
TABLE OF CONTENTS

Executive summary	i
Capacity building	xiii
Acknowledgements	xv
List of Appendices	xix
List of Tables	xx
List of Figures	xxiii
Chapter 1: Habitat: description of sampling sites for water, sediment, fish and invertebrates	1
1.1 Introduction	1
1.2 Description of the sample sites	3
(a) Fish and invertebrate sample sites (water and sediment collected as well)	3
(b) Water and sediment sampling sites	14
Chapter 2: Water quality	23
2.1 Introduction	23
2.2 Materials and methods	23
Field Work	23
Laboratory work	23
2.3 Results and Discussions	26
2.3.1 Water parameters	51
2.3.2 Inorganic constituents	58
2.3.3 Metals and metalloids	65
2.3.4 Bacteriology	86
2.3.5 Toxicity testing	89
2.3.6 Integrated water quality	92
2.3.7 Present ecological state of the system	98
2.4 Conclusions and Recommendations	101
2.5 References	104
Chapter 3: Sediment	111
3.1 Introduction	111
3.2 Materials and methods	111
3.3 Results and discussions	114
3.4 Conclusions and recommendations	131
3.5 References	132

Chapter 4: Pesticides	135
4.1 Introduction	135
4.2 Materials and methods	136
4.3 Results and discussion	136
4.4 Conclusions and recommendations	136
4.5 References	138
Chapter 5: Macroinvertebrates	141
5.1 Introduction	141
5.2 Materials and methods	142
5.3 Results	142
5.4 Discussion, conclusions and recommendations	148
5.5 References	150
Chapter 6: Amphibian aspects	151
6.1 Introduction	151
6.2 Tadpoles	153
6.3 Habitat selection	154
6.4 Tadpoles and pollutants	155
6.5 Study area	155
6.6 Methods	156
6.7 Results	156
6.8 Discussions	157
6.9 Habitat destruction, fragmentation and degradation	158
6.10 Proposed sampling techniques for amphibians	159
6.11 Short-term sampling	160
6.12 Assumptions	161
6.13 Audio strip transects	161
6.14 Quantitative sampling of tadpoles	162
6.15 Proposed amphibian index	163
6.16 Limitations	164
6.17 References	165
Chapter 7: Plants	169
7.1 Introduction	169
7.2 Materials and methods	170
7.3 Results	172
7.4 Discussions	184
7.5 Recommendations	186
7.6 Recommended further studies	186
7.7 References	188

Chapter 8: Fish	229
8.1 Introduction	229
8.2 Materials and methods	230
8.3 Results	230
8.4 Discussions	236
8.5 Recommendations	238
8.6 References	239
Chapter 9: Wetland assessment protocol	241
9.1 Biological assemblages	243
9.2 Wetland Classification	244
9.3 Wetland Selection	245
9.4 Sampling Method Selection	245
9.5 Data analysis and matrix determination	247
9.6 Aquatic Macro-invertebrates	247
9.7 Habitat Quality Rating	247
9.8 Land Usage Rating	250
9.9 Wetland Biological Index Score	250
9.10 Result Reporting	250
9.11 Case study	251
9.12 References	257
Chapter 10: Proposed Management Framework	
10.1 Introduction	259
10.2 Why a management framework?	260
10.3 Example of the implementation of the "Management Framework".	264
10.4 References	277

LIST OF APPENDICES

Appendix 1: (Chapter 7)

Checklist of plant species recorded from the study area, as obtained from the current study, various local checklists and National Herbarium collection records. Species marked with an asterisk are naturalized exotics. Species taxonomy is according to Germishuizen and Meyer, (2003).	189
--	-----

Appendix 2: (Chapter 7)

Detailed environmental and species composition information from each of the 8 monitoring sites sampled for the purposes of this study.	219
---	-----