

DE LA SALLE UNIVERSITY

CORRELATION BETWEEN THE EDIBLE FRESHWATER BIVALVES AND SOME ECOLOGICAL FACTORS AT SELECTED SITES OF CAGAYAN RIVER

2000

A THESIS

PRESENTED TO

THE FACULTY OF THE DEPARTMENT OF BIOLOGY
FOR THE DEGREE OF MASTER OF SCIENCE IN BIOLOGY

COLLEGE OF SCIENCE

BY

NENETTE A. TOLENTINO

January, 1996

AKLATANG EMILIO AGUINALDO



JUN 0 6 1996

DE LA SALLE UNIVERSITY

ABSTRACT

The edible freshwater bivalves identified in Cagayan River were : *Batissa childreni*, *Corbicula manilensis* and *Psammotaea virescens*. *Corbicula manilensis* was the most abundant species collected. High density and bigger sized bivalves were collected in the months of May, which was the peak season. A high density of *Batissa childreni* was noted as the temperature of water was low. Total hardness and organic content significantly influenced the density of *Corbicula manilensis* and *Psammotaea virescens*. Lesser density of *Corbicula manilensis* resulted as the total hardness decreased while high density of *Psammotaea virescens* was noted as the organic content of the substrate increased. Relative abundance was greatly affected by the total water hardness. A positive correlation existed between relative abundance of *Batissa childreni* and total hardness while a negative correlation existed between relative abundance of *Corbicula manilensis* and total hardness. Shell size of *Corbicula manilensis* was bigger as the total hardness increased and bigger sized *Psammotaea virescens* was noted as the organic content of the substrate increased. No predictor variables were significantly correlated with relative abundance of *Psammotaea virescens* and the shell size of *Batissa childreni*.



DE LA SALLE UNIVERSITY

TABLE OF CONTENTS

	PAGE
LIST OF FIGURES	i
LIST OF TABLE	iii
LIST OF APPENDIX II	iv
I. INTRODUCTION	1
1.1 Objectives of the Study	2
1.2 Significance of the Study	2
1.3 Scope and Limitations of the Study	3
II. REVIEW OF RELATED LITERATURE	
2.1 Taxonomy	4
2.2 Ecology	5
2.3 Uses and Commercial Value	7
III. METHODOLOGY	
3.1 Study Area	9
3.2 Biological Collection	12
3.3 Dredging	12
3.4 Shell Size and Density	14



DE LA SALLE UNIVERSITY

3.5 Physico-chemical Parameters	14
3.6 Substrate Analysis	15
3.7 Statistical Analysis	16
IV. RESULTS	
4.1 Identification	17
4.2 Physico-chemical Parameters	23
4.2.1 Water Quality	23
4.2.1.1 Physical Factors	23
4.2.1.1.1 Depth	23
4.2.1.1.2 Transparency	24
4.2.1.1.3 Temperature	25
4.2.2.1 Chemical Factors	27
4.2.2.1.1 Dissolved Oxygen	27
4.2.2.1.2 pH	28
4.2.2.1.3 Total Hardness	29
4.2.2.1.4 Salinity	30
4.2.2.1.5 Conductivity	31
4.2.3 Substrate Quality	32
4.2.3.1 Particle Size	32
4.2.3.2 Organic Content	33
4.3 Population Density	34



DE LA SALLE UNIVERSITY

4.4 Relative Abundance	37
4.5 Shell Size	40
V. DISCUSSION	
5.1 Identification and Distribution	43
5.2 Physico-chemical Parameters	44
5.3 Factors Affecting Population Density	46
5.3.1 Temperature	46
5.3.2 Total Hardness	47
5.3.3 Organic Content	47
5.4 Factors Affecting Relative Abundance	48
5.4.1 Total Hardness	48
5.5 Factors Affecting Shell Size	49
5.5.1 Total Hardness	50
5.5.2 Organic Content	50
VI. CONCLUSION	52
VII. RECOMMENDATION	54
VIII. LITERATURE CITED	55
IX. APPENDICES	
9.1 Detailed Procedure	59
9.2 Summary of Appendix II	71
9.3 Classification	93



DE LA SALLE UNIVERSITY

LIST OF FIGURES

FIGURES	PAGE
1. The Cagayan River	10
2. The Four Stations of the Study Area	11
3. The Dredge of "Tako"	13
4. <i>Batissa childreni</i> (Gray)	18
5. <i>Corbicula manilensis</i> (Reeve)	20
6. <i>Psammotea virescens</i> (Deshayes)	22
7. The Depth in the Four Stations	23
8. The Secchi Disc Transparency in the Four Stations	24
9. The Surface Temperature of Water in the Four Stations	25
10. The Bottom Temperature of Water in the Four Stations	26
11. The Dissolved Oxygen in the Four Stations	27
12. The pH in the Four Stations	28
13. The Total Hardness in the Four Stations	29
14. The Water Salinity in the Four Stations	30
15. The Water Conductivity in the Four Stations	31
16. Organic Content of the River Substrate in the Four Stations	33



