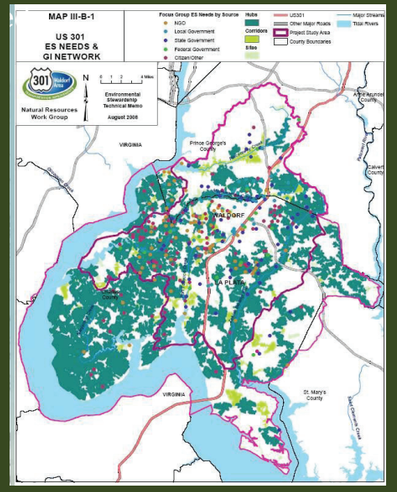
Gaps are developed, agricultural, mined or transitional baren lands within the hub-corridor network, that could be targeted for restoration.

Project Selection Methods

- **Government agencies and NGOs typically use a rank-based approach to select projects for implementation.**
- **The rank-based approach focuses only on the benefits of a project without considering the project's cost, which can result in highly inefficient investments.**
- **It ignores potential "good buys" that offer high quality (environmental benefits) at a significantly lower cost.**
- **The use of optimization in project selection provides a means to extend the reach and effectiveness of environmental efforts.**

Sample comparison of benefit-cost optimization and rank-based selection of parcels for fee simple purchase.

Constraints	Selection method	Number of parcels selected		Cost	Total area selected (ha)	Total conservation value	Area of green infrastructure selected (ha)
							823
$15 million budget, 30 acquisitions max.	Rank-based	28		$14,960,245	878	38.2	406
$15 million budget, 30 acquisitions max.	Optimized		30	$13,105,263	1025	41.0	292
$5 million budget, 15 acquisitions max.	Rank-based	13		$4,988,513	406	19.9	
$5 million budget, 15 acquisitions max.	Optimized		15	$4,946,283	297	22.6	



Green Infrastructure Approach is a process that promotes a systematic and strategic approach to land conservation at the national, state, regional, and local scales encouraging land use planning and practices that are good for nature and people.