

**Human-River Relationships in the Kat River Catchment and the
implications for Integrated Water Resource Management (IWRM):
an exploratory case study**

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by

Sharon Alice Birkholz

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ABSTRACT

Through out this study ‘relational scenarios’ were seen as the possible outcomes of the expression of human-river relationships in a catchment. Working within Inglis’s (2008, pg. 10) comment that ‘*the Human World Relationship is expressed through a person’s views and behaviour towards the natural world, which can be either constructive or destructive*’, two relational scenarios were selected to represent these two predicted outcomes of human-environment (or in the case of this thesis human-river) relationships: IWRM, seen as constructive and mutually beneficial to both the social and ecological system, and the Tragedy of the Commons, seen as destructive and parasitic in nature. In respect to this assertion, a conceptual framework or model was developed and used to guide the inductive process of this research.

Through a social survey (administered via semi-structured interviews) of stakeholders (water-users) in the Kat River Catchment, Eastern Cape, South Africa, social attitudes towards the Kat River were explored. These attitudes were considered as variables that relate to the expression of ‘*Human World Relationships*’ namely ‘*values and behaviour*’ (Inglis, 2008, pg. 10). The findings of this thesis confirm that attitudes are influential components of human-river relationships in the Kat River Catchment. It was observed from the findings that the attitudes individuals have towards the Kat River have the potential to influence the ways people interact with the River and its associated resources, and are in turn influenced by the condition of the River and connections people have or make with the River within their daily lives. Such relationships in turn affect the management of the River and its water resources and influence how individuals approach water-related issues and undertake the associated activities. Given this understanding it was then proposed that attitudes could provide information that enables the prediction of likely ‘relational scenarios’ (IWRM or the Tragedy of the Commons) in a catchment. The findings appear to support this proposal, and three main attitude groups (utilitarian, associative and dissociative) were identified and used to further the discussion into how this knowledge could be used in predicting possible relational scenarios based on human-river relationships.

Further exploration of the identified attitude groups suggested that these variables are significantly influenced by environmental ethics and place attachment (present in the community) and a series of guiding frameworks were developed to facilitate the exploration of the attitude groups relative to these concepts. The frameworks were generated from the hypothesis that knowledge of attitude groups in a catchment, in connection with the relative degrees to which moral values and worldviews are expressed, could provide insight into the readiness of a catchment system for the implementation of IWRM and/or the facilitative steps needed to shift the influence of unfavourable attitude groups (*i.e.* dissociative attitudes). Such steps would most likely involve extensive educational, awareness and capacity building programs.

Finally, given the above theoretical frameworks, inductively developed from the findings of the social survey and related literature, the conceptual model was re-evaluated and extended to include the thesis findings and hypotheses. It is suggested that in a catchment where there is a balance between the expression of utilitarian and associative attitude groups, then there is a high probability of finding present evidence of mutually beneficial human-river relationships already in play, as well as ‘fertile soil’ for the promotion of IWRM and philosophies and skills that generate such relationships. Alternatively in an area with a strong expression of dissociative attitudes, it is more likely to find evidence of destructive, more parasitic-like relationships being expressed, and a lack of commitment and interest in being involved in changing the status quo. It is likely that where both associative and dissociative attitudes are present there will be an overlap of elements of both scenarios – a situation that is probable in most catchments – depending on the strength of expression of either attitude group the balance will shift (be shifting) between the two relational scenarios.

Keywords: IWRM, socio-ecological case study, exploratory study, human-river relationships, attitudes, attitude groups, IWRM, tragedy of the commons, South Africa.

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ABBREVIATIONS

CAC	Command and control
CF	Catchment Forum
CMP	Catchment Management Plan
DWAF	Department of Water Affairs and Forestry
IWRM	Integrated Water Resource Management
KRWUA	Kat River Water User Association
NWA	National Water Act
PES	Present Ecological State
RDM	Resource Directed Measures
REC	Recommended Ecological Class
WRC	Water Research Commission
WUA	Water Users Association

TABLE OF CONTENTS

Abstract.....	ii
Acknowledgements.....	iv
Abbreviations.....	vi
List of Figures.....	x
List of Tables	xiv
List of Boxes.....	xv
Chapter 1 Thesis Introduction & Literature Review.....	1
1.1 Introduction To Study.....	1
1.1.1 Research Aim & Objectives	2
1.1.2 Rationale & Significance.....	3
1.1.3 Thesis Outline & Research Approach	5
1.2 Human-Environment Relationships	8
1.2.1 Introduction	8
1.2.2 Human-Environment Relationships and Relational Scenarios.....	10
1.2.3 Concepts Instrumental in the Assessment of Human-Environment Relationship	19
1.2.4 Attitudes and Human-River Relationships	21
1.3 The Kat River Case Study	31
Chapter 2 Study Area: The Kat River Catchment.....	32
2.1 Introduction	32
2.1.1 The Kat River Catchment and the National Water Act	34
2.1.2 The Kat River Valley & the Kat River Catchment.....	35
2.1.3 The Kat River Water User Association Voting Regions	35
2.2 The Kat River Catchment Situational Information	40
2.2.1 Historical Context.....	40
2.2.2 Catchment Characteristics	41
2.3 Contextualising Human-River Relationships in the Kat River Catchment....	50
2.3.1 The Roles of the River in the Lives of the People.....	50
2.3.2 Overview of Water Management & Associated Issues in the Kat River Catchment.....	51
2.3.3 The Roles of the River & Water Management Issues: Influence on Human- river Relationships.	56
2.4 Research in the Kat River Catchment.....	58
2.4.1 Catchment Management Planning in the Kat River Catchment.....	58

Chapter 3 Research Philosophy & Design	60
3.1 Introduction	60
3.2 Methodological Considerations.....	62
3.2.1 Logic & Scientific Reasoning	62
3.2.2 Recognition of Subjectivity	67
3.2.3 Interdisciplinary Research	67
3.3 Method Considerations.....	69
3.3.1 Attitude Surveys & Natural Resource Management	69
3.3.2 Additional Sources of Information	70
3.3.3 Conceptual Model	71
3.3 Summary	73
Chapter 4 The Kat River Attitude Survey	74
4.1 Introduction	74
4.2 Methods	76
4.2.1 Data Collection	76
4.2.2 Data capturing	92
4.2.3 Data Analysis.....	92
4.3 Findings	94
4.3.1 Section A	94
4.3.2 Section B	108
4.3.3 Section C	118
4.3.4 Section D	134
4.4 Interpretations of Findings.....	137
4.4.1 ‘Attitudes towards the Kat River’	137
4.4.2 ‘Attitudes towards the Management of the Kat River’	140
4.4.3 ‘Attitudes towards the use of the Kat River’	142
4.4.4 ‘Attitudes towards Personal Actions related to the River’	143
4.4.5 ‘Attitudes towards the Study of or Research into the River’	143
4.4.6 Relationships between the People and the Kat River	144
4.4.7 Observations from and on the Study	146
Chapter 5 Human-River Relationship Assessment & Theory development	147
5.1 Introduction	147
5.2 Part 1: Discussion on the process of assessing the Human-River Relationships in the Kat River Catchment.	148
5.2.1 Human-River Relationship Assessment Framework.....	148
5.2.2 Use of Attitude Variables in Human-River Relationship Assessment	152
5.3 Part 2: Discussion on the Identified Attitude Groups.....	159
5.3.1 Identifying Attitudes in the Kat River Catchment.....	159
5.3.2 Attitude Groups and Social System dynamics	160
5.3.3 Attitude Groups	164

5.4	Part 3: Implications of Attitude Groups & Hypothesis Development.....	179
5.4.1	Assessment Compass.....	184
5.5	Summary	188
	Chapter 6 Conclusions & Recommendations	191
6.1	Introduction	191
6.2	Review of Findings & Theory.....	192
6.2.1	Significant Findings.....	192
6.2.2	Significant Theory	195
6.3	Implications of Thesis Findings & Theory for IWRM	198
6.3.1	Implications of Human-Environment Relationships for IWRM	198
6.3.2	Implications of Human-River Relationships for IWRM.....	199
6.3.3	Implications of Attitude Groups for IWRM.....	201
6.3.4	Implications of the Kat River Case Study for IWRM	202
6.4	Future Research and Limitation of the Present Study	207
6.5	Conclusion	210
	References	213
	Appendix A.....	A.238
	Appendix B.....	B.274
	Appendix C.....	C.295
	Appendix D.....	D.306

LIST OF FIGURES

Figure 1.1	Chapter 1 layout.	1
Figure 1.2	Schematic view of the Thesis Set-up (left); Design (centre) and Tools/methods (right).	6
Figure 2.1	Chapter 2 Layout.....	32
Figure 2.2	The Kat River Catchment within its: Primary Catchment (the Great Fish); its provincial context (Eastern Cape); and national context (South Africa).....	33
Figure 2.3	The Kat River Water User Association Voting Regions (Catchment Regions).36	
Figure 2.4	The Upper Kat.....	37
Figure 2.5	The Middle Kat.	38
Figure 2.6	The Lower Kat.	39
Figure 2.7	The Kat River, its tributaries and mountains.....	45
Figure 2.8	Estimated population size of each race group within the three regions (upper, middle and lower) and the total race populations for the Kat River catchment.47	
Figure 2.9	Distribution of age classes in the Kat River Catchment relative to Gender (source data Jhagoroo <i>et al.</i> , 2000).	48
Figure 2.10	Highest education levels attained by over 20 year olds, 2001 census (source data Jhagoroo <i>et al.</i> , 2000).....	48
Figure 3.1	Chapter 3 Layout.....	60
Figure 3.2	Conceptual framework of the Inductive and Deductive Processes.....	63
Figure 3.3	Conceptual Model and Inductive Guide to the Study.	71
Figure 4.1	Chapter 4 layout	74
Figure 4.2	Proportions of respondents in the final sample from the respective regions in the Kat River Catchment.	94
Figure 4.3	Age characteristics of the sample population for the Catchment. Total ... sample populations.....	95
Figure 4.4	Highest Educational level characteristics of the sample population for the Catchment. Total ... sample populations.....	96
Figure 4.5	Racial characteristics of the sample population for the Catchment. Total ... sample populations.....	97
Figure 4.6	Place-type categories lived in by respondents in the Kat River Catchment. Total ... sample populations.	98
Figure 4.7	Place-type categories in which respondents grew up. Total ... sample populations.....	99
Figure 4.8	Length of time respondents have lived in the Kat River Catchment. Total ... sample populations.....	100

Figure 4.9	Reasons respondents came to live in the Kat River Catchment. Total ... sample populations.	101
Figure 4.10	Religious (Spiritual) orientations of respondents. Total ... sample populations.	102
Figure 4.11	Respondents' responses to the question of whether the Kat River is spiritually significant. Total ... sample populations.	103
Figure 4.12	Association between race and spiritual association with the Kat River (N=92). ...	103
Figure 4.13	Number of sources of water at a respondents' disposal. Total ... sample populations.	104
Figure 4.14	Respondents' indication of involvement in Catchment Management Activities (e.g. WUA & CF) (past, present and future). Total ... (See Appendix B).	106
Figure 4.15	Respondents' responses to semi-structured questions on the valence of their feelings towards aspects related to the River.	108
Figure 4.16	Distribution of respondents' responses to the question ' <i>Are your personal feelings towards the river positive or negative</i> ', ... not shown.	109
Figure 4.17	Distribution of respondents' responses to the question ' <i>Are the feelings local people have towards the river positive or negative</i> ', ... not shown.	110
Figure 4.18	Distribution of respondents' responses to the question ' <i>Do you think the local community's feelings towards the river have changed in the last 10 years? How have they changed</i> ', ... not shown.	112
Figure 4.19	Distribution of respondents' responses to the question ' <i>Are your feelings towards the ways local people interact with the river positive or negative</i> ', ... not shown.	113
Figure 4.20	Distribution of respondents' responses to the question ' <i>How do you feel about the present management of the river and its resources</i> ', ... not shown.	114
Figure 4.21	Respondents' responses to semi-structured questions on community related aspects and study of the River.	115
Figure 4.22	Distribution of respondents' responses to the question ' <i>Would you like to learn more about the river</i> ', ... not shown.	116
Figure 4.23	Respondents' indication of the need for change in the management of the Kat River. ... the question.	118
Figure 4.24	Statements exploring the respondents' 'sense of connection' with the River (T1).	119
Figure 4.25	Statements exploring the respondents' perceptions of the cultural and generational significance of the River (T2).	121

Figure 4.26	Statements exploring the perceptions respondents' have towards the management of the River and its water resources (T3).	123
Figure 4.27	Statements exploring the sense of community respondents' have with longitudinal dimensions of the River (T4).....	127
Figure 4.28	Statements exploring respondents' perceptions of the River (T5).....	129
Figure 4.29	Statements exploring respondents' attitudes concerning research into the River (T6).	130
Figure 4.30	Statements exploring the use aspects of the River (T7).....	132
Figure 4.31	Valances related to the type of person respondents' saw the River as being if a person.....	134
Figure 4.32	Comparison between respondents' responses to section D's question and voting regions.....	135
Figure 5.1	Chapter 5 Layout.....	147
Figure 5.2	Framework for the assessment of Human-River Relationships in relation to information requirements. ... systems.....	149
Figure 5.3	Framework for the assessment of human-river relationships, relative to information obtained for this thesis. ... systems.	151
Figure 5.4	Diagram of the use of the Attitude Variables as indicators of the social system's relational dynamics with the River.....	153
Figure 5.5	Conceptual view of the place of an Attitude Group in relation to the social system and expressions of the social system relationship with the ecological system. ... relationships.....	161
Figure 5.6	Breakdown of Environmental Ethics and Place Attachment into principal components and the relationship between them.	162
Figure 5.7	Sliding-scale guide to the assessment of attitudes climate in a catchment system.	183
Figure 5.8	Conceptual version of the Attitude Group Assessment Compass.....	184
Figure 5.9	Theoretical Framework developed through this study and the Re-evaluated conceptual model. ... thesis.	190
Figure 6.1	Layout of Chapter 6.....	191
Figure A.1	Amherst (Upper Kat).....	A.262
Figure A.2	'The Bum Slid' (below Kat Dam, Upper Kat).....	A.262
Figure A.3	Amherst (Konzi Farm, Upper Kat).	A.263
Figure A.4	Whites Weir (Upper Kat).	A.263
Figure A.5	Amherst (below Picardy, Upper Kat).....	A.264
Figure A.6	Warden's Weir (Lower Kat).	A.264

Figure A.7	Sheshego (east bank, right side of picture)/ Bushkloof farm (west bank, left side of picture) (Lower Kat).	A.265
Figure A.8	Ntilini (Middle Kat).	A.265
Figure A.9	Fort Beaufort Barrage (Middle Kat).....	A.266
Figure A.10	Fairbairn (Upper Kat).....	A.266
Figure A.11	Fairbain (Upper Kat).	A.267
Figure A.12	Kat River Dam (Upper Kat).	A.267
Figure A.13	Ntlini (Middle Kat).	A.268
Figure A.14	Fairbairn (Upper Kat).....	A.268
Figure A.15	Tamboekiesvlei (Upper Kat).....	A.269
Figure A.16	Hertzog (Upper Kat).	A.269
Figure A.17	Balfour (Upper Kat).	A.270
Figure A.18	Bushkloof Farm (Lower Kat).	A.270
Figure A.19	Charlgrove Farm (Lower Kat).	A.271
Figure A.20	Fairbairn Bridge (Upper Kat).	A.271
Figure A.21	Amherst (Upper Kat).	A.272
Figure A.22	Fairbairn (Upper Kat).....	A.272
Figure A.23	Bath Farm (Upper Kat).	A.273
Figure A.24	Wardens Weir (Lower Kat).....	A.273

LIST OF TABLES

Table 2.1	Summary of socio-ecological (and concerns and issues) characteristics in each region.....	42
Table 2.2	Objectives of the CMP process in the Kat River Catchment..... (O’Keeffe & Birkholz, 2004).....	59
Table 3.1	Differences in approach to the Inductive and Deductive Processes.	63
Table 4.1	Attitude variables behind instrument construction and related themes identified from relevant literature.	79
Table 4.2	Average Profile of a respondent from the different regions in the Catchment..	107
Table 4.3	Positive and negative Keywords used by respondents to describe the Kat River (if it were a person).....	135
Table 5.1	Process for determining attitude groups.	155
Table 5.2	Characteristics of Attitude Groups	166
Table 6.1	Summary of benefits and limitations of human-river relationships for IWRM.	200
Table 6.2	Summary of benefits and limitations of attitude groups for IWRM.....	202
Table 6.3	Summary of benefits and limitations of Kat River Case Study for IWRM.....	204
Table 6.4	Future Research topics, related ideas, and associated limitation of the present study.	207
Table B.1	Section A proportions of responses by respondents.	B.275
Table B.2	A selection of respondents’ responses to why they felt positively towards the Kat River.	B.280
Table B.3	A selection of respondents’ responses to why they felt negatively towards the Kat River.....	B.281
Table B.4	A selection of respondents’ responses to why they felt both positive and negative feelings towards the Kat River.	B.282
Table B.5	A selection of respondents’ responses to the question: ‘ <i>What’s Important about the River to you?</i> ’	B.283
Table B.6	A selection of respondents’ responses to why they felt positively towards the ways local people interact with the Kat River.	B.285
Table B.7	A selection of respondents’ responses to why they felt negatively towards the ways local people interact with the Kat River.	B.285
Table B.8	A selection of respondents’ responses to why they felt both positively and negatively towards the ways local people interact with the Kat River.	B.286
Table B.9	A selection of respondents’ responses to the question: ‘Do you think the local community’s feelings towards the River have changed in the last 10 years?’.....	B.288

Table B.10	A selection of responses from respondents who said ‘yes’ to the question: <i>‘Would you like to know more about the River? If so can you name any aspect you may be interested in?’</i>	B.292
Table C.1	Numbers and Percentages of respondents’ responses to Section C survey items relative to the different regions. ... population.....	C.296
Table D.1	A selection of respondents’ responses to the question: ‘If the River was a person what kind of a person would it be and why?’	D.307

LIST OF BOXES

Box 1.1	Principles of Integrated Water Resource Management (UNDP/GWP, 2004).....	3
Box 4.1	Central attitude variables considered for questionnaire (instrument) construction.	77
Box 5.1	Variables influencing Place Attachment (adapted from Crystal & Harris, 1995).	173

CHAPTER 1

THESIS INTRODUCTION & LITERATURE REVIEW

1.1 INTRODUCTION TO STUDY

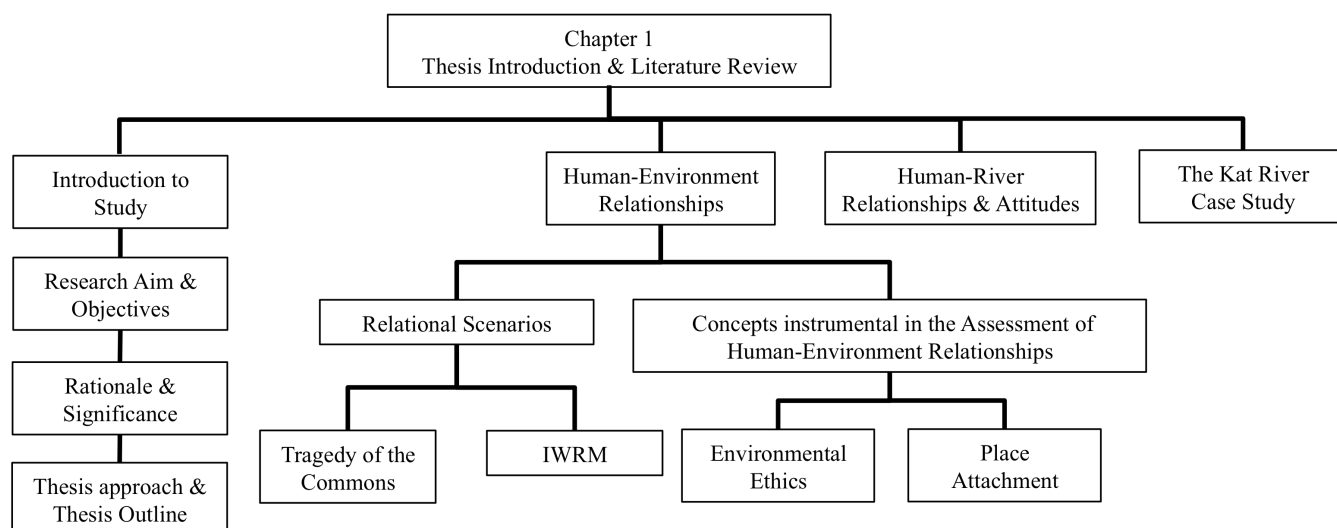


Figure 1.1 Chapter 1 layout.

The journey I have taken in developing and researching this thesis has been both exciting and daunting. Exploring the relationships between people and their environment/s is most often an exploration of the unknown, a case of boldly going where few have gone before. In the past, the complexity commonly associated with human-environment relationships (Berkes & Folke, 1998) has decreased researchers' enthusiasm for the adventure of exploring their fascinating depths. Current shifts in thinking around systems and their structure and function have laid open the way for researchers to begin to brave the complexity of human-environment relationships and holistically adventure along the path of generating greater understanding and awareness of these fundamental components of the living world. It was just such a challenge that I endeavoured to take up in this thesis.

River environments hold a special place in my heart and seeing them sustainably looked after and conserved is a driving goal. This thesis describes my adventure in exploring the relationships between the people of the Kat River Catchment and the Kat River. This adventure found its birth through my involvement in facilitating the

development a Catchment Management Plan (CMP) for the area. I hope that the reader finds it both useful and interesting.

The present chapter introduces the thesis and presents the literature reviewed in developing this study. Figure 1.1 presents the breakdown of the layout of Chapter 1.

1.1.1 Research Aim & Objectives

Thesis Aim

The two aims of this thesis are:

To develop an understanding of attitudes as attributes of human-river relationships in the Kat River Catchment.

To inductively explore the significance of attitudes, in human-river relationships, in the promotion of two selected relational scenarios: Integrated Water Resource Management (IWRM) or the social dilemma of the ‘Tragedy of the Commons.

Research Objectives

1. To utilise available information on the Kat River Catchment, Eastern Cape, to describe and develop a contextual understanding of the historical, social, economic, biophysical and research situations of the Catchment. (Chapter 2).
2. To undertake a social survey of the attitudes of residents of the Kat River Catchment concerning the River, its use, its management, and research into it. (Chapter 4)
3. To utilise the social survey to provide a qualitative interpretation of the relationships residents of the area have with the River. (Chapter 4 & 5).
4. To utilise the information gathered from the three previous objectives to develop hypotheses concerning how attitudes surrounding human-river relationships might promote either IWRM or the ‘tragedy of the commons’ (relational scenarios) in the Kat River Catchment and river catchments in general. (Chapter 5).

1.1.2 Rationale & Significance

The current notion of Integrated Water Resource Management (IWRM) is a perspective on water resource management that has evolved out of the global opinion that social and ecological systems are linked and therefore cannot be managed separately from each other (Medema & Jeffrey, 2005; Pahl-Wostl & Sendzimir, 2005; Jeffrey & Gearey, 2006). Box 1.1 lists the principles of IWRM as outlined by the Global Water Partnership (UNDP/GWP, 2004). This list highlights IWRM's goal of promoting effective management structures that link and manage all aspects of catchment systems holistically, taking into account both social and ecological components. In implementing the principles of IWRM it is necessary to collect and interpret information not only on individual components of the catchment system, but also on the outcomes, structures and functions that effect the relationships between the social and ecological systems (Lal *et al.*, 2001; UNDP/GWP, 2004). In light of this, research into human-environment relationships is important to the advancement of IWRM, specifically the relationships between people and surface waters, *i.e.* rivers, wetlands and lakes (Cordell, 1995) (referred through out this thesis as human-river relationships).

Box 1.1 Principles of Integrated Water Resource Management (UNDP/GWP, 2004).

1. The river basin (catchment) is the correct administrative unit for managing water.
2. Water resources and the land that forms the river basin area must be integrated, in other words, planned and managed together.
3. Social, economic and environmental factors must be integrated within water resources planning and management.
4. Surface water and groundwater and the ecosystems through which they flow must be integrated within water resources planning and management.
5. Public participation is necessary for effective water resource decision-making. It requires good public awareness and understanding so that participation is informed participation. (Because water is managed for the sole purpose of providing water to the people and the environment in which they live).
6. Transparency and accountability in water management decision-making are necessary features of sound water resource planning and management. Transparency means the people need to be informed about the options in water management to be able to respond to decisions made about their water. Accountability means the public has the right to question and complain to responsible organisations and those organisations need to answer to their clients – the public.

Within this context, the need to actively identify and investigate key attributes of socio-ecological systems becomes fundamental. Attitudes can be considered as attributes of socio-ecological systems that have a significant influence on the activities and habits (behaviour) of social systems, and which influence and affect biophysical processes and relationships in the ecological system (Palmer *et al.*, 2004a; Palmer *et al.*, 2004b; Mooney *et al.*, 2005; Peterlin *et al.*, 2007). Attitudes are key components in the ways people psychologically relate to and understand their environments (Fazio & Olson, 2003) and, therefore, influence the way they learn and make decisions about these environments (or choose to participate in management of them). Research into attitudes in a catchment system, and the potential role they play in influencing water resource and river management (and the general dynamics of human-river relationships), is important to the generation of IWRM as a philosophy and process, and the establishment of local sustainable and adaptive management plans.

From the investigation of the attitudes local residents (stakeholders) have concerning the Kat River, this thesis has inductively explored the human-river relationships in the Kat River Catchment, Eastern Cape, South Africa. This exploration sought to provide insight into the significance of these relationships to catchment and water resource management, specifically IWRM. For over 12 years research into establishing management institutions, which function within the principles and philosophy of IWRM, has been carried out in the Kat River Catchment; within this context the Catchment can be considered to be a relative IWRM case study. The lack of such case studies, globally, and the need for methodological development within the philosophy and process (Biswas, 2004; Medema & Jeffrey, 2005; Jeffrey & Gearey, 2006), placed this study in the significant position of being able to contribute to the development of theory and tools for the promotion and implementation of IWRM.

1.1.3 Thesis Outline & Research Approach

1.1.3.1 Thesis Outline

Chapter 1, as shown in Figure 1.1, consists of an introduction to the thesis and a review of the relevant literature. Chapter 2 introduces the study area. Chapter 3 describes the methodological considerations behind the study. Chapter 4 is the primary data collection chapter, and details the process undertaken in constructing an attitude survey and analysing the findings in terms of the attitudes Kat River residents have towards the Kat River. Chapter 5 provides a more qualitative analysis of the findings obtained in Chapter 4, and describes the generation of theory around attitudes in human-river relationships and their significance to IWRM and management initiatives. Lastly, Chapter 6 provides a review of the significant findings of the study and examines their implications to IWRM.

Figure 1.2 illustrates a schematic view of the thesis set-up and design, and the tools developed to facilitate each step. In the centre of Figure 1.2 is a diagrammatic representation of the ‘flow’ and connection of the different components and activities that made up this study. This diagram illustrates that I constructed the conceptual model from both literature and my situation assessment; in keeping to this thinking I have therefore made my literature review Chapter 1 and description of study area Chapter 2. Because I consider the construction of my conceptual model as methodological I have made Chapter 3 Research Design. The rest of the diagram follows on in a similar manner. On the right hand side, I have indicated where the various tools or methods have been relevant or utilised.

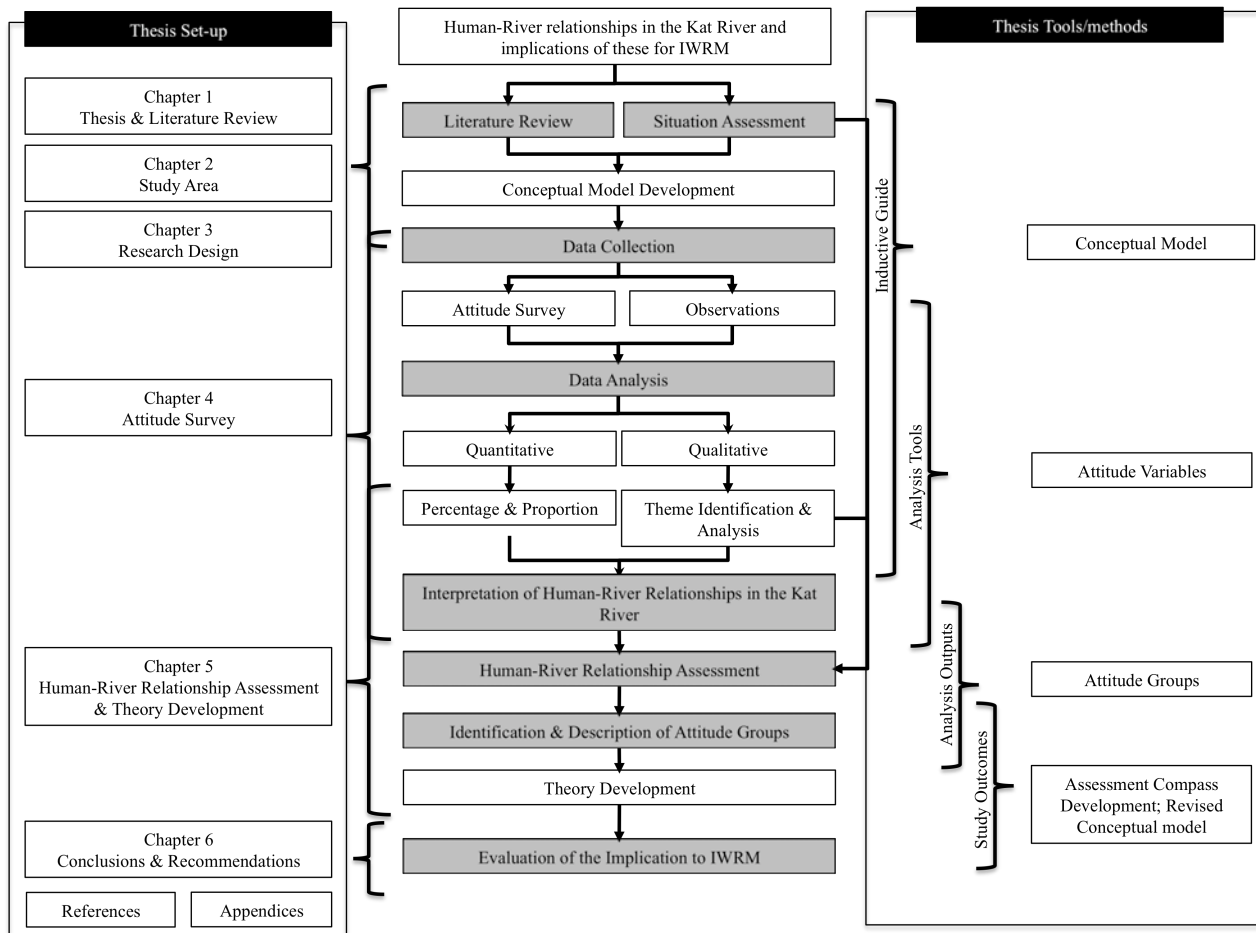


Figure 1.2 Schematic view of the Thesis Set-up (left); Design (centre) and Tools/methods (right).

1.1.3.2 Research Approach

This thesis presents an exploration of the dynamics around the human-river relationships in the Kat River Catchment. It utilizes data from both social (attitudes) and ecological (biomonitoring) surveys/studies to describe the human-river relationships and to identify aspects that influence water management structures in the catchment of the Kat River.

A central theme or approach of this thesis is the acceptance of a dichotomous view on the outcomes of human-river relationships. Such a view does suggest that such relationships will either have a symbiotic or mutually beneficial outcome or alternatively a harmful parasitic outcome. This is arguably a simplistic view of a set of relationships (human-river) that form part of a complex system, and implies that

other ‘less extreme’ relationships do not exist, *e.g.* commensalism. It appears, however, from literature that the outcomes of relationships between humans and the ecological system either have destructive or constructive outcomes (Inglis, 2008). Within this context this thesis chose to consider the outcomes of human-river relationships from either mutually beneficial or parasitic perspectives. In accepting this viewpoint two related relational scenarios (here used to refer to the potential outcomes of human-river relationships) were selected. IWRM is considered, in this thesis, as a constructive relational scenario, and Hardin’s (1968) social dilemma of the ‘Tragedy of the Commons’ as a destructive relational scenario.

1.1.3.2.1 Capitalising ‘River’ and ‘Catchment’

Throughout this thesis, the reader will see that all references to the Kat River or Catchment have been capitalised. Firstly, this has been done because it is tedious to refer to the ‘Kat River’ as opposed to just the ‘River’ throughout the thesis, similarly the ‘Catchment’ for the ‘Kat River Catchment’. Secondly, I have taken a perspective from which I see the River as an active stakeholder in the water management process and as such have sought to highlight its relevance and role throughout the thesis by capitalising reference to it and its Catchment.

1.2 HUMAN-ENVIRONMENT RELATIONSHIPS

1.2.1 Introduction

‘The need for water is universal. It is present everywhere, and without water, life, as we know it, will simply cease to exist’ (Biswas, 2004, pg. 248). People depend on freshwater bodies – lakes, reservoirs, rivers and wetlands – to sustain life and to support the economies on which their livelihoods depend. This theme has been taken up by many groups and authors, including: the Committee on Inland Aquatic Ecosystems (1996); Board on Sustainable Development (1999); Baron *et al.* (2003); Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems (2004); Medema & Jeffrey (2005). Unfortunately, at the same time that water resources are so important to people, people’s activities threaten the quality and sustained provision of freshwater resources (Committee on Inland Aquatic Ecosystems, 1996; Medema & Jeffrey, 2005). The toll on the environment of human development over the last half century is manifold (Board on Sustainable Development, 1999; Baron *et al.*, 2003), and the ever-increasing human population is a growing concern in a world with finite resources (Hardin, 1968). We are today more crowded, more consuming, more connected and, in many places, more diverse than at any other time in history and the result appears to be the widespread degradation of freshwater ecosystems the world over.

Aquatic ecosystems (here defined as a collection of living and nonliving elements interacting in aquatic environments *e.g.* rivers, lakes, dams, estuaries *etc.*) are responsible for fulfilling numerous environmental functions, and providing a wide range of important goods and services (Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, 2004; Baron *et al.*, 2003). Services provided by freshwater ecosystems include: transportation; recreation; purification of human and industrial wastes; and production of fish and other foods and marketable goods (Baron *et al.*, 2003). Ecological services such as these are commonly defined as *‘the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life’* (Baron *et al.*, 2003, pg. 2); this definition highlights how valuable these resources are to

human social and economic survival, and Baron *et al.* (2003) notes that replacing such services is costly and often impossible to achieve.

The threat to global freshwater resources has led to widespread re-evaluation of past and present management philosophies and strategies (Hartje *et al.*, 2003; Biswas, 2004; Pahl-Wostl & Sendzimir, 2005) in the hope of turning the tide on human consumption patterns and promoting sustainable utilization and conservation of freshwater resources (Board on Sustainable Development, 1999; Medema & Jeffrey, 2005). This shift in water resource management thinking turns the focus of management away from applying ‘*command-and-control*’ approaches to well-defined societal problems (*i.e.* wastewater treatment problems, hygienic and pollution problems *etc.*), which effectively dealt with these problems in isolation and out of the consideration of long-term implications (Pahl-Wostl & Sendzimir, 2005, pg. 1), towards holistic and adaptive management approaches. Lee (1999) describes adaptive resource management as a process that seeks to formulate ‘*management policies as experiments that probe the responses of ecosystems as people’s behavior in them changes*’; this thesis has adopted this view of adaptive management in its use of the term.