DE LA SALLE UNIVERSITY

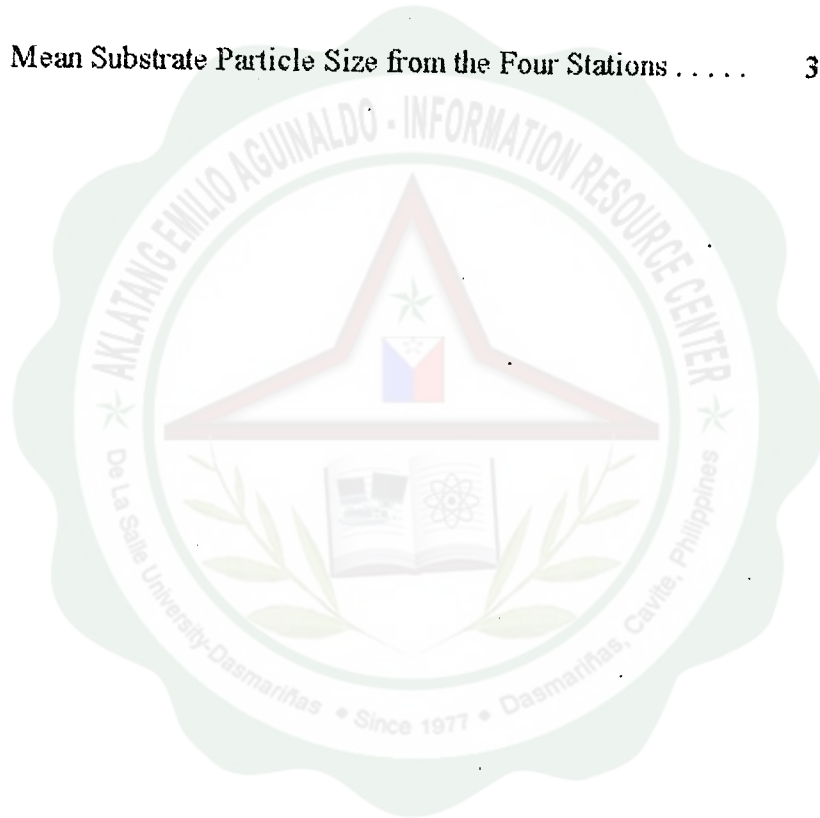
17. Density of <i>Batissa childreni</i> Collected	
from Stations I and II	34
18. Density of <i>Corbicula manilensis</i> Collected from	
Stations I, II and III	35
19. Density of <i>Psammotaea virescens</i> Collected	
from Stations II and III	35
20. Relative Abundance of <i>B. childreni</i> Collected	
from Stations I and II	37
21. Relative Abundance of <i>C. manilensis</i> Collected	
from Stations I, II and III	38
22. Relative Abundance of <i>P. virescens</i> Collected	
from Stations II and III	39
23. Shell Size (L & W) of <i>Batissa childreni</i> Collected	
from Stations I and II	40
24. Shell Size (L & W) of <i>Corbicula manilensis</i> Collected	
from Stations I, II, and III	42
25. Shell Size Range (L & W) of <i>Psammotaea virescens</i>	
Collected from Stations II and III	42



DE LA SALLE UNIVERSITY

LIST OF TABLE

TABLE	PAGE
1. Mean Substrate Particle Size from the Four Stations	32



DE LA SALLE UNIVERSITY

LIST OF APPENDIX II

APPENDIX	PAGE
2.1. Analysis of Variance on The Mean Water Depth from the Four Stations	73
2.2. Analysis of Variance on the Mean Transparency from the Four Stations	73
2.3. Analysis of Variance on the Mean Surface Temperature from the Four Stations	73
2.4. Analysis of Variance on the Mean Bottom Temperature from the Four Stations	74
2.5. Analysis of Variance on the Mean Dissolved Oxygen Content from the Four Stations	74
2.6. Analysis of Variance on the Mean pH from the Four Stations	75
2.7. Analysis of Variance on the Mean Total Hardness of Water from the Four Stations	75
2.8. Analysis of Variance on the Mean Salinity from the Four Stations	75
2.9. Analysis of Variance on the Mean Conductivity from the Four Stations	76



DE LA SALLE UNIVERSITY

2.10. Analysis of Variance on the Mean Organic Content of the Substrate from the Four Stations	76
2.11. Analysis of Variance on the Mean Density of <i>Batissa</i> <i>childreni</i> from the Four Stations	76
2.12. Analysis of Variance on the Mean Density of <i>Corbicula</i> <i>manilensis</i> from the Four Stations	77
2.13. Analysis of Variance on the Mean Density of <i>Psammotaea</i> <i>virescens</i> from the Four Stations	77
2.14. Analysis of Variance on the Mean Relative Abundance of <i>Batissa childreni</i> from the Four Stations	77
2.15. Analysis of Variance on the Mean Relative Abundance of <i>Corbicula manilensis</i> from the Four Stations	78
2.16. Analysis of Variance on the Mean Relative Abundance of <i>Psammotaea virescens</i> from the Four Stations	78
2.17. Monthly Mean of Water Depth in the Four Stations . from Feb. to July, 1994	79
2.18. Monthly Mean of the Water Transparency in the Four Stations from Feb. to July, 1994	79
2.19. Monthly Mean of Surface Temperature in the Four Stations from Feb. to July, 1994	80



DE LA SALLE UNIVERSITY

2.20. Monthly Mean of Bottom Temperature in the Four Stations from Feb. to July, 1994	80
2.21. Monthly Mean of Dissolved Oxygen Content in the Four Stations from Feb. to July, 1994	81
2.22. Monthly Mean of Water pH in the Four Stations from Feb. to July, 1994	81
2.23. Monthly Mean of Total Water Hardness (mg/L) in the Four Stations from Feb. to July, 1994	82
2.24. Monthly Mean of Water Salinity in the Four Stations from Feb. to July, 1994	82
2.25. Monthly Mean of Water Conductivity (mS/cm) in the Four Stations from Feb. to July, 1994	83
2.26. Monthly Mean of the Organic Content of the River Substrate in the Four Stations from Feb. to July, 1994	83
2.27. Monthly Mean of the Density of <i>Batissa childreni</i> Collected from the Four Stations from Feb. to July, 1994	84
2.28. Monthly Mean of the Density of <i>Corbicula manilensis</i> Collected from the Four Stations from Feb. to July, 1994	84
2.29. Monthly Mean of the Density of <i>Psammotaea virescens</i> Collected from the Four Stations from Feb. to July, 1994 ...	85



DE LA SALLE UNIVERSITY

2.30. Monthly Mean of the Relative Abundance of <i>Batissa childreni</i> Collected from the Four Stations from Feb. to July, 1994	85
2.31. Monthly Mean of the Relative Abundance of <i>Corbicula manilensis</i> Collected from the Four Stations from Feb. to July, 1994	86
2.32. Monthly Mean of the Relative Abundance of <i>Psammotaea virescens</i> Collected from the Four Stations from Feb. to July, 1994	87
2.33. Monthly Mean of the Shell Size (L & W) of <i>Batissa childreni</i> Collected from Stations I and II	87
2.34. Monthly Mean of the Shell Size (L & W) of <i>Corbicula manilensis</i> Collected from Stations I, II and III	87
39. Monthly Mean of the Shell Size (L & W) of <i>Psammotaea virescens</i> Collected from Stations II and III	88
2.36. Summary of Multiple Regression Coefficient Between Density and the Physico-chemical Parameters	88
2.37. Adjusted Effects of the Variables of Density of <i>Batissa childreni</i> <i>Corbicula manilensis</i> and <i>Psammotaea virescens</i>	89
2.38. Summary of Multiple Regression Coefficient Between Relative Abundance and the Physico-chemical Parameters	89



DE LA SALLE UNIVERSITY

2.39. Adjusted Effects of Variables of Relative Abundance of <i>Batissa childreni</i> , and <i>Corbicula manilensis</i>	90
2.41. Summary of Multiple Regression Coefficient Between Shell Size (L) and the Physico-chemical Parameters	90
2.41. Adjusted Effects of Shell Size (L) of Variables of <i>Corbicula manilensis</i> & <i>Psammotaea virescens</i>	91
2.42. Summary of Multiple Regression Coefficient Between Shell Size (W) and the Physico-chemical Factors	91
2.43. Adjusted Effects of Shell Size (W) of Variables of <i>manilensis</i> and <i>Psammotaea virescens</i>	92
2.44. Summary of Simple Correlation Coefficient Between Density and the Physico-chemical Parametrs	92
2.45. Summary of Simple Correlation Coefficient Between Relative Abundance and the Physico-chemical Parameters	93
2.46. Summary of Simple Correlation Coefficient Between Shell Size and the Physico-chemical Parameters	93

