

ABSTRACT

Land use change and River ecology in the Arima Valley, Trinidad

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There is an urgent need for multiple scaled watershed studies within the tropics as a poor understanding of local biodiversity is combined with increasing frequency and intensity of human perturbation within our watersheds.

The objectives of this study were to investigate the impact of land use within the Arima Valley during 2003 upon (1) the physico-chemical water quality of the Arima River at the catchment scale; and (2) upon the benthic macroinvertebrate community composition. Analysis focused on effects of land use in a temporal scale analysis by comparing 2003 macroinvertebrate community composition at several stations which had also been sampled by H.B.N. Hynes in 1969, to determine if linkages to land use changes existed in each year.

Five stations along the Arima River, four of which were originally sampled by Hynes in 1969, were sampled quantitatively for macroinvertebrates and over twelve environmental variables were recorded. GIS watershed land use themes for both 1969 and 2003 (based on the National Topographic map series 1:25000 (1970) and on a 1:25000 digital ortho-photo mosaic of the Arima watershed taken in 1994, respectively) were constructed. Multivariate ordination and clustering were used to detect community similarities during both 2003 and 2003 and 1969

combined. The PRIMER software's BIOENV test was used to relate community data to (i) water quality and (ii) land use during 2003.

A eutrophic trend stemming mainly from agriculture and settlement was detected during 2003 along the Arima River, with macroinvertebrate community composition more closely related to land use at the smallest/reach scale rather than the catchment scale. No significant dissimilarities were noted at the family level between 2003 and 1969 despite there being drastic changes in land use between both years.

It is recommended that more research is needed to refine conservation management and mitigation techniques that can be used to prevent further watershed degradation.

Keywords: Macroinvertebrates, community composition, multiple land use scales, multivariate ordination BIOENV, Geographic Information Systems, GIS.