Eco-Logical GIS
Houston-Galveston Area Council, Houston, Texas

About the Project
The Houston-Galveston Region contains a diverse array of environmental resources that are increasingly affected by development. By 2035 the 8-county Houston-Galveston region is forecasted to have over 8 million people and 4 million jobs.

The Eco-Logical project stems from a national effort of the Federal Highway Administration. It was guided by a committee which met over the course of two years (2008-2010) to provide H-GAC with input and feedback into the process, mapping, metrics, and development of a GIS-based system. This Eco-Logical GIS can be utilized to integrate long-range transportation and environmental planning, as well as assist in conservation planning to identify high priority environmental resources.

The Eco-Logical GIS can be used in a browser or ArcGIS desktop environment to view eco-logical map layers, and provides analytical tools for assessing potential impacts to eco-logical resources.

Identification of Ecotopes
The eco-types were identified in four general areas: Coastal Prairie, Bottomland Forest, Upland Forest, and Tidal Wetlands. Imagery and other environmental resource data was used to digitize features and classify levels of quality.

Development of Eco-Logical GIS
Development of metrics for measuring the intrinsic value of an ecotype.

Cumulative Metric Rankings
Priority conservation areas were determined by calculating a score based upon the metrics. The map below shows priority levels calculated using a uniform weight for all metrics. Level 1 rankings had the highest unweighted scores.

Definition of Metrics and Calculation
1. Size: Area Occupied
   - Output: GIS database with metric values for each ecotype feature, including an unweighted score.
   - Using data in the Eco-Logical database, we developed an ArcServer based interactive GIS:
     - Key Capabilities:
       - Layers accessible through multiple user interfaces
       - Models accessible through multiple user interfaces
       - Models can be integrated with other models
       - Models and metrics are table driven, thus making updates to the database efficient

2. Shape: Measure of compactness
   - Least Compact: Measure of the spread of the feature
   - Interior habitat: More compact
   - Edge habitat: Less compact

3. Isolation: Degree that an ecotype is separated
   - High Diversity: Favor high diversity
   - Low Diversity: Favor low diversity

4. Diversity: Number of different ecotypes within 1 mile grid
   - High Diversity: Favor high diversity
   - Low Diversity: Favor low diversity

5. Quality: Beneficial properties of an ecotype feature
   - High Quality levels 1-3: High quality
   - Low Quality level 3: Low quality
   - Freshwater wetlands, where present, were incorporated into these areas

6. Adjacency: Bordering other ecotype features
   - Coastal Prairie
   - Upland Forest
   - Tidal Wetlands
   - Urbanized Area

7. Regional Scarcity: Rarity within the region
   - Rarity within the watershed
   - Rarity within the region

8. Watershed Scarcity: Rarity within the watershed
   - Rarity within the watershed

9. Threatened Species: Presence of threatened species
   - Presence of threatened species

Scores for each metric were computed on a 0-100 scale for each ecotype feature, with 100 being the best score possible.