Thesis title: **Essays on the Infestation of Lake Victoria by the Water Hyacinth, Fisheries Production, and on the Welfare Costs of Electricity Outages**

Abstract

This thesis consists of four essays that seek to estimate the abundance of the water hyacinth in Lake Victoria during the 1990s and analyse its effects on the catchability of fish, estimate the elasticities of catch with respect to the various components of effort in lake Victoria fisheries, and estimate the welfare costs of electricity outages.

In the first essay, data on the extent of water hyacinth mat coverage collected from a number of reports and surveys is used to fit time trend water hyacinth mats growth curves for the three sections of Lake Victoria. Estimates of the annual rates of infestation are derived from this analysis, and used as the indicators of the periodical extent of weed coverage in the second essay.

The study in the second essay examines the effect of the water hyacinth abundance on the catchability of fish in Lake Victoria. Within the framework of the Schaefer model, and its variant in which fish stock growth was captured by first order difference equations, the water hyacinth abundance is incorporated in the catchability coefficient function. Catch-effort and Catch per Unit of Effort functions were estimated from catch, effort and water hyacinth data from each section of the lake. The implied values of intrinsic growth rates for stocks, carrying capacity and water hyacinth induced catchability coefficients were calculated. Further the trend Lake Victoria stocks took between 1983 and 2000 was examined. Results revealed that fish stocks in Lake Victoria steadily declined between 1990 and 2000, and increases in water hyacinth mats on the lake reduced the catchability of fish in all sections. The effect was more severe for the Kenyan section where the catchability coefficient fell by 50% during the period the lake was heavily infested by the water hyacinth.

Work in the third essay analyses the structure of fisheries production in Uganda's section of Lake Victoria. Restricted Translog functions were estimated for the Nile perch and tilapia fisheries from data collected in a survey on 100 boats in the Nile perch fisheries, and 150 boats in the tilapia fisheries. The elasticities of catch with respect to the variable inputs and the returns to scale for each fishery were estimated. Fishing units in both the Nile perch and tilapia fisheries of Uganda's Lake Victoria were found to be operating with decreasing returns to scale.

In the fourth essay, we use the Contingent Valuation Method (CVM) to elicit the welfare costs of electricity outages from domestic consumers. Consumers were subjected to a number of outage scenarios, and payment cards used to elicit their willingness to pay (WTP) to get rid of each type of outage. WTP means and medians were estimated using the Ayer et al. (1955) procedure. We explored the determinants of WTP by use of a Tobit model with sample selection effects. Outage costs were found to be high. The main determinants of outage costs were income, substitution costs and whether electric energy was the main source of cooking for the household.

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