ECONOMIC ANALYSIS OF EDGE OF FIELD RUNOFF IN THE LOWER ARKANSAS MISSISSIPI RIVER BASIN

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INTRODUCTION

The quality and quantity of water in the Mississippi River Basin is of national importance. As the production of agricultural crops increase in this area, it is very important that monitoring and data analysis plans be implemented aggressively. The Mississippi River Delta is widely recognized to be one of the most productive agricultural regions in the world. In Arkansas, agriculture is the most important industry accounting for almost $16 billion of its total economy. Corn, soybeans, wheat, rice, and cotton along with animal production such as beef, pork, and poultry are some of the most prevalent commodities. Also, row crops are likely to be treated with fertilizers and pesticides. Rivers and streams, within the Mississippi River Basin, carry runoff form the agricultural areas downstream. Runoff from these upstream areas eventually empty into the Mississippi River which eventually discharges into the Gulf of Mexico.

The Natural Resources and Conservation Service (NRCS) has developed a program, to measure water quality and quantity at a national scale. This project focuses on monitoring in the Bayou Meto Watershed. Arkansas is one of the 13 states that is participating in this initiative.

We have installed automatic samplers at several privately owned farm sites (Lonoke & Jefferson counties, Fig 1), this research is associated with cost/benefit relationship of these technology interventions at the field level. We hope to be able to determine the optimum level of conservation practices to incorporate on the ground, at the field level in order to improve water quality and wildlife habitat in the Mississippi River Basin.

OBJECTIVES

The implementation of this technology (conservation systems approach), the MRBI is hoping to track the cost of this project and determine the level of conservation practices to incorporate at the field level. The specific project objectives are as follows:

1. Use APEX to model hillslope runoff from agricultural fields.
2. Compare APEX model results to the on-the-ground water quality results.
3. Estimate the economic cost related to the actual nutrient, sediment and pesticide pollution in the run off from the sampling site and the benefits that may be attributed to employing the conservation practice.

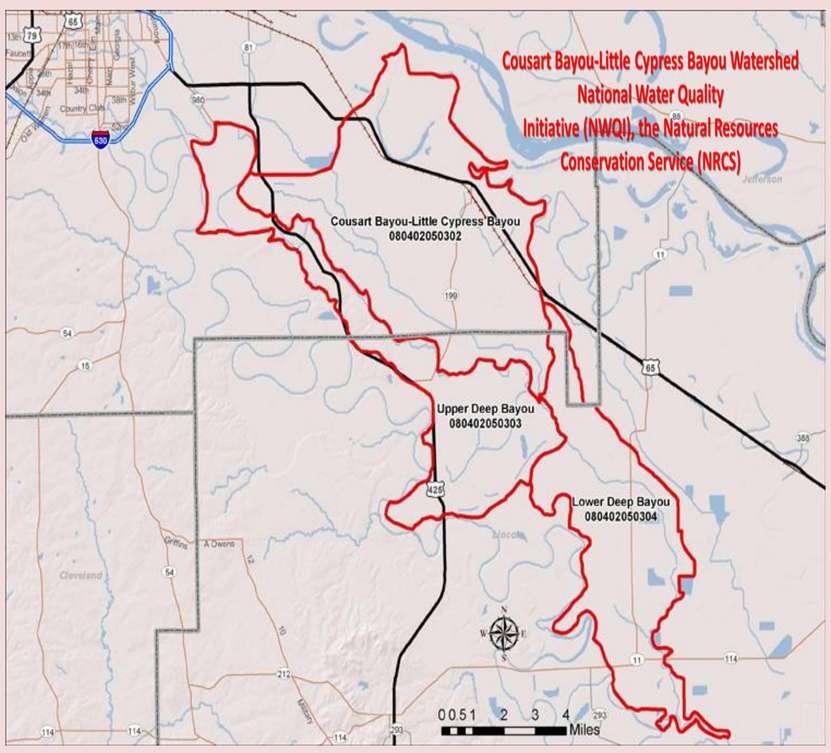

Fig. 1 Mapped out watershed of sample areas (Lonoke and Jefferson counties).

MONITORING DESIGN

Fig. 2 An ISCO 6712 Automatic Sampler is installed at all sites to automatically collect water samples once the threshold water flow is detected. Each monitoring station was equipped with a flow outlet structure (the open-channel pipe in the current situation). The outlet structure was outfitted with flow sensors, data loggers, and communication devices.

Fig. 3 An ISCO 6712 Automatic Sampler.

Fig. 4 Lonoke County Site 2: Site has no open-channel pipe present. Runoff volume will be calculated from pressure transducer measurements and water depth with the appropriate equations for use with the trapezoidal weir.

METHODOLOGY

This project will use a combination of economic and sampling practices to determine the most efficient conservation practices.

The APEX model will be used to compare actual on-the-ground sampling results to hill-slope model findings. The economic cost of constituent runoff will be estimated, while the downstream cost of this projects surrounding communities will be determined using an economic methodology such as “willingness to pay or the travel cost” method.

This project will be using a ISCO automated water Sampler, that will collect and analyze water samples during the rain events (Fig. 2-4).

ANTICIPATED RESULTS

This research will expectantly determine whether there are measurable differences between:

1. Sample areas with and without best management practices (bmps).
2. The associated cost with the acquisition of the samplers, its management cost, opportunity cost and damage cost of this technological intervention.

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www.Arkansaswater.org

Arkansas Department of Environmental Quality - Water Division

Arkansas Department of Agriculture

The Natural Resources Conservation Service (NRCS)

ACKNOWLEDGEMENTS

Natural Resources Conservation Services
University of Arkansas Department of Agriculture
Arkansas State University- Ecotox Research Facility
Mr. Vince Wiley, Mr. Jerry Gray, Mr. Kendrick Mitchell and Jeremiah Anderson University of Arkansas Pine Bluff Agriculture Farms
Participating farmers

USDA