Adaptive resource management approaches recognize the role that linkages between humans and the environment play in determining the outcomes for both social and ecological systems (Berkes & Folke, 1998; Gunderson & Holling, 2002; Taylor, 2002; Berkes *et al.*, 2003; Dietz *et al.*, 2003; Bohensky, 2006). For example the economic vitality of agricultural, industrial, recreational and domestic activities is dependent on the condition of supporting ecosystems (Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, 2004). In addition, it has also been determined that the condition of these ecosystems affects people’s well being on less explicit levels: socially, culturally, recreationally, spiritually and historically (sentiment) (Crystal & Harris, 1995; Bengston, 2000; Backlund, 2005; Kyle *et al.*, 2005; Todd & Anderson, 2005).

1.2.2 Human-Environment Relationships and Relational Scenarios

1.2.2.1 *'The Tragedy of the Commons'*

On contemplating the issue of human population stress on global natural resources Garrett Hardin (1968) presented a scenario that he entitles the 'Tragedy of the Commons'. In the 40 years since this scenario was first published the concept of the 'Tragedy of the Commons' has influenced debate and thinking around the conservation and management of natural resources (Uphoff & Langholz, 1998; Dietz *et al.*, 2003). Within this scenario, Hardin (1968) describes the social dilemma of herdsmen making use of a common grazing area; essentially each herdsman will try to keep as many cattle on the commons as possible. While this might work for many years given tribal wars, poaching and disease, when social stability pushes man and beast over the land's carrying capacity, this strategy generates tragedy (*i.e.* the personal exploitation strategies of each herdsmen favour the herdsmen at the expense of the resource until that resource is depleted – otherwise there is no tragedy). Hardin (1968) describes how each herdsman is locked into a system that compels him to increase his herd for personal benefit. In doing so, however, he effectively functions without limits in a limited system and he says '*Ruin is the destination towards which all men rush, each pursuing his own best interests in a society that believes in the freedom of the commons*' (Hardin, 1968, pg. 1244). At its essence Hardin points out that as long as people are looking to their own survival, the 'tragedy of the commons' is assured, and as populations increase it is even more so. Hardin (1968) labels these issues as '*no technical solution problems*' (pg. 1243) as he does not foresee science, incomplete as it is, having the capacity to solve these dilemmas, and advocates private and state ownership (privatisation or socialism) as the only ways around them (Hardin, 1976; Hardin, 1977; Elliott, 1997; Ostrom *et al.*, 1999; Dietz *et al.*, 2003).

Hardin (1977) in a later article debating the implications of ethics around carrying capacity put forward the case of the famine that struck the six Sahelian zone countries of West Africa, killing some 100 000 people and leaving 7 million others dependent on foreign food aid. Using this example, Hardin (1977) outlines how this disaster is not caused by dry weather or climate change, but by man himself. Although the

drought may have been the agent of collapse, slow degradation of natural nomadic lifestyles and bioethics in the region, in part brought about by French colonialism, destabilised the fragile balance between man and environment and resulted in the slow ecological breakdown of the Sahel (Hardin, 1977). Hardin (1968) does not neglect freshwater in his description of the scenario of the ‘tragedy of the commons’, and describes the situation where a person finds the costs associated with discharging waste into the commons are less than the costs associated with purifying their waste before releasing it into the system. In this sense, the problems of pollution can also be connected to this social dilemma (Hardin, 1968). Hardin (1968, pg. 1245) says that *‘the pollution problem is a consequence of population’* complicated by old adages such as *‘flowing water purifies itself every 10 miles’*. Indeed such an adage may hold some sway if one lonely herdsman used the river for disposal of his waste, but when thousands of individuals deposit their waste either directly or indirectly natural chemical and biological recycling processes become overloaded and the river less and less resilient to the effects of the pollution (Hardin, 1968).

In both cases Hardin (1968 & 1977) presents examples or illustrations of the outcomes of the ‘tragedy of the commons’ that are clearly driven by the relationships that humans have with their environments. Unfortunately in the outcomes of Hardin’s (1968) scenario, these relationships have ceased to be mutually beneficial and have taken on parasitic characteristics, leaving the environment in a growing state of disadvantage. Berkes & Folkes (1998) explain how such shifts in human-environment relationships revolve around the gradual erosion of effective communication between humans and their environment. Placed within the context of Systems Theory this communication is termed ‘feedback’ and represents the cues and signs the ecological system provides the social system (and visa versa) concerning the response the one system has in connection to the other’s activities (Berkes & Folkes, 1998).

Within well-established socio-ecological systems, local or indigenous knowledge has facilitated the development of mechanisms that allow local populations and people to be sensitive to ecological feedback (Berkes & Folkes, 1998). Based on the local institutions and cultural policies that have developed out of the evolved understanding

between the local people and the resources they depend on, such mechanisms can themselves be considered systems for management. Berkes & Folkes (1998) refer collectively to these evolved institutions and cultural policies as *cultural capital*; they consider this concept to include: local governance policies, laws and restrictions, the institutions that enforce and teach these (*i.e.* families, chiefs (and other forms of government), community, religion *etc.*), and the mechanisms where by ecological resilience (as defined by Holling & Gunderson, 2002, pg. 28; '*the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behaviour*') is sustained. Within the concept of cultural capital, the authors assume that every society will have its own means and adaptations to deal with the natural environment (Berkes & Folke, 1998).

Going back to Hardin's (1977) examples of the desertification of the Sahel, and even his illustration of the pollution dilemma in freshwater systems (Hardin, 1968), it becomes clear that changes in the local human-environment relationships can effectively convert them from being mutually beneficial and sustainable to essentially parasitic and destructive. The natural cultural capital of the Sahel population had established regimes around resource use that effectively reinforced the ecological resilience of the area (Hardin, 1977). The imposition, however, of the French 'way of life' (essentially the introduction of an alien cultural capital) threw out of balance the relationships between humans and the environment in this area and shifted them from being sustainable to being destructive and exploitive (Hardin, 1977). Consequently, due to this shift in relationship balance, there was a gradual erosion of the communication (*i.e.* the ability for the local population to understand and respond to system feedback) between humans and their environment/s, which lead to a loss of ecological resilience and the steady desertification of the region.

The central issue behind most of Hardin's articles and research was the population problem (Hardin, 1968; 1976; 1977; 1998). He asserted that with population numbers kept in check, local human-environment management structures function effectively; however, with the introduction of a 'stable society' in which medical and scientific breakthroughs have enabled prolonged and sustained life-spans and populations, the essential morals, ethics and knowledge governing these management structures are

eroded: it becomes less and less beneficial to the individual to practice altruism and the result is individually orientated perspectives on survival and resource management. Hardin (1998) uses the case of international fisheries to illustrate the response of society to steadily decreasing resources, namely the establishment of restrictions over use. More eloquently put '*the more the population exceeds the carrying capacity of the environment, the more freedoms must be given up*' (Hardin, 1998, pg. 683).

The suggestion that private and state ownership (privatisation or socialism) (*i.e.* the reduction of freedoms related to a common resource) are the only ways around the 'tragedy of the commons' (Hardin, 1968; Hardin, 1976; Hardin, 1977) is not supported by other authors and researchers (Elliott, 1997; Ostrom *et al.*, 1999; Dietz *et al.*, 2003). These professionals have seen the failed outcomes of 'command and control' approaches (CAC) to natural resource management (Dietz *et al.*, 2003; Olsson *et al.*, 2004; Pahl-Wostl & Sendzimir, 2005) (*i.e.* the approach '*where political authorities mandate people, by enacting a law, to bring about a behavior and use an enforcement machinery to get people to obey the law ... in environmental policy, the CAC approach basically involves the setting of standards to protect or improve environmental quality*' (EID, 2002, pg. 1)) and have found reason to disagree with Hardin on his suggested means for dealing with management and governance of common resource bases (Ostrom *et al.*, 1999; Dietz *et al.*, 2003). These authors and others (Berkes & Folke, 1998) advocate reviewing the cultural capital and local knowledge of a region and establishing local-resource-governing institutions, through which they believe a belief in the 'freedom of the Commons' might not end in 'ruin for all', but instead 'some for all' (Bohensky, 2006). In developing such institutions, it is hoped that once again sustainable, mutually beneficial relationships between humans and their environment/s might be established. One such approach to water resource management is IWRM, which is based on the principle of holistic management of socio-ecological systems and the bringing together of representatives from user groups, local and national government, municipal departments, and research groups, to create holistic and adaptive management structures for common water resources (Medema & Jeffrey, 2005; Pahl-Wostl & Sendzimir, 2005).

1.2.2.2 *Shifting Paradigms of Ecosystem Management*

Within the 19th and 20th Century, two ecological paradigms or worldviews were dominant in western culture; these were the ‘anthropocentric ecological paradigm’ and the ‘bio or eco-centric ecological paradigm’ (List, 1992; Motteux, 2002; Dietz *et al.*, 2005). The two paradigms lie on contrasting ends of the environmental ethics debate (List, 1992). Within one extreme of this debate, man is seen as central and all things are there for his benefit and use. At the other end of the spectrum, the focus is on the intrinsic or inherent value of elements of nature and its biotic systems (List, 1992), and man is just part of the biotic system.

The anthropocentric ecological paradigm can be traced back as far as Francis Bacon (1561-1626) who saw scientific progress as essential to human mastery of the natural world (Motteux, 2002). The outcome of this paradigm for the scientific community is the opinion that knowledge must identify aspects of the natural and social world from the perspective of how these aspects are useful and beneficial to humans. Likewise, natural resource management approaches have sought to maximise the utilitarian value of these resources (*i.e.* ‘how can we conserve and manage these resources in such a way to benefit humans’). Consequently, they have been characterised by well-defined problems that society wants solved *e.g.*: hygienic problems within cities stimulated efforts into improved urban water management; eutrophication problems in lakes and coastal systems called for research and changes in legislation; and rivers were controlled to prevent flooding of urban areas (Pahl-Wostl *et al.*, 2005).

Although several scientists (including Charles Darwin) have based their findings on more holistic and less anthropocentric perspectives for at least the last two centuries (List, 1992), such perspectives did not make it into the global debate around resource management until the latter part of the 20th Century. Stimulated by the growing awareness of an ecological crisis, highlighted by the works of Rachael Carson (Carson, 1965) and others during the 1960s, society at large began to question the anthropocentric ecological paradigm, and shifted towards a more bio or eco-centric ecological paradigm. Indeed such authors as Heberlein (1981), Caron (1989), Noe & Snow (1990), Corral-Verdugo & Armendáriz (2000), Dunlap *et al.* (2000) and

Cordano *et al.* (2003) have been carrying out extensive research around what they have termed the 'New Ecological Paradigm'. This paradigm is a psychological phenomenon believed to illustrate the shift in environmental attitudes people have concerning the natural world. These shifts in environmental attitudes, in society, science and natural resource management are believed to have been influenced by such movements as Aldo Leopold's Land ethic in the 1930s and deep ecology in the 1960s. Leopold is known to have said that '*A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise*' (In Leopold, 1987 cited by Dietz *et al.*, 2005, pg. 343).

A significant outcome of the adoption of the eco-centric ecological paradigm is the acceptance that the natural world is a complex adaptive system, of which humans are a component (Bohensky & Lyman, 2005; Folke *et al.*, 2005) intimately linked with the ecological and vice versa (Berkes & Folke, 1998; Bohensky, 2006; Inglis, 2008). Consequently, science and management institutions, which adopt the eco-centric paradigm, have had to stop dealing with specific issues or problems in isolation from each other (reductionism), and begin to explore more interdisciplinary and integrative approaches with consideration of long-term consequences (Abel, 1998; Lal *et al.*, 2001). Another outcome is that no longer is a 'command and control' approach considered appropriate for natural resource management (Pahl-Wostl *et al.*, 2004; Pahl-Wostl & Sendzimir, 2005); instead management has begun to couple social and ecological variables in such a way as to work adaptively with them and the outcomes of their relationships (Medema & Jeffrey, 2005). Areas of research in which the promotion of such communication is actively being undertaken is in social-ecological systems (Berkes & Folke, 1998; Ascher, 2001; Gunderson & Holling, 2002; Brunckhorst, 2005; Folke *et al.*, 2005; Bohensky, 2006); the ecosystem management approach (Cordell, 1995; Hartje *et al.*, 2003); and Integrated Water Resource Management (IWRM) (Biswas, 2004; Cap-net, 2005; Medema & Jeffrey, 2005; Jeffrey & Gearey, 2006).

1.2.2.3 *Integrated Water Resource Management (IWRM)*

IWRM is considered ‘*simultaneously a philosophy, a process and an implementation strategy...*’ (Gorgens *et al.*, 1998, pg. 2) that promotes integration of traditionally fragmented aspects of water resource management and research (GWP, 2004). In many respects, IWRM has become a widely accepted philosophy for water resource management (Biswas, 2004; Rahaman & Varis, 2005; Jeffrey & Gearey, 2006). As such, much of the global legislation around water resources is now based on this philosophy. This is true of the South African National Water Act (NWA) (Act 36, 1998), which was developed around IWRM and its grounding principles (DWAF & WRC, 1996; Gorgens *et al.*, 1998). Central to this philosophy is the recognition that all users of a resource are interlinked and that management of the resource must occur within a framework that actively integrates and considers all users of that resource and the resource itself (Cap-net, 2005).

Strictly speaking, IWRM is not a new philosophy to institutionalised water resource management (Biswas, 2004; Rahaman & Varis, 2005). Rahaman & Varis (2004) and Dukhovny *et al.* (2004) describe the historical development of water resource management and point out that several countries have had advanced and integrated ways of managing their water resources for centuries. Spain is a forerunner, having had operational multi-stakeholder participatory water tribunals since the beginning of the Twentieth Century, and a water management system organised around basin delineations (the system of *confereraciones hidrográficas*) since 1926 (Rahaman & Varis, 2005; Dukhovny *et al.*, 2004). France and Italy have had an integrated water management system, referred to as ‘Integrated water and land resources development and management’ since the second half of the Twentieth Century (Dukhovny *et al.*, 2004). The USSR developed an integrated approach to water management between 1950 and 1980 (Dukhovny *et al.*, 2004). Additional attempts to implement such systems have since been tried in many other countries over the last five to six decades *e.g.* the Tennessee Valley Authority in the 1940s; and Hesson, Germany in 1960 (Rahaman & Varis, 2005). The last three decades has witnessed an array of summits and mega-conferences taking place, these include: United Nations Conference on Water (Mar del Plata 1977); International Conference on Water and Environment

(Dublin 1992); Second World Water Forum & Ministerial Conference (The Hague 2000); International Conference on Freshwater (Bonn 2001); World Summit on Sustainable Development (Johannesburg 2002); and the Third World Water Forum (Kyoto 2003). These have collectively promoted awareness in the international community of the urgency of improved water management and its connection to quality of life (Rahaman & Varis, 2005).

1.2.2.4 IWRM & the Tragedy of the Commons

Human-environment relationships are intrinsically important in environmental management initiatives. These relationships are believed to be influenced by perceptions, beliefs and attitudes individuals, communities, organisations and governments hold regarding these environments and their importance for various functions and resource provision (Irwin, 2001; Milton, 2002; Inglis, 2008). In addition, because of the psychological connection between people and their environment (characterised through perceptions, beliefs and attitudes) human-environment relationships go beyond resource utilisation to intrinsic wellbeing (Crystal & Harris, 1995).

When it comes to wetlands, rivers in particular (due to this thesis' focus) human-river relationships are about more than just water; there are numerous associations people have with the river environment that have very little to do with the use of water *e.g.* spiritual and religious (Crystal & Harris, 1995; Fox, 2005); recreational (Backlund, 2005); security; provision of food and building materials (Fox, 2005). All these associations will influence how people relate to the river, how they perceive it, and the decisions they make in connection to it and its management – essentially the philosophies and attitudes they have concerning the river and related themes (*e.g.* management, use, research, *etc.*). In this context human-river relationships can be considered as the functional components in both Hardin's 'Tragedy of the Commons' (in the context of wetland environments) and IWRM. In terms of potential outcomes of relationships, here termed 'relational scenarios', Hardin (1968) views human-environment relationships from a parasitic perspective, while IWRM seeks to develop

mutually-beneficial relationships between all system components, especially humans and their environments.

Beside, or perhaps because of, the common focus on human-river relationships the two relational scenarios share a common function in providing an inter-disciplinary platform from which to better understand natural systems. Hardin (1998), in an article in *Science* entitled 'Essays on Science and Society: Extensions of "The Tragedy of the Commons"', refers to his 1968 article as '*My first attempt at interdisciplinary analysis*' and later goes on to comment how he '*did not start out intending to forge an interdisciplinary link*' but seems to have achieved it. IWRM, however, has always aimed at forging interdisciplinary links between knowledge systems and providing holistic, system-orientated perspectives of both social and ecological system dynamics (Abel, 1998; Redclift, 1998; Kinzig, 2001; van Dijkum, 2001).

In this regard, although both relational scenarios appear to present contrasting perspectives on the nature and potential outcomes of human-environment relationships, they both provide useful inter-disciplinary platforms from which to begin exploring the human-river relationships in the Kat River Catchment and the likely consequences for the water resources and the River in the system. In using the two relational scenarios as contrasting reference points, the various aspects and characteristics of the human-river relationships in the Catchment can be assessed in regards to possible parasitism or mutualism tendencies. Such knowledge stands to provide valuable understanding to the likeliness of success of the IWRM process that is currently playing out in the Catchment.

1.2.3 Concepts Instrumental in the Assessment of Human-Environment Relationships

1.2.3.1 *Environmental Ethics*

Environmental Ethics is a discipline of study concerned with the moral relationship between humans and the living and non-living environments (SEP, 2002; Inglis, 2008). The discipline is principally interested in value associations, specifically those values ascribed to the ‘natural or ecological’ world (SEP, 2002). The Stanford Encyclopedia of Philosophy (SEP, 2002) points out that, in the environmental ethics literature, such values are generally divided into instrumental values or intrinsic values. The Encyclopedia (2002) defines instrumental values as the ‘...*value of things as means to further some other ends...*’ whereas intrinsic values are the ‘... *value of things as ends in themselves regardless of whether they are also useful as means to other ends*’. Inglis (2008, pg. 59) refers to these values as ‘*nature values*’ and points out how these are used to answer the enduring question of ‘*what kind of value should be attributed to the natural environment, to the things other than human beings, living and non-living?*’ (Benson, 2000, pg. 1 cited in Inglis, 2008, pg. 59).

In her doctoral thesis Inglis (2008, pg. 50) discusses the various philosophical statements that have been made concerning the ‘*moral status*’ people ascribed to the natural environment, *e.g.* Deep Ecology (Naess, 1973 cited in Inglis, 2008); she goes on to suggest that the relationship between the groups of values one holds and the various moral statuses they attribute to the natural environment forms an individual’s or group’s ‘*ecological orientation*’ (pg. 49) and this in turn their worldview. Ecological orientation and/or worldviews include: Anthropocentrism (only humans have independent moral value); Sentientism (all conscious creatures have independent moral value); Biocentrism (all living creatures have a good of their own and intrinsic value); and Ecocentrism (all ecosystems have a good of their own and intrinsic value independent of components) (Inglis, 2008). The worldview an individual is seen to hold is considered to greatly influence their behavior and beliefs towards the natural or ecological world (Fox, 2005; Inglis, 2008).

1.2.3.2 Place Attachment

Sense of Place or Place Attachment is regarded as the extent to which an individual values or identifies with a particular environmental setting (Todd & Anderson, 2005). It describes the emotional affinity, connection or regard a person has for a place, area or locality (Overdevest *et al.*, 1995). Place attachment theories suggest that over time and with increased exposure people form emotional and functional bonds with a specific resource or place (Backlund, 2005; Kyle *et al.*, 2005; Todd & Anderson, 2005). Such bonds can have social, cultural, recreational, spiritual and historical value associations (Crystal & Harris, 1995; Bengston, 2000; Backlund, 2005; Fox, 2005; Kyle *et al.*, 2005; Todd & Anderson, 2005) and can include a sense of timelessness and feelings of community and connectedness to other people (Crystal & Harris, 1995).

1.2.3.3 Community Attachment

Sense of community looks at the attachment people feel to their communities (Davidson & Cotter, 1991). Davidson & Cotter (1991, pg. 246) describe people who have a strong sense of community as having '*a feeling of belonging; they believe that they can exert some control over the group and also be influenced by the group; they believe that their needs can be and are being met through the collective capabilities of the group; and because of a shared history, they feel a very strong emotional bonding and investment in the group.*' In an earlier paper the same authors (Davidson & Cotter, 1989) showed how people who demonstrated a high sense of community also participated far more in politically orientated activities (*e.g.* voting, interaction with local political offices *etc.*). Very often, such communities are geographically orientated, and share a common resource pool. In this regard a sense of community will include a collection of attitudes related to perceptions of a) membership or belonging; b) influence or mattering; c) reinforcement or shared needs; and d) shared emotional connection (McMillan & Chavis, 1986 referenced in Davidson & Cotter, 1989).

1.2.4 Attitudes and Human-River Relationships

Rivers have often been described as the ‘life-blood’ of the planet. From the essential roles they play in the lives of so many, and the vital functions they perform in the delivery of water and other resources, one would assume that rivers would be highly valued amongst the people who rely so heavily on them, that people would be interested in seeing the source of their livelihoods and personal well being cared for and healthy. Instead it would appear that *‘people have forgotten the vital and contradictory roles that our rivers play as cleaners and renewers, destroyers and creators, sculptors of landscapes, life-givers, and life-takers’* (Davies & Day, 1998, pg. 79) and as a consequence the wetlands of the world are some of the systems most under threat (Bennun, 2001).

‘Rivers are more than just water’ (Rowntree, 2005 per comm.), they are sustained by a myriad amount of complex and adaptive abiotic and biotic relationships (Davies & Day, 1998; Baron *et al.*, 2003). They provide habitat to an assortment of diverse species, and play instrumental roles in shaping the geographical landscape. It is the presence of flowing water, in space and time, that unifies catchment systems, and makes them diverse four-dimensional entities with vertical, cross-sectional, longitudinal and temporal components (Davies & Day, 1998).

Rivers are seen as continuous longitudinal ecosystems from source to estuary; ecosystems that are intimately and intricately connected to the greater catchment area and the activities and landscapes that occur within them. This intimate relationship with the surrounding area essentially makes rivers *“lenses in, or mirrors of, the landscape, giving us insights into, or reflecting, the ‘health’ or ‘ill-health’ of their catchments”* (Davies & Day, 1998, pg. 111). The health of a river’s catchment and, therefore, the river, is dependent on the treatment received from its human occupants. Such treatment is related to the perceptions and attitudes these occupants have of their natural environments, and such attitudes are dependant on their various contextual aspects *i.e.* culture, spiritual and religious beliefs, history, country, town, education, economic connection to the river etc (Irwin, 2001; Milton, 2002).

Although all these aspects play a role in developing the attitudes of people towards rivers, until recently resource managers have not generally included these relational aspects, and have not sought the protection of the resource base (*i.e.* the river ecosystem), in their pursuit of procuring the resource (*i.e.* water) (Baron *et al.*, 2003). This has resulted in large-scale alterations to river environments (Baron *et al.*, 2003; Bohensky & Lynam, 2005) and implicit examples of Hardin's (1968) relational scenario (tragedy of the commons). Human tendency to want to alter the environment to suit personal needs and to make access to resources easier, more ensured and more controlled, has played a significant role in altering and affecting the relationships people have with natural environments (Crystal & Harris, 1995; Berkes & Folke, 1998). Unfortunately, the lack of attention given to the psychological and cultural landscapes, within which social systems utilise river resources, reduces a management institution's ability to effectively and holistically sustain them (Taylor, 2002). In many regards, water management is not about managing water resources, but about managing the people who use it (Hanna, 2001). It is at the interface between people and the river that the ecological is most influenced by the social (Greenwood & Edwards, 1979; Irwin, 2001; Hanna, 2001; Milton, 2002). Growing awareness of this has begun to shift research and management foci towards the exploration and consideration of the dynamics and characteristics of human-river (environment) relationships and the psychological influences behind them (Cordell, 1995; Hanna, 2001; Bohensky, 2006).

The rest of this literature review explores attitudes, what they are, how they are likely to be expressed and how they are important to research of socio-ecological systems and thereby human-river relationships.

1.2.4.1 *Attitude Definition*

'It is difficult to imagine a psychological world without attitudes. One would go about daily life without the ability to think in terms of 'good' and 'bad', 'desirable' and 'undesirable', or 'approach' and 'avoid'. There would be no activation of positivity or approach tendencies upon encountering objects that would engender positive outcomes, but perhaps more seriously, there would also be no mental faculty

for avoiding negative objects in one's environment. Our environment would make little sense to us; the world would be a cacophony of meaningless blessings and curses...' (Fazio & Olson, 2003, pg. 139).

The opening paragraph of Fazio & Olson's (2003) chapter on Attitudes: Foundations, Functions, and Consequences, brings to life the intrinsic yet complicated role of attitudes in our everyday lives. Attitude theory has been around for several decades as the following reviews highlight: Cooper & Croyle (1984); Chaiken & Stangor (1987); Tesser & Shaffer (1990); Olson & Zanna (1993); Petty *et al.* (1997); Ajzen (2001); Fazio & Olson (2003); but what is this thing that is so intrinsic to our lives that without them *'existence would be truly chaotic, and probably quite short'* (Fazio & Olson, 2003, pg. 139)?

Although the concept of attitude has enjoyed a favourable position in social psychology (Fazio & Olson, 2003), no single definition exists (Strauss, 1945). Numerous researchers in the field have put a definition to the concept (Shaw & Wright, 1967; Jonas *et al.*, 1994; Petty *et al.*, 1997; Ajzen, 2001; Bell *et al.*, 2001). In fact, Shaw & Wright (1967) provide a useful list of definitions connected with the concept at the time, and Strauss (1945) provides a short review of the consequences to the research outcomes in having such varying definitions and *'no general agreement upon what the term attitude denotes'*. Even with this disparity in defining the term, the concept has persisted and evolved, and present day definitions appear to view and define attitudes within the idea of object evaluation: *'Attitude, the psychological tendency to evaluate a particular entity with some degree of favour or disfavour'* (Jonas *et al.*, 1994, pg. 776); *'...summary evaluations of objects (e.g. oneself, other people, issues etc.) along a dimension ranging from positive to negative'* (Petty *et al.*, 1997, pg. 611); *'Attitude represents a summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant, and likable-dislikeable'* (Ajzen, 2001, pg. 28); *'Attitudes represent a tendency to evaluate an entity such as an object or an idea in a positive or negative way'* (Bell *et al.*, 2001, pg. 26).

Although the definition of attitude varies between the different fields of social science (*e.g.* psychology, sociology, anthropology *etc.*); this thesis is constrained by the viewpoints and theories around attitudes found in social and, to a lesser degree, environmental psychology. Within this context this thesis has accepted a combination of the above definitions as its working definition: ‘attitudes are predispositions related to objects we have assessed and evaluated in the environment around us; they enable us to filter and relate to the various aspects of our environment and potentially protect us from negative or harmful situations’ (Osgood *et al.*, 1957; Olson & Zanna, 1993; Blair *et al.*, 1996).

1.2.4.2 *Attitude Expression*

Katz (1960, pg. 168) suggests that ‘*opinion is the verbal expression of an attitude...*’ but further suggests that they can also be expressed in ‘nonverbal behaviour’. This view of the expression of an attitude suggests that attitudes are potentially related and constructed around several psychological aspects. Indeed much debate has occurred around the dimensionality of the concept, principally in relation to the tripartite theory of attitude that outlines the roles of cognition (beliefs), affect (emotion) and behaviour (experienced & intended) in the construction and expression of an attitude (Shaw & Wright, 1967; Cooper & Croyle, 1984; Chaiken & Stangor, 1987; Henerson *et al.*, 1987; Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Ajzen, 2001; Fazio & Olson, 2003). Fazio & Olson (2003) pointed out that although the tripartite view of the attitude construct provides for a way to catalogue attitudinal responses and develop frameworks for their study, there are several assumptions that need to be highlighted. These assumptions include: that an attitude should be observable in reported thoughts, feelings and behaviour; that the three aspects (thoughts, feelings and behaviour) should be consistent with each other given their relationship to the underlying construct; and that there should be a consistency between a reported attitude and behaviour (Fazio & Olson, 2003).

The relationship between the various dimensions (thoughts, feelings and behaviour) of attitudes has been tied closely to the reasons people hold the attitudes they do – *i.e.* the potential function of the attitude to the holder (Katz, 1960). Four main functions

have been associated with attitude formation and expression: 1) instrumental, adjustive, or utilitarian function (this function essentially identifies with the fact that people strive to maximize the rewards in their external environment); 2) ego-defensive function (this function is related to the processes by which a person protects themselves from acknowledging the basic truths about themselves, and/or the harsh realities in their external world); 3) value-expressive function (attitudes with this function convey to the external world, positive expressions of who the person is, their central values and self-image); 4) knowledge functions (based largely upon the need an individual has to provide structure to their universe) (Katz, 1960). The slightly metaphysical nature of these functions identifies with the observation that many people will not be aware of the expression of an attitude (Shaw & Wright, 1967) and might be predisposed to respond to an object or environment in a subconscious manner.

Variables such as: the affective (emotional) component, accessibility (from memory) and ambivalence (conflicting valences *i.e.* both positive and negative, favourable or unfavourable) will influence the intensity and strength of attitude expression (Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Ajzen, 2001; Fazio & Olson, 2003). Such variables can influence the expression of an attitude either verbally or behaviourally and can themselves be influenced by the functional context of the attitude (Katz, 1960), the situational context (Corraliza & Berenguer, 2000), and the implicit or explicit nature of the attitude (Baron & Banaji, 2006).

In Ajzen's (2001) review, he indicated that a person can hold more than one attitude at a time towards an attitude object, each attitude varying in the degree to which it is more implicit and, therefore, more likely to be expressed without conscious intervention. He goes on to describe how '*Motivation and capacity are assumed to be required to retrieve the explicit attitude in favour of the implicit evaluative response*' (Ajzen, 2001, pg. 29). The understanding that attitudes possess varying degrees of inter-relatedness with one another is not new (Heider, 1946; Shaw & Wright, 1967); however, any definite understanding of the outcomes of this inter-relatedness has not adequately developed. Petty *et al.* (1997) reviewed evidence suggesting that certain attitudes might have some genetic basis and that this might strengthen them,

increasing their accessibility from memory; however, this is unverified and surrounded by methodological issues. Traditionally it appears that social psychologists follow the theory that attitudes are learnt and acquired through experience of our environments (Shaw & Wright, 1967), and that our experience of our environments is recorded in an array of different attitudes constructed from varying relationships between our beliefs, emotions and potentially our behavioural decisions.

1.2.4.3 *Attitudes: a hypothetical construct*

At its very essence, *‘an attitude is a hypothetical construct about a mental state which is inferred from verbal reports and behavioural observation’* (Heberlein, 1981, pg. 2). This makes them tricky to determine and describe, a fact that is compounded by an attitude’s relationship to values and beliefs. Most of the reviews around the topic of attitudes state at some point that attitudes add to and are part of the value system a person holds (Cooper & Croyle, 1984; Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Ajzen, 2001; Fazio & Olson, 2003). Values, like attitudes, are hypothetical mental constructs, which hold both cognitive and affective elements (Heberlein, 1981). In this regard they are types of attitudes, save that unlike attitudes values are not associated with specific objects, as the same value can be applied or associated to many different situations, issues, or objects (Heberlein, 1981), which in principle is not true for an attitude (Shaw & Wright, 1967, Heberlein, 1981). *‘Values are important life goals or standards that serve as guiding principles in a person’s life’* (Schultz & Zelezny, 1999, pg. 256). As such, this view of value intrinsically links to a person’s belief system. Heberlein (1981, pg. 5) describes them as being *‘the basis for evaluative beliefs, and other linkages among beliefs’* and suggests that because of this they are difficult to change; should there be a change we would expect to see major cognitive reorganisation. So in effect, values order the beliefs and, to a degree, the emotive aspects underpinning the manner in which an individual views or evaluates (and to some extent experiences) his or her environment and, therefore, the creation of their attitude network. It is important to highlight that at the scale of the individual, our individuality lends itself to the creation of a diverse and complex

psychological landscape. Collectively these landscapes organise into a cultural grouping of like attitudes.

1.2.4.4 *Application of Attitude Theory*

It is clear from the reviews of the topic that the attitude construct and associated concepts have elicited much research, thought and debate (Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Ajzen, 2001; Fazio & Olson, 2003). Topics such as attitude nature, structure, formation, and change, and the implications for memory, behaviour and learning have received intensive focus over the last few decades and propelled the field of attitude theory into questions of potential application (Kelman, 1958; Katz *et al.*, 1957; Shaw & Wright, 1967; Cooper & Croyle, 1984; Chaiken & Stangor, 1987; Henerson *et al.*, 1987; Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Eagly *et al.*, 1999; Wood, 2000; Ajzen, 2001; Eiser *et al.*, 2003; Fazio & Olson, 2003; Fazio *et al.*, 2004). Visser & Cooper (2003, pg. 211) describe it as such: *‘The long standing interest in the attitude construct is perhaps not surprising – an extensive literature attests to the fact that attitudes often do...powerfully influence perception, cognition and behaviour, profoundly shaping peoples interactions with the social world’*, it should not be difficult to extend this to include the ecological world.

Indeed given the present ecological crisis resulting from the relationship between humans and the ‘natural’ environment (Greenwood & Edwards, 1979; Barry, 1999) or, perhaps more precisely, the way humans relate to the ‘natural’ environment, understanding the attitudes behind these relationships presents a possible means to better bringing about sustainable change in them (Nickerson, 2003). Given the proposed make-up of attitudes (cognition, affect, and/or behaviour) (Shaw & Wright, 1967; Henerson *et al.*, 1987), and the psychological aspects related to them (value & belief) (Heberlein, 1981; Pooley & O’Connor, 2000), it is suggested here that attitudes may act as an indicator of human-environment interactions and their consequential outcomes.

A key assumption behind this line of thought is that attitudes have an influence on a person's behaviour (Kaiser *et al.*, 1999; Pooley & O'Connor, 2000). From the various reviews it appears that the relationship between attitude and behaviour is an intensive field of interest and that ascertaining the link between a person's behaviour and attitude offers, potentially, a valuable mechanism for change (Cooper & Croyle, 1984; Chaiken & Stangor, 1987; Henerson *et al.*, 1987; Tesser & Shaffer, 1990; Ajzen, 1991; Olson & Zanna, 1993; Fazio & Roskos-Ewoldsen, 1994; Petty *et al.*, 1997; Corraliza & Berenguer, 2000; Wood, 2000; Ajzen, 2001; Eiser *et al.*, 2003; Fazio & Olson, 2003; Fazio *et al.*, 2004). Indeed, such a mechanism would provide researchers (educators, managers, economists, marketers *etc.*) with a key to guiding or changing a person's behaviour in relation to shifts in their associated attitudes. Testament of this is the huge body of literature detailing the research around attitude change and persuasion (Katz *et al.*, 1957; Cooper & Croyle, 1984; Chaiken & Stangor, 1987; Henerson *et al.*, 1987; Tesser & Shaffer, 1990; Olson & Zanna, 1993; Petty *et al.*, 1997; Corraliza & Berenguer, 2000; Wood, 2000; Ajzen, 2001; Eiser *et al.*, 2003; Fazio & Olson, 2003; Fazio *et al.*, 2004). It must be noted, however, that the evidence supporting this relationship is not as strong as assumed (Fazio & Roskos-Ewoldsen, 1994; Peterlin *et al.*, 2007). Several theories have developed around the mediating variables of attitude-behaviour relationships: The Theory of Planned Behaviour (Ajzen, 1991); Theory of Reasoned Action (Fishbein & Middlestadt, 1987; Slocombe, 1999); Attitude-to-Behaviour Process Model (Fazio & Roskos-Ewoldsen, 1994); and the MODE model which attempts to synthesis the principles in the other theories into one integrated method for analysis (Fazio & Roskos-Ewoldsen, 1994).

