Investigation and Demonstration of Intervention Strategies to Improve Water Quality on Country Club Bayou

Theodore G. Cleveland, Jeffrey Davis, Hui Zhu, Daria Bougai Shareema Houston, and Mackrena Linares

Department of Civil and Environmental Engineering
University of Houston, Houston TX, 77204

This research tested the potential effectiveness of various strategies for improving water quality on Country Club Bayou. Pollution of the bayou has been problematic for at least a dozen years. Currently suspected high organic loading in the upstream covered portion of the bayou contributes to observed low dissolved oxygen values, septic odor conditions, and septic (black) color in the bayou water. Attempts at eliminating the sources of organic loading to the bayou have not produced an obvious increase in water quality. Despite repair of numerous sewage leaks and reductions in industrial discharges, septic odor and low dissolved oxygen conditions continue to exist.

The investigation included field monitoring of selected water quality parameters, a series of dye tracer studies, and a computer simulation of water quality to evaluate possible intervention strategies.

The field monitoring indicated that when septic odor conditions are prevalent, DO and BOD levels are significantly different than during non-odor conditions. The elevated BOD indicates that some source (commercial wash water, industrial discharge, etc.) supplies an additional organic load to the bayou that in-turn depresses the DO. Odor likely results when this mixture sits relatively stagnant under the Hughes facility.

The field monitoring also indicated that the mean values of DO and sulfate meet existing or proposed state water quality standards for an unclassified stream. The fecal coliform (FC) values do not. Only about 25% of the FC values measured in this research meet the current standard (2000 cfu/100mL). A change in water quality occurs between Evergreen Cemetery and Hughes Street. Between these two locations the DO declines, the ammonia increases, and the BOD declines. The BOD decline is diagnostic because it suggests that the bayou has assimilative capacity and that there is either no source between these two locations or there is significant dilution by some unknown source of water. The changes are greater between these two locations than elsewhere in this study, and this section of bayou corresponds with the stagnant section just described.

A computer model of the water quality of Country Club Bayou was developed to predict the effect of selected intervention strategies developed over the course of the research by the research partners. Based on the models predictions flow augmentation (one of several strategies) provides improvement in water quality at all flows simulated and is reasonably simple to implement.

In addition to flow augmentations, routine monitoring, continued enforcement (source control), and cleaning of portions of the bayou is recommended for long-term management of water quality on Country Club Bayou. Suggestions for funding the implementation are provided.

If you have any questions, please contact **Dr. C.Vipulanandan**