Agriculture production is the main source of economic resources for the study area. Primary crops produced are soybeans, corn, grain sorghum, and wheat. For the purpose of this study we will only be considering soybean production. Soybeans are the only crop grown in the flooding area due to lower production cost and resilience in terms of rainfall, soil drainage, and plant date.

**Methods**

1. **Identifying flooding prone areas**
   
   Our first goal was to geographically identify and explain the physical extent of probable flooding that occurs within our study area. We did this by obtaining a Digital Elevation Model (DEM) for the area from Southern Illinois University Geology Department. The DEM was classified manually by elevation so that the elevation classes can be used in analysis later. Due to the very flat nature of the topography, small class differences were used. We set the very high risk flooding range at 108.84 meters above sea level and the high risk at 107.66 meters above sea level. The spatial extent is identified by the total amount of acres that fall under both agriculture production and flooding risk. Using the DEM image as a base, we overlaid the Fountain Bluff Township plat map. Using the classified DEM and the referenced Plat map overlay, we now began identifying risk areas within the township. Two shapefiles were created in ArcCatalog so the high risk zones (104.38-106.84 meters above sea level), and the very high risk zones (106.85-107.66 meters above sea level), could be digitized. Once the areas were digitized, the areas calculations were done using ArcToolbox to calculate areas. The resulting areas were calculated in square meters and converted to square acres.

**Determining Economic Loss Caused by Flood Scenario I**

1. Determine late plant date yield per acre
   
   Yield % by plant date = post plant date x Normal yield

2. Determine expense invested per acre
   
   Expense per acre=insurance + interest + land + fertilizer + seed planting overhead + pesticides

3. Determine total invaded acres
   
   Area in High Risk Zones (acre)

4. Determine total dollar loss incurred by community
   
   Yield loss for total affected acres x current market value

**Determining Economic Loss Caused by Flood Scenario II**

1. Determine late plant date yield per acre
   
   Yield % by plant date = post plant date x Normal yield

2. Determine total affected acres
   
   Current market value x Affected acres

3. Determine total dollar loss incurred by community
   
   Yield loss for total affected acres x current market value

The economic information presented in our project could be used for future research into the sustainable agriculture production and water resource management of the area. The Army Corp of Engineers (ACE) has had a substantial role in the development of the area with the construction of the levee in 1954 and will have a continued role in the future. Our research could be expanded upon and used by the ACE for a cost/benefit analysis to improve drainage in the area, a “with-out project condition”.

However, the ACE is moving away from structural means for flood control as highlighted in its Environmental Operating Principles. These principles state that the ACE should strive to achieve environmental sustainability by recognizing the interdependence of life and the physical environment, and seeking balance between human development activities and natural systems. In light of these goals, landowners will need to find innovative solutions to their drainage problems. Some of the flooding areas would be classified under programs offered by the United States Department of Agriculture (USDA) such as the Wetland Reserve Program, Environmental Quality Incentives Program, or the Wildlife Habitat Incentives Program. This research could potentially assist in sustainable agricultural management decisions and development within the floodplain.

Knowledge of economic loss and risk involved in farming these flooding areas would be an important key to weighing the benefits of the USDA programs. Also highly correlated with agricultural production and flooding is an increase in non-point source pollution. While the effects of this factor have not been weighed for the study area, there is reasonable belief that the effect could be great, and represent a prime example of non-sustainable actions.