The view that attitudes are antecedents to behaviour is relevant in natural resource and ecosystem management (White *et al.*, 2005). Attitude surveys can act as an important guide to how individuals, and the communities they collectively make-up, relate to and value their local environment (both socially and ecologically) (Environment B.O.P, 1995). A growing trend in most developing (Hernández *et al.*, 2000) and developed countries is the environmental attitude survey (Heberlein, 1981; Witherspoon *et al.*, 1995; White *et al.*, 2005; Energy Saving Trust, 2007). These surveys enable the assessment of attitudes towards the environment (Heberlein, 1981;

Dunlap *et al.*, 2000) or issues and components related to it (Environment B.O.P, 1995; Arnold, 2004; Lipchin *et al.*, 2004).

1.2.4.5 *Attitudes as Attributes of Socio-ecological Systems*

Humans are a driving force in most worldly systems (Palmer *et al.*, 2004a; Nelson *et al.*, 2006), and are the recipients of the consequences of their actions on these systems (*i.e.* global change, climate change) (Lee & Schaaf, 2004). Their activities and habits (behaviour) alter and affect biophysical processes and relationships the world over (Palmer *et al.*, 2004a; Palmer *et al.*, 2004b; Mooney *et al.*, 2005; Peterlin *et al.*, 2007). We manage our environments and leave our fingerprints on the outcomes (Palmer *et al.*, 2004a). Physiologically, anatomically and psychologically we interact and are affected and sustained by our environments; essentially the very concept of adaptation is only applicable if coupled with the recognition of our link with the environments in which we live and rely on for survival. Most of the resources we require for our various lifestyles come from our environments, and all our basic needs (*i.e.* oxygen, water, food *etc.*) are supplied by ecological systems (Biggs *et al.*, 2004; Scholes & Biggs, 2004; Mooney *et al.*, 2005). Recognising the relationship between social and ecological systems begs the questions: what role does the attitude concept potentially play in the various expressions and outcomes of this relationship? And what are the management implications?

Socio-ecological systems have both ‘natural’ and cultural attributes (Berke & Folke, 1998; Fox, 2005). The Britannica Concise Encyclopaedia (2006) describes culture as the: *‘Integrated pattern of human knowledge, belief, and behaviour that is both a result of and integral to the human capacity for learning and transmitting knowledge to succeeding generations. Culture thus consists of language, ideas, beliefs, customs, taboos, codes, institutions, tools, techniques, works of art, rituals, ceremonies, and symbols’*. The American Heritage Dictionary summarises this nicely as: *‘The predominating attitudes and behaviour that characterise the functioning of a group or organisation.’*

The network of attitudes a society holds constitutes the collective culture of that society and the various sub-cultural groupings within it. Attitudes can be seen, therefore, as the building blocks from which a group of individuals find commonality

over an environmental aspect or issue, and relate accordingly. They are key components in the ways in which people psychologically relate and understand their environments (Fazio & Olson, 2003); this essentially influences the way they learn and make decisions about their environments.

The recognition of the potential role of attitudes within the construct of socio-ecological systems has reverberated into management philosophies. One such outcome of this revolution in natural resource management is the encouragement of more direct and collaborative communication between biophysical and social scientists and scientists and non-scientists (Rhoads *et al.*, 1999). Such inter- and multi-disciplinary/societal communication is required to help develop a sound understanding of the relationships between these attributes and the estimation of the potential outcomes of them in the context of various system processes and drivers.

Today's environments reflect the management decisions and activities of the previous generations or, perhaps more precisely, the perceptions and attitudes previous generations had towards their natural resources and environments. These perceptions and attitudes influenced how the past generation related to the 'natural' environment, and became imprinted on these environments. It is important then, in light of the fact that we sit with the trend of a diminishing resource base and 'environmental crisis' warnings (Greenwood & Edwards, 1979; Barry, 1999), to take note of the present generation's perceptions and attitudes (as well as look back on the past's). As outlined previously, the present generation's choice is a more integrated approach to environmental management, as opposed to a more isolated (or reductionist) 'command and control' approach (Pahl-Wostl *et al.*, 2004; Pahl-Wostl *et al.*, 2005; Pahl-Wostl & Sendzimir, 2005). This must include analysis and investigation into the psychological and sociological connections between people and their environments. In many regards, if we are truly trying to work within new management philosophies, it is important to understand what these are, and what the present perceptions, attitudes and habits of the population inhabiting or visiting the environment are, because these are what will determine what the environment becomes for the next generation.

1.3 THE KAT RIVER CASE STUDY

The need for developing an understanding of human-river relationships and the implication of these relationships for IWRM in catchments is immense, especially as few examples of IWRM in practice are available (Biswas, 2004; Jeffrey & Gearey, 2006). Hardin (1977) has been able to point to several studies of the ‘Tragedy of the Commons’ in action, suggesting that Hardin’s (1968) scenario maybe outrunning IWRM as the most likely relational scenario. The following lists a summary of the key points of this literature review:

- Human-environment relationships are seen to have either destructive or constructive outcomes; these outcomes can be described in terms of the ‘relational scenarios’ of IWRM and the Tragedy of the Commons.
- Relational scenarios for catchment management are influenced by the nature of human-river relationships.
- Human-river relationships are influenced by or maybe even determined to some degree by attitudes.
- Attitudes towards the River are influenced by culture, history, location (relative to the River); use (recognised direct need) of the River.
- Attitudes can be used as a means of assessing and evaluating human-river relationships in terms of the likely relational scenario; as such attitudes can also then be used to guide and inform management decisions and actions.

The Kat River is a central and essential resource to all living in the Catchment. Residents of the Catchment have open access to it, and have reason to relate to it on many levels. The questions this thesis seeks to address are: ‘What are the existing attitudes towards the Kat River? How do they vary by group, use, location *etc.* in the Kat River Catchment? What do they tell us about the nature of the human-river relationships in the Catchment? And finally what are the implications of these attitudes and human-river relationships to catchment management and the two relational scenarios of IWRM and the Tragedy of the Commons.

CHAPTER 2

STUDY AREA: THE KAT RIVER CATCHMENT

2.1 INTRODUCTION

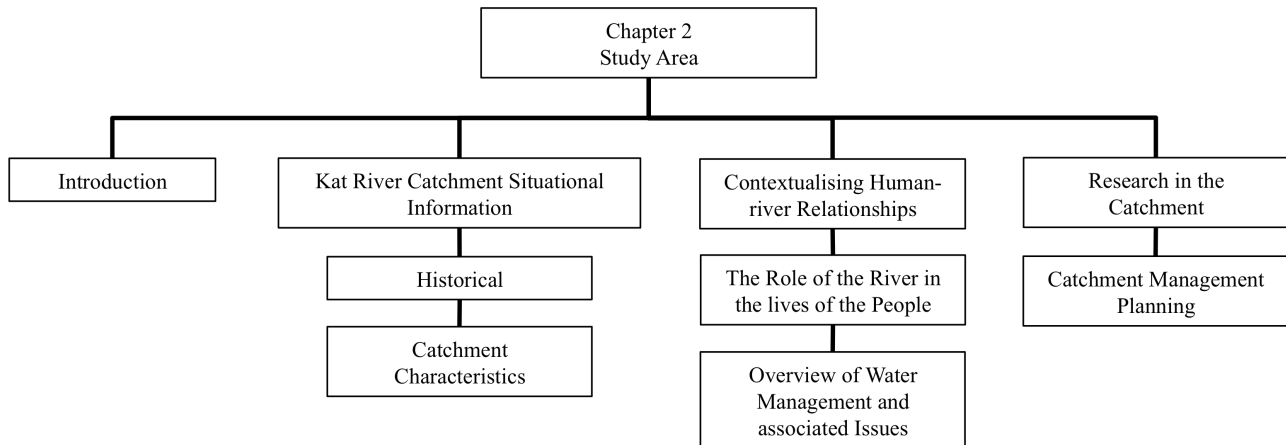


Figure 2.1 Chapter 2 Layout

The focus of this study is the Kat River Catchment, a small river basin in the Eastern Cape, South Africa (Figure 2.2). The Catchment was primarily selected because of the work and research that has occurred in it over the last 12 to 13 years, and because I was working in the Catchment on an IWRM orientated project aimed at developing a Catchment Management Plan (CMP) for the basin. Such research and work experience provided a suitable platform from which to explore the human-river relationships in the Catchment, and assess to what degree and how these relationships might influence the IWRM process occurring in the area.

The Kat River Catchment is in the interesting position of being one of the few catchments in South Africa to have developed a functioning Water Users Association (WUA) and, although still to be recognised by the Department of Water Affairs and Forestry (DWAF), an active Catchment Forum (CF) (Motteux, 2002; Burt *et al.*, in press). Both these institutions, as described in the National Water Act (Act 36, 1998) (NWA), are composed of local representatives of water user groups – the CF is mainly composed of local village representatives (Motteux, 2002; Burt *et al.*, in press). These institutions spearhead the IWRM drive in the Catchment, and present

platforms from which the many diverse stakeholders can participate in the management of their local water resources.

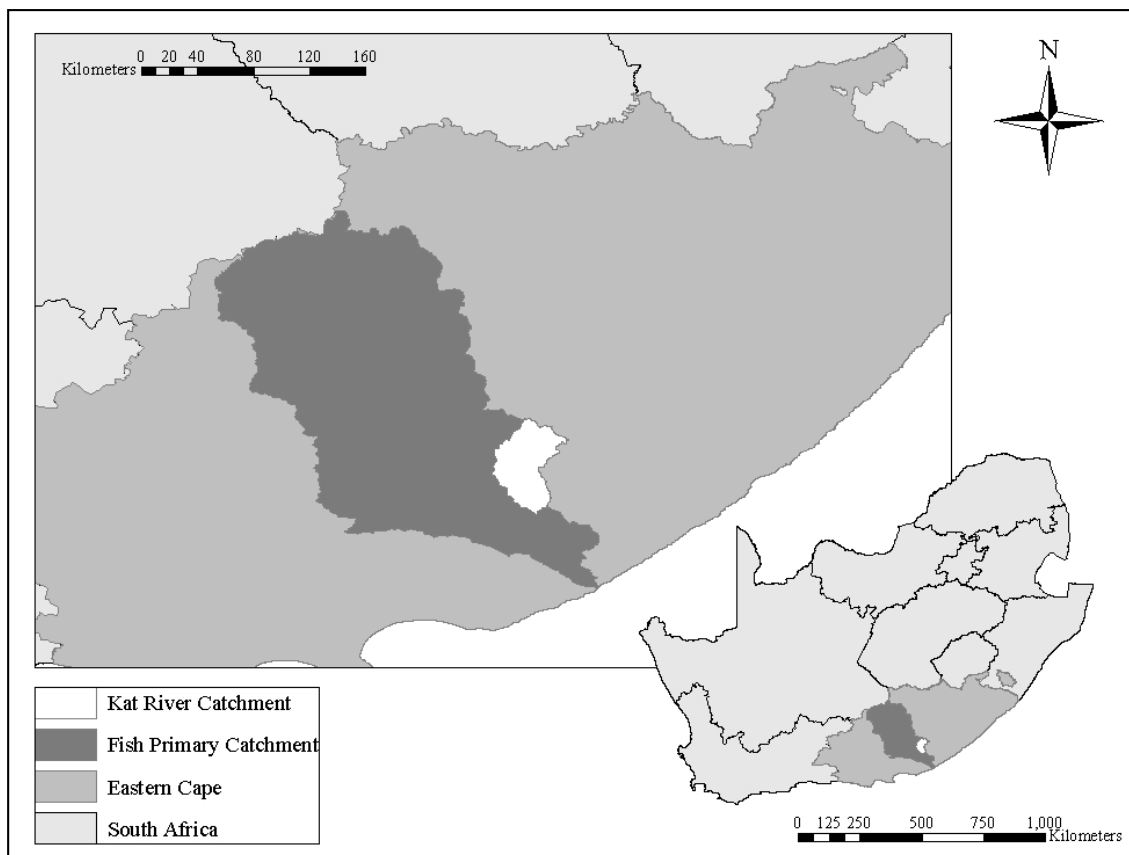


Figure 2.2 The Kat River Catchment within its: Primary Catchment (the Great Fish); its provincial context (Eastern Cape); and national context (South Africa).

These institutions and the progress they have made in moving towards resource negotiation and stakeholder capacitation represents a significant and active case study of IWRM in practice within a small-rural catchment. Essential to the understanding of the IWRM process in the Kat River Catchment is the development of an understanding of the context of the Catchment itself (Medema & Jeffrey, 2005). For, although the Kat River Catchment is small (1715km²) compared to other river systems, the Catchment is a place with a diverse cultural, spiritual and socio-ecological landscape (Fox, 2005). Such diversity presents interesting challenges for the integration of knowledge and the co-operation, collaboration and communication between stakeholders.

2.1.1 The Kat River Catchment and the National Water Act

Catchment Management is the principle purpose of the NWA (Act 36, RSA, 1998); it attempts to establish in South Africa a decentralised governance system by which all catchment related resources, specifically water and forestry, are managed in a sustainable manner (Gorgens *et al.*, 1998). Such a governance system has to recognise the need for an integrated approach and the essential role local decisions makers have in influencing the condition and availability of these resources (Gorgens *et al.*, 1998).

With the democratisation of South Africa a growing awareness towards the people's desire to be more involved in the management of their own resources grew (Gorgens *et al.*, 1998). This desire for more hands-on involvement and the recognition that local-resource users need to have a say to ensure that their concerns and needs are being met, resulted in 'public participation' being a key principle and activity of the NWA (Gorgens *et al.*, 1998).

IWRM is the foundation philosophy upon which the NWA was established (DWAF & WRC, 1996; Gorgens *et al.*, 1998). IWRM recognises that all users of a resource are interlinked and that management of the resource must occur within a framework that actively integrates and considers all users of that resource (Cap-net, 2005). This demands more than the involvement of the Department of Water Affairs and Forestry (DWAF) and water professionals (Biswas, 2004). Other government departments, considerations of socio-economics, legality, land use, and characteristics of catchment resource use must be considered and involved for IWRM to be effective.

It is within this context that the Kat River is politically conserved and managed. The implementation of the NWA, and its guiding IWRM principles (Table 1.1), in the Kat River Catchment, is the chief goal of the WRC funded CMP Project. The success of this project and other such research and management initiatives stand to be influenced by the attitudes present in the Catchment towards the River and its management.

2.1.2 The Kat River Valley & the Kat River Catchment...

The vernacular name of the Catchment is the 'Kat River Valley'; however, during our work in the area the various researchers became aware of the conceptual difference between references to the 'Kat River Catchment' and the 'Kat River Valley'. To most people the Kat River Valley is a physical place in space and time, it has historical association and clearly delineated geographic and social boundaries, and the people who live in it can easily visualise it and its communities and land uses. The 'Kat River Catchment', on the other hand, is a research concept that holds validity within an IWRM framework/context. It is a term used by researchers to denote the myriad collection of social and ecological relationships that are occurring within and around the Kat River. Its delineation is defined by the River's drainage area and watershed, all of which makes it less easy to visualise and its communities (social and ecological) conceptual and diverse in nature. Within the context of this thesis, reference is made to the Kat River Catchment.

2.1.3 The Kat River Water User Association Voting Regions

Three WUA voting regions were determined for the Catchment: the upper, middle and lower Kat (Burt *et al.*, in press) (Figure 2.3); these areas effectively divide the Catchment into three distinct groups of water users. These three groups are represented on the WUA, and their associated voting regions, hereafter referred to either as 'catchment regions' or simply 'regions'. These regions represent the geographic delineations around which water resource allocation and management is discussed; as such, I thought it best to use the regions as my points of comparison in this study (unit of analysis). Figures 2.4, 2.5 & 2.6 illustrate the different regions (upper, middle and lower) in the Catchment.

Refer to Figure 2.1 for more detail on characteristics.

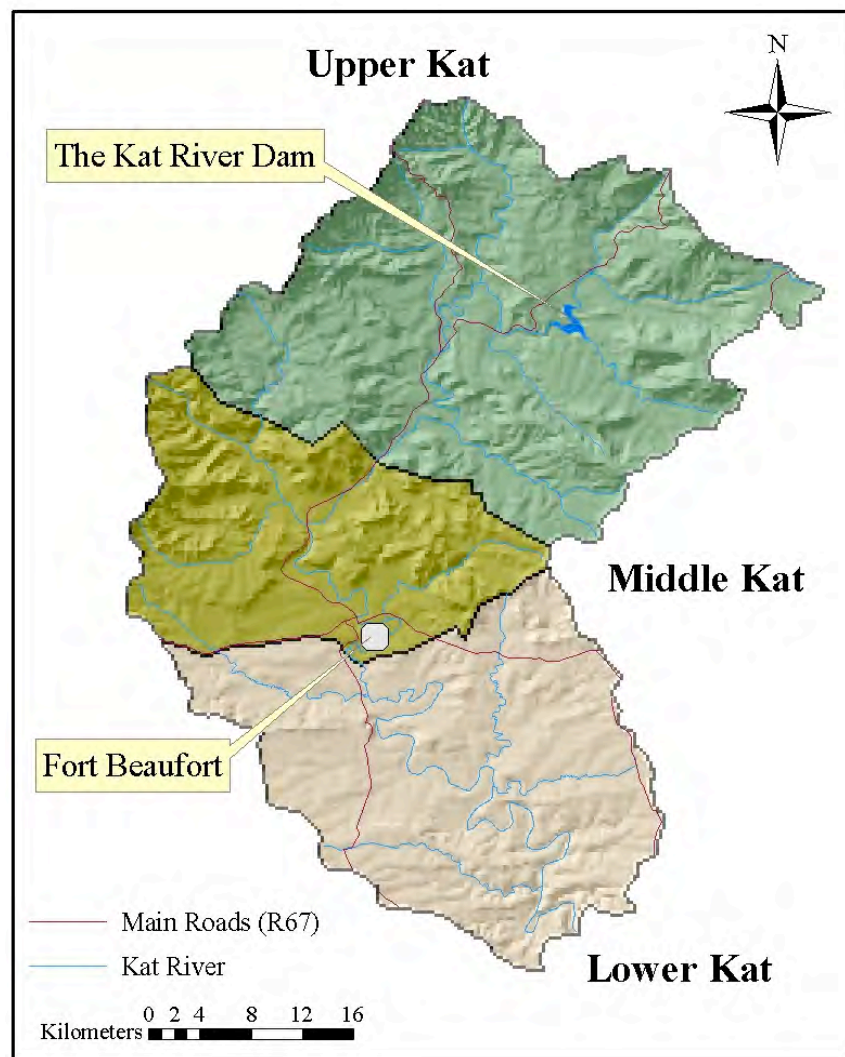


Figure 2.3 The Kat River Water User Association Voting Regions (Catchment Regions).

The following sections present contextual information on the Catchment and various contextual issues (biophysical, socio-economic, water resource use and distribution, history), both relevant to the overall Catchment and specific to the different regions. A more detailed situation assessment can be reviewed in Birkholz, 2006.

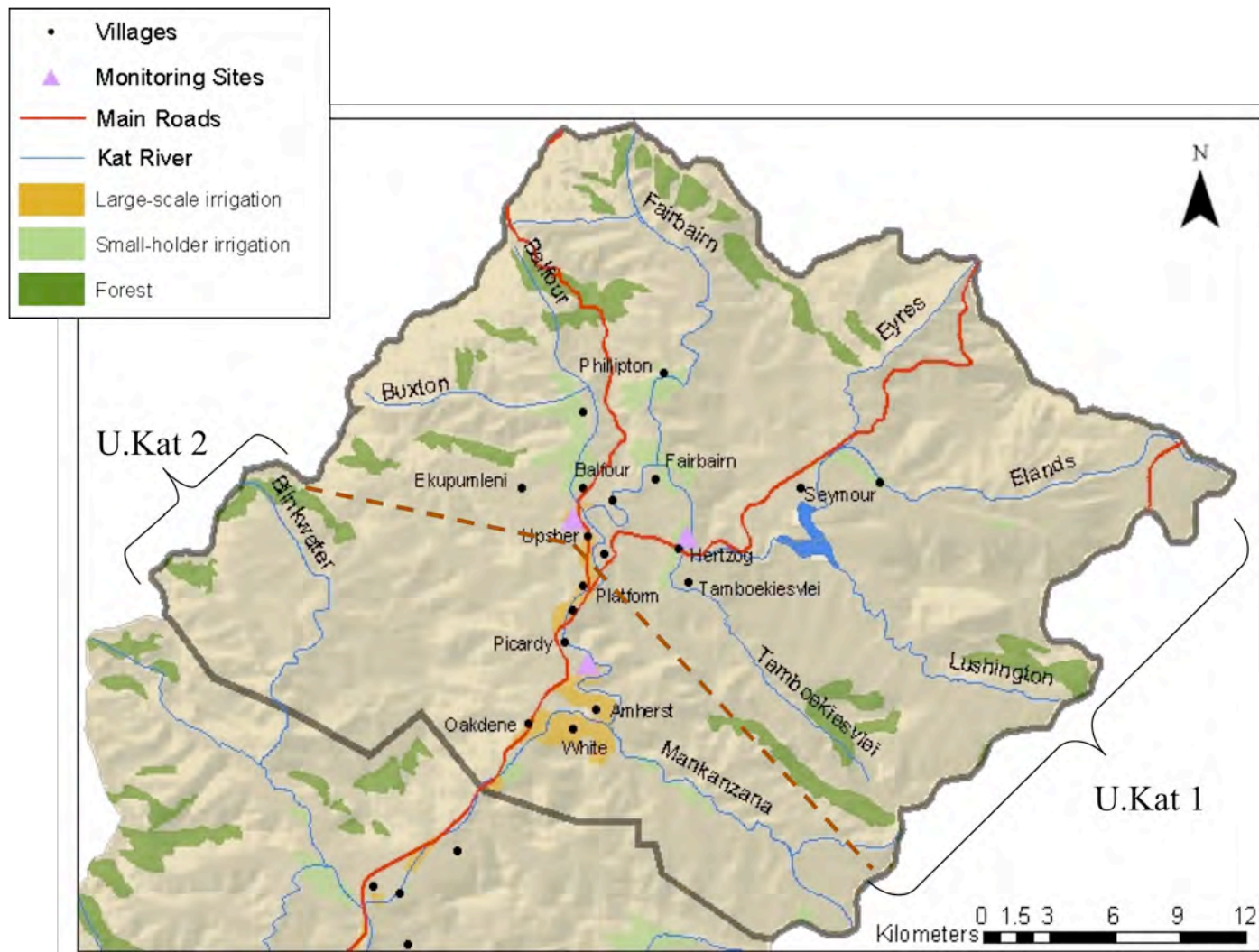


Figure 2.4 The Upper Kat.

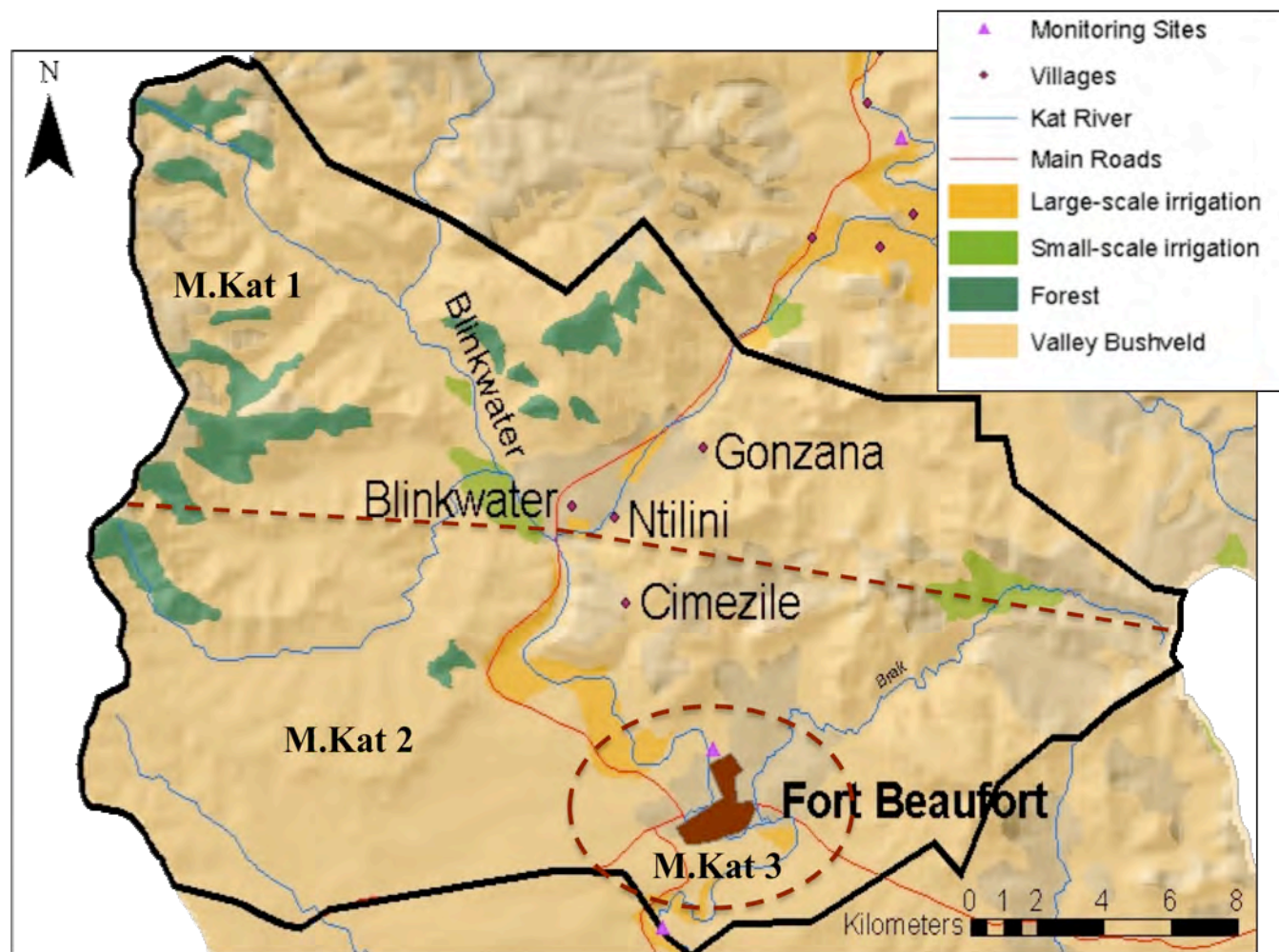


Figure 2.5 The Middle Kat.

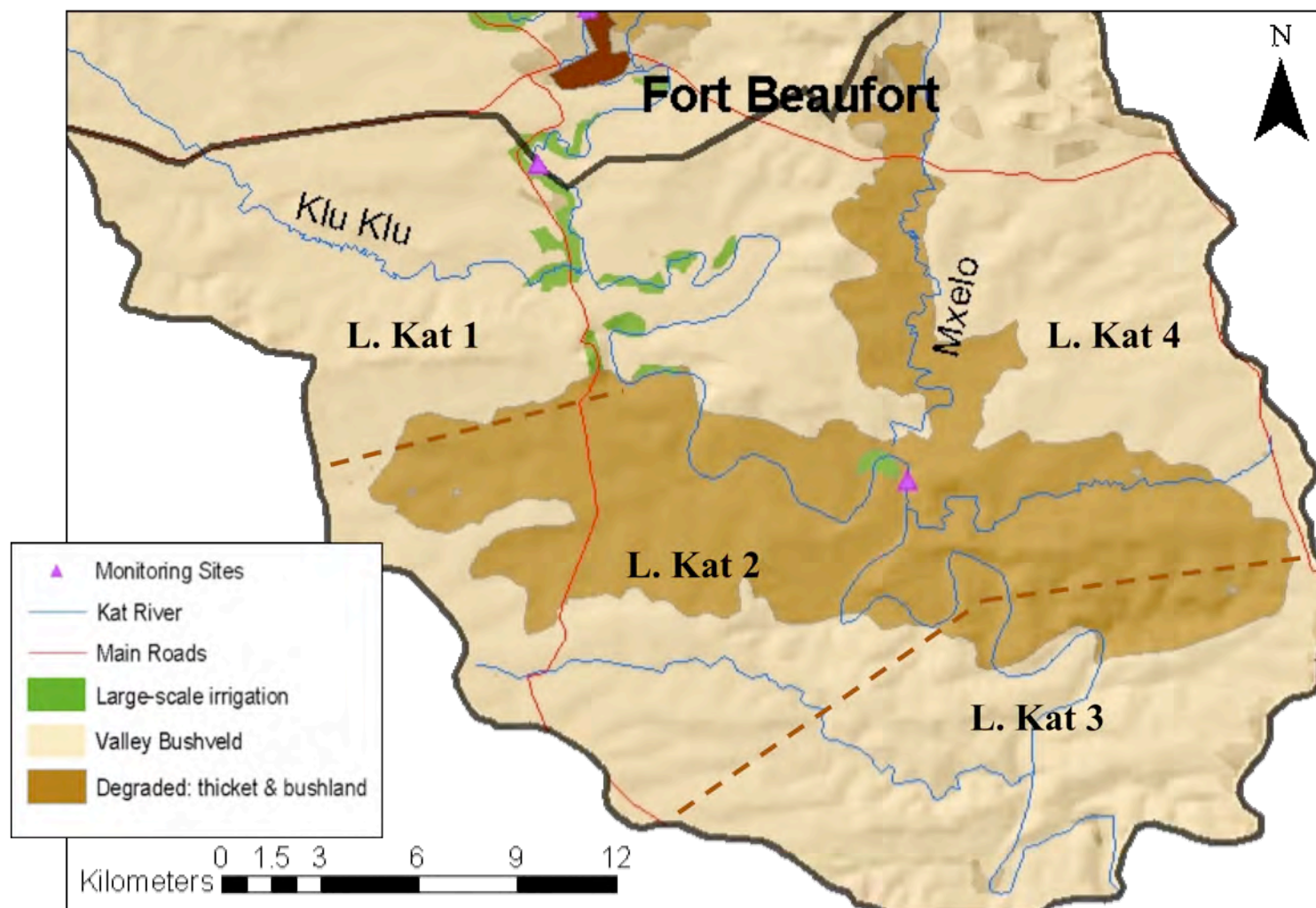


Figure 2.6 The Lower Kat.

2.2 THE KAT RIVER CATCHMENT SITUATIONAL INFORMATION

2.2.1 Historical Context

Listed below is a summary of those historical variables considered to have had direct impacts on the present situation (social, economic, and ecological). A fuller review of the history of the Catchment the reader is pointed to Logie et al. (2000), Motteux (2002), Ross (2004) and Ross (2003).

- The Catchment has a rich and diverse history. Situated on the eastern frontier of the Cape Colony, it has been the site of: numerous battles between the British and the Xhosa tribes; Maqoma's territory; and numerous historical monuments such as Fort Armstrong in the upper Kat.
- The northeastern and southeastern sections of the Catchment were part of the independent homeland of the Ciskei, which means that these areas have high concentrations of previously disadvantaged individuals and the land has been neglected and its physical management structures allowed to fall into ruin.
- Reoccurring historical trends:
 - o Lack of title deed e.g. 1829 – 1851 (original Kat River settlers); 1974-1994 (emerging farmers, and local village communities living on abandoned farms); 1994 – Present (emerging farmers and land reform and redistribution).
 - o Cultural/racial cycling e.g. 1800 – 1828 (Xhosa territory); 1829-1851 (Coloureds given land to farm and build homes); 1852-1972 (whites encroach and take over land, establish large commercial farms); 1972 – 1994 (northern reaches of the Catchment and the east bank annexed into the Ciskei most of the larger farms taken over by government officials, south west remains in South Africa); 1994 – present (the Catchment once again completely in South Africa and open to all races).
 - o Conflict and strife e.g. 1828-1951 (3 frontier wars, continued dispute between frontier settlers and Xhosa tribes to the east; theft; vagrancy); 1951-1972 (encroachment by white settlers on the west and conflict from Xhosa tribes on the east, land taken by white settlers and coloured farmers removed, apartheid and the establishment of the Ciskei as a self-governing state); 1972-

1994 (tensions created by Ciskei government, racial segregation, tensions for water between the Kat Irrigation Board and lower Kat Farmers, theft and tension issues over boarder); 1994 – present (land tenure issues, lack of trust between communities and government, struggles to re-establish farms in the upper Kat, theft, violence, lack of employment and sense of encouragement, tensions over water allocation between the different water sectors in the Catchment).

- o Government Attitudes *e.g.* 1829 – 1994 (racial segregation and prejudice, little aid, numerous wars, broken promises and little trust between the people and government); 1994 – present (lots of promises little fulfilment, wavering trust between people and government, aid beginning to come in, but lack of integrated communication between government departments results in unfocused and scattered empowerment and upliftment efforts, frustration over bureaucracy and distinct lack of acceptance of responsibilities behind the implementation of resource management plans.
- o Frontier territory *e.g.* 1829 – 1860 (physical frontier of the Cape Colony); 1860-1994 (political and racial frontiers, apartheid and the establishment of Ciskei); 1994-Present (research and social frontier, over ten years of working with the local stakeholders in implementing the principles of IWRM within the Catchment).

2.2.2 Catchment Characteristics

Both social and biophysical characteristics of the Catchment have been summarised in Table 2.1, the reader is directed to this table to get an overview of the Catchment and its social and biophysical situation.

Table 2.1 Summary of socio-ecological (and concerns and issues) characteristics in each region.

Catchment Regions	Upper Kat	Middle Kat	Lower Kat
Social Characteristics (Birkholz, 2006)	<u>U. Kat 1:</u> • Community farming schemes: vegetables & cotton. • Livestock (Subsistence). • Governmentally owned Commercial Forestry. • Katberg Leisure group & Amathole Heritage – tourism. • Seymour & Balfour main town/village. • Numerous land tenure issues (<i>e.g.</i> lack of title deeds; land claims; and conflict over land ownership). • Kat River Dam. <u>U. Kat 2:</u> • Emerging citrus. • Livestock (subsistence). • Mpofu Game Reserve (North West side of valley). • Small-scale vegetable production. <u>U. Kat 1 & U. Kat 2</u> • Mpofu District. • Original Stockenstrom District (Kat River Settlement). • Former Ciskei. • Frequent exchange of land between races, most times not on friendly terms. • Predominantly Xhosa and coloured population.	<u>M. Kat 1:</u> • Emerging commercial citrus. • Livestock (subsistence). • Predominantly Xhosa and coloured population. • Former Ciskei. • Mpofu Game Reserve. • Fort Fordyce Reserve. <u>M. Kat 2:</u> • Established Commercial Citrus. • Commercial Livestock (cattle) & Game Farming. • Mixed Xhosa, coloured & white population. • Former Ciskei on east bank of the River. <u>M. Kat 3:</u> • Fort Beaufort. • Mixed racial population. • Largest population. • Several townships and evidence of more to be built. • Only peri-urban/urban environment in the Catchment. • Local businesses support livelihoods of residents and/or the University of Fort Hare in Alice.	<u>L. Kat 1:</u> • Commercial Citrus. • Commercial Livestock (Cattle) & Game Farming (Kat River Conservancy). <u>L. Kat 2:</u> • Commercial citrus farms. • Commercial Livestock (Goats & Cattle) & Game Farming (Kat River Conservancy). <u>L. Kat 3:</u> • Sam Knott & Double Drift Game Reserves. • East bank of river former Ciskei. <u>L. Kat 4 (not included in study):</u> • Sheshego communal land. • Former Ciskei.

