1. Planned Activities:

Policy Ranking
In order to compare the incentives provided by individual state governments, an index approach will be used to rank each state for state-level policies relevant to woody biomass utilization. Many economic competitiveness indices assess state economic performance or state economic structure through scoring and weighting various quantifiable indicators such as employment by industry, investment, the number and value of initial public stock offerings by companies, the number of scientists and engineers in the workforce, gross product growth, and the number of patents issued (Atkinson and Andes 2008; Laffer, Moore, and Williams 2009). State environment and tax policy rankings also used measurable indicators such as per capita environment spending, corporate and personal income tax rate, and property tax rate, which are easy to score and compare (Ridley 1987; Padgitt 2010). Indices that included regulations as indicators used the count of policies as a measure for ranking (Hall and Kerr 1991; Reed 2009). As related to weighting of different indicators, equal-weighting and unequal-weighting methods will be assessed.

BioSAT Model Enhancements

The BioSAT model will be enhanced by integrating a policy module to allow users to evaluate the impact of state and local incentives, and environmental protection policies. States were ranked based on an ordinal scale representing the degree to which incentives are available to reduce the cost of plant establishment and operation. While it was not possible to estimate the specific impact of the policies on potential establishment and production costs, an index approach may help BioSAT model users make better regional comparative assessments incorporating this information.

Resource Sustainability Criteria

Supplying the feedstock needs for a growing biomass industry will not occur independently of existing markets. Logging residues, for example, will not meet the demand for woody feedstocks in all locations, resulting in increased demand for fiber currently utilized for other products such as pulp. Abt and Galik (2009), for example,
demonstrated that logging residues in two of three states examined were not adequate to meet the demand for bioenergy feedstocks. The Southern Forest Resource Assessment suggests that urbanization will have the greatest impact on the health and extent of southern forests (Wear and Greis 2002, Butler 2008). When population densities increase, there is a corresponding decrease in timber production and active forest management (Gobster and Rickenbach 2004, Wear et al. 1999). As population density approaches 150 people per square mile the probability of sustainable timber production approaches zero (Wear et al. 1999). Therefore, an initial index of sustainability will be developed by county for the 13 southern states using population density and merchantable tree growth/removal levels.

Microsoft® SQL® Database of Study Data

Currently the BioSAT Microsoft® SQL® database consists of woody and agriculture feedstock data (e.g., mill residues, unused mill residues, logging residues, softwood pulpwood, hardwood pulpwood, softwood sawtimber, hardwood sawtimber, cornstover, etc.). Economic data in the current BioSAT database consists of feedstock price data (e.g., pulpwood stumpage, mill residues prices, sawtimber stumpage, etc.), harvesting costs, transportation costs by feedstock type, and type of transportation network (truck only, railroad availability, truck/rail intramodal transfer availability, etc.). Total cost, average total costs, and marginal cost curves were estimated from which supply curves were developed for a demand ZCTA’s bioshed (Young et al. 2009). Data from this study will be incorporated in the BioSAT Microsoft® SQL® database. Dependent variables of this study will be type and capacity of cellulose using facilities (e.g., biorefinery, pellet mill, particleboard mill, medium density fiberboard mill, oriented strand board mill, pulpmill, sawmill, etc.).

Statistical-based Feature Extraction Models

Statistical-based feature extraction models will be developed using logistic regression, Bayesian logistic regression, and classification trees (CTs). Each technique has its own limitations and advantages (Press and Wilson 1978, Dudoit et al. 2002). The models identified optimal biorefinery sites with associated statistical significant attributes associated with cellulose-using facilities. These models and feature extraction algorithms will be included in the BioSAT system as helpful optimization tools for client users.

2. Actual Accomplishments:

The problem addressed by this study was to develop a database of the aforementioned factors and develop feature extraction models from the database. The development and incorporation of such models into a public domain web-based siting decision tool will greatly enhance market information for the emerging bioeconomy. Outcomes of this research will be added to the BioSAT model (www.BioSAT.net) which is accessible in the public domain.

Objectives and Scope

Given this problem definition the objectives of the study were:
1) Conduct a review of existing local and state policy incentives, and environmental protection polices for biorefineries and quantify these incentives using ordinal scaling;

2) Develop a quantitative resource sustainability criteria;

3) Develop a Microsoft® SQL® database of key independent and dependent variables (independent variables will include feedstock, economic, geographic, demographic, resource sustainability, social, and policy factors. Dependent variables will include location and capacity of existing agricultural and woody cellulose using facilities);

4) Develop feature extraction models which identify optimal biorefinery locations;

5) Incorporate the feature extraction models as algorithms in the BioSAT platform for use by clients;

6) Develop a final report of project findings.

All six objectives of the study will be completed by the end of 2010. The scope of the proposed study was 13 southern states. The resolution of the data for the 13-state study region was the county for objectives one and two and the “zip code tabulation area” or ZCTA for objectives four and five (U.S. Census Bureau 2000).

3. **Explanation of Variance:** None

4. **Plans for Next Quarter:** Not Applicable, project expires on 12/31/10

5. **Budget:**
   a. Funds Expended to Date (End of Reporting Period): $79,015
   b. Remaining Balance of Funds: $0

6. **Patents:** Not Applicable

7. **Publications / Presentations:**

   **Publications:**


Proceedings:


