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

By
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Thesis submitted in fulfilment of the requirements
of the degree of Master of Science at the
University of Technology, Sydney.

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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 (Ulimerophlebia, Thraulus 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.

UPPER GEORGES RIVER WATER QUALITY STUDY
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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.
# ABSTRACT

# ACKNOWLEDGEMENTS

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

## Chapter 1 INTRODUCTION AND OBJECTIVES

1.1 SOURCES OF IMPACT

1.2 Community Monitoring

1.3 Experimental Design

1.4 Interpretation Impediments

1.5 Statistical Analysis

1.6 Study Requirement

1.7 Upper Georges River

1.8 Objective

## Chapter 2 MATERIALS AND METHOD

2.1 Description of the Study Area

2.2 Site Descriptions

2.3 Physical and Chemical measurements
## Chapter 3

### RESULTS AND DISCUSSION

#### 3.1 PHYSICAL AND WATER CHEMISTRY CHARACTERISTICS

<table>
<thead>
<tr>
<th>3.1.1</th>
<th>Turbidity</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.2</td>
<td>Water Temperature</td>
<td>22</td>
</tr>
<tr>
<td>3.1.3</td>
<td>Dissolved Oxygen</td>
<td>24</td>
</tr>
<tr>
<td>3.1.4</td>
<td>pH</td>
<td>26</td>
</tr>
<tr>
<td>3.1.5</td>
<td>Conductivity</td>
<td>27</td>
</tr>
<tr>
<td>3.1.6</td>
<td>Ammonia</td>
<td>29</td>
</tr>
<tr>
<td>3.1.7</td>
<td>Nitrate</td>
<td>30</td>
</tr>
<tr>
<td>3.1.8</td>
<td>Nitrite</td>
<td>32</td>
</tr>
<tr>
<td>3.1.9</td>
<td>Orthophosphate</td>
<td>32</td>
</tr>
<tr>
<td>3.1.10</td>
<td>Sulphide</td>
<td>33</td>
</tr>
</tbody>
</table>

#### 3.2 AQUATIC MACROINVERTEBRATE ABUNDANCE AND TAXONOMIC RICHNESS

<table>
<thead>
<tr>
<th>3.2.1</th>
<th>Pool Habitat - Abundance</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.2</td>
<td>Edge Habitat - Abundance</td>
<td>35</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Pool Habitat - Diversity</td>
<td>35</td>
</tr>
<tr>
<td>3.2.4</td>
<td>Edge Habitat - Diversity</td>
<td>36</td>
</tr>
</tbody>
</table>
3.3 COMPARISON OF MACROINVERTEBRATE ABUNDANCE AND TAXONOMIC RICHNESS IN RELATION TO PHYSICAL AND WATER CHEMISTRY CHARACTERISTICS 41

3.4 COMPARISON OF MACROINVERTEBRATE ABUNDANCE AND DIVERSITY BETWEEN THE POOL AND EDGE HABITATS 42

3.5 COMPARISON OF SITES IN RELATION TO MACROINVERTEBRATE COMMUNITY STRUCTURE AND TAXA VARIABLES 43

3.5.1 SURVEY 1 - POOL 43

3.5.2 SURVEY 1 - EDGE 44

3.5.3 SURVEY 2 - POOL 44

3.5.4 SURVEY 2 - EDGE 45

3.5.5 SURVEY 3 - POOL 45

3.5.6 SURVEY 3 - EDGE 46

3.5.7 SURVEY 4 - POOL 46

3.5.8 SURVEY 4 - EDGE 46

3.5.9 SURVEY 5 - POOL 47

3.5.10 SURVEY 5 - EDGE 47

3.5.11 SURVEY 6 - POOL 48

3.5.12 SURVEY 6 - EDGE 48

3.6 CONCLUSIONS - POOL 74

3.6 CONCLUSIONS - EDGE 74
3.6 RAINFALL MEASUREMENTS  74
3.7 SEASONAL TRENDS IN
PHYSICAL AND WATER
CHEMISTRY VARIABLES  74
3.8 SEASONAL COMPARISON OF SITES
FOR MACROINVERTEBRATE
COMMUNITY STRUCTURE  81
3.9 SEASONAL COMPARISON OF
MACROINVERTEBRATE ABUNDANCE
AND DIVERSITY WITH REFERENCE
TO SITES  81
3.10 SAMPLING VARIABILITY  81

Chapter 4  GENERAL DISCUSSION,
CONCLUSION AND
RECOMMENDATIONS  87
4.1 INTRODUCTION  87
4.2 LARGE SCALE SPATIAL VARIATION  87
4.2.1 pH  87
4.2.2 Conductivity and Turbidity  89
4.2.3 Nutrients  89
4.2.4 Coal Particles  90
4.2.5 Temporal Variation  93
4.2.6 Small Scale Spatial Variation  93
4.3 INDICATOR TAXA  94
4.4 CONCLUSION  95
4.5 RECOMMENDATIONS FOR
UPPER GEORGES RIVER WATER QUALITY STUDY  vi
FURTHER STUDY

4.6 RECOMMENDATIONS FOR FUTURE CONSERVATION OF THE UPPER GEORGES RIVER CATCHMENT

REFERENCES

APPENDIX

A PHOTOGRAPHS
B PHYSICAL AND WATER CHEMISTRY PARAMETERS TABLES
C ABUNDANCE AND DIVERSITY TABLES
D ANALYSIS OF VARIANCE
   - ABUNDANCE
   - DIVERSITY
E MONTHLY RAINFALL GRAPHS
F MACROINVERTEBRATE SURVEY DATA
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Legend</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Summary of major monthly rainfall variations</td>
<td>13</td>
</tr>
<tr>
<td>3.1a</td>
<td>Measurements taken along Brennans Creek</td>
<td>27</td>
</tr>
<tr>
<td>3.1 - 3.12</td>
<td>Correlation coefficients and significances for chemical variables with macroinvertebrate derived ordination vectors</td>
<td>50 - 61</td>
</tr>
<tr>
<td>3.13 - 3.24</td>
<td>Correlation coefficients and significances for taxa variables with macroinvertebrate derived ordination vectors</td>
<td>62 - 73</td>
</tr>
<tr>
<td>4.2</td>
<td>Correlated variables with similar gradients to correlated taxa for the pool habitat.</td>
<td>91</td>
</tr>
<tr>
<td>4.3</td>
<td>Correlated variables with similar gradients to correlated taxa for the edge habitat.</td>
<td>92</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Legend</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Location map for sampling sites on the Upper Georges River</td>
<td>16</td>
</tr>
<tr>
<td>3.1</td>
<td>Turbidity graph</td>
<td>21</td>
</tr>
<tr>
<td>3.2</td>
<td>Temperature graph</td>
<td>23</td>
</tr>
<tr>
<td>3.3</td>
<td>Dissolved Oxygen graph</td>
<td>25</td>
</tr>
<tr>
<td>3.4</td>
<td>pH graph</td>
<td>26</td>
</tr>
<tr>
<td>3.5</td>
<td>Conductivity graph</td>
<td>28</td>
</tr>
<tr>
<td>3.6</td>
<td>Ammonia graph</td>
<td>29</td>
</tr>
<tr>
<td>3.7</td>
<td>Nitrate graph</td>
<td>30</td>
</tr>
<tr>
<td>3.8</td>
<td>Nitrite graph</td>
<td>32</td>
</tr>
<tr>
<td>3.9</td>
<td>Orthophosphate graph</td>
<td>33</td>
</tr>
<tr>
<td>3.10</td>
<td>Sulphide graph</td>
<td>34</td>
</tr>
<tr>
<td>3.11</td>
<td>Macroinvertebrate Abundance graphs for the pool habitat, for all six surveys and all nine sites.</td>
<td>37</td>
</tr>
<tr>
<td>3.12</td>
<td>Macroinvertebrate Abundance graphs for the edge habitat, for all six surveys and all nine sites.</td>
<td>38</td>
</tr>
<tr>
<td>3.13</td>
<td>Macroinvertebrate Diversity graphs for the pool habitat, for all six surveys and all nine sites.</td>
<td>39</td>
</tr>
<tr>
<td>3.14</td>
<td>Macroinvertebrate Diversity graphs for the edge habitat, for all six surveys and all nine sites.</td>
<td>40</td>
</tr>
<tr>
<td>3.15(A) - 3.26(A)</td>
<td>TWINSPAN analysis of taxa abundances, pool and edge habitat, six surveys.</td>
<td>50 - 61</td>
</tr>
<tr>
<td>3.15(B) - 3.26(B)</td>
<td>MDS analysis of taxa abundances, pool and edge habitat, six surveys, with correlated chemical vectors.</td>
<td>50 - 61</td>
</tr>
<tr>
<td>3.27 - 3.38</td>
<td>MDS analysis of taxa abundances, pool and edge habitat, six surveys, with correlated taxa vectors.</td>
<td>62 - 73</td>
</tr>
<tr>
<td>3.39 - 3.44</td>
<td>Daily rainfall graph for both Cataract and Appin rain gauges, for all six surveys.</td>
<td>75 - 80</td>
</tr>
<tr>
<td>3.45</td>
<td>Combined TWINSPAN analysis for all six surveys</td>
<td>82</td>
</tr>
</tbody>
</table>
3.46 Mean macroinvertebrate abundance + 1SD (r=4) for the pool habitat, for all six surveys. 83
3.47 Mean macroinvertebrate abundance + 1SD (r=4) for the edge habitat, for all six surveys. 84
3.47 Mean macroinvertebrate diversity + 1SD (r=4) for the pool habitat, for all six surveys. 85
3.47 Mean macroinvertebrate diversity + 1SD (r=4) for the edge habitat, for all six surveys. 86