Concerns & issues	• Lack of Awareness around water use • Unemployment and few prospects even for matriculants. • Main sources of income: pensions & remittances. • Growing violence in rural areas, revolving around youth. • Lack of Capacity & Infrastructure for farming & community development. • Issues & tensions around land-tenure (e.g. lack of title deeds; land claims; and conflict over land ownership).. • Emerging citrus farms, still waiting for title deed. • Subsistence vegetable farms, lack of available market. • Subsistence Livestock, concern for soil erosion. • Direct domestic use of river, and/or community taps.	• Flooded citrus market. • Desire to expand but restricted by previous water scheduling requirements. • Commercial livestock, theft. • Game Farming, theft & illegal hunting. • Sewage flowing directly into river from Fort Beaufort, concern over water quality. • Impact of agricultural activities on Fort Beaufort Residents – crop spraying, health concerns. • Impacts of alien invasive species on the local vegetation, and sediment loads.	• Flooded citrus market. • Desire to have ensured water scheduling. • Unrestricted growth of enterprise. • Commercial livestock, theft. • Game Farming, theft & illegal hunting. • Communal land Sheshego, citrus & stock theft across the River. • Game Farming, theft & illegal hunting. • Sewage flowing directly into river from Fort Beaufort, concern over water quality. • Impacts of alien invasive species on the local vegetation, and sediment loads.
Ecological Characteristics of River (ecological Reserve assessment, PES¹) (Louw & Koekemoer, 2006)	<u>U. Kat Overall PES B/C² category:</u> • Geomorphology: C. • Hydrology: D. • Water Quality: C. • Riparian Vegetation: B/C. • Invertebrates: C. • Fish: B.	<u>M. Kat Overall PES C category:</u> • Geomorphology: D. • Hydrology: D. • Water Quality: B/C. • Riparian Vegetarian: C. • Invertebrates: C. • Fish: B/C.	<u>L. Kat Overall PES C category:</u> • Geomorphology: C. • Hydrology: E. • Water Quality: D. • Riparian Vegetarian: C/D. • Invertebrates: C. • Fish: C.

¹ Present Ecological State.

² A rating is described as a degree of change from reference conditions, ranging from 0/A (no change) to 5/F (max. change) (Louw & Koekemoer, 2006).

2.2.2.1 *Biophysical*

The Kat River is a small tributary of the Great Fish River, situated on the eastern littoral of South Africa (Figure 2.2). Stretching 147km from source to confluence, the River is fed by a catchment area of 1715km², just a little more than 5% of the total catchment area of its Primary system the Great Fish (Midgley *et al.*, 1994).

The northern reaches of the Catchment are enclosed in the northwest by the eastern end of the Amathole Mountain Range (Elandsberg & Menzieberg) and in the northeast by the Ndidma Mountains (Katberg) (Figure 2.7). The general topography of the Catchment – like most places in the Eastern Cape – is hilly and undulating. The hills of the Kat River Catchment become progressively flatter from north to south, a trend that is followed in one way or another by several climatic variables (*i.e.* precipitation (decreases) and temperature (increases)).

The decrease in altitude that occurs between the north (1540m asl. average) and south (659m asl. average) ends of the Catchment is a principle variable behind the climatic trends observed. In general the temperature fluctuations in the northern areas are greater and more variable both seasonally and diurnally than those in the south (Hill, Kaplan & Scott, 1990). The average annual summer temperatures for the entire Catchment range between 20 and 35°C, and the average annual winter temperatures range between freezing and 20°C (Magni, 1999). Winters in the northern reaches can be severally cold and frost and snow (mainly on the mountain peaks) do occur (Hill, Kaplan & Scott, 1990).

Although the average rainfall in the Catchment decreases towards the south, its variability increases (Midgley *et al.*, 1994). Because the Catchment is in a summer rainfall area there is a higher variability in rainfall during the winter months than summer months. The drought and non-drought periods appear to occur, on average, over ten year cycles. Due to this high variability of rainfall in the Catchment local farmers are forced to rely heavily on the dam and River for water for irrigation.



Figure 2.7 The Kat River, its tributaries and mountains.

2.2.2.1.1 Biophysical Condition: biomonitoring and the ecological Reserve

In terms of the findings of the WRC CMP's biomonitoring program (Birkholz, 2007) and the ecological Reserve study (Louw & Koekemoer, 2006), the Kat River and its associated tributaries are not in a poor condition (*i.e.* D-F REC) in terms of water quality and general ecological health. The ecological Reserve found the ecological condition of the River to fall within the suggested Recommended Ecological Class (REC) range of B, B\C, to C (relative to the regions of the Catchment) (Table 2.1) (Louw & Koekemoer, 2006). A REC is determined from an assessment of a degree of change from reference conditions, ranging from 0 (no change, A) to 5 (max. change, F) (Louw & Koekemoer, 2006).

The findings of the biomonitoring program indicate that the water in the River, in terms of available water quality guidelines (DWAF, 1996a & b), is of a quality fit for domestic and agricultural use (Birkholz, 2007).

2.2.1.2 *Socio-economics of the Kat River Catchment*

The total population in the Kat River Catchment was observed to decrease from 55777 to 49530 between the 1996 and 2001 nation census (Farolfi & Jacobs, 2005). It is very likely that this decrease in population size is directly related to the HIV/AIDS pandemic and migration of workers from the rural areas to urban or available employment (Farolfi & Jacobs, 2005). Figure 2.8 presents estimated population sizes for each region relative to race. From this figure it is observable that the Kat River Catchment is a multi-racial and cultural catchment, with a diverse array of related racial and cultural tensions and dynamics. Africans make up the largest race group with a population size that is usually more than 10 times the size of the combined population size of the other races (92% of the total Catchment population are Africans).

According to the national 2001 census information, the largest percentage of the population is between 15 and 34 years of age, (35%, N=76 858) (Figure 2.9) (Jhagoroo *et al.*, 2000). Within this age category there are more females (18%, N=76 858) than males (17%, N=76 858) (Figure 2.9). Whereas there appears to be a balance between the genders in the younger age range (0-14 years), Figure 2.9 shows that larger percentages of men are either dying or moving away in the older age ranges (15-over 65 years). Such trends may be indicating the effects of HIV/AIDS on the older population and the drive for young people, especially males between 15 and 35, to seek work in other areas.

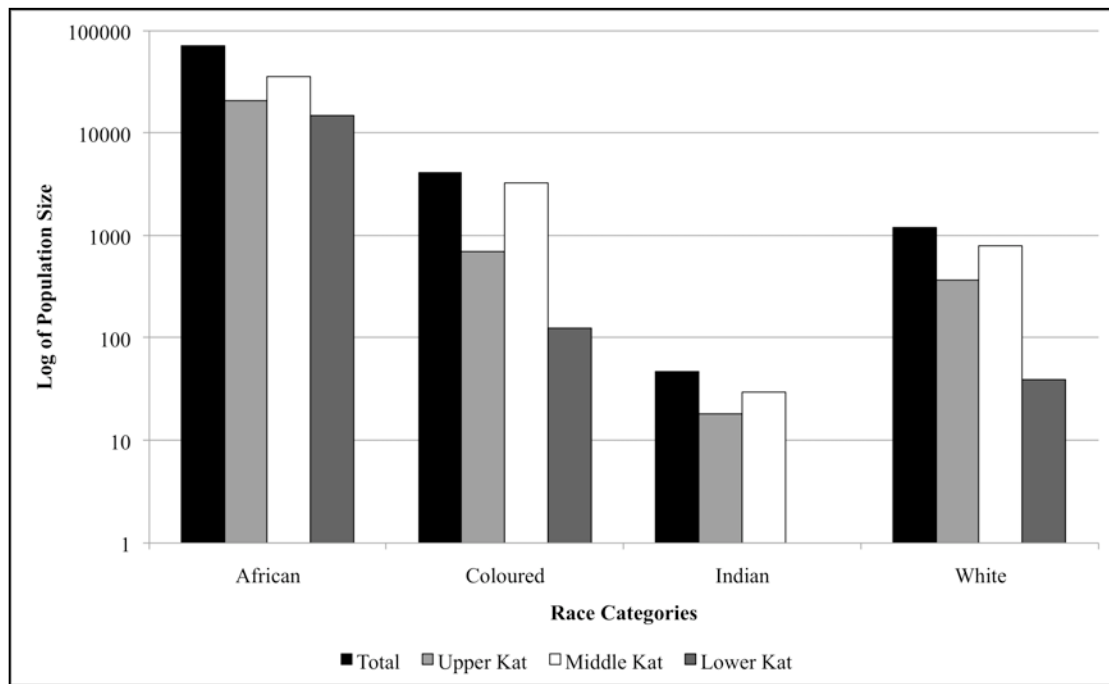


Figure 2.8 Estimated³ population size of each race group within the three regions (upper, middle and lower) and the total race populations for the Kat River catchment.

The majority of residents in the Catchment who have jobs are employed in either the agricultural or social sectors (*e.g.* government administration, domestic workers, local retail industry – Fort Beaufort *etc.*)(Farolfi & Jacobs, 2005). According to Motteux (2002) a large portion of the Catchment's population survive on government pensions, grants and remittances from family members working outside the Catchment. According to the 2001 census just over half (52%, N=43 931) of all residents over the age of 20 years in the Catchment have some secondary education and 6% possess some form of tertiary education (Figure 2.10) (Jhagoroo *et al.*, 2000).

³ Population estimates calculated from the statistical data available from the 2001 National census data (Jhagoroo *et al.*, 2000) relative to person per km² estimations. This is recognised to not be the best way to determine the population estimates, as the population in rural areas will not be evenly dispersed but occur in clusters (villages, farms, towns *etc.*). Unfortunately I was unable to obtain the census information relative to settlements and had to make the estimates based on the ward information. Additionally the demarcation of the census data relative to wards and not catchment boundaries often means a ward will fall partially in and partially out of the catchment boundary. Therefore, calculating the population/s for the Catchment and for the regions is difficult without more specific information concerning households and settlement sizes. As such it was decided to utilise population densities to calculate the relative regions' populations sizes.

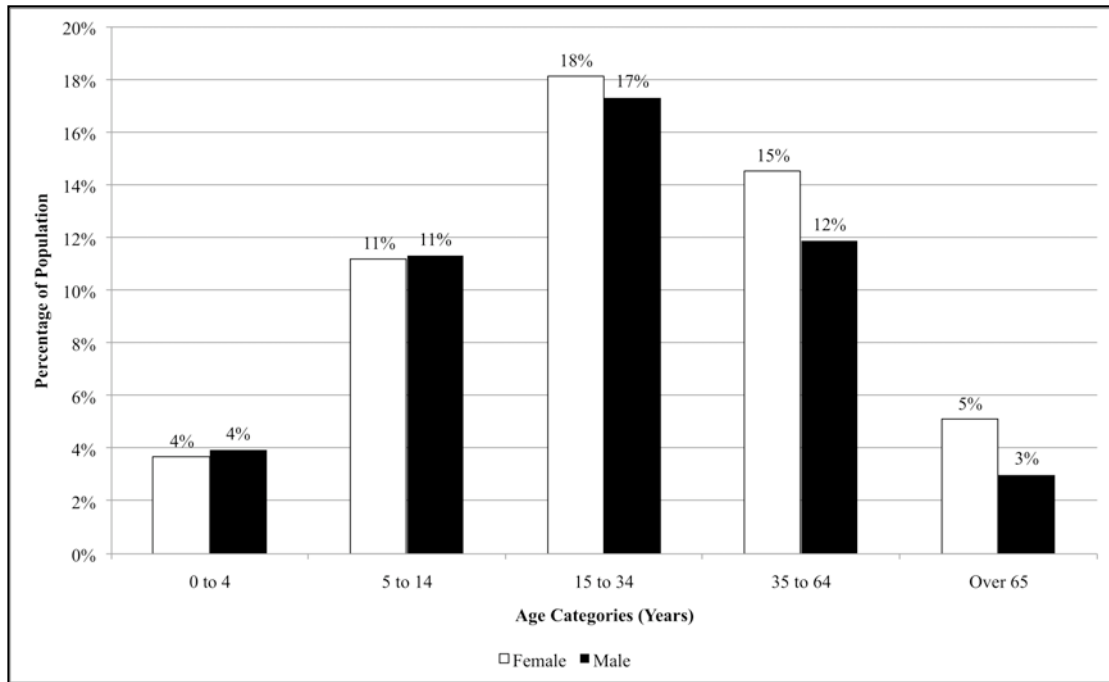


Figure 2.9 Distribution of age classes in the Kat River Catchment relative to Gender (source data Jhagoroo *et al.*, 2000).

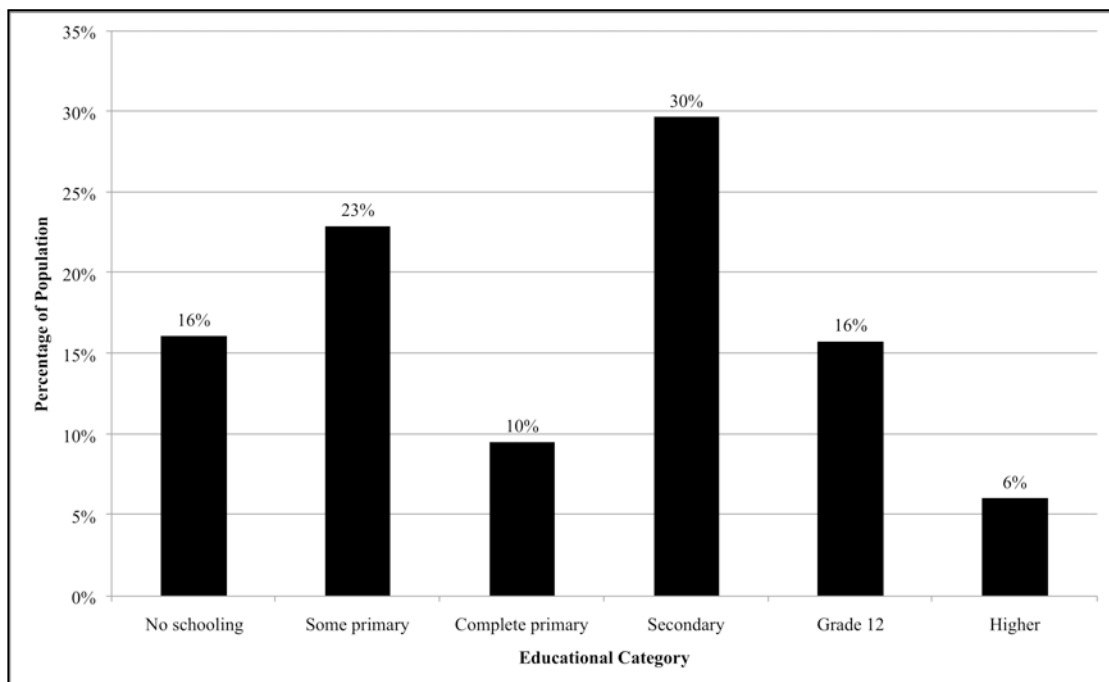


Figure 2.10 Highest education levels attained by over 20 year olds, 2001 census (source data Jhagoroo *et al.*, 2000).

Citrus is the leading economic export and most of the citrus produced is exported to international markets. Emerging⁴ commercial citrus producers are situated in the upper (U. Kat 2) and middle Kat (M. Kat 1 & 2) (Figure 2.4 & 2.5; Table 2.1). Established commercial citrus producers are situated in the middle (M. Kat 2 & 3) and lower Kat (L. Kat 1 & 2) (Figure 2.5 & 2.6; Table 2.1). There is an active relationship between both emerging and established citrus producers; many of the established producers have organised to help in the development of the emerging producers and the re-establishment of orchards that have fallen into disrepair.

Traditionally and culturally cattle are very important to the Xhosa people as they are often considered a sign of wealth and utilised in traditional ceremonies (Fox, 2005). Subsistence livestock farming occurs throughout the Catchment and commercial (predominantly cattle) livestock production occurs chiefly in the middle (M. Kat 2 & 3) and lower Kat (L. Kat 1, 2 & 3) (Figure 2.5 & 2.6; Table 2.1). Sheep and goats are present throughout the Catchment; however, most of these are managed on a subsistence basis. A few commercial farmers keep angora goats and mohair sheep in the lower reaches of the Catchment (L. Kat 2) (Figure 2.6).

⁴ Emerging Farmers in the Kat River Catchment, are generally black, previously disadvantaged farmers who at present are trying to establish themselves as commercial producers in the Catchment. These farmers generally own land given to them by the Ciskei Government, and manage relatively small farms (between 30 and 60ha).

2.3 CONTEXTUALISING HUMAN-RIVER RELATIONSHIPS IN THE KAT RIVER CATCHMENT

2.3.1 The Roles of the River in the Lives of the People

The Kat River is the backbone of the Kat River Catchment. As the primary water source in the Catchment it has played a significant role in structuring the settlements, farms and livelihoods of the people living in the area.

In the upper Kat the River is still the principal source of all domestic water requirements (*e.g.* drinking, cooking and washing Soviti, 2002). Motteux (2002) describes the people's uses of the River for domestic and agricultural purposes, its significance to livelihoods and social concerns. Fox (2005) described the spiritual and cultural significance of the River to the local communities as well as the important goods and services (*e.g.* reeds, medicines, fishing, mud) the people receive from the River. Rowntree & du Preez (2006) describe the river terraces that stretch out from the River along the valley floor, all of which are composed of rich alluvial soils that provide for fertile sites for agricultural activities when irrigated (Hartmann *et al.*, 1979; Magni, 1999). Locals in the upper Kat still enjoy the River recreationally, with people being observed swimming in it and enjoying themselves on the banks. Historically the incised meanders of the River in this area of the Catchment were seen to provide military protection; an example of this is the site selected to build Fort Armstrong, which in the 1800s was a bustling trading outpost and military stronghold.

In general the roles of the Kat River in the lives of the people in the middle Kat do not differ significantly from those described for the upper Kat; however, there is less of a direct reliance on the River for drinking water as water is piped to villages and to the town, and a greater use of the River for irrigation. Furthermore, in this region the River also played the role of political boundary between the Ciskei and South Africa. Many of the residents remember enjoying the River recreationally in the past, reporting having enjoyed swimming, boating, fishing, and picnicking next to it, but there is very little of this occurring today (pers. comms., Fort Beaufort residents and

citrus farmers, 2007). Additionally, even further back in time (1800s), the location for Fort Beaufort, like Fort Armstrong, was selected relative to the protective capacity the meanders of the River provided.

Like the middle Kat, the establishment of the Ciskei divided the lower Kat. In this region of the Catchment the River acted as a political border between the homeland and the republic, with the land on the east bank falling under Ciskei governance and the land on the west bank falling under South African rule. This border has posed considerable security risks for the farmers on the west bank, as even today people from the east bank cross the River to steal from their orchards (pers. comms., lower Kat farmers, 2006; 2007).

The lower Kat is the second largest of the three sections in the Catchment. Although there is known to be a diverse Xhosa population in the region it is not known to what extent the River plays a significant role spiritually and traditionally in this section. The River has significant economic value for the citrus farmers, and in addition many of these describe playing in the River as children (pers. comms., lower Kat farmers, 2006; 2007). As in the middle Kat, however, the extent to which the current generation enjoy the River recreationally appears to have decreased considerably (pers. comms., lower Kat farmers, 2006; 2007).

2.3.2 Overview of Water Management & Associated Issues in the Kat River Catchment

Typical for the Eastern Cape the majority of the Kat River's tributaries are ephemeral and, therefore, unreliable sources of water in most years. The Balfour River is one of the few perennial tributaries below the Kat River Dam (Figure 2.7). Prior to the building and completion of the Kat River Dam (S32°35'; E26°45') in 1969, the Kat River itself was ephemeral (at least in the lower reaches).

The Kat River Dam, also referred to as the Seymour Dam, was built to provide an assured supply of water to the irrigators in the Catchment (Magni, 1999). A more detailed description of the Dam, its structure, size and capacity can be found in

Birkholz (2006). The Dam fell under Ciskei control during the apartheid period, but the Kat River Irrigation Board continued to play a significant role in its maintenance and management and were the main users of the water. The Kat River Dam represents the primary mechanism for water management in the Catchment; it is essentially the chief source of 'controllable' water and given its position in the Catchment and the Mean Annual Runoff (MAR) dynamics of the area, it is believed that the dam impacts streamflow and geomorphic processes throughout the Catchment (Rowntree & du Preez, 2006).

Weirs are a common feature along the length of the Kat River; there are approximately three weirs per km of River, although this frequency varies within the different regions of the Catchment (*i.e.* the incidence of weirs in L. Kat 1 is higher than in most other areas). Weirs are believed to influence the geomorphic processes and structure of the River channel, and alter the hydrologic dynamics immediately upstream and downstream of them (Rowntree & du Preez, 2006). Although most weirs in the Catchment do not exceed 3m in height, several in the lower reaches are as high as 6m. Unfortunately very little is known about their actual impact on the ecological integrity of the system, but it is clear that they have a high social value, especially amongst farmers. Their role in capturing and storing water for irrigation and other water uses makes them important variables in water management in the Catchment.

Irrigated Agriculture is the primary economic industry throughout the Catchment. Under the previous Water Act (Act 54, 1956) water rights were connected to land ownership so if a farmer owned land adjoining an unregulated River he or she was free to utilise a portion of water for their purposes without the need for a license (Tewari, 2005). When the Kat River Dam was built in 1969, water allocation from the Dam occurred through individual scheduled rights. These rights were based on hectares under irrigation and ensured the holder entitlement to water for the irrigation of those hectares. This connection between scheduled water allocations and hectares, however, meant that those individuals scheduled for an amount of water from the Dam were not legally able to expand their enterprises beyond their scheduled hectares.

According to Ninham Shand (1997), an estimated 1596ha of land was under irrigation in 1997; it is not sure what the extent of irrigation is today. An estimated 1127ha, of this irrigated land was in the upper and middle Kat and had scheduled water rights (Ninham Shand, 1997), the remaining irrigated land occurred in the lower Kat. Farmers in the lower Kat made the decision not to be part of the scheduling, but to rely on surplus water coming down the river.

For those individual farmers who chose to remain outside of the scheduled area, they farmed at a risk as they were not assured an allocated amount of water from the Dam and, therefore, relied on what was in the stream for their irrigation needs, this being the low flow (and floods) in the River. These farmers were, however, not restricted in expanding their enterprises by water allocation and were free to do so at their own risk. Non-scheduled farmers could request water from the Irrigation Board at a cost, but were not guaranteed it.

Under the new NWA (Act 36, 1998) water rights are no longer connected to riparian or land ownership, and all users of water (not including domestic entitlement drawn from a local source) must register their water use and apply for a license. This new system effectively does away with the scheduling system, and future water allocations will be made through licensed allocations. This generates a complex social dynamic amongst the various stakeholders in the Catchment. The established scheduled citrus farmers in the middle Kat, those who have paid for and managed the Dam over the last 27 years or so, via the Kat River Irrigation Board, and who have been restricted in their growth because of scheduling, now have to entertain the idea of including the non-scheduled citrus farmers from the lower Kat in allocating water from the Dam (Burt *et al.*, 2007). This would mean that the lower Kat farms would have to receive water to sustain their expanded industry (Burt *et al.*, 2007). The middle Kat farmers are themselves eager to expand so are reluctant to hand over water allocation to the lower Kat farmers who have been free to expand at their own risk (Burt *et al.*, 2007). The lower Kat farmers see the new system as a 'clearing of the slate', whereby everyone should now be free to request the water they need from the Dam, be licensed for it and ensured that allocation (relative to climatic influences *e.g.* drought) (Burt *et al.*, 2007; pers. comms., Lower Kat farmers, 2006 & 2007). Both sets of farmers are

fully aware of the influence the development and re-establishment of the upper Kat farms will also have on increasing the demand for water allocations (Burt *et al.*, 2007). The upper Kat and middle Kat farmers are aware of the potential influence these established users could have on the allocation process, so approach the negotiation of water very cautiously and would prefer to slow the process down, allowing them to fully grasp and understand the situation before agreeing to any sort of allocation plan, which might take water away from them.

Following the establishment of the Ciskei (late 1970s to early 1980s) many of the farms in the upper Kat were sold or abandoned by their white owners, who were forced to leave under the new political dispensation (approximately 150 farms, Logie *et al.*, 2000). Although this should have impacted the productivity of the area, records at the Katco citrus co-op. in Fort Beaufort show that in spite of the exodus of white farmers in the upper Kat, for much of the 1980s the farms still continued to produce (pers. comms.. Lower Kat farmer, 2007). This did change in the late 1980s to early 1990s, with the division and allocation of farms to black farmers by the Ciskei parastatal Ulimicor and the eventual end of Apartheid in 1994. During this period many of these farmers could not obtain the funding they required to maintain their orchards and farming activities sufficiently so several farms were either neglected or abandoned. Additionally the shifts in ownership (and associated management practices) and the eventual confusion and conflict over land rights in the upper Kat (specifically U. Kat 1, Figure 2.4) eroded farm borders and decreased the water used for irrigation in this area. This decreased use of scheduled water in the upper Kat increased the amount available for the non-scheduled users – by virtue of leaving more water in the River. Upper Kat residents and farmers are concerned that this may mean they have lost that scheduling; this concern is augmented particularly in regards to their lack of capacity and infrastructure to utilise the scheduling (Burt *et al.*, 2007; pers. comms. upper Kat farmers, 2006 & 2007). These farmers are, therefore, very cautious when it comes to water allocation negotiations, as they maintain that they do not want to lose allocation because of their present lack of ability to use it (Burt *et al.*, 2007). They are presently receiving and/or seeking government assistance in re-establishing farming activities in the upper Kat.

Unfortunately, the situation in the upper Kat is compounded by the lack of information about farming activities. The available farm boundaries mapped out for the upper and middle Kat still present the active farms in the early 80s, those farms present before the expulsion of white farmers from the area. Since that time these boundaries have been significantly altered, as the land first went to Ciskei politicians, then state and then private ownership, and now is either used by community co-ops or lies fallow and under land tenure disputes. It is difficult, therefore, to ascertain the full extent of agricultural activities happening in the upper Kat, and the lack of this information presents a barrier to the development of water allocation scenarios for the Catchment, as information on the needs of the upper Kat cannot fully be determined.

At present the Kat River is an open system, meaning that there is more water available than demanded. This situation, however, could change so it is important for the agricultural users to be negotiating and establishing scenarios and procedures for water allocation from the Dam. Interestingly, although riparian rights are now no longer connected to land ownership, without clear ownership of land farmers cannot establish themselves and, therefore, apply for a water license. Essentially this could reveal that indirectly water use and licensing is still dependent on land ownership and, therefore, continues to disadvantage numerous farmers in the upper and middle Kat, who are currently attempting to address the situation out with the Departments of Land Affairs, Agriculture and Water and Forestry.

Although access to water for irrigation is the major concern, other issues are also seen to be important. For farmers and residents in the middle Kat there is growing concern over the impact of alien invasive vegetation in the Catchment, and the affects this vegetation has on erosion and local species. Farmers are concerned that the spread of alien vegetation in the Catchment is increasing the sediment load in the River, which ultimately blocks and reduces the depth of their weirs.

The residents of Fort Beaufort have increasing concerns over the quality of water they receive from the Municipality (pers. comms., Fort Beaufort residents, 2006). There are numerous reports of raw sewage leaking into the River, and of locals having to be hospitalised with water related illness and complaints (pers. comms., Fort Beaufort

residents, 2006). In addition, several residents have concerns regarding the health and environmental effects of the crop sprays that get administered to the citrus orchards both upstream and downstream of the town (pers. comms., Fort Beaufort residents, 2006; 2007). These they fear pose potential health risks especially for those with lung related complaints (*e.g.* asthma, allergies and sinus problems) (pers. comms., Fort Beaufort residents, 2006; 2007).

As in Fort Beaufort, water quality is of considerable concern in the lower Kat. The town, situated upstream of the lower Kat farmers, affects the quality of the water that reaches these farmers. Farmers also complain about the poor sewage treatment and the raw waste getting into the River (pers. comms., lower Kat farmers, 2006; 2007).

2.3.3 The Roles of the River & Water Management Issues: Influence on Human-river Relationships.

Throughout the preceding sections several aspects important and influential to human-river relational dynamics and, therefore IWRM, have been discussed. The roles the River plays in the lives of an individual or community add value to the River. Additionally, many of these roles promote direct interaction with, and knowledge of, the River. Such values and interactions influence the attitudes people have concerning the River and its resources, and consequently their behaviour and actions. Each role of the River represents aspects of the relationships the people of the Kat River have with the River, and from the various roles described previously it can be seen that the River is an important environment in their lives, and one with which all residents of the Catchment, whether directly or indirectly will be relating with. Even the fact that these people are collectively recognised as ‘Kat River’ residents or stakeholders, ties the River to them and their identities.

In spite of the significance of the River to the lives of the Kat River residents, and the collection of different roles it plays in their lives, the River and water resources are synonymous in the minds of people; therefore, issues connected to water resources are likely to influence the relational dynamics between people and the River. The above description of the various water management issues present in the different regions of

the Catchment provide some insight into the variables likely to be influencing human-river relationship dynamics in the Catchment. Furthermore, knowledge of these issues provides a platform from which to begin observing and identifying the expression of various attitudes related to water management and their implications for IWRM in the area. IWRM will need to take account of, and in many respects be developed relative to, the attitudes in a catchment

2.4 RESEARCH IN THE KAT RIVER CATCHMENT

The Kat River Catchment has for the last thirteen years (since 1995) been the focus of several intensive studies led by Rhodes University Researchers and students (Prof. Kate Rowntree, Dr Nicole Motteux, Ms Jane Burt, Mr Alistair McMaster, and Mr Monde Ntshudu) and funded by the National Research Foundation (NRF) and Water Research Commission (WRC). Much of this research has been aimed at initiating the formation of stakeholder led catchment management groups, like the Water User Association (WUA) and Catchment Forum (CF), as defined under the new NWA (1998) (McMasters, 2002; Motteux, 2002).

Researchers focused the formation of these groups on participation by local stakeholders in catchment management (Motteux, 2002; Burt *et al.*, in press). Dr Nicole Motteux, Prof. Kate Rowntree and Ms Jane Burt successfully assisted the transformation of the Kat River Irrigation Board into the Kat River Water User Association (KRWUA), and assisted a large group of previously disadvantaged stakeholders to form their own Catchment Forum (Burt *et al.*, in press). Such work requires that the stakeholders be informed about the NWA and the ecological Reserve and its associated activities.

2.4.1 Catchment Management Planning in the Kat River Catchment

As a result of this facilitation a WRC project (WRC Project no. K5/1496: A stakeholder driven process to develop a Catchment Management Plan for the Kat River Valley), proposed by the stakeholders, was developed in order to take their knowledge and management capacity a step further. The project included the ecological Reserve assessment, water allocation negotiations (and related yield research) and capacity building activities that would facilitate the development of a CMP by the stakeholders who would thereafter implement, manage and maintain the CMP themselves.

As set out in the NWA, the CMP must be developed according to the principles of IWRM, and should include all stakeholders' opinions and situations. Additionally all

opinions and needs should be identified via a participatory approach that allows for all stakeholders to have a voice in the sustainable management of their common resources. IWRM, within the NWA considers three main principles fundamental for its implementation (Chapter 1 of the NWA; RSA, 1998):

1. Equitable allocation of resources to all peoples involved;
2. Environmental sustainability; and
3. Economic development.

All of these must be carried through into the development of the CMP for the Kat River Catchment. This process was seen nationally as a first of its kind, with few other examples of stakeholder initiated catchment management projects available. It therefore presented itself as an invaluable case study in stakeholder participation, local water resource management institution development and the implementation of the NWA and IWRM in a small agricultural catchment context. Table 2.2 summaries the objectives of the CMP process.

Table 2.2 Objectives of the CMP process in the Kat River Catchment (O’Keeffe & Birkholz, 2004).

• Development and design of a catchment management plan. • Development of guidelines for developing CMPs for small catchments. • Resource Directed Measures (RDM) for the Kat River. • A water allocation plan for the initiation of licensing in the Kat River Valley. • Capacity and upliftment amongst the stakeholders of the Catchment. • Long-term monitoring plan for assessment of success of the CMP and the biophysical aspects of the river and its associated catchment resources.

The catchment management planning process was initiated in 2004 and will hopefully continue into the future (Rhodes University’s involvement ended at the end of 2007).

CHAPTER 3

RESEARCH PHILOSOPHY & DESIGN

3.1 INTRODUCTION

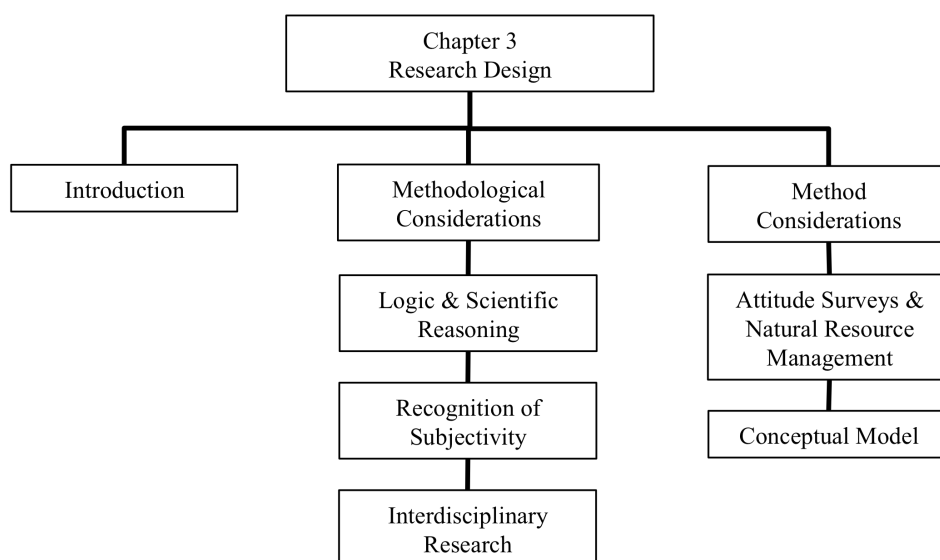


Figure 3.1 Chapter 3 Layout

This thesis has endeavoured to go deeper into the human-river relationships in the Kat River Catchment, via the exploration and analysis of the identifiable attitudes attributable to these relationships. In so doing it has had to lean on the observations and experience gained through working with the stakeholders around water management issues. It is from such observations and experience that the initial belief developed that a better understanding of the attitudes stakeholders have towards the River is fundamental for the promotion and development of IWRM. It was observed that attitudes attributable to human-river relationships played a significant role in the expression of various relational scenarios: in the case of this thesis the ‘tragedy of the commons’ and IWRM (parasitism vs. mutualism).

First and foremost this is an exploratory data analysis study. It aims to create thinking and probable hypotheses about human-river relationships and the expression of relational scenarios (*i.e.* parasitism vs. mutualism) from relative attitudes and their qualities. In doing so it makes use of both quantitative and qualitative methods and

data sources, and skips between disciplinary knowledge pertaining to the various aspects of interest, namely: social and ecological systems; attitude theory; IWRM; the ‘tragedy of the commons’; and the Kat River Catchment. The following chapter discusses the general methodological approach behind this thesis, and presents the conceptual model that has guided the direction of thought and analysis within the study, relative to potential relational scenarios. Figure 3.1 illustrates the layout of Chapter 3.

3.2 METHODOLOGICAL CONSIDERATIONS

3.2.1 Logic & Scientific Reasoning

A topic such as logic and scientific reasoning will generally end up in the arena of philosophy, and a debate around the perceptions of truth and its evaluation. Having browsed through such literature and debate I have no intention of replicating it here; instead I will discuss my thinking around the route taken in this thesis. As discussed in the introduction, this is first and foremost an exploratory study; it seeks to establish probable hypotheses but does not start by making one.

Logic is defined by Skyrms, (1986 pg. 4) as *‘the study of the strength of the evidential link between the premises and conclusions of arguments’*; it is the evaluation of an argument based on perceptions of truth and what conclusions might derive from such perceptions. In general there are two accepted ways to viewing logic and the processes of scientific reasoning. The first is Deduction and the second Induction; generally the distinction between the two is based on the generation of knowledge from either general to specific or specific to general principles, respectively (Rothchild, 2006). In reading the works of Charles Peirce one could argue that in exploratory data analysis the presence of a third system to reasoning, namely Abduction, is applicable (Yu Chong, 1994). In not wanting to complicate the methodological process too much I refrained from pursuing this third option and restricted my thoughts to the conventional options, but mention it here as a valuable logic system to integrative (qualitative and quantitative) research.

As pointed out previously, the distinction between deductive and inductive processes can be seen to lie within the direction of generality (Rothchild, 2006). Logic is the pursuit of truth, and Skyrms (1986) suggests that the true distinction between induction and deduction is based not on items of generality but on validity and probability. He argues that a more accurate distinction between the two perspectives on logic is in the definitions of deductive validity and inductive strength; inherent within these definitions is the measurement of the ability to trust the conclusions.

Theories or hypotheses are the central premises utilized in both social and natural sciences to generate knowledge. Within this context the inductive approach is considered to generate theory from observation, and the deductive approach to test theory with observations (Vickers, 2006) (Figure 3.2; Table 3.1). Conventionally the deductive approach has appealed more to scientists, as the risks associated with accepting a false hypothesis are considered less than those associated with the inductive approach (Harvey, 1969). In saying this, however, it is not implied that induction is a flawed logic, only that there lies within inductive inferences a larger probability of accepting or generating a false hypothesis. This, therefore aligns with what Skyrms (1986) means when he suggests that validity and probability are the two distinctive qualities of deduction and induction, respectively.

Different scientific communities (and indeed non-scientific communities as well *e.g.* historians, philosophers, and educators) have responded in contrasting ways to the issues of validity and probability related to deduction and induction. Before going into the choice of logic for this thesis, the following section briefly outlines the relationship logic and the sciences have.

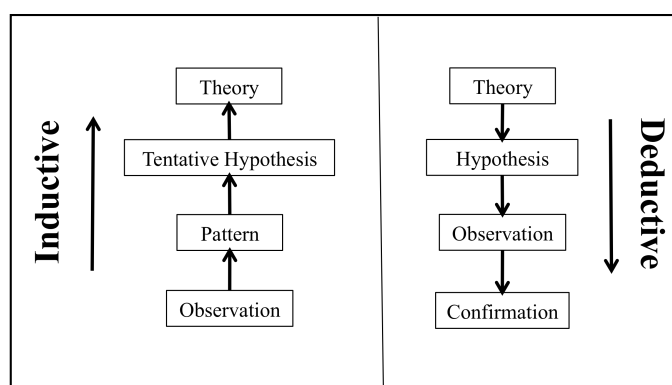


Figure 3.2 Conceptual framework of the Inductive and Deductive Processes

Table 3.1 Differences in approach to the Inductive and Deductive Processes.

Induction	Deduction
• Bottom-up approach; • Start specific and develop general conclusions; • Open-ended & exploratory (especially when starting); • Starts with data collection, examines data for patterns & constructs a theory from these patterns.	• Top-down approach; • Start general and develops specific conclusions; • More narrow in nature and is concerned with testing and confirming hypotheses; • Starts with theory that is actively tested to confirm or disprove hypothesis.

3.2.1.1 *The Issue of Logic & Scientific Communities*

Science as a logic driven process has found itself, in one way or another, defined relative to the preferences and perspectives of the time. Francis Bacon (1561 – 1626) is largely accredited as being the founder of modern scientific thought in the 17th century; Bacon's use of induction provided a powerful logic alternative to the more conventional Aristotelian and scholastic dogma of the time (Rothchild, 2006). Moving forward to the 20th century, Karl Popper (1902 – 1994) denounced the use of induction in science and promoted deduction and the theory of Falsification instead (Yogesh, 1994). Although later in his career Popper acknowledged that science did indeed need inductive logic, his theory persisted and essentially transformed the objective of science from the generation of truth to solving problems (Yogesh, 1994). In between and succeeding both men came an assortment of others: Thomas Bayes (1702 — 1761) and Bayes' theorem; David Hume (1711-1776) and the theory of causal inference; Rudolf Carnap (1891 – 1970) and his views on the problem of induction; Thomas Kuhn (1922 – 1995) and Kuhn's paradigm. These men contributed their views to the logic debate and directly and/or indirectly influenced the dimensions of scientific thought and paradigm creation throughout the scientific community.

Within the different scientific communities, how a theory is viewed and used will influence the collective knowledge generated and passed on to initiates (Kuhn, 1970). This, therefore, influences the way people come to understand how and why they know what they know (epistemologies). The epistemological differences between social and natural sciences originate from the logic approaches accepted within the paradigms around which a scientific community is established (Kuhn, 1970). In this regard the extent to which valid assumptions (laws) are required within a scientific paradigm will influence the likely choice in logic approach.

Rothchild (2006, pg. 5) says that *'In science, the importance of our viewpoint when examining information of any kind cannot be too strongly emphasized, for how we look at a thing determines what we see.'* It appears that those sciences generally interested in social dynamics and human character tend to be ready to accept more

probable theories and, therefore, clustered around an inductive approach to understanding (David & Sutton, 2004). Alternatively, those sciences that are focused on aspects of 'nature' and the biological have tended to seek more valid assumptions and, therefore, to cluster around Popper's view of deduction and falsification (David & Sutton, 2004).

Deductive approaches are essentially considered explicative, whereas inductive approaches are seen as ampliative (Vickers, 2006). What this means is that whereas induction in the social sciences is amplifying and generalising our experience, broadening and deepening our empirical knowledge, deduction, in the natural sciences, is ordering and rearranging our knowledge without adding to its content (Vickers, 2006). If this is true, the logical outcome is on the one hand a science that has an open body of generalised theories, which it uses to generate understanding and knowledge about observations and experiences, and on the other hand a science that has a collection of specific theories that it has tried to prove valid.

As shifts away from conventional reductionist thinking have occurred (List, 1992; Biswas, 2004), concurrent with a growing awareness of the need for integrated and inter-disciplinary research (Abel, 1998; Redclift, 1998; Kinzig, 2001; van Dijkum, 2001), the response of both scientific communities has been to attempt to develop more integrated and holistic theory and process around their accepted epistemologies, for example: environmental psychology, environmental anthropology, environmental sociology; and the natural sciences equivalent – environmental science. These are inter-disciplinary scientific communities associated with obvious parent paradigms, paradigms that have ceased to be able to explain or encompass fuller explanations for natural trends. These shortcomings in explanations, within disciplinary paradigms, have created a crisis and in responding to this crisis disciplines have sought to develop more integrated research approaches. New inter-disciplinary communities are still, however, associated with the larger parent communities and, therefore, utilise the parent epistemologies in the generation of their approaches to research problems. Where these parent epistemologies still fall short, these new inter-disciplinary communities will be seeking to develop new more holistic paradigms and, where there are new paradigms under consideration, there must be an orientation around a

preferred means of viewing and researching that paradigm (Kuhn, 1970). Therefore, we arrive back at the issue of logic.

The issue of logic in many respects provides a philosophical and conceptual foundation to scientific endeavours. It is because of its foundational characteristics that it is important to ascertain which logic approach the different disciplines have chosen to cluster around. But it is also necessary to begin to identify which foundation this new view of integrated and inter-disciplinary research is basing itself on.

3.2.1.2 *The Significance of Logic to this Thesis*

Establishing communication and bridging the division between social and natural sciences is especially relevant to the study of human-environment relationships. Such relationships cannot be effectively explored from the perspective of a single paradigm, and require the co-operation and coordination of the diverse epistemologies and paradigms that exist within the various sciences to build more holistic understandings of the dynamics of human-environment relationships (Redclift, 1998).

The still much-unexplored landscape of human-environment relationships and specifically human-river relationships in the Kat River Catchment opened itself to exploratory research. Such research has few previously deduced, holistic, assumptions and therefore cannot be restricted by the fear of the probability of developing a false hypothesis. To a large extent socio-ecological exploratory research requires probable inductive inferences to enable the generations of new more integrative theories to natural resource management and research. Indeed it could be argued that within the evolution of more holistic scientific paradigms induction will be essential. In this regard I have selected to utilise conventional inductive reasoning to make possible my exploration of human-river relationships in the Kat River Catchment.

Briefly before moving on, I believe it is important to highlight that, although deduction and induction have here been portrayed as mutually exclusive avenues to scientific reasoning, they are probably most effective when not viewed as such. As Popper himself found, science needs inductive logic as well as deductive knowledge to develop (Yogesh, 1994). Instead of the two systems being considered as separate processes it is probably more correct to view them as two aspects of the same reflective process (Harvey, 1969). Induction generates probable hypotheses that deduction validates or refutes and so the process continues and scientific thought evolves (Harvey, 1969).

3.2.2 Recognition of Subjectivity

As an inductive study, it is important at some point to raise the issue of subjectivity. I raise it here and throughout this thesis through the use of 'I' in the text. The assessment of human-river relationships in the Kat River Catchment has been made through a series of conceptual frameworks and analysis tables, each of which I have developed (relative to current literature and theory) to attempt to make the assessment process as structured and as objective as possible. I recognize that this has been my journey with this information and therefore likely to have been influenced by my own attitudes and worldviews; in light of this I openly acknowledge the presence of subjective interpretations and actively encourage further testing and validating of my findings and suggested theories.

3.2.3 Interdisciplinary Research

The holistic, system-orientated perspectives of IWRM depend on generating an understanding of both social and ecological system dynamics; therefore interdisciplinary research is fundamental to IWRM initiatives (Abel, 1998; Redclift, 1998; Kinzig, 2001; van Dijkum, 2001). Likewise is it important for research into human-environment relationships (Berkes & Folke, 1998; Gunderson & Holling, 2002; Inglis, 2008). In this regard the present study has attempted to develop context from inter-disciplinary perspectives. Its association with the Water Research Commission's Catchment Management Project (described in Chapter 2, and here after

referred to as the WRC's CMP Project) has meant that information from a range of disciplines (*e.g.* ecological, toxicological, entomological, hydrological, geographical, psychological, educational, sociological, historical *etc.*) could be utilised in developing understanding around the human-river relationships in the Kat River Catchment. Having said this, it must be pointed out that a full review and analysis of all this information would be beyond the scope of an MSc thesis; therefore the dominant discourse of this study is concerned primarily with the social system's perspectives of the River and makes extensive use of theory from social and environmental psychology.

In summary, this study is an exploratory data analysis that endeavours to find a pattern with respect to the attitudes associated with human-river relationships and potentially influencing relational scenarios in the Kat River Catchment. It seeks to contribute to the conceptual or qualitative understanding of human-river relationships via an inductive, mixed methodological approach.

3.3

METHOD CONSIDERATIONS

3.3.1

Attitude Surveys & Natural Resource Management

Questionnaire-based surveys are a popular method for collecting data relating to the knowledge, attitudes, and behaviour of people (Schnetler, 1989; Fink, 1995). As far back as Moses, surveys, censuses and polls have been administered to generate information on sample populations (Weisberg *et al.*, 1989). They are utilised in political, socio-economical and ecological arenas to gather the data needed to answer the many important questions of modern society (Weisberg *et al.*, 1989).

Surveys have the advantage of providing systematic, unbiased quantitative information on a wide range of people within a brief amount of time (Schnetler, 1989); however, they also have the disadvantage of carrying a high financial cost, are limited in the extent a respondent's reply can be explored, and interviewer and respondent affects (Schnetler, 1989). Survey data can provide: fairly accurate descriptions of abstract and general attitudes towards an idea or object; the evaluation of an idea or object; perceptions of reality; levels of knowledge; preferences and wishes; fears and concerns; and certain socio-demographic information (Trent, 1995). Surveys, however, provide less accurately the salience of the idea or object, sensitive socio-demographic information (*e.g.* income), actual behaviour, needs, and reasons for opinions (Trent, 1995). Survey data cannot provide information on how a given individual will behave in varying situations, nor how an attitude might change over time (Trent, 1995).

In terms of social monitoring and assessment for natural resource management, attitude surveys have been widely used in determining the general attitudes and/or values a population group has concerning an environmental issue, concept and/or item. Attitude surveys have been utilised to generate information about global opinion of the environment (Heberlein, 1981; Dunlap & Scarce, 1991; Dunlap *et al.*, 2000) and issues and/or components related to it (Environment B.O.P, 1995; Arnold, 2004; Lipchin *et al.*, 2004). Further examples of the use of surveys is in the assessment of: the knowledge and attitudes of private forest owners to nature

Conservation - Sweden (Uliczka *et al.*, 2004); the perceptions of people regarding the Millennium Development Goals – Europe (MA, 2005); public expectations regarding the use of natural resources in a catchment – Columbia (Trent, 1995); landscape preferences and attitudes towards water conservation – New Mexico (St Hilaire *et al.*, 2003); and the collection of baseline information regarding key social and economic factors affecting decision-making – Australia (Byron *et al.*, 2006).

Within a democratic society surveys and polls provide policy makers with an ear to the voice of the people. The same is true for natural resource management and related legislation and policy; it is more likely that such legislation will be effective if it has the ‘buy-in’ of the relative population of people, be they resource users/stakeholders, local residents of an urban or rural area, a country’s national population *etc.* Managers can make management plans *ad nauseam*, but if they do not have a link with and understanding of how people at the interface with the resource relate to it, there is a high potential that none of their plans will succeed. Within this context attitude surveys can be a valuable monitoring tool both for the social assessment of the relationships people have with resources and for the generation of projected relational scenarios of possible impacts on and outcomes for resources that arise as a consequence of the dynamics of these relationships.

Information for this thesis has to a large extent originated from an attitude survey I undertook amongst the Kat River residents to: 1. Gather information concerning their relationships with the River, and 2. Provide specific information concerning their attitudes towards the River and key related variables (Box 4.1).

3.2.2. Additional Sources of Information

My work in the Kat as co-ordinator of the WRC funded project gave me opportunity to not only be actively involved in the facilitation workshops, but to attend and participate in KRWUA and CF meetings, interact and talk to stakeholders throughout the Catchment, organise and participate in all project tasks (*e.g.* ecological monitoring, ecological Reserve assessment, the investigation into legality of water use, organising and working with other researchers and students, participate in the

construction of a negotiation support tool – KATAWARE (Farolfi, 2007)). Through my involvement and participation in these tasks, meetings and workshops I was able to generate a record of observations and information concerning the water use situation in the Catchment, and the general interactions people have with the River. This record of observations and information I used to contextualise the findings from the survey (Chapter 4). Additional sources of information included: an extensive literature review – academic and grey literature; conversations with other people who have undertaken research in the Catchment on various aspects (*e.g.* Prof. Robert Ross, Leiden University); and a photographic record of the Catchment, its River and its people.

3.2.3 Conceptual Model

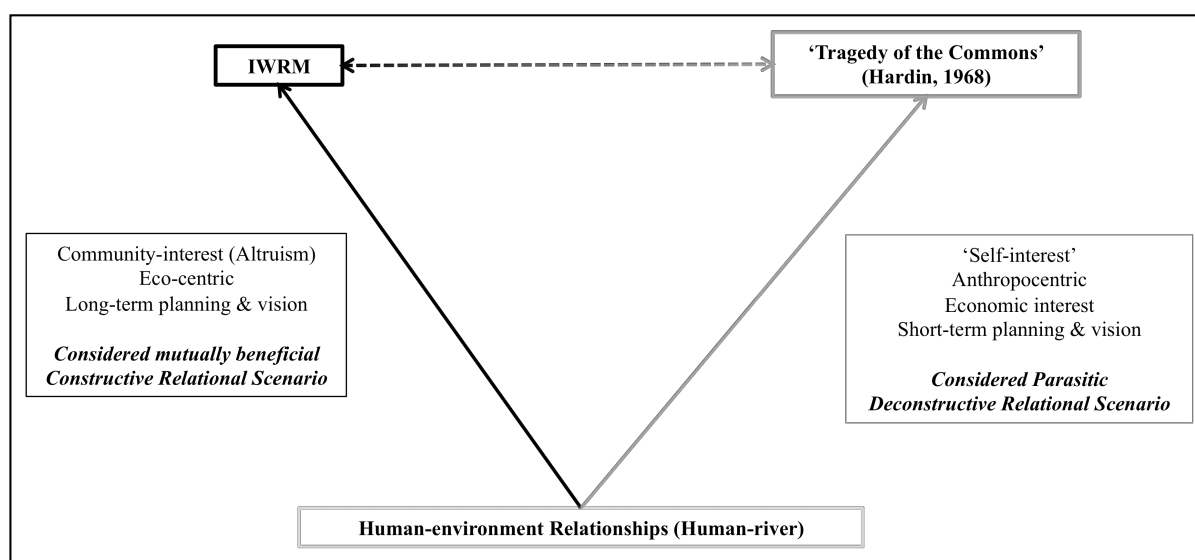


Figure 3.3 Conceptual Model and Inductive Guide to the Study.

Explorative research, like any good scientific endeavour, requires a map or guide to help focus its objectives and activities. In the absence of a research hypothesis, this thesis has made use of the conceptual model, shown in Figure 3.3, to guide the direction of thought and analysis around the information gathered for the Kat River human-river relationships. This model was based firstly on the literature on IWRM and the tragedy of the commons (Chapter 1) and on experience gained from working in the Kat (Chapter 2). Of particular interest to this study is the implication of these two philosophies for water resource (catchment) management. These are shown in the conceptual model (Figure 3.3) as the potential expressions (outcomes) of human-

environment (human-river) relationships. IWRM is considered in this thesis to represent a mutually beneficial and sustainable relational scenario (constructive), Hardin's (1968) Tragedy of the Commons scenario is considered here to represent a parasitic, non-sustainable relational scenario (destructive). Several characteristics believed to influence the expression of these scenarios have been listed on either side of the model (Figure 3.3).

3.3 SUMMARY

In summary, this chapter has presented the general theoretical and methodological approaches to this thesis. It has highlighted the role of explorative, inductive design, and presented the conceptual framework relative to which this thesis makes many of its assumptions. In respect to specific methods, namely the collection of attitude data, the next chapter (Chapter 4) presents a detailed description of the steps undertaken and methods utilised.

CHAPTER 4

THE KAT RIVER ATTITUDE SURVEY

4.1 INTRODUCTION

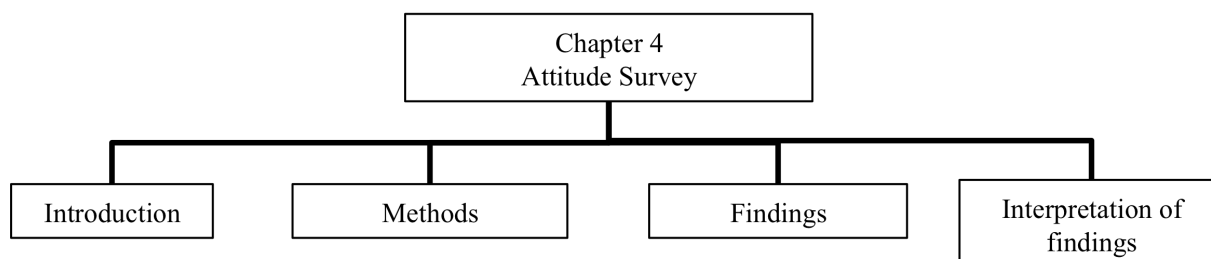


Figure 4.1 Chapter 4 layout

In Chapter 1 the theory related to human-river relationships was reviewed; in Chapter 2 the study area was described; and Chapter 3 outlined the methodological thought behind the study. The process undertaken to survey attitudes and to gather information on the social perspectives relating to the Kat River are detailed in this chapter (outlined in Figure 4.1), which also outlines and interprets the findings.

This study represents a explorative assessment of the attitudes connected to the human-river relationships in the Kat River Catchment. Although attitudes are considered hypothetical psychological constructs (Heberlein, 1981), the application of attitude theory has been found to provide valuable information on the influence of perception, cognition and behaviour on people's interactions with the social (Visser & Cooper, 2003) and ecological (Irwin, 2001) environments. It is assumed that in order to better understand the human-river relationships in the Catchment information is needed on the attitudes of the Kat River residents concerning the Kat River.

The objective of Chapter 4 is:

To provide data and information about the attitudes held by residents of the Kat River Catchment towards the Kat River and water resources.

Key Questions:

1. What attitudes do residents of the Kat River Catchment have towards the Kat River?
2. How do these attitudes differ between the different regions of the Catchment (*i.e.* upper, middle and lower)?
3. What do they tell us about the relationships between the people and the Kat River?

The following section describes the methods utilised, and variables considered in developing the attitude survey for this study. Such methods and variables are important in contextualising the process to the Kat River and, where possible both the advantages and disadvantages of each (method or variable) is outlined and described.

4.2 METHODS

4.2.1 Data Collection

A cross-sectional⁵ assessment was undertaken to survey the residents' attitudes towards the Kat River, its use and its management. To facilitate this assessment, an attitude survey was used as the primary data collection method; secondary information sources included personal observations of: WUA & CF meetings; stakeholder interactions between themselves and between them and the river and water resources; water use practices and discussions around them; historically influenced challenges and issues regarding water use and allocation *etc.* Grey literature on: the Kat River, water use in the Kat River, stakeholder involvement in the Kat River, ecological monitoring of the Kat River *etc.* Academic articles on: development in the Kat River, stakeholder involvement, institutional transformation in the Kat River *etc.*

This is a descriptive study as it presents a wide data set relating to a heterogeneous range of people. This data was used not only to describe the attitudes these people have towards the Kat River, but also in the development of hypotheses around issues that affect the development and expression of these attitudes in the context of water and river management (Chapter 5). Fink (1995, pg. 25) describes descriptive survey designs as those that aim to '*produce information on groups and phenomena that already exist.*'

4.2.1.1 Questionnaire Construction

The questionnaire or operational instrument is of the utmost importance in a survey, and can have the greatest influence on the reliability (consistency) of information obtained (Schnetler, 1989; Fink, 1995). As a respondent's response to a question is indirect evidence for their attitude, it is important to ensure that the basis upon which a specific attitude, belief, perception or value is inferred is sound (Black, 1999).

⁵ A sample, or the entire population (if feasible), of a diverse population is assessed at a single point in time; as opposed to the continued assessment of a selected sample through time, *i.e.* a longitudinal study

Developing valid instruments for the measurement of attitudes, values and beliefs is more difficult than developing instruments to measure cognitive aspects (*e.g.* knowledge and skills) (Black, 1999). People are continuously exposed to stimuli that readily change their attitudes and opinions in a short space of time; therefore, the predictive validity of an attitude instrument can be very low (Black, 1999). Consequently the focus of an attitude instrument is on construct validity, and of providing a cross-sectional measure for a single temporal period (Black, 1999).

It is generally advised by attitude survey professionals that any endeavour to determine attitudes towards an issue or object should first seek to locate a previously developed instrument that has been tested for validity and reliability (Fink, 1995a). Unfortunately, because of the specific focus of residents' attitudes towards the Kat River, no previously tested instrument exists. Therefore, one had to be created specifically for this exploratory study. In order to ensure validity and reliability, the development of most attitude surveys require more financial and human resources than were available for this study. The instrument developed, therefore, requires further testing (for validity and reliability) and refinement.

The questionnaire developed for this study was based around the central variables (attitude variables) listed in Box 4.1.

Box 4.1 Central attitude variables considered for questionnaire (instrument) construction.

- 'attitudes towards the Kat River';
- 'attitudes towards the management of the Kat River';
- 'attitudes towards the use of the Kat River';
- 'attitudes towards personal actions related to the Kat River'; and
- 'attitudes towards the study of or research into the Kat River'.

The final instrument consisted of five sections made up of both quantitative and qualitative questions. Quantitative questions primarily involved a 5-point Likert scale ranging from strongly agree to strongly disagree, with neutral in the middle (representing either both agreement and disagreement or neither agreement nor disagreement), and a demographic section. Additionally, all sections were coded

categorically, effectively enabling the quantitative incorporation of nominal and ordinal information from all the sections. Qualitative sections included open questions concerning a respondent's verbal opinion on the various concepts explored, a question on 'what kind of person they believe the River would be' and their reasons for selecting the ten photographs they liked best. The use of both quantitative and qualitative questions enabled a deeper exploration of the key attitude variables (Box 4.1).

4.2.1.1.1 *Developing Survey Questions*

Structured questions are generally considered to provide more reliable information than open questions in attitude surveys (Fink, 1995a; Blaikie, 2003). In light of this, more structured questions were included than open. Question construction and content is highly dependent on: knowledge of the type of respondents to be interviewed; the aim of the research; the size of the test sample; the choice of the method for data collection; and the choice of method for analysing the data (Schnetler, 1989; Fink, 1995a; Black, 1999).

My knowledge of respondents was broad and fairly extensive, as I had been working with Kat River residents for two and a half years before questionnaire construction began. In addition, my work in the Catchment had included an extensive review of literature concerning the area and its inhabitants (both present and historical). From this knowledge I decided to administer the questionnaire across different cultures and social groups. Within these cultures and groups I understood that varying levels of interaction occurred either directly or indirectly (*i.e.* through water use) with the Kat River. From a review of historical documents I had gained an understanding of previous attitudes and beliefs, as well as other factors influencing the creation of the present socio-cultural and ecological landscapes (*e.g.* political, legal, religious and spiritual *etc.*). My work also had enabled me to develop an understanding of the varying educational levels (Figure 2.10) in the Catchment, and the language restrictions I would have to consider in developing my questions and their meanings.

The aim of the survey was to identify and describe the present attitudes the residents of the Kat River Catchment have towards the River. Reoccurring variables or themes, in the relevant literature (pertaining to: management, psychology, sociology, geography; ecology and the environment), were recorded and reviewed. From this list a range of variables considered useful in identify and describing attitudes were selected (Table 4.1). These variables provided the skeleton for the construction of the instrument while the questions and relevant research themes provided the flesh and content to the questions (Table 4.1). Seven themes for analysis were developed with respect to their associated theory and assigned to each attitude variable to aid with data analysis (Table 4.1).

Table 4.1 Attitude variables behind instrument construction and related themes identified from relevant literature.

Attitudes Variables	Related Concepts and Theory	Analysis Themes
1. Attitudes toward the River:	•Place attachment (Backlund, 2005; Kyle <i>et al.</i>, 2005; Todd & Anderson, 2005); •Environmental Ethics (Inglis, 2008); •Traditional, cultural, spiritual connections to the River (Fox, 2005; Bernard, 2003); •Stewardship & heritage; •General beliefs held concerning the River.	•T1: Sense of connection with River; •T2: Perceptions of the cultural and generational significance of the River; •T5: Perceptions of the River.
2. Attitudes towards the management of the River:	•Public Participation (Davidson & Cotter, 1991; White <i>et al.</i>, 2005; Burt <i>et al.</i>, in press); •General Resource Management (Heywood, 1995; Flora, 2000; Lal <i>et al.</i>, 2001; Inglis, 2008); •IWRM (GWP, 2000; Jonch-Clausen, 2004; UNDP/GWP, 2004; Medema & Jeffrey, 2005; Pahl-Wostl & Sendzimir, 2005); •Water & related infrastructure management (GWP, 2004; Hart & Hart, 2006); •Environmental Risk Management & Perception (Gregory <i>et al.</i>, 2006); •Environmental Ethics (Inglis, 2008).	•T3: Perceptions of management of the River & water resources; •T2: Perceptions of the cultural and generational significance of the River.

3. Attitudes towards the use others make of the Kat River:	•Sense of Community (Davidson & Cotter, 1998; Davidson & Cotter, 1991); •Environmental Risk Management & Perception (Gregory <i>et al.</i>, 2006); •Environmental Ethics (Inglis, 2008); •Socio-economic Judgements; •Types of use (basic human need vs. economical; use of water saving technology vs. inefficient water use technologies).	•T4: Sense of community respondents have longitudinally down the River; •T7: Opinions into use aspects related to the River.
4. Attitudes towards personal uses of the Kat River:	•Sense of community (Davidson & Cotter, 1998; Davidson & Cotter, 1991); •Place attachment (Backlund, 2005; Kyle <i>et al.</i>, 2005; Todd & Anderson, 2005); •Environmental Ethics (Inglis, 2008); •Spiritual and religious values (Crystal & Harris, 1995). •Altruism vs. Self-interest; •Ability to change to better water and river management practices; •Degree of fatalism within oneself towards being able to 'make a difference'.	•T1: Sense of connection with River; •T4: Sense of community respondents have longitudinally down the River; •T7: Opinions into use aspects related to the River.
5. Attitudes towards research:	•Recognition of its importance and benefit; •Identification of it as not being in competition with development needs.	•T6: Opinions concerning research into the River;

Initially, a sample based on a 100 interviews was aimed for; however, it was recognised that given the time and resources available this number could vary. It was understood that this was a relatively small population and, because of the eligibility criteria selected (see below), would not be completely representative of the diverse, multi-cultural population inhabiting the Catchment (Figure 2.8). I decided to obtain as broad a range of information as was possible from the respondents who could be interviewed. Hyman (1955) points out that often the goals of a survey can be multiple and, consequently, a researcher will seek to obtain information that will satisfy a wide range of objectives. The gains from such multi-content surveys can be considerable, but the loss in quality of research is also considerable (Hyman, 1955). It was felt, however, that the exploratory nature of this research called for broader examination of attitudes, aiming to describe the current attitudes in terms of variables related to human-river relationships. Therefore, some loss in research quality may have

occurred in extending the content of the instrument was considered acceptable. If this research were to be carried further, it should look at ‘fine-tuning’ the instrument based on more specific aims and current knowledge.

The choice to undertake administered interviews with respondents further supported the decision to create a broad and diverse set of questions and utilise varying methods (*i.e.* open and closed questions, Likert Scale, use of photographs) in administering them. The personal interaction that would take place between the interviewer and respondent would allow for the assessment of a respondent’s reaction to, and understanding of, what was being asked, and allow the interviewer to subjectively judge whether the multi-content (here after used to refer to the different methods used within the attitude instrument to assess the attitudes of stakeholders towards the Kat River) was confusing the respondent in any way. In addition interviewers would be able to explore in more depth the various responses of the respondents to the questions.

The method for analysing the data is tied closely to the type of data captured. The goal was to produce nominal and ordinal datasets that could be analysed both qualitatively and quantitatively. All questions were categorical to some extent. Most questions were closed, as the use of closed questions greatly enhances the researcher’s ability to produce categorical information (Blaikie, 2003).

Question wording is considered of high importance in the construction of a questionnaire (Schnetler, 1989; Fink, 1995a). Before getting to the words, it is important to determine the content of the questions; this is of course directly associated with those variables described above that guided question construction (Box 4.1; Table 4.1). Question content can be fact orientated or directed at determining attitudes and opinions, it can aim at shaping an understanding of the knowledge a respondent has on an issue or matter, or it can be geared at developing insight into the types of behaviour a respondent is willing to report on in regards to an issue or matter (Schnetler, 1989). The multi-content Kat River questionnaire was focused on generating information concerning attitudes. It was, however, also intended to help in gathering information that would contextualise and more

effectively describe variables related to the attitudes (*i.e.* demographic data; information on association with the River (sense of place, and place attachment); knowledge individuals have concerning the management of the River; beliefs about the management and willingness to be involved).

Consideration was given to language and ambiguity of words. Such issues if not considered have the ability of greatly reducing the effectiveness of questions in obtaining the desired information (Schnetler, 1989; Fink, 1995a). Words and phrases were kept as simple and informal as possible to facilitate understanding by a diverse group of people. Abbreviations and slang or colloquial language were avoided. The majority of the questions were short and provided multiple-choice response options. This helped in terms of both language and ambiguity. Although efforts were taken to minimise the use of words that might not be understood in the same way by all respondents (*e.g.* attitude), it was observed in administering the questionnaire that respondents were ambiguous in their conceptual understanding of what constituted the ‘local community’ or ‘people’. It was decided to allow for this ambiguity for it revealed information concerning the respondent’s perceptions on what constituted their catchment and, related to this, who they perceived to be their neighbours and how they were connected to them. Several issues connected to meaning within sentences arose during the pilot study; these issues are described in the relevant section below.

All questions contained only one idea so as not to confuse respondents and decrease the quality of the information obtained; however, many questions were followed up with some form of open descriptor ‘why’ or ‘how’, to better describe and contextualise initial responses to questions. Negative questions were utilised in the Likert scale, but in no other section, and the negative (*i.e.* no, not, neither *etc.*) was emphasised during the administering of the questionnaire. Every effort was made to ensure that any English speaking respondent, from the Catchment, could actively participate in the questionnaire without feeling it was biased towards certain social or cultural groups. The questionnaire consisted of five sections A to E. The full questionnaire can be found in Appendix A. An overview of each section is presented here.

Section A:

This section consisted of 16 structured (multiple-choice) questions concerning personal demographic and geographic information about a respondent and their association with the Kat River area. This section also explored reported religious or spiritual orientations, and any spiritual association respondents felt concerning the River.

Section B:

This section consisted of 10 structured questions, with open-ended follow up questions. The first four asked about the valence (positive or negative) of the respondent's feelings towards: the River; the way local people interacted with the River; how they perceive local people feel about the River; and how they believed the local people's feelings had changed in the last ten years. Each of these questions gave the respondent a choice of having a positive or negative association with what the question asked, and then asked 'why' they felt that way (although not specifically given as a response options, 'positive and negative' and 'neutral' responses were also allowed during interviews). The next four questions looked at how the respondent felt about the River's management. To open this set of questions, they were asked to comment on what was important about the River to themselves, how they felt about the present management, if they thought anything needs to be changed about the management, and finally if they believed that local people should be included in the management of the River. The two remaining questions explored the respondent's feelings towards research into the River, asking first if they would like to learn more about the River and, if so, what aspects, and lastly if they felt learning or studying the River was important.

The content of this section was structured to collect more developed opinions concerning how respondents felt about the River. The exploration of the respondents' valence towards the question content encouraged the respondent to reflect on why they felt what they felt and consider and compare what they were feeling with what others may be feeling. This provided a platform from which to explore their sense of community concerning the River, its management and use.

Section C:

This section consisted of 42 Likert-scale items (declarative statements) that indirectly explored the attitudes of the respondents relative to the attitude variables (Box 4.1; Table 4.1). As attitudes are hypothetical and abstract concepts, a scale is advantageous in that it allows for a respondent's attitude to be measured indirectly (Schnetler, 1989). Using a scale also enables information on sensitive issues to be obtained while simultaneously improving the reliability and validity of the data; the more possible response options a respondent is presented with the greater the probability that his or her true attitude will emerge (Schnetler, 1989). Validity of the attitudes being explored is improved by approaching the variables from different aspects (Schnetler, 1989). Lastly, measurement in a Likert Scale can be standardised to allow for comparison between numerous samples (Schnetler, 1989). Disadvantages around using a Likert Scale include: the amount of time and resources required for their construction and the need for some form of validation (Schnetler, 1989); the possibility of a predisposition to respond (*i.e.* the respondents responds as they believe is socially accepted or expected as opposed to their own thoughts and feelings) (Schnetler, 1989); and issues (answering through a continuum *i.e.* strongly agree through to strongly disagree, is an foreign concept to Xhosa people especially rural people) around cross-cultural use of scales (van der Reis, 1988).

In addition to their cognitive response to items, affective or emotional aspects of respondents' opinions were also assessed. This information, however, was not utilised in the final analysis of data due to time constraints.

Section D:

This section initially consisted of one hypothetical question asking the opinion of the respondents to the type of person the River would be, if it were a person. Following the pilot study, I added the question 'what type of person they would like it to be'. In hindsight, however, this was found to be superfluous and was not included in final analyses.

Although the use of hypothetical questions is not always advised in a questionnaire (Schnetler, 1989), they were utilised in this section as a means to evaluate respondents' responses in terms of the potential expression of deeper associations with the River. Personifying the River was believed to trigger more inherent feelings and opinions and provided information on respondent's value association of the River removed from livelihood and socio-economic considerations. Additionally, it provided information on the level of interaction, direct or indirect, a respondent had with the River.

Section E:

The final section of the questionnaire used photographs to collect data on the respondent's sense of place. Due to time constraints the analysis of this data was not undertaken for this thesis. The initial protocol for this section was to ask the respondent to select 10 photographs they liked most and 10 that they did not like, and then ask them to give three reasons for liking or disliking each. After the pilot study (in which I observed that identifying the 20 questions was tenuous and tiring), however, I changed the protocol to selection of the 10 they liked and the reasons why they liked these photos. The reader is directed to Appendix A, for a list of the photos used in the interviews.

4.2.1.1.2 *Validity and Reliability*

It is recognised that most attitude surveys are statistically checked for validity and reliability, but lack of time and resources meant that the instrument developed here did not undergo all these tests. As the overall aim was to collect exploratory, descriptive information rather than information for multi-variate statistics, the length and present crudeness of the instrument was considered appropriate. Essentially, if a survey is valid it is also reliable (Fink, 1995), and valid survey instruments serves the purpose they were created for (Fink, 1995); in this case the instrument was made to assess the attitudes towards the Kat River and the results appear to be consistent with descriptions of the attitudes available from other sources (*i.e.* from observations, research reports and personal conversations with residents). Several steps were undertaken to help improve the reliability and validity of the questionnaire.

The questions were reviewed by a survey specialist from the Rhodes University Environmental Education Department (Prof. Pat Irwin), and an expert in catchment management and ecological assessment from the Rhodes University Geography Department (Prof. Kate Rowntree). Additionally, the instrument was reviewed by a Xhosa researcher connected with the WRC CMP project (Chapter 2), Mr. Monde Ntushdu. Mr. Ntushdu has worked extensively as a facilitator and translator in the Kat River Catchment, and knows the people intimately. These reviews occurred prior to the administering of a first draft of the instrument in a pilot study.

The pilot study was run at Riverside Packshed, one of the two local citrus pack sheds in the Kat River Catchment. Initially the instrument was tested with no language restrictions, as Mr. Ntushdu accompanied me in the interviews and provided translation, where needed. It became apparent that some loss of meaning was occurring within the translation process and it was decided not to use any form of translation in the actual study. Several mistakes and comprehension problems within the various sections (predominantly section C and section E) were identified and alterations made.

An observation made during the pilot study involved the Xhosa belief in right and wrong answers to questions; Xhosa respondents found it difficult to understand the agreement scale as a form of answer to what they perceived as questions. The description of the section was changed to enhance the use of the word 'statements' as opposed to 'questions' and, during the interviews, interviewers emphasised that there was not a wrong or right answer and that the respondent should reply based on what they themselves thought or believed.

An additional observation concerning the Xhosa respondents was that there appears to be fewer emotive words in Xhosa than in English, so describing or being able to even recognize a response as emotional was difficult for those respondents with Xhosa as their mother language. A list of vocabulary to describe emotions was developed for the final study; this carried the added benefit of enabling categorical capture of emotional responses. This list is included in Appendix A (section A.2.1).

The pilot study was carried out at the place of work of the respondents, with their supervisor calling them in. This was found to put many of the respondents on edge, as they were concerned about what the implications of their response in the survey would be for their jobs. As far as possible, all future interviews were arranged telephonically in advance, with the respondent themselves, and occurred either at the respondent's home or, if convenient for them, at their place of work.

Older participants became tired more quickly, and found the interview too long. One lady became visibly frustrated and exhausted and we had to call short the interview. It was observed that the emotional state of the respondent during the interview affected the interviewer emotionally and physically, leading to exhaustion. Positive responses encouraged the interviewer to persist, where as trying and difficult interviews drained the interviewer considerably, resulting in them having to retire early. Interview schedules were, therefore, made as flexible as possible to ensure that if a trying interview did occur, the interviewer did not do any more that day, thereby avoiding negative affects on the interview process and resultant data.

A total of thirteen people, from mixed cultural and social groupings, were interviewed during the pilot. Respondents consisted of a diverse array of Kat River residents, and several of the lead researchers working on the WRC's CMP Project (Chapter 2) who were believed to have in-depth knowledge about the Catchment due to their experience with the people and the area. They too will have formed opinions/attitudes towards the River and are stakeholders in the process of developing management objectives for the Catchment. It was assumed that they will influence the process of IWRM and, therefore, it was important to assess their attitudes.

Comments and observations concerning the reliability of the instrument made via the review process and pilot study were used to develop two additional drafts, before the final instrument was drawn up and administered.

4.2.1.2 *Sampling Procedures*

4.2.1.2.1 *Snow-ball Sampling*

A non-probability sampling method was selected for identifying possible respondents as no list of the population in the Catchment was available that would have enabled me to cover most areas, commercial and subsistence (Fink, 1995b; Black, 1999). Snow-ball sampling entails letting one respondent connect you to another and, for this study, each interviewed respondent was asked to give between three and five names and contact numbers of people in the Catchment they thought would be willing to participate. Black (1999) highlights a disadvantage of this way of sampling, in the lack of certainty the researcher can have over the representivity of the population. To increase the possible representivity of the sample population, two ‘snow-balls’ were set in motion, one starting with a white commercial citrus farmer in the lower Kat, and the other with a black commercial emerging citrus farmer from the upper Kat.

Advantages of this technique were: 1. the ability to explore the connectedness of the residents of a small catchment; 2. the provision of names and contact details allowed us to phone and make appointments, increasing the response rate for the survey; 3. the characteristics respondents felt others should have to want to participate in the survey could be assessed (*i.e.* perceptions of other people’s interest, skills and relevance to water and river matters).

4.2.1.2.2 *Eligibility Criteria*

The eligibility criteria for a questionnaire refer to the characteristics of respondents who are eligible to participate in the survey (Fink, 1995). Eligibility criteria for the Kat River questionnaire included stakeholders (Kat River Residents) above the age of 18 currently living or working in the Catchment who were able to answer the questionnaire in English. An exception to the residence criterion was the group of researchers working on the WRC’s CMP project. In addition a few migrant workers were also interviewed; these men live and work for most of the year in the Catchment, but are officially resident in another area.

The age criterion (above 18) was set to avoid requiring parental consent to do an interview with a willing respondent. Furthermore, this criterion also meant that the instrument did not have to be re-designed to make it more accessible to teenagers and children.

The language criterion (English) was set to avoid having to get the instrument translated and relevant language speaking interviewers found. I chose to avoid this firstly because I was acutely aware (through my work with the stakeholders) of the ease with which misunderstandings between cultures occur and as such did not want to bias or misinterpret the response of a respondent. Secondly, questionnaire translation requires much time, money and human resources to be done effectively. It is a complex process, with the instrument being translated and re-translated to ensure that no error in question meaning occurs during the process. Given the lack of statistical reliability and other validity checks for the questionnaire, I believed that validity and reliability was best maintained by only focusing on the English speaking population in the Catchment.

There are still geographical cultural and political divisions in the Kat River Catchment synonymous with the old homeland of Ciskei (Birkholz, 2006). As language is intimately tied to culture and race, the language limitations could also have limited the geographic extent of the study. The older (60 and above) generation within Xhosa and Coloured populations had less opportunity to learn English (most would have been farm workers on white owned farms before Ciskei, and even here most white farmers speak Xhosa to communicate with their staff). The language and age criteria therefore together limited the possible age group of respondents from amongst Xhosa and Coloured communities to between 18 and 60. This prevented possible comparison of past and future opinions and attitudes with the present ones.

The major disadvantage to both the above criteria (age and language) was the bias towards adult non-Xhosa/Afrikaans speakers and a decrease in sample representivity of the catchment population. The Xhosa and Afrikaans speaking populations are far bigger than the English speaking population (Figure 2.8).

To overcome some of these limitations I adapted the way the interviews were carried out in the Xhosa rural areas. Within these areas I would do an interview and rate how proficient I believed the respondent was in answering and understanding the questions asked. The rating was crude, a simple 1-10 scale, ten being highly proficient and 1 showing little to no proficiency. Any interview with a score below 4 was not included in the analysis. Fortunately, in most interviews in which I had concerns regarding the understanding of the respondent, I was able, during the interview, to adapt the interview process to make it more accessible. For example, I did not ask respondents to describe their emotional responses to the statements in section C and spent longer explaining the meaning of statements.

A limitation of the research was that it targeted only Kat River residents and researchers. These were all people who could be expected to have developed a personal relationship with the river that would have coloured their attitude towards it. Although the attitudes of government officials towards the IWRM process are important, their attitude towards the river may be less relevant as they have no personal association with it. The criterion of residence or close association (researchers) meant that government (*e.g.* DWAF) representatives from outside the Catchment were not interviewed. A representative from the Nkonkobe Local Municipality was interviewed, but the interviewer was unsatisfied with the conditions of both respondent and environment so the results were not included in the analysis.

4.2.1.3 *Fieldwork*

Fieldwork took place from June to October 2006 and throughout February 2007. During this period, data was collected via structured interviews (N=92). Each interview was made by appointment, and mostly took place in the homes of respondents, a few occurred at their place of work or some other location depending on their preferences.

Interviews were carried out by myself, and Ms. Helen Fox who had extensive interview experience and had worked with Kat River residents in undertaking both her previous Honours and Masters research. We each aimed at a quota of five interviews

per day; however, consideration was given to the difficulty of preceding interviews, the emotional and physical condition of the interviewers, and the length of time it took to get to the interview location. Ultimately the average number of interviews done per day was 4.6 over a twenty-day sampling period between 12th June 2006 and 29th February 2007 (including pilot study 12/06 – 29/06). Average length of interviews was one hour and five minutes. Where possible interviews were recorded as well as captured in print (there was only one Dictaphone, so effectively only half the interviews could be recorded).

In some instances respondents forgot about the appointments and were not available as planned. In these situations we had to phone additional possible respondents to organise an interview to make up the time. Setting up interviews a few hours before proved far more successful than making appointment days in advance. Although, the response rate for the study was very good, with approximately 5 out of a possible 97 respondents either not being available after saying they would, or declining to participate at all. Those that declined did so generally under the belief that they would not be able to contribute anything to a questionnaire about the Kat River and water resources. No group interviews were undertaken, all interviews were with one respondent.

Before administering any interview, respondents were made aware of the content and objectives of the study and were asked to read and sign a covering letter saying that they were aware of the content and objectives, and of their right to withdraw at any time. They were also asked to give signed permission that their responses, recordings and any photos taken could be used in the study.

Normally the questions were read out to respondents, although two respondents decided to complete section C without assistance. Each interviewer had a survey kit, in which they had a copy of the questionnaire and additional materials, which included the vocabulary list and photographs (Appendix A).

After each interview, interviewers asked the respondents to give between 3 and 5 names and contact details of other people who they felt would be interested in doing the questionnaire. Additionally, a space was provided at the end of each interview for the interviewer to write comments on the respondent and observations they had observed concerning the respondent and their responses to the questions.

4.2.2 Data capturing

Through the interview process a total of 92 questionnaires were completed. To facilitate the use of nominal and ordinal data, each response option was coded numerically (*i.e.* yes = 1; no = 2) and their codes recorded on separate coding sheets to make capturing the information quicker. Data was captured in Excel (Microsoft, 2003). In addition to recording the coded data, each questionnaire was typed out in full, *i.e.* long answers recorded, to capture the more qualitative answers. On completion of this capturing exercise, the spreadsheet was copied and the data then re-coded and compared to the initial coded data for any possible error in data capturing.

4.2.3 Data Analysis

4.2.3.1 Inductive Analysis

This study is inductive by nature and, as such, seeks to develop theory related to attitudes and their role in human-river relationships in the Kat River Catchment as opposed to testing a hypothesis. Inductive research is ampliative (Vickers, 2006) and involves using the data to expand and speculate on the subject matter of interest. In line with this, it was decided to undertake only simple descriptive statistical analysis of the data, and to build on this analysis with qualitative observations and findings.

4.2.3.2 Selecting Data

For analysis of the attitudes of the population from a catchment perspective, all data obtained (including that from the pilot study, and for ‘outsiders’ – researchers working on the project) were included. This provided a sample size of 92

respondents. For a catchment perspective the response of researchers working in the Catchment were included in the analysis (N=92). For analysis between regions in the Catchment (upper, middle and lower) researchers' responses were not included in the final analyses (N=84).

Data from section C concerning the emotional responses of respondents and the data from section E were not included in the analysis process (see relevant descriptions in above sections).

In terms of qualitative responses, only those responses that presented unambiguous thoughts and opinions were used in the analysis process. This reduced the degree of subjectivity when assessing what a respondent may have been trying to say in their response.

4.2.3.3 *Analysis of Data*

Given the explorative, inductive nature of this study, it was decided to keep the analysis as simple as possible, relying primarily on population proportions and percentages to describe the findings of the study. In addition, although for later work it will become important to look at the influence of demographic variables in deepening the understanding of respondents' relationships to the River, this study restricted analysis to relationships between the responses of respondents from the three regions (upper, middle and lower Kat). This decision was made on the basis of available time and resources.

4.2.3.4 *Presentation of Data*

As far as possible relevant data has been included in the main discussion of this thesis, however, for several of the sections the data was based on extensive tables that can be found in the appendix. In the following section a detailed review of the findings is presented and, where applicable, reference is made to the relevant appendix.

4.3 FINDINGS

4.3.1 Section A

Section A used multiple-choice questions to ask respondents about their demographic, geographic and spiritual orientations, and sought to explore various aspects of their association with the Kat River and its management. A total of 92 respondents made up the final sample, of this 31% (N=29), 39% (N=36) & 21% (N=19) came from the upper, middle and lower Kat respectively and the remaining 9% (N=8) included researchers from outside the Catchment (Figure 4.2).

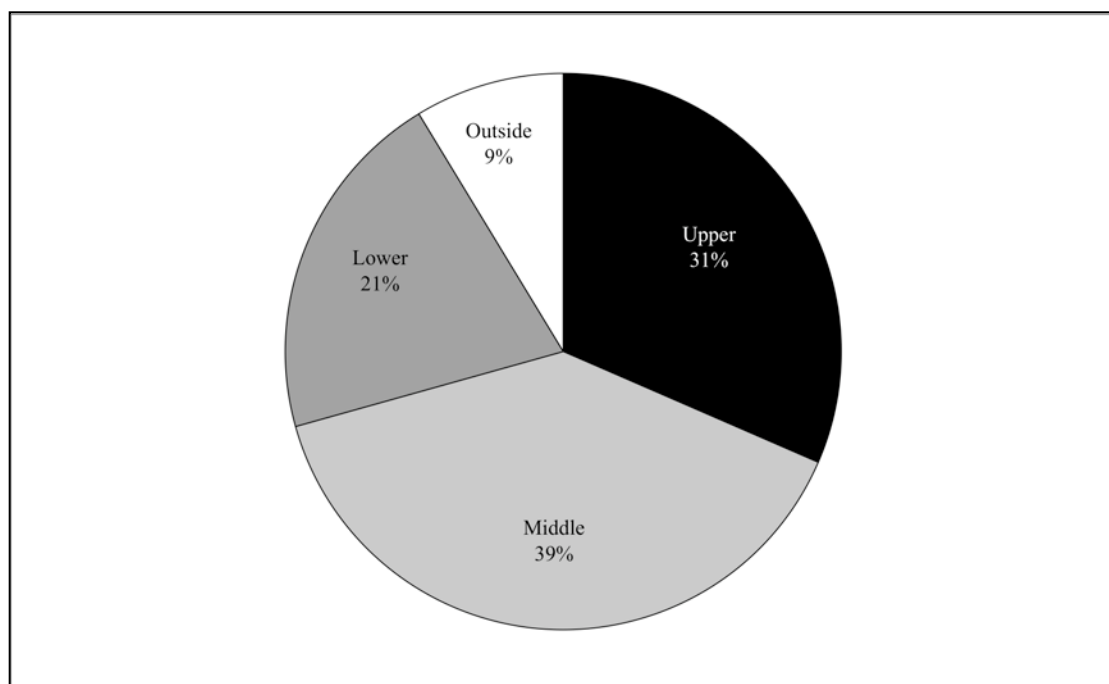


Figure 4.2 Proportions of respondents in the final sample from the respective regions in the Kat River Catchment.

Although gender proportions from the 2001 national census (Figure 2.9) suggest more females than males in the Catchment, the sample for this study was made up of more males (58%, N=53) than females (42%, N=39) (Table B.1, Appendix B). In this regard the sample population is not considered representative of the Catchment population; but may reflect current gender involvement in water management issues. It possible that the snow-ball process revealed that men in the Catchment are considered by their peers to be more knowledgeable of water related matters than are women. Alternatively this finding could simply indicate that men know more men than women.

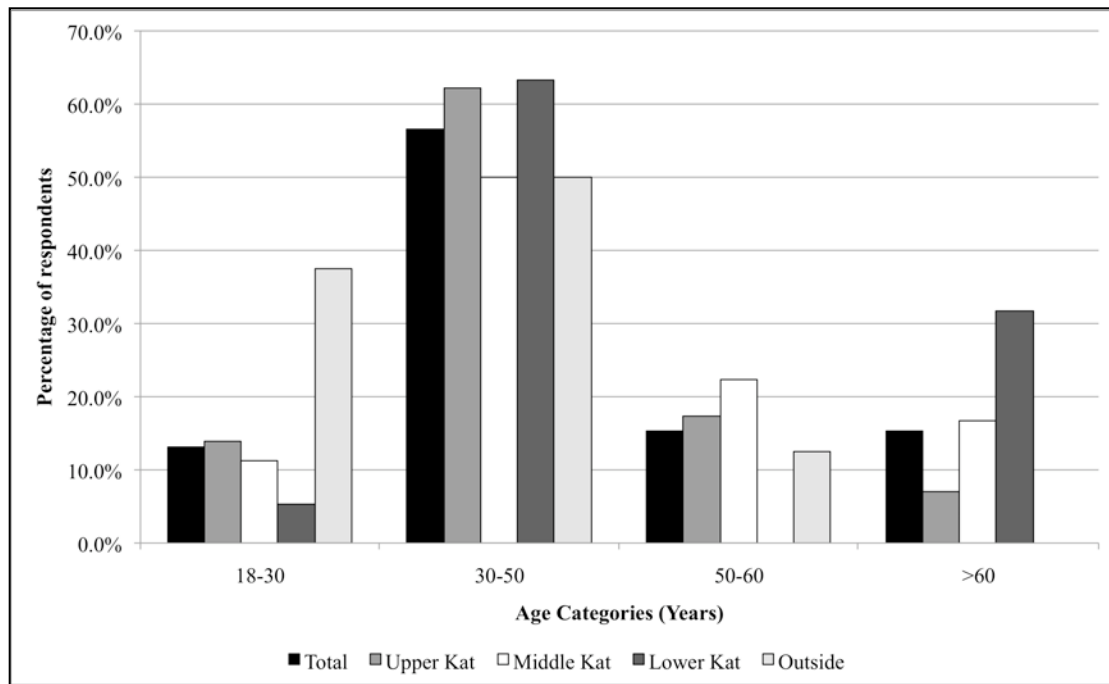


Figure 4.3 Age characteristics of the sample population for the Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Most of the respondents came from the 30-50 years age category (56.5%, N=92); this trend was observed throughout the sample population (Figure 4.3). In terms of the 2001 census (Figure 2.9), this trend is more or less concurrent with the age distributions of the Catchment population. In this regard the age distribution of the sample population is representative of the whole population in the Catchment. Snowball sampling could have had an effect on the incidence of respondents over the age of 30 as both the snowballs began with a respondent over the age of 30 years.

Figure 4.4 shows the educational characteristics of the sample population. Most of the respondents had completed Matric (88%, N=92); and of these most had also some form of tertiary education (61%, N=92). This observation is not concurrent with the information given by the 2001 census (Figure 2.10) that suggests that less than 22% of the population of adults over the age of 20 have a Matric (grade 12) or higher. In this regard it would appear that the sample population was influenced by the selection criteria. It is likely that the percentage of respondents with higher education was heavily influenced by the limitation of the survey to English language speakers. English language speakers will have historically been the more educationally

advantage group, especially in terms of racial delineations (an influence of Apartheid). In rural areas, experience with English most often comes through school and higher education opportunities.

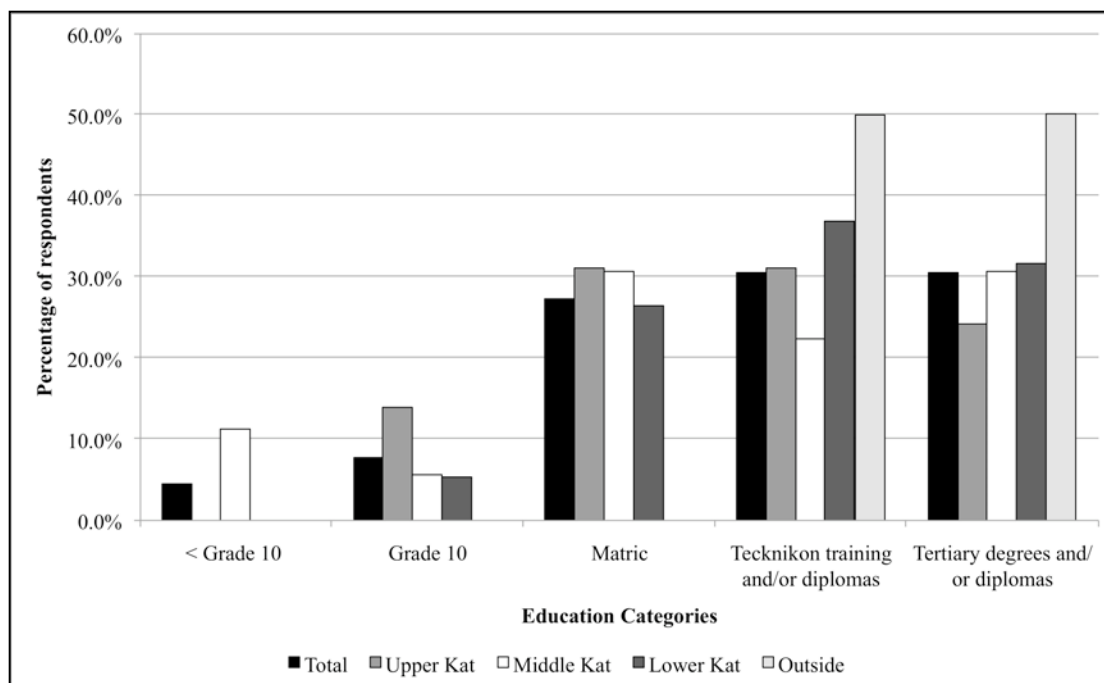


Figure 4.4 Highest Educational level characteristics of the sample population for the Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

This discrepancy between the national census information and the study's sample population may suggest that education plays a role in the involvement of people in water management issues. Within the sample population there appears to be a balance between the different regions of the Catchment, with regard to education levels. It is likely that respondents selected or nominated possible, future participants based on their regard for their knowledge levels, which would most likely be directly associated with their education. It was observed during interviews that while nominating future participants, respondents demonstrated a high concern for their ability to provide helpful and useful information.

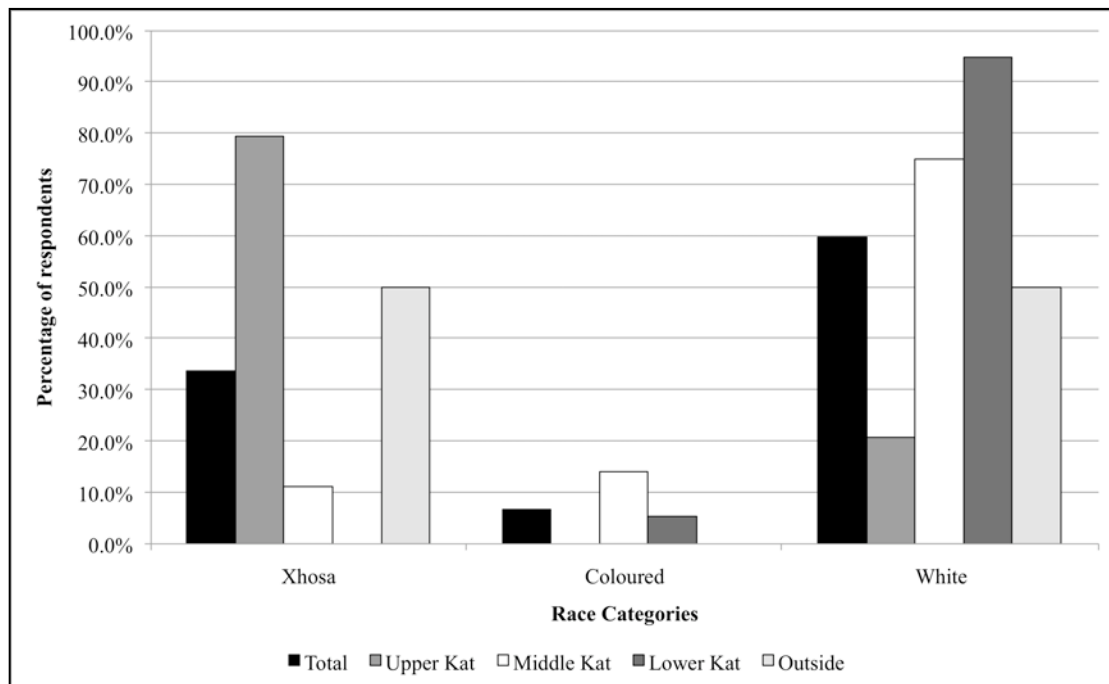


Figure 4.5 Racial characteristics of the sample population for the Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.5 shows the racial characteristics of the sample population. More than half of the respondents were white (60%, N=92), the remaining respondents were either Xhosa (34%, N=92) or Coloured (7%, N=92). This is most obviously not concurrent with the 2001 census results (Figure 2.8) that indicate that the Xhosa people far outnumber all other race groups. Again language is the most likely determinant for the racial distribution of the sample population. English is a second language (if that) to most Xhosa and Coloured people in the Catchment so although many were eager to participate it was more difficult to find people with a high enough proficiency in English to be able to adequately understand and answer the questions in the survey.

Most respondents from the upper Kat (79%, N=29) were Xhosa, whereas in the middle (75%, N=36) and lower (95%, N=19) Kat most respondents were white. The white population in the upper Kat is very low so it was unlikely that this region would have a high proportion of white respondents. Although the Xhosa and coloured populations in the middle and lower Kat far outnumber the white population (Figure 2.8), the economy of the area is driven by the activities of the white commercial farmers and they appear to have the dominant voice when considered as participants for water-related interviews. An example of this is that even though the second

snowball was started with a black commercial citrus farmer in the upper Kat, he put forward the names of white commercial farmers from the middle and lower Kat as possible participants.

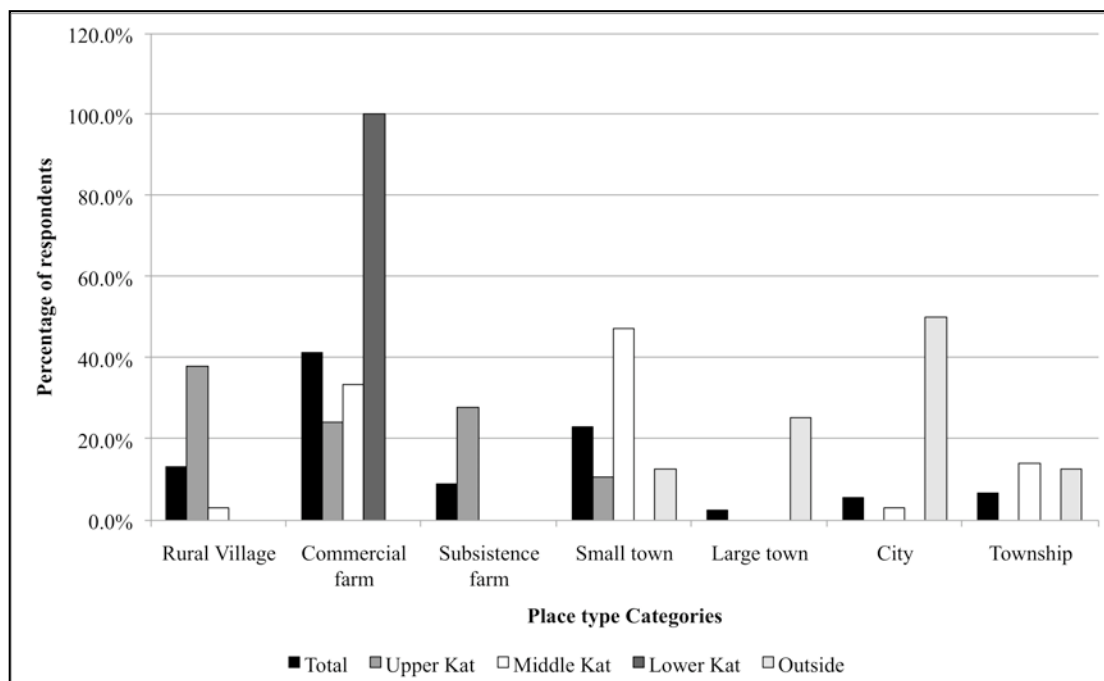


Figure 4.6 Place-type categories lived in by respondents in the Kat River Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.6 shows the ‘place-type’ categories that respondents reported living in. The Place-Type category was included in the survey, firstly, to describe the place in which a respondent lives in the Catchment and, secondly, to describe the place in which they grew up (Figure 4.7). These categories were included because it was believed that a respondent’s ‘place type’ (*i.e.* where they are from or where they grew up) will influence how directly they interact and relate with the River (Cordell, 1995). The population of the Catchment is predominantly rural and the majority of respondents either lived on commercial farms (41%, N=92) or in a small town (*e.g.* Seymour or Fort Beaufort) (21%, N=92) in the Catchment.

Upper Kat respondents live in a diverse range of place-types: rural villages (38%, N=29); subsistence farms (28%, N=29); commercial farms (24%, N=29); and a small town (*e.g.* Seymour) (10%, N=29). In the middle Kat the largest percentage of respondents reported living in a small town, namely Fort Beaufort (FB) (47%, N=36).

Middle Kat respondents were observed to come from the most diverse range of place-types, with respondent from: a small town (FB) (47%, N=36); commercial farms (33%, N=36); townships (14%, N=36); rural villages (3%, N=36) and, cities (3%, N=36). All 19 respondents from the lower Kat came from commercial farms (100%, N=19).

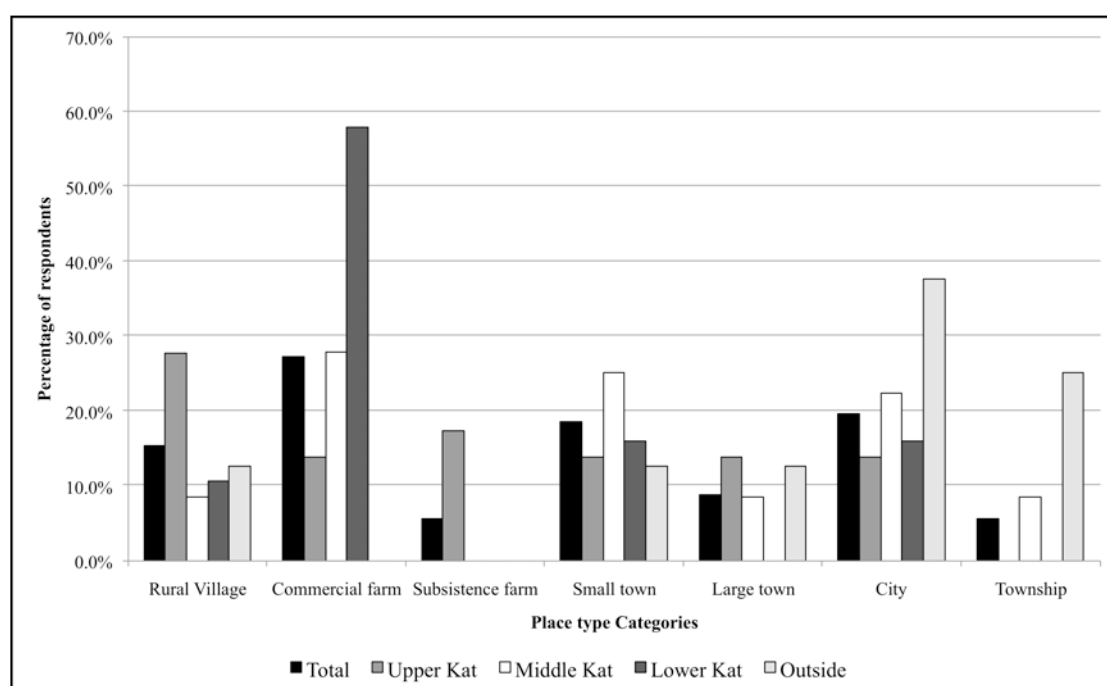


Figure 4.7 Place-type categories in which respondents grew up. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.7 illustrates the distribution of place-types respondents reported growing up in. The largest percentage of respondents reported growing up on commercial farms (27%, N=92); these respondents were closely followed by those who grew up either in cities (20%, N=92) or in small towns (19%, N=92). Both the upper and middle Kat had respondents who originated from a diverse range of environments; the largest percentage of respondents in the upper Kat grew up in rural villages (28%, N=29), and in the middle Kat the largest percentage of respondents grew up on commercial farms (28%, N=36). There were a similar percentage of respondents from the middle Kat, who had grown up in either small towns (25%, N=36) or cities (22%, N=36). In the lower Kat a little over half the respondents grew up on commercial farms (58%, N=19). The remaining respondents from the lower Kat originate from small towns or

cities (both 16%, N=19), but a small percentage came from rural villages (8%, N=19). It is most likely that the distinction between those who grew up on commercial farms and those that did not, in the lower Kat, is based on marriage (Figure 4.9).

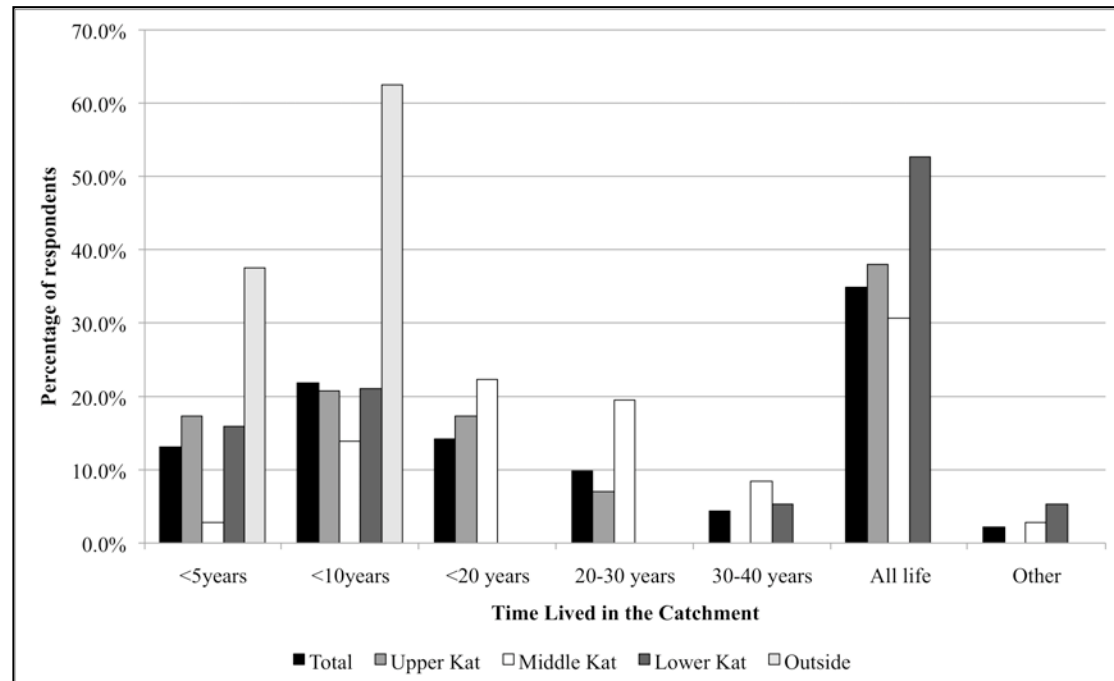


Figure 4.8 Length of time respondents have lived in the Kat River Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.8 illustrates the distribution of respondents relative to how long they have lived in the Catchment. Those respondents who indicated having lived in the Catchment all their lives made up the largest percentage of respondents (35%, N=92). A similar trend to the one observed for the over all population was observed for both upper and lower Kat respondents. The middle Kat, however, showed a higher percentage of respondents who have lived in the Catchment less than twenty years (22%, N=36) or between twenty and thirty years (19%, N=36). This suggests that in the middle Kat there is a larger population of people who have lived in the Catchment over ten years, but were not necessarily born in the Catchment.

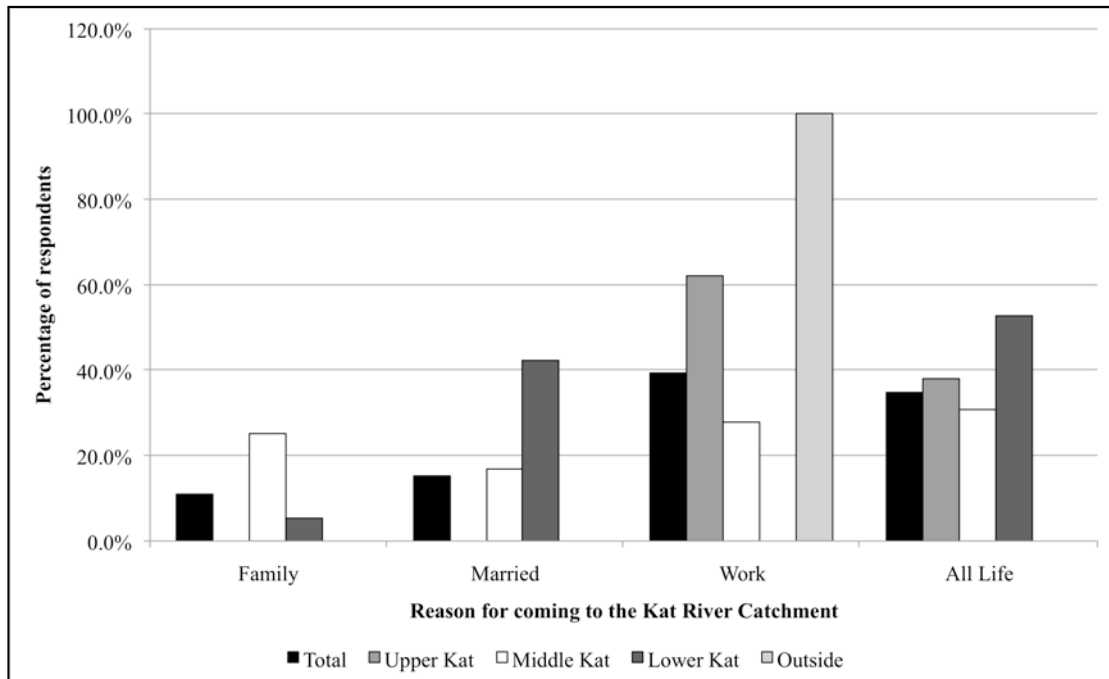


Figure 4.9 Reasons respondents came to live in the Kat River Catchment. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.9 shows the main reasons for respondents moving into the Catchment. The two main reasons respondents came to live in the Catchment were work (39%, N=92) or being born there (35%, N=92). In the upper Kat the primary reason for coming to the Catchment is employment (62%, N=29). The middle Kat appears to have the population with the most diverse range of reasons for coming to the Catchment. Many however, indicated living in the region most of their lives (31%, N=36). This group was closely followed by those who came seeking work (27%, N=36) or because of family (25%, N=36). In the lower Kat respondents for the most part were either in the Catchment because they had been there all their lives (53%, N=19) or because they had married someone from the area (42%, N=19).

Figure 4.10 shows the distribution of religious orientations amongst the respondents. The majority of respondents are Christian (64%, N=92) and this appears to be the case throughout the Catchment. In the upper Kat, however, 35% (N=29) indicated that they believed in a mixture of religions and 21% (N=29) said they believed in 'other' religions. During interviews 'other' was most often taken as a response for the animistic faith in ancestors, which is prevalent amongst the Xhosa people (Fox,

2005; Bernard, 2003). Those that indicated a mixed faith described this as a belief in both Christian and ancestral teachings.

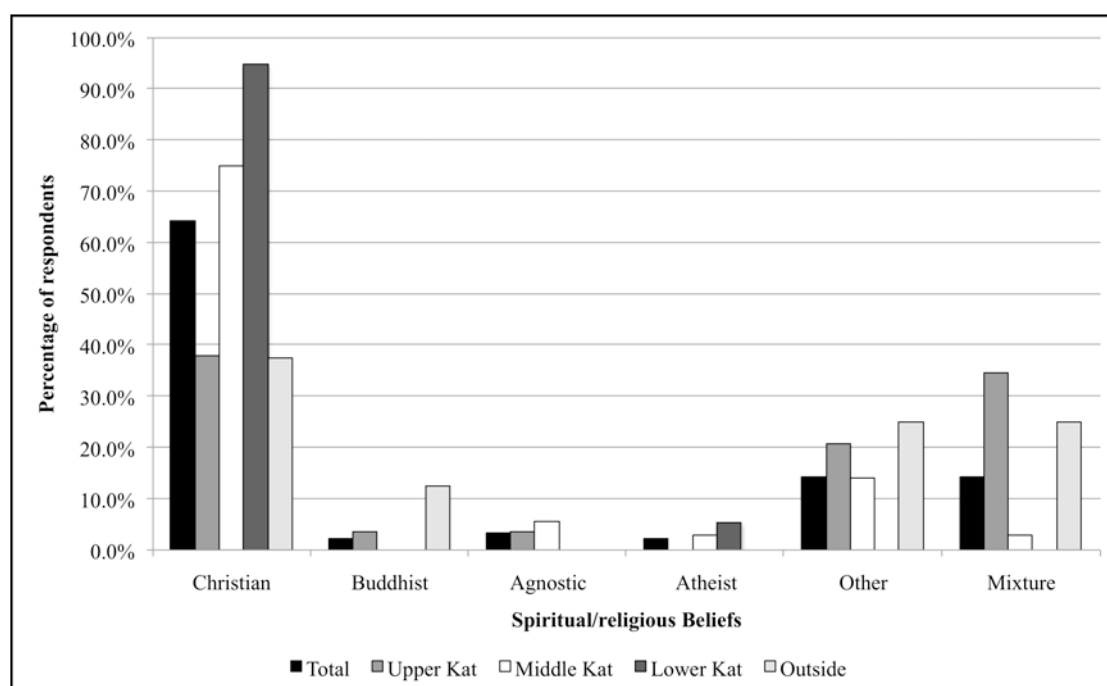


Figure 4.10 Religious (Spiritual) orientations of respondents. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figures 4.11 and 4.12 indicate respondents' responses to the question of whether they believed the River held spiritual significance and the possible relationship that exists between this belief and race, respectively. A large percentage of respondents (47%, N=92) said yes it did, 37% (N=92) said no it did not, and 16.3% (N=92) gave no response. The upper and lower Kat appear to be reversed, where as the majority of respondents in the upper Kat said 'yes' (83%, N=29) the majority of lower Kat respondents said 'no' (74%, N=19). This divergence could be related to the different racial groups and associated beliefs; the upper Kat sample population is predominantly Xhosa, and the lower Kat's population white (Figure 4.12). Of Xhosa respondents, 74% (N=31) indicated that they believed that the Kat River was spiritually significant (Figure 4.12). Alternatively 55% (N=55) of white respondents said that they did not believe that the River had any spiritual significance; in fact when asked the question it was observed that many white respondents demonstrated confusion or indifference over it, whereas Xhosa respondents reacted more matter-of-factly or emphatically, and apparently had a greater innate sense of what the question was alluding to.

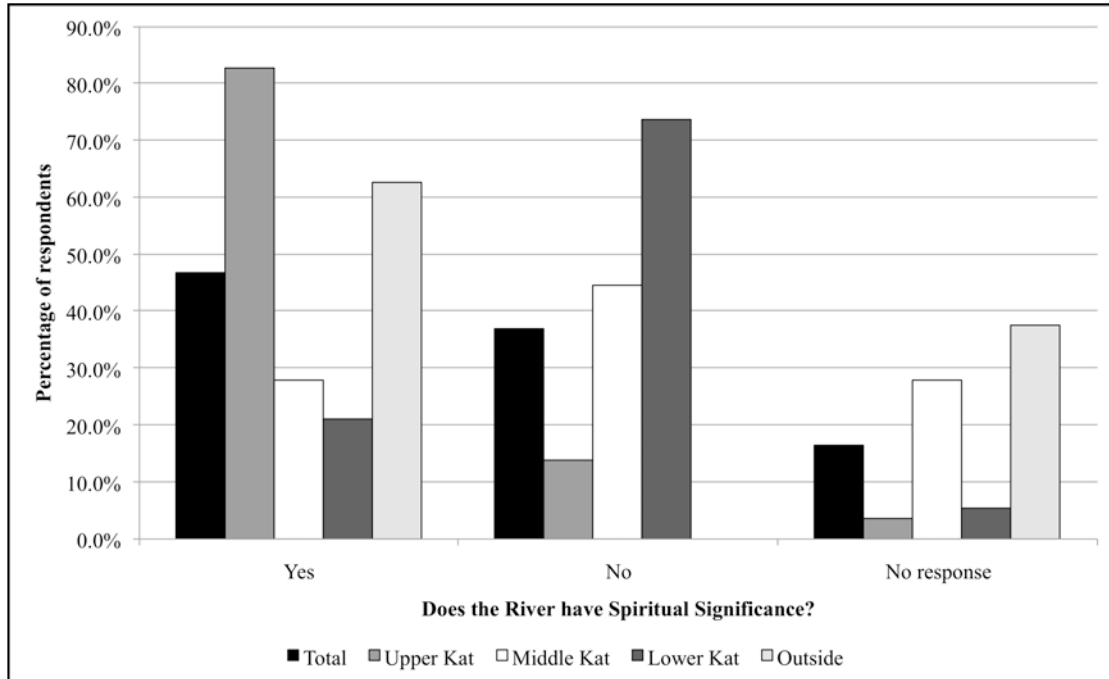


Figure 4.11 Respondents' responses to the question of whether the Kat River is spiritually significant. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

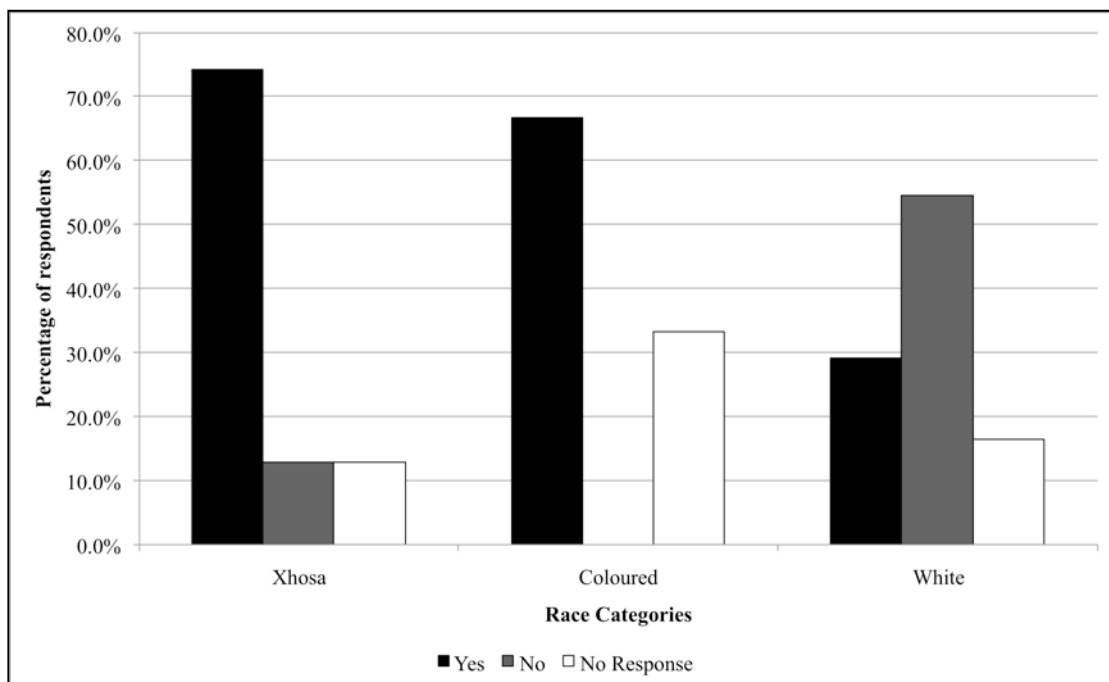


Figure 4.12 Association between race and spiritual association with the Kat River (N=92).

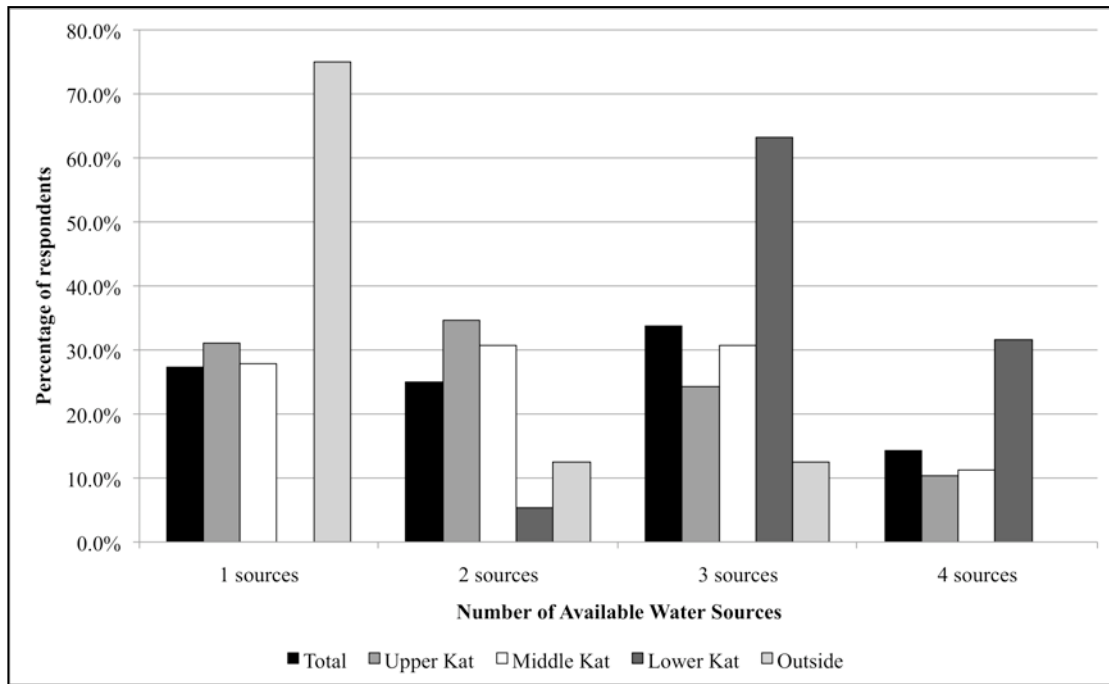


Figure 4.13 Number of sources of water at a respondents' disposal. Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations.

Figure 4.13 illustrates the number of water sources respondents had access to. There was a more or less equal number of respondents with access to different water sources within the sample population. The largest percentage of respondents indicated having access to more than 3 sources of water (34%, N=92). In the upper Kat the largest percentage of respondents indicated having access to 2 sources of water (35%, N=29), while most respondents in the lower Kat indicated having access to either 3 (63%, N=19) or 4 (32%, N=19) sources of water. This need for more sources of water in the lower Kat is most likely directly related to the water history (lack of assured scheduling) and their position in the Catchment (Chapter 2). The number of sources of water in the middle Kat was distributed throughout the middle Kat population, with more or less equal percentages of respondents indicating access to the varying number of water sources.

Figure 4.14 shows the responses of respondents to the questions of whether they were, are or would like to be involved in catchment management institutions and activities. In terms of both past (55%, N=92) and present (75%, N=94) involvement in catchment management activities, such as the WUA or Catchment Forum (CF), most

respondents suggest that they have not been or are not involved. There was a strong geographical difference, primarily between the upper Kat and the middle and lower Kat, to the question of involvement (past, present or into the future). In spite of historically not being able to participate in catchment management (45%, N=29, not previously involved), upper Kat respondents appear to be eager to be given the opportunity to become involved. Results show that 35% (N=29) of upper Kat respondents consider themselves currently involved, and 83% (N=29) of respondents indicated that they want to be involved in the future. A reverse trend appears to be taking place in the middle and lower Kat, with both regions indicating a decrease in the desire of respondent to be involved into the future (middle 17% to 53%, N=36; lower 21% to 58%, N=19). Middle and lower Kat respondents cited the following reasons for not wanting to be involved: a lack of time; a lack of commitment and interest in the matter; and/or had witnessed the difficulties experienced by present members and were happy to leave it in their hands.

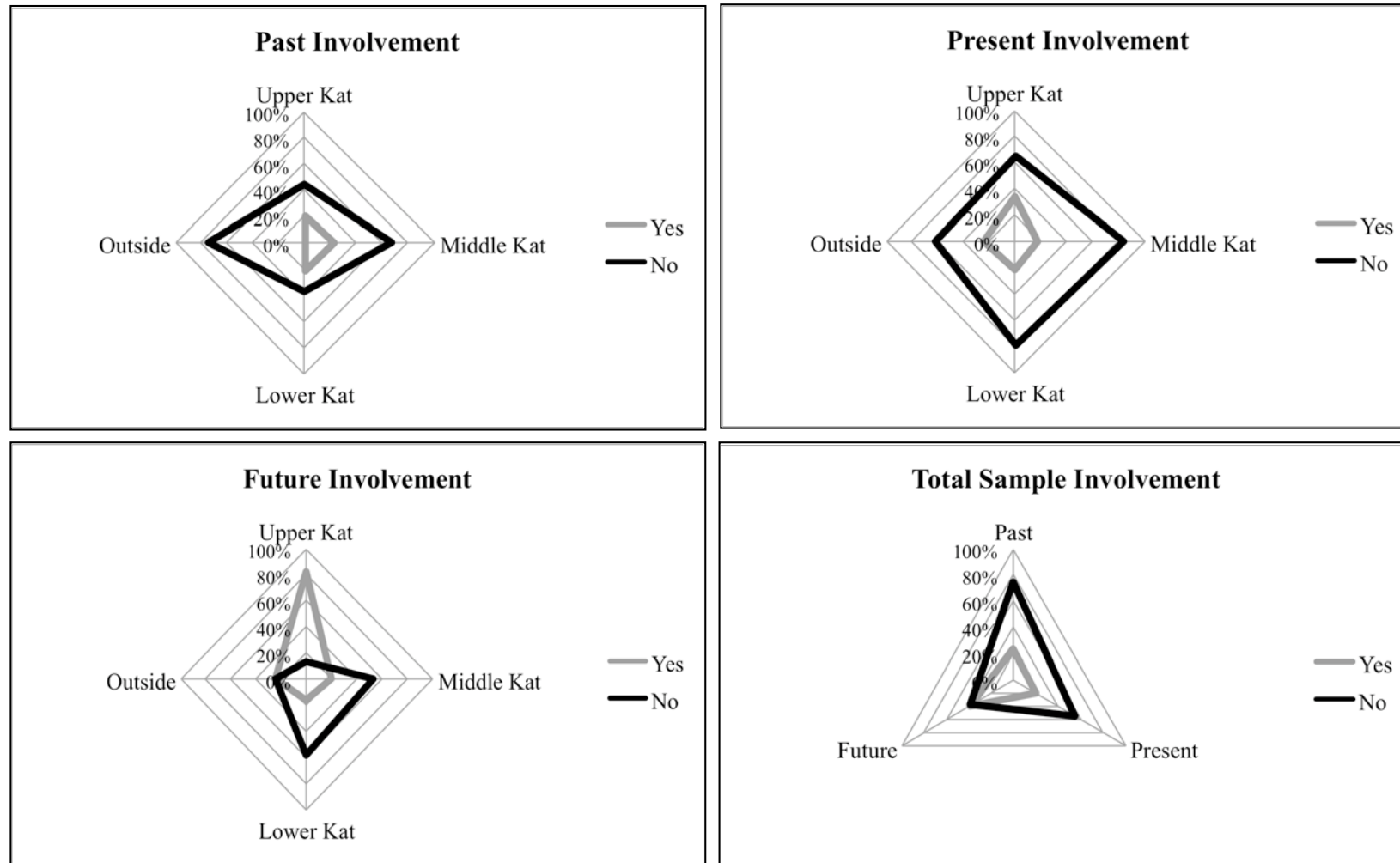


Figure 4.14 Respondents' indication of involvement in Catchment Management Activities (*e.g.* WUA & CF) (past, present and future). Total refers to the total Catchment sample N=92; region proportions determined relative to the different region sample populations. Non-responses have not been included (See Appendix B).

4.3.1.1 *Sample Population Profile and Representivity*

Table 4.2 lists the average characteristics of a respondent from the various regions in the Catchment, compiled from the answers to section A. It is clear that the sample population is not representative of the total Catchment population, and that the selection criteria heavily influenced the type of respondent. I do not, however, believe that the lack of representivity of the sample population for the total population is an issue, as the use of a snow-ball sampling methodology aided in ensuring that the type of respondent selected was most representative of those believed to be influential in water management issues (whether or not they wish to participate in catchment activities). I do believe, however, a broader population representation will be important for any future review of the theories developed here, however, in terms of exploring the key attitudes behind relational scenarios in the Kat River Catchment, those represented in this sample are more than sufficient.

Table 4.2 Average Profile of a respondent from the different regions in the Catchment.

Upper Kat	Middle Kat	Lower Kat
Is Xhosa, most often male, aged between 30 and 50, has a matric or higher qualifications. Has lived in the Catchment all his life and, therefore, comes from a rural background, and lives currently in a rural setting (farm or small village or town); alternatively if the Catchment is not his birthplace he came to it looking for work. He either professes to be Christian or is practicing his traditional Xhosa beliefs in ancestor worship; overall, however, he believes that the River does have spiritual significance. He has not previously been involved in catchment management activities, and is probably not involved, but would like to be given the opportunity to be involved in the future.	Is white, can be either male or female aged between 30 and 50 and has a matric or higher qualifications. He/she has not necessarily lived in the Catchment all their lives, and can have originated from both urban and rural environments; currently, however, he/she lives in a small town (namely Fort Beaufort) or on a commercial citrus farm around Fort Beaufort. He/she may have come to the Catchment for any number of reasons, family, marriage, or work. He/she is most likely Christian and may or may not believe that the River has spiritual significance. He/she has not been previously involved in catchment management activities, is most likely not currently involved, and has no wish to be involved in the future.	Is white, can be either male or female aged between 30 and 50 and has a matric or higher qualifications. If male has most likely lived in the Catchment on a commercial farm all his life. If female then they have most likely lived less than 10 years in the Catchment, usually originating from an urban environment (city or large town), and came to the Catchment when they married their husband. Male or female they profess to be Christians and most likely do not believe that the River has any spiritual significance. He/she has not been previously involved in catchment management activities, but is most likely currently involved, however, they are involved out of necessity and if they could have it their way would prefer not to be involved in the future.

4.3.2 Section B

Section B consisted of semi-structured questions through which respondents were asked to indicate the valence of their feelings towards various aspects of the River and its use and management, and suggest why they felt that way. Parts of this discussion make reference to data in tables in Appendix B, where applicable these tables are referenced. Respondents were asked to express their feelings in terms of positive or negative (or both) orientations towards the questions. Figure 4.15 shows the respondents' responses to these questions.

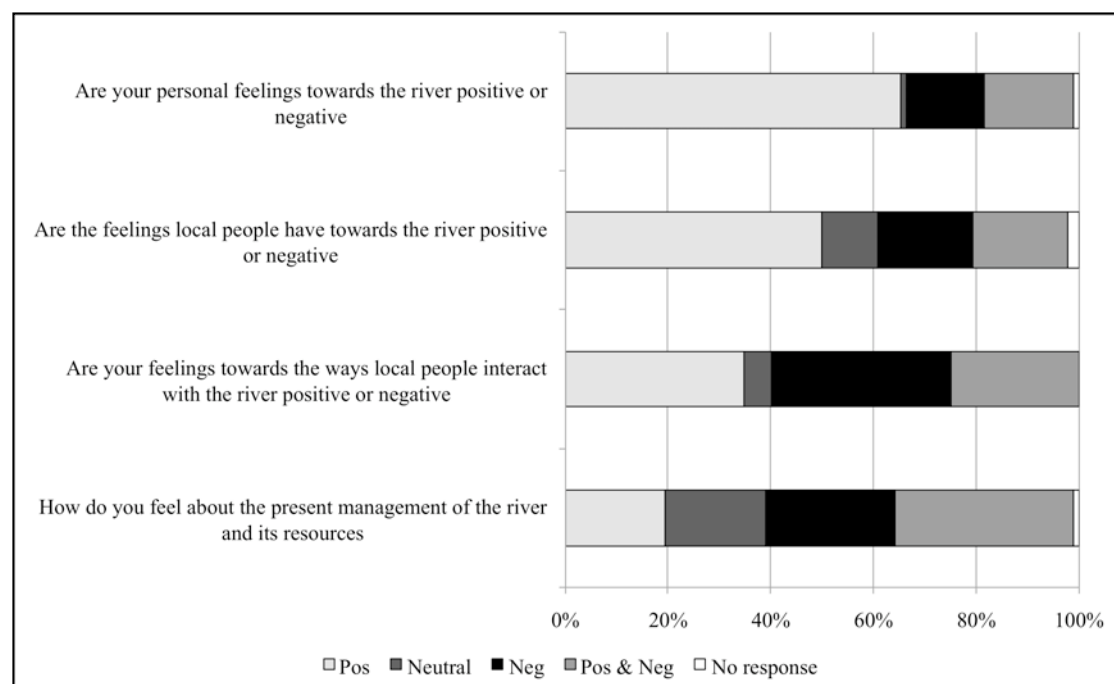


Figure 4.15 Respondents' responses to semi-structured questions on the valence of their feelings towards aspects related to the River.

The majority of respondents indicated that their feelings towards the Kat River were positive (65%, N=92). Reasons given included: seeing the River as the life-blood of the Catchment; essential for livelihoods and farming; a place of renewal and inspiration; source of cleansing; and associated it with spiritual beliefs (Table B.2, Appendix B). Those respondents that indicated that they felt negatively about the River (15%, N=92) mostly cited the condition of the water in the River as the main reason for their negativity; additional responses highlighted an unease certain respondents had concerning the quantity of alien vegetation in the Catchment, and the

erosion in the upper parts of the Catchment (Table B.3). The remaining respondents (17%, N=92) had both positive and negative feelings towards the River and indicated similar reasons for their feelings as those given for respondents who had only positive or negative feelings (Table B.4).

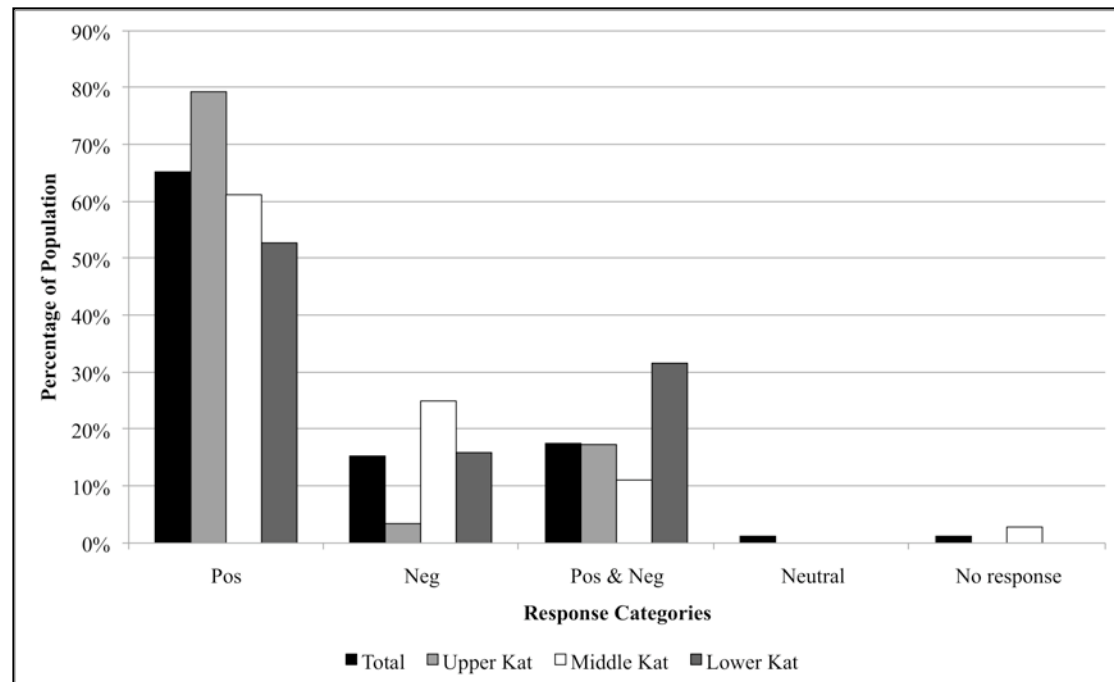


Figure 4.16 Distribution of respondents' responses to the question '*Are your personal feelings towards the river positive or negative*', between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

It is interesting to note that the majority of those who felt negatively (from the total sample) about the River (69%, N=13) came from the middle Kat (Figure 4.16). It was noticed during interviews that most of the respondents living in Fort Beaufort indicated 'negative' or 'positive and negative' feelings towards the Kat River. This was generally backed up with 'it's dirty', and the observation that pollution is a major consideration for Fort Beaufort residents. The majority of upper Kat respondents felt positively about the River (79%, N=29) (Figure 4.16).

Table B.5 lists various responses of respondents from the various regions to the question: 'What's important about the River to you?' As would be expected the significance of the River for agricultural activities increases down the Catchment and upper Kat respondents demonstrate interest in more domestic uses of the River. Clean

water and the importance of looking after the River are themes observable throughout the Catchment; the significance of the water that the River provides was recognised by most respondents.

Respondents appeared less sure of the feelings ‘local people’ in the Catchment might have towards the River. Many white respondents saw ‘local people’ as the local Xhosa community, thereby dissociating themselves from their opinions. Others saw ‘local people’ as those people living within their region, or town or village. Whatever the perception, most considered it difficult to ascertain how local people may be feeling. Half of the respondents (50%, N=92) suggested that the feelings local people have towards the River are positive, still others were spilt between negative feelings (35%, N=92), or positive and negative (25%, N=92) feelings (Figure 4.15).

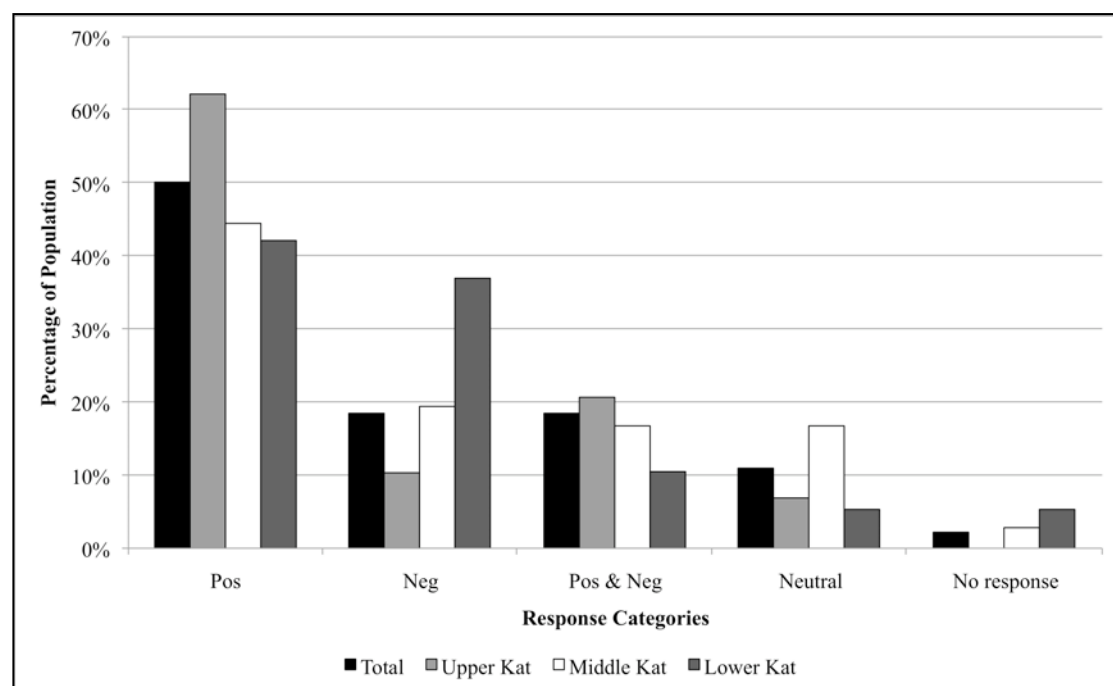


Figure 4.17 Distribution of respondents' responses to the question '*Are the feelings local people have towards the river positive or negative*', between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

Figure 4.17 illustrates the distribution of opinions that respondents, in the various regions, had concerning how ‘local people’ felt about the River. The largest percentage of respondents that thought local people felt negatively towards the River came from the lower Kat (37%, N=19). The majority of upper Kat respondents said

that local people feel positively about the River (62%, N=29). Responses from middle Kat respondents varied, the largest percentage of respondents from this region said people felt positively (44%, N=36); however, the remaining 53% (3% no response) suggested negative (19%, N=36), negative and positive (17%, N=36) and neutral (17%, N=36) feelings were felt by the local people towards the River. It appears that respondents' felt that there are more negative associations to the River in the lower Kat than in the upper Kat and respondents in the middle Kat have a mixture of opinions.

When asked whether respondents felt that the feelings the 'local people' had towards the River had changed in the last 10 years 48% (N=84) of respondents said 'yes', 31% (N=84) said 'no', a remaining 21% (N=84) were neutral or could not answer (Figure 4.21). Increased awareness from research activities and media were often cited as reasons why the feelings in the Catchment have changed. A few respondents suggested that there was an increased western influence (the manner in which people organise themselves around water/resource management – characterised by the practices of western (e.g. United States; United Kingdom) countries and cultures). On water management, and that this has begun to replace traditional cultural and spiritual customs. Others thought that the new NWA (Act 36, 1998) had changed relationship dynamics amongst water users in the Catchment, and encouraged more open negotiation amongst users. Several respondents said that increased service provision had dissociated residents from the River; when taps are provided people no longer feel as responsible for the River. One respondent in the upper Kat suggested that they saw a change in feelings between the younger and older generations: *'I think the young people have changed but not the elderly people. The older people are used to going to get water from the river, but the younger generation want taps right next to their houses. Older people used to wash by the River, but the younger generation say it's not healthy'* (survey respondent: Xhosa women, >60 years, 2007). The above responses can be reviewed in Table B.6 in Appendix B.

The majority of respondents from the upper (55%, N=29) and middle (53%, N=36) Kat thought that the feelings in the Catchment had changed, whereas the majority of lower Kat respondents said 'no' (53%, N=19) they had not changed (Figure 4.18).

Those that did indicate that they had changed described how they used to get far greater recreational value out of the River, but that ‘*now it is too dirty to put a foot in it*’ (survey respondent: white woman, 40-60 years, 2007) (Table B.6). The decrease in recreational value of the River was also described by several middle Kat Respondents.

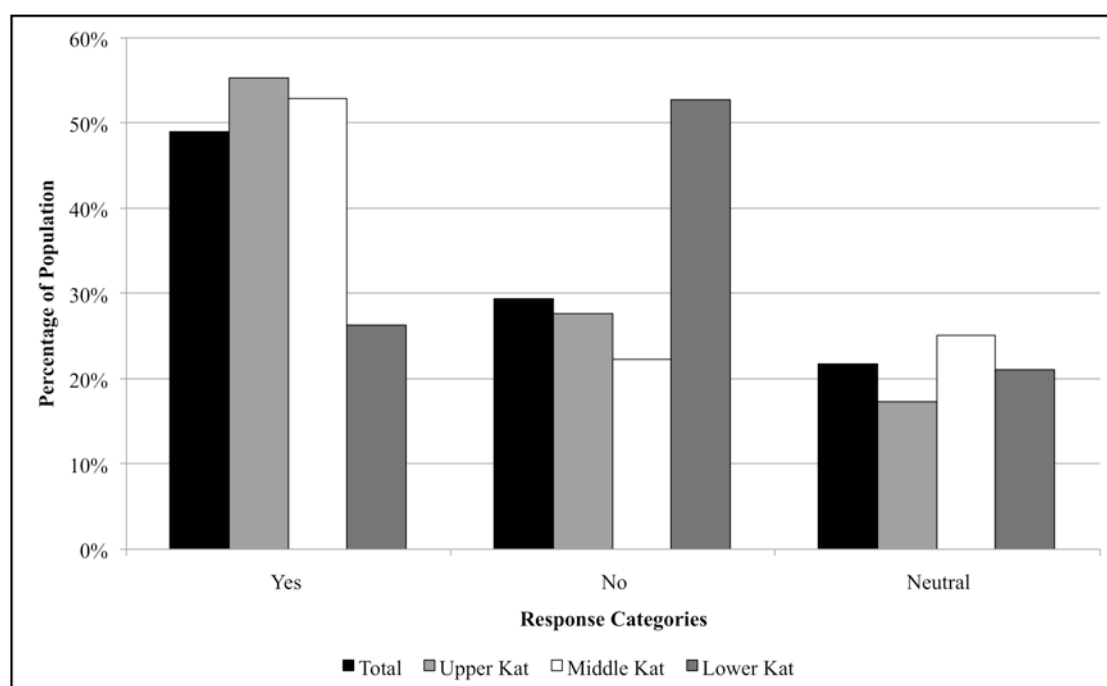


Figure 4.18 Distribution of respondents’ responses to the question ‘*Do you think the local community’s feelings towards the river have changed in the last 10 years? How have they changed*’, between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

There was a mixed response in feelings towards the ways local people interact with the River. Many said that they had negative feelings (36%, N=92), alternatively 22% (N=92) said that they felt positively about it and 27% (N=92) indicated that they felt both negatively and positively (Figure 4.15). The upper (45%, N=29) and lower (42%, N=19) Kat had the highest percentage of respondents that indicated that they had negative feelings towards the ways local people interact with the River; the middle Kat had the largest percentage of respondents that indicated having positive feelings towards the ways local people interact with the River (39%, N=36) (Figure 4.19).

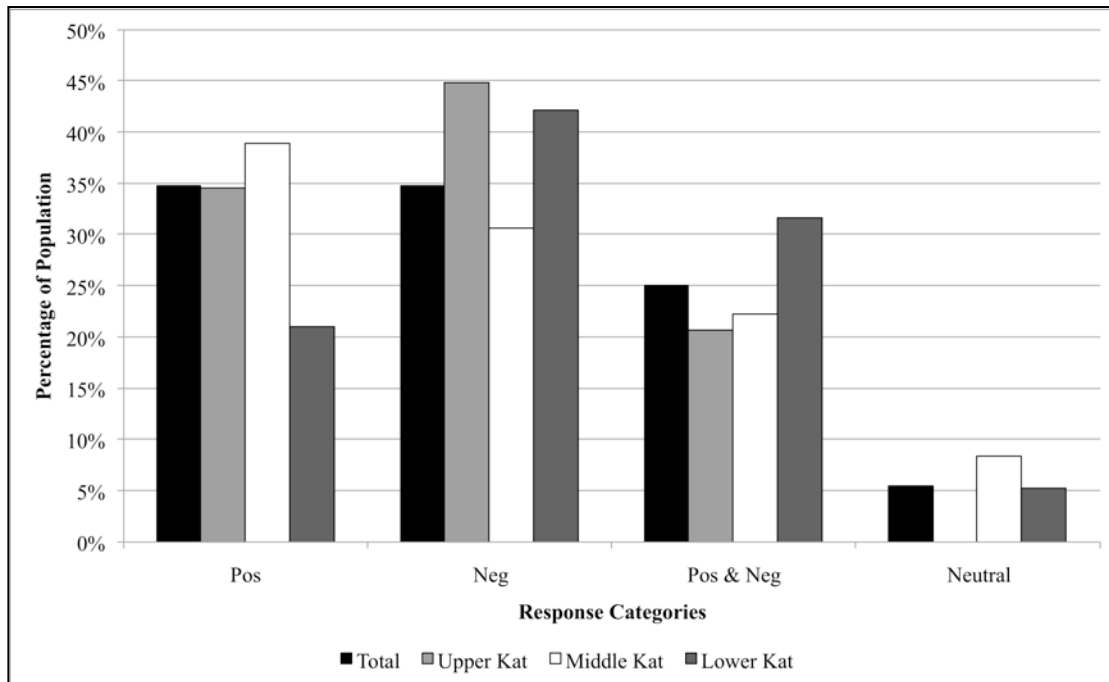


Figure 4.19 Distribution of respondents' responses to the question '*Are your feelings towards the ways local people interact with the river positive or negative*', between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

It appeared that respondents felt positively about the role the River plays in the lives of the local people, and recognise its value in terms of what it provides for them socially, economically, ecologically and spiritually. There are, however, negative feelings around the roles local people play. Respondents suggested that there was increased erosion in the Catchment and that this was causing heavy silt loads that blocked weirs and affected water quality. Many said that they believed that there is a need for greater awareness and education amongst residents in the Catchment concerning their activities and the River; the need for awareness was not confined to the upper Kat Residents, but middle and lower Kat farmers as well. Water quality and pollution in the River were again cited as reasons that respondents felt negatively towards the way local people interact with the River. Several respondents specifically implicated the municipality as the primary cause of the pollution problem and gave examples of leaking sewage pipes, poorly maintained water treatment equipment, and littered and unkept streets as sources of pollution that they felt the municipality could abate. One lower Kat farmer touched on the tension that exists between the scheduled and unscheduled areas and the issues of water allocation: '*Upper & middle farmers*

are against us getting more water; they generalize about the amount of development which has been happening' (survey respondent: white male farmer, 30-45 years, 2007). Upper Kat farmers highlighted the faulty and poorly maintained infrastructure available to them for abstracting water and lack of education opportunities. The above responses can be reviewed in Tables B.7, 8 & 9 in Appendix B.

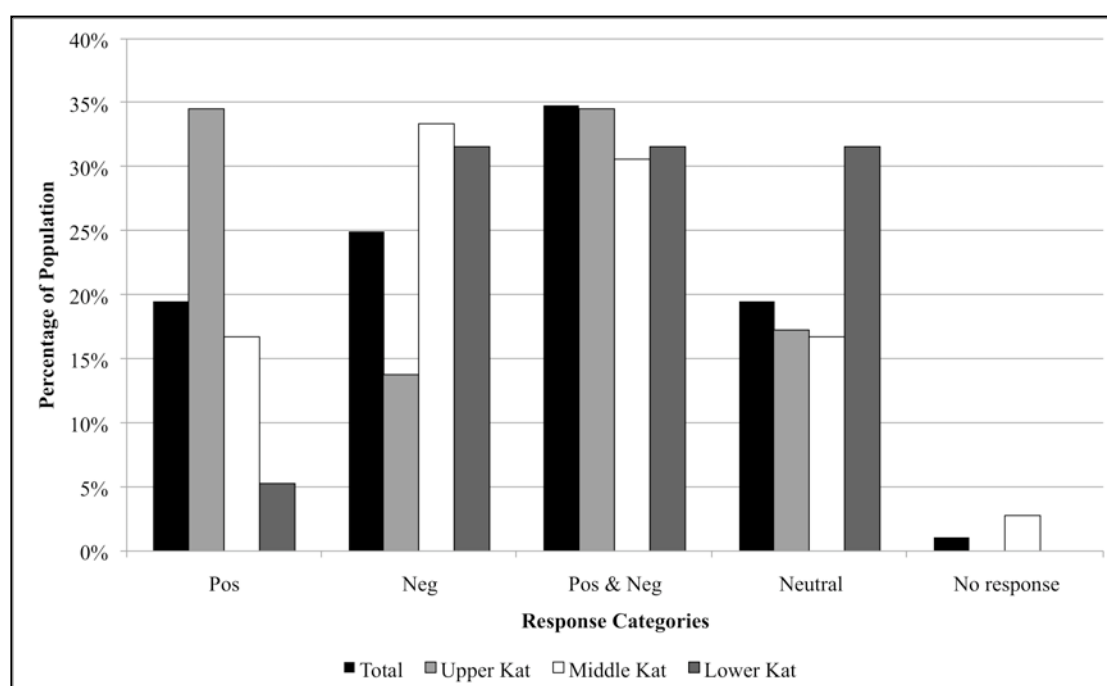


Figure 4.20 Distribution of respondents' responses to the question 'How do you feel about the present management of the river and its resources', between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

In terms of feelings toward the present management of the River, 35% (N=92) of respondents indicated that they had both negative and positive feelings, 25% (N=92) said they felt negatively, and an equal proportion (20%, N=92) of respondents indicated having either positive or neutral feelings towards the issue (Figure 4.15). In general middle Kat respondents had either negative (33%, N=36) or positive and negative (31%, N=36) feelings, while many of the upper Kat respondents had positive (34%, N=29) or positive and negative (34%, N=29) feelings towards the management of the River (Figure 4.20).

Most respondents indicated that they knew very little about the present management of the River. Many of the upper Kat respondents equated present management to the work ‘Working for Water’ is doing in the upper Kat, and the middle Kat respondents to the municipality and its work connected to service provision. It is interesting that most of the lower Kat respondents thought first of the WUA and DWAF when considering present management, and respondents in this area were equally (32%, N=19) divided between negative, positive and negative, or neutral feelings towards the management of the River (Figure 4.20).

An interesting observation is that as the questions shift from more personal feelings (Figure 4.15) to feelings about others and lastly management (Figure 4.20) the level of positivity decreases. This suggests that in general Kat River residents or water users feel positively about their own relationships with the River, and how they utilise its resources, but less positively about the relationships they observe others having with it. One could speculate that it may be because of their own positive feelings towards the River, and negative opinions of other peoples’ use of the River that they are concerned about the management of it.

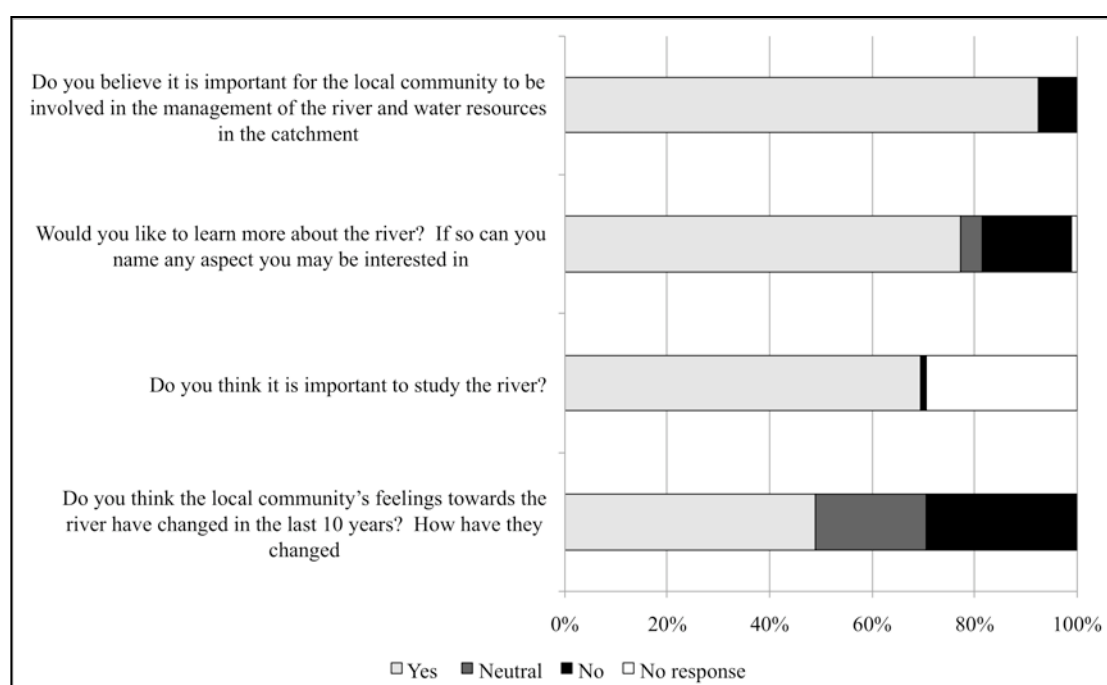


Figure 4.21 Respondents’ responses to semi-structured questions on community related aspects and study of the River.

The next group of questions in section B asked respondents for their opinion on matters related to local community feeling and involvement, as well as on research into the River and its relevance, refer to Figure 4.21. Most (92%, N=92) respondents said ‘yes’ it was important for the local community to be involved in the management of the River. In general responses were immediate, and backed up with comments such as ‘*of course they must be, it’s their River*’; ‘*definitely, it’s very important that they are*’ (survey respondents, 2007). This is an interesting response when contrasted to the low level of interest shown by respondents to be involved in the present and future management of the River (Figure 4.14).

An interest in learning more about the River was expressed by the majority of respondents (77%, N=92), who indicated interests in aspects related to: the ecology of the River; the geography of the River; the management of the River; and the use benefits of the River. Respondents, who said ‘no’, that they didn’t want to know more about the River, either cited knowing all they needed to know, or old age and retirement as reasons for their disinterest.

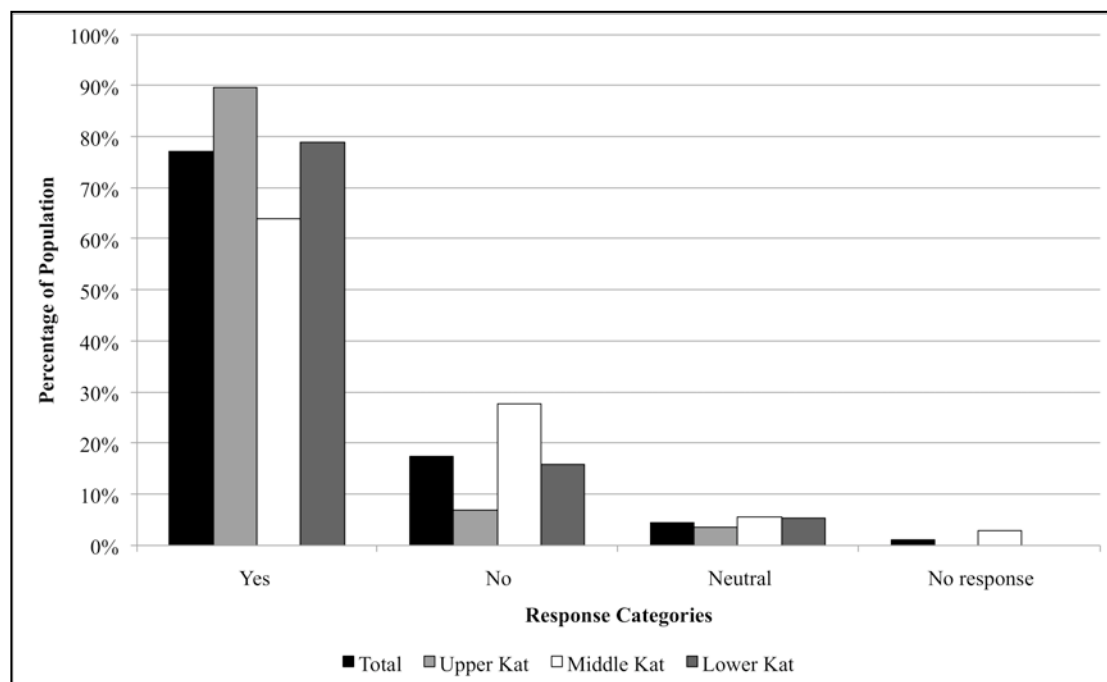


Figure 4.22 Distribution of respondents’ responses to the question ‘*Would you like to learn more about the river*’, between the different regions in the Kat River Catchment. Responses from the group of respondents from outside the Catchment not shown.

Of upper Kat respondents 90% (N=29) indicated that they wanted to learn more about the River (Figure 4.22); interest within this group included learning about: weirs and their construction; the ecological Reserve; determining river health; and the general ecology and geography of the River. Of middle Kat respondents 64% (N=36) said 'yes', they would like to know more about the River, and interests in this region included: knowledge into ways for ensuring a clean supply of water; information about the chemicals the municipality uses in purifying the water; and the general ecology and geography of the River. Finally 79% (N=19) of lower Kat respondents said 'yes', they would like to know more about the River and were interested in: the River's capacity (yield) and water allocation systems; how to determine the quality of the water; and the general ecology and geography. The above responses can be reviewed in Tables B.6 & B.7 in Appendix B.

In response to the question of whether they felt it was important to study the River, 70% (N=92) of respondents said 'yes' it was important (Figure 4.21). Most respondents said that study of the River enabled them to understand it better and, therefore manage and monitor it better. Many focused on the pollution concerns in the middle and lower Kat and said that studying the River would warn residents of potential concerns.

When asked what respondents felt needed to be changed about the management of the River, 80% (N=92) of respondents indicated that 'something' needed to be changed (Figure 4.23). Many respondents were often unsure of exactly what did need changing, but felt that it could be improved. Many Fort Beaufort residents and lower Kat respondents pointed to the municipality and its functions in managing the system, some upper Kat respondents said that dam operation needed to be improved and upper Kat residents and farmers should be informed when water was going to be let out of the Dam so that they could: 1. prepare and, 2. warn residents to watch children and others, as several cases of drowning have been reported because of the flash floods that sometimes come with the opening of the sluice gates.

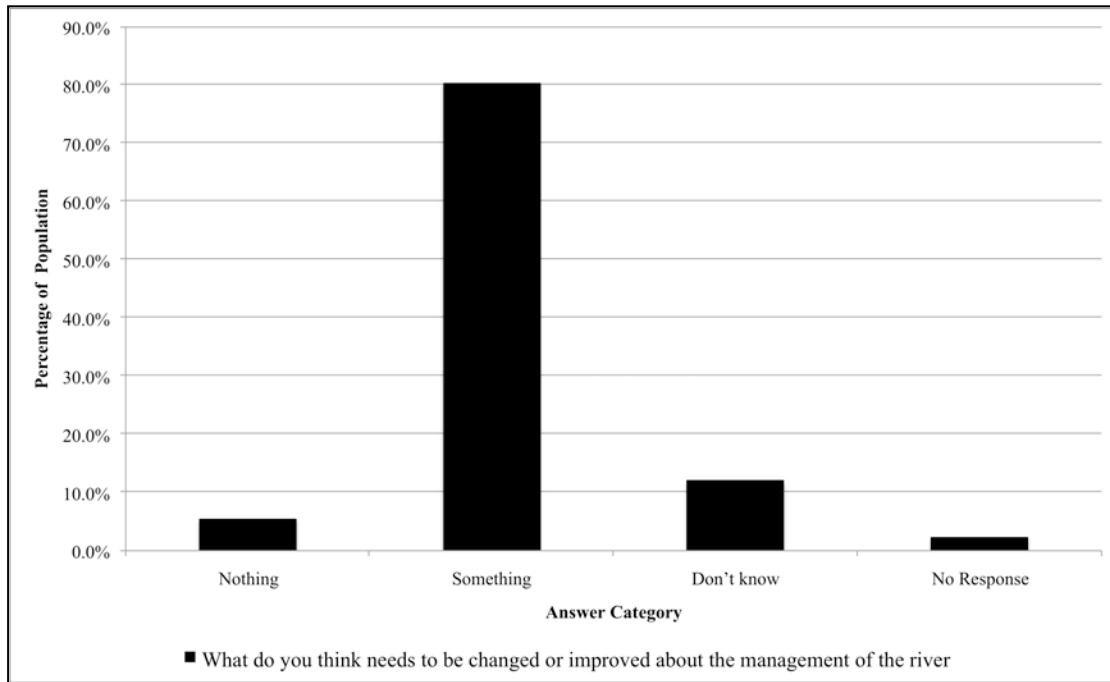


Figure 4.23 Respondents' indication of the need for change in the management of the Kat River. 'Nothing' indicates that respondents didn't feel anything needed changing; 'something' indicated that respondents felt something needed changing; 'don't know' indicated that respondents were unsure; and 'no response' indicates that respondents did not respond to the question.

4.3.3 Section C

The Likert scale in section C consists of 42 items or statements relative to which respondents indicated their level of agreement or disagreement. Although the scale was developed around the concepts of: 'attitudes towards the Kat River'; 'attitudes towards the management of the Kat River'; 'attitudes towards the use of the River'; 'attitudes towards personal actions related to the River'; and 'attitudes towards the study of or research into the River', analysis was done relative to the seven analysis themes (Table 4.1):

- T1 = 'respondents' sense of connection with the River';
- T2 = 'respondents' perceptions of the cultural and generational significance of the River';
- T3 = 'respondents' perceptions of the management of the River and its water resources';
- T4 = 'the sense of community respondents have longitudinally down the River';
- T5 = 'respondents' perceptions of the River';

- T6 = ‘respondents’ opinions concerning research into the River’; and finally
- T7 = ‘respondents’ opinions into use aspects related to the River (personal and community)’.

4.3.3.1 T1: Respondents’ sense of connection with the River

Theme 1 (T1) explored the sense of connection respondents had with the River, this was achieved through the awareness they have of the roles the River plays in their lives, and to what degree they associate it and its condition with their own wellbeing, health and livelihoods. Responses to statements related to T1 (Figure 4.24) were mostly in agreement, acknowledging the respondents’ dependence on the River, and the potential impact the respondents can have on its quality.

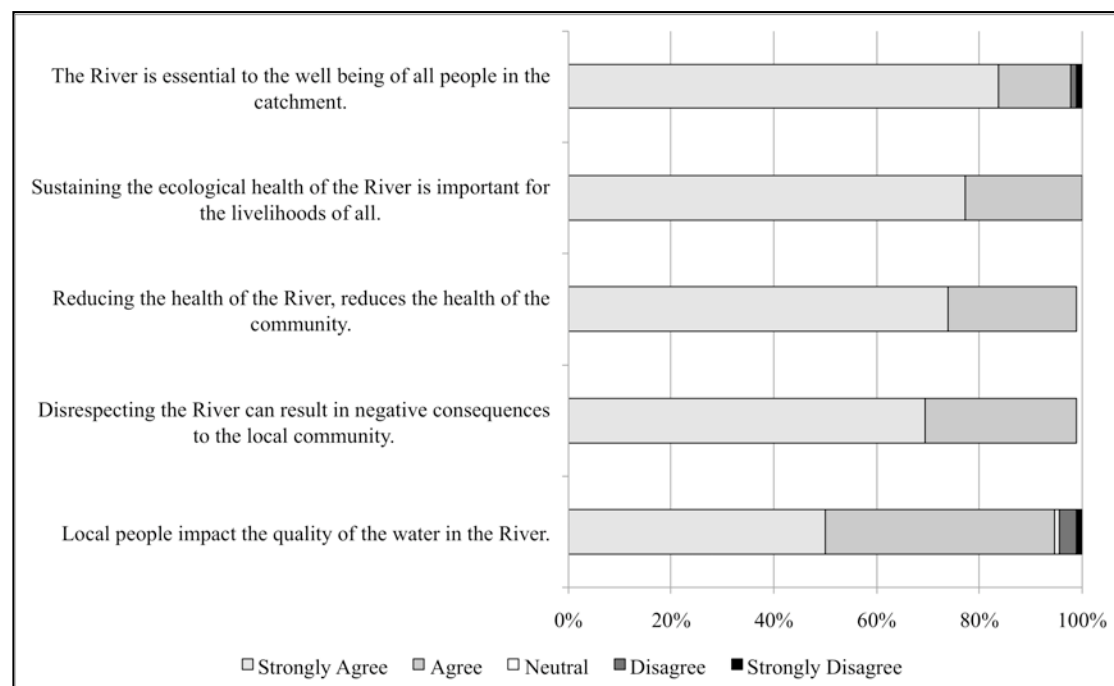


Figure 4.24 Statements exploring the respondents’ ‘sense of connection’ with the River (T1).

For the most part respondents (84%, N=92) strongly agreed that the River was essential to the well being of all people in the Catchment. Concurrent with this response, 77% (N=92) of respondents strongly agreed that sustaining the ecological health of the River was important for the livelihoods of everyone in the Catchment and the remaining 23% (N=92) agreed with the statement. Furthermore, 74% (N=92)

of respondents strongly agreed with the statement that said that ‘reducing the health of the River would also reduce the community’s health’. It appears, therefore, that respondents in general have a good awareness of their connection with the River, and its role in sustaining their wellbeing and health.

In terms of the regions in the Catchment, most of the upper Kat respondents strongly agreed (86%, N=29) with the statement that ‘reducing the health of the River reduces the health of the community’. This was similarly expressed by most of the middle (67%, N=36) and lower Kat (68%, N=19) respondents; the remaining respondents from all regions agreed with the statement. The above responses can be reviewed in Table C.1 in Appendix C.

Most respondents either strongly agreed (50%, N=92) or agreed (45%, N=92) with the statement that ‘local people impact the quality of the water in the River’, demonstrating awareness of the role local people play in impacting the water quality of the River (Figure 4.24). Agreement shown for this statement was stronger amongst the upper (59%, N=29) and lower (58%, N=19) Kat respondents than the middle Kat (36%, N=36) respondents, who in general simply agreed with the statement (56%, N=36) (Table C.1).

4.3.3.2 T2: Respondents’ Perceptions of the Cultural and Generational Significance of the River

It is clear from Figure 4.25 that nearly all respondents (91%, N=92) felt strongly that it is important to look after the River for the next generation, and were in a general agreement that the River is part of everyone’s heritage (55% Strongly Agree (SA) and 35.87% Agree (A), N = 92). As such they believed that it is an open resource that none should be excluded from interacting with (43% disagree (D) and 29% strongly disagree (SD), N =92, that only certain people should be allowed near the River). In the upper Kat, however, the strength of this belief was weaker (28% D and 38% SD, N=29) then in the middle (56% D and 19% SD, N=36) and lower (58% D and 21% SD, N=19) Kat (Table C.1).

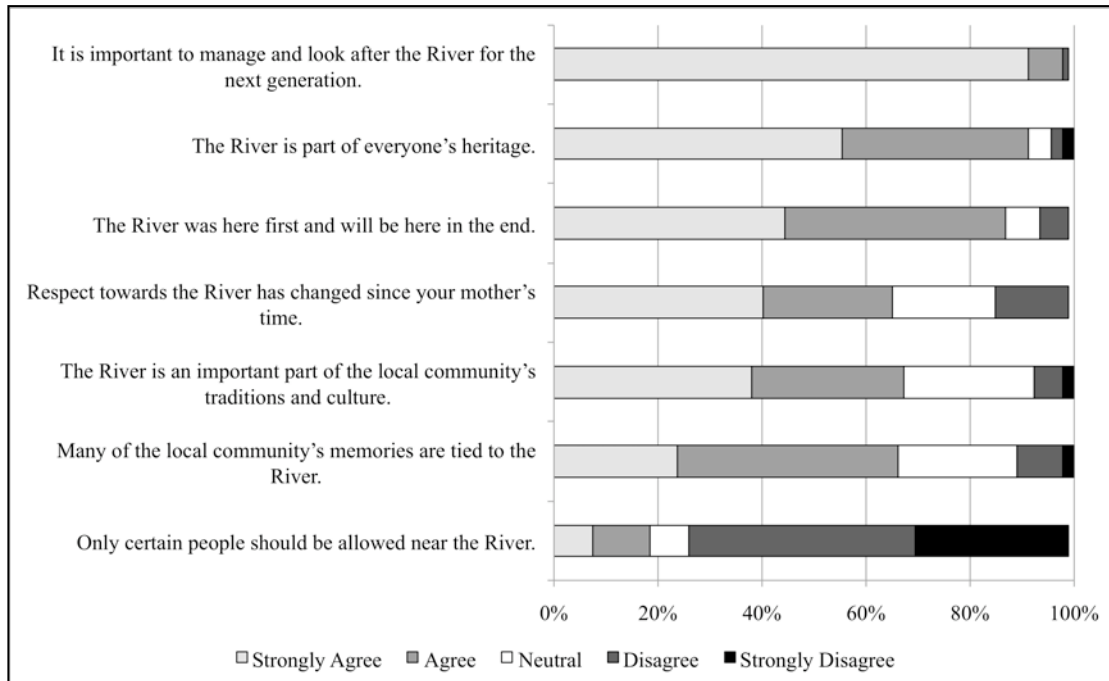


Figure 4.25 Statements exploring the respondents' perceptions of the cultural and generational significance of the River (T2).

Most respondents agreed (40% SA and 25% A, N=92) that respect towards the River has changed in some way since their parents (mother's) time (Figure 4.25). They still, however, perceived it as being an important part of the local community's traditions and culture (38% SA and 29.35% A, N=92) and, considered many of the local community's memories to be linked with the River (24% SA and 42% A, N=92).

The Kat River is considered important not only to the present generation (T1) but also to the next (T2), and appears to have a high sentimental and socio-economic (livelihoods) value to local residents. Most respondents saw the River as persistent (45% SA and 42% A, N = 92, that the River was here first and will be here in the end) and enduring.

In general the upper Kat respondents seemed to have stronger opinions around the generational and cultural aspects of the River and, their responses varied far less than did those of the respondents from the other two regions (Table C.1). It appears that middle and lower Kat respondents are less uniform in their beliefs about the generational and cultural significance of the Kat River and, the upper Kat respondents more of one mind in consideration of them.

4.3.3.3 T3: Respondents' Perceptions of the Management of the River & its Water Resources.

Respondents' perceptions of the management of the River and its water resources were assessed via items that examined: their sense of whose responsibility it was to manage the River; their opinions on the current management of the River and dam; their assessment of the job the WUA is doing in managing the Catchment's water resources; their opinion on whether or not water quality is a problem; and lastly how important the management of the River is in terms of their own thoughts and concerns. The results are presented in Figure 4.26.

There was an overall agreement that it is everyone's responsibility to look after the River and water resources (71% Strongly Agree (SA) and 28% Agree (A), N=92), and that it is important to give the local people the opportunity to participate in the management of the River (49% SA and 36% A, N=92). There was also, however, an overall agreement that it is the government's responsibility to manage and conserve the River (42% SA and 28% A, N=92); however, respondents responded to this item less strongly than they did the two previous statements. This suggests that respondents felt that the local community has a responsibility to look after the River, but also felt that the government has a role to play. During interviews several respondents appeared disillusioned with the government and its efforts to assist them in managing their water resources and, therefore, had considerable doubt over the government's ability to effectively manage the Kat River and its resources. Moreover, several respondents, either because of their experience with government or for other reasons, felt that it was wrong to rely wholly on the government to look after their River and water.

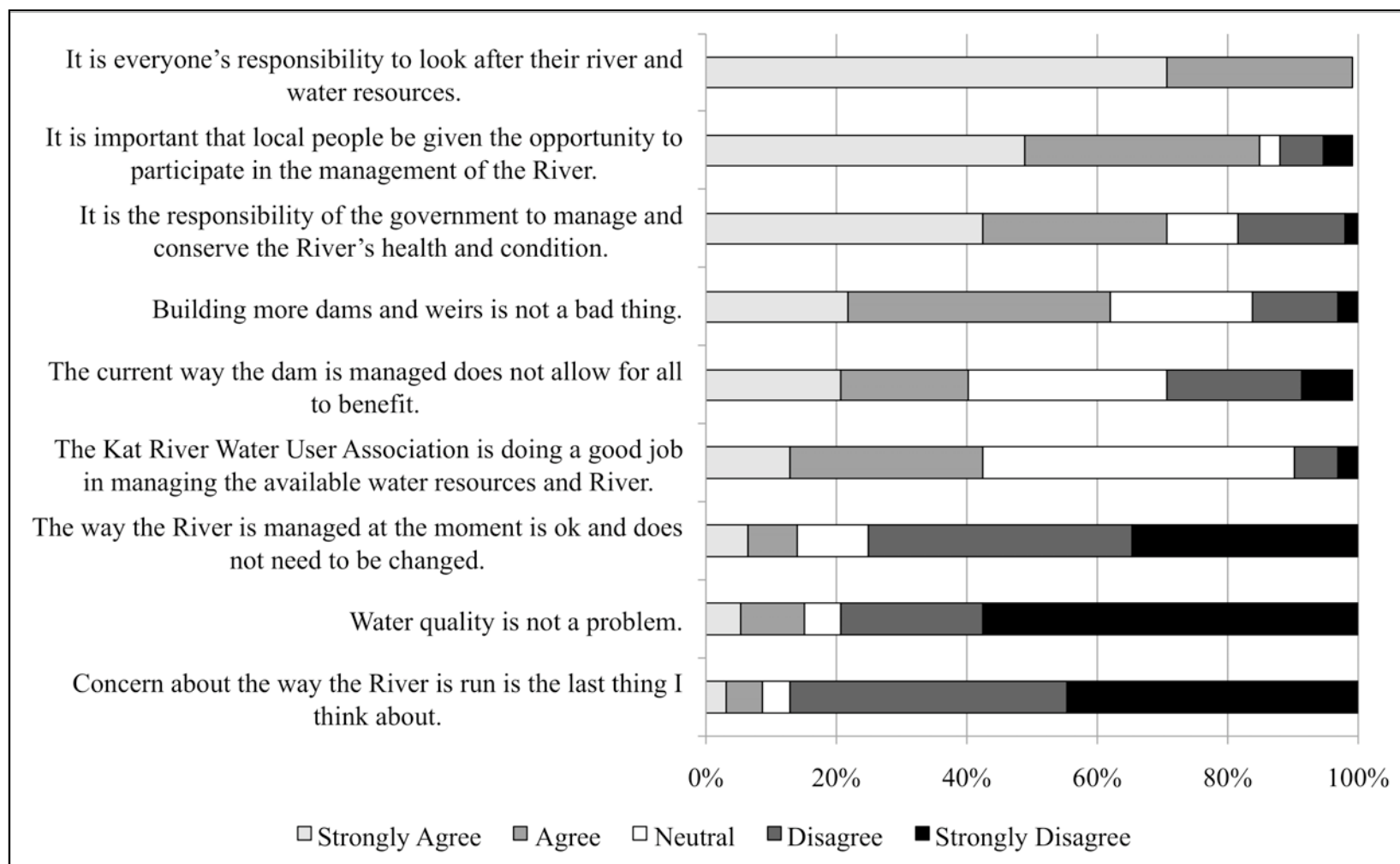


Figure 4.26 Statements exploring the perceptions respondents' have towards the management of the River and its water resources (T3).

In connection with respondents' perceptions on the responsibility of government, it appears from the data that more respondents in the lower Kat felt that the government has a responsibility in managing their River and water resources (53% SA and 32% A, N=19) than the other two regions (Table C.1). Although most upper Kat respondents were in agreement over the government's responsibility (49% SA and 14% A, N=29), there was a larger percentage of respondents from the upper Kat who felt either neutral or disagreed with the statement that 'it is the government's responsibility to look after the River's health and condition' (10% N and 24% D, N=29) (Table C.1). If this is true, it is an interesting finding, as it is the upper Kat respondents that are most reliant on government aid and intervention at present; however, when compared to upper Kat responses in connection with statