

**MACROINVERTEBRATE
COMPOSITION OF THE
UPPER GEORGES RIVER,
WITH REFERENCE
TO URBAN, INDUSTRIAL
AND AGRICULTURAL
IMPACTS.**

By

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of the degree of Master of Science at the
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DECLARATION

This thesis is submitted in accordance with regulations of the University of Technology, Sydney in fulfilment of the requirements of Masters of Science (Course work Ecotoxicology). The work described in this thesis was carried out by me and has not been submitted to any other university or institution.

Dean Jarvis

April 1998

ABSTRACT

This thesis investigates the water quality of the Upper Georges River with respect to macroinvertebrate community structure and physical and water chemistry variables.

Four replicate macroinvertebrate samples were collected from two habitats, pool and edge at each of nine sites, for six surveys. The macroinvertebrates were sampled using standard kick net sampling. Samples were preserved, picked and identified to species level where possible. Physical measurements and water samples were taken at each site for every survey. The physical variables measured include turbidity, temperature, dissolved oxygen, pH and conductivity. The water samples were analysed in the laboratory for ammonia, nitrate, nitrite, orthophosphate and sulphide.

Data analysis included graphing, Analysis of Variance (ANOVA), Two Way Indicator Species Analysis (TWINSpan) and Semi-strong Hybrid MultiDimensional Scaling (MDS), Principal Axis Correlation (PCC) and Monte-Carlo sampling (MCAO) in PATN. The data were fourth root transformed and a Bray-Curtis Dissimilarity Matrix was used in MDS.

The reference sites had the lowest abundance for five of six surveys for the pool habitat and all surveys for the edge habitat. The highest abundance was at the impacted site 5 for most surveys, for both habitats. The lowest diversity was recorded at one of the reference sites for four of six surveys for both habitats. The highest diversity was recorded at site 5 for both habitats, for the most surveys. TWINSpan and MDS separated the sites into similar groups. MDS separated the reference sites and the downstream sites along a physical or water chemistry gradient, for all six surveys, for the pool habitat, and for five surveys for the edge habitat. pH correlated with the ordination of sites on the most number of occasions, with five surveys for the pool habitat and four surveys for the edge habitat. Conductivity and turbidity correlated the next highest. Ammonia and nitrate did not correlate with the macroinvertebrate ordination. Excessive algal growth at sites 5 and 6 appeared to indicate that nutrients were entering the Georges River above these sites. Low pH values found at the reference sites 1 and 2 were natural and were not influencing the abundance and species richness at sites 1 and 2, except for the pool habitat and only for abundance. An orange scum was present at sites 1 and 2 and this could have affected the function of macroinvertebrates and macrophytes in this habitat. The Baetidae mayfly was found to be intolerant to low pH values, as was the Ephemeroptera Caenidae which had a vector gradient similar to the pH vector gradients for three of the four times pH was correlated. The Leptophlebiidae mayflies (Ulmerophlebia, Thraulius and Genus s) were tolerant to the low pH values and only the Ulmerophlebia had a gradient which was similar to pH on two occasions. The Hydrophilidae coleopteran also had correlation gradients similar to both pH and conductivity.

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I also dedicate this thesis to the Earth:

“All things are connected, whatever befalls the Earth, befalls the children of the Earth”.

I liked it so much mate that I had to put it in as well.

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