Focus for the Period Reported:  Web-based Interactive Teaching Tool (Goal No. 3)

For the period reported here, research efforts have been mainly focused on developing design and implementation strategies for web-based interactive tool (see Goal # 3 in the project proposal). To that end, following tasks have been completed: 1) acquisition and preliminary processing of raster-based geospatial data; and 2) preliminary selection of design and implementation strategies. A brief description of these tasks is provided below:

Task 1: This involved acquisition and preliminary processing of multi-temporal satellite imagery data. Multiple satellite images from 1970s, 1980s, 1990s, and 2000s covering the Pontchartrain Basin have been acquired and preliminary processing including delineation of St. Tammany, Washington, Tangipahoa, and St. Johan parishes have been completed. More advanced processing leading to a detailed land use / land cover analysis is currently in progress. The work on GIS and other socio-economic data also is in progress.

Task 2: This involved a selection of preliminary design and implementation strategies for web-based interactive teaching tool. The objective is to make all the available information including geospatial data, imagery, maps, and previously published relevant research work live, interactive, and accessible to end user. Below is the description of preliminary design and implementation strategy for web-based interactive teaching tool:

- **Project architecture:** 3 Tire Architecture
- **Programming language:** Java, J2EE, C++
- **Web language:** Html and Xml
- **Imagery Processing tool:** ERDAS Imagine
- **Database tools:** ArcGIS, Oracle10i or MySql

In this client server architecture user interface, functional process logic, data storage, and access will be developed and maintained in the form of independent modules on separate platforms. Figure 1 and 2 show a preliminary design layout for web-based interactive teaching tool.
**Tier 1: Client / User Presentation Layer**

The top level of application is user interface. It will be designed to translate tasks and results into something that the user can understand. List of features that will be available to end user may include:

1. Interactive maps containing information about:
   - Transportation network
   - New Growth Areas (Town, neighborhood, suburban, industrial expansion)
   - Land use / Land cover layers (e.g., existing wetland, new or restored wetland, agricultural land, forest or open land, built-up areas, water bodies)
   - Reinvestment Areas (Urban Center, City Center, Town Center, Existing Urbanized Areas, Special Economic Zones)
   - Interactive videos containing brief introductions of selected region

2. Data Visualization tools

3. Help Tools to provide information about terms used in Geospatial Data Analysis, Visualization, and Sustainable Development etc.

4. Interactive Tools to develop a plan of project for smart and sustainable growth of particular parish (to be decided later…).
Tier 2: Application layer
This layer will coordinate applications and process commands. It will make logical decisions and evaluations as well as will perform calculations. It will also move and process data between the two surrounding layers.

List of Services for processing request:
1. Web Service: will handle request and response operations between client and the server.
2. Map Service: will contain classes which handle operations related to maps
3. External Service: will contain embedded programs of external sources like ERDAS imaging etc.
4. Messaging and Queuing Service: will handle interaction between data layer and the application layer.
5. CAD interface service: this can be used to transfer data online between external systems like GIS to our web application.

Tier 3: Data layer
In this layer, the information is stored and retrieved from a database or file system. The information is then passed back to the application layer for processing, and then back to the user. It will consist of the following components:

1. Spatial Data Server like ArcGIS.
2. Traditional Data Server like Oracle, MySql
3. Data Warehouse containing historical information, external information.

Figure 2 below shows additional preliminary design and implementation strategy for building web-based interactive teaching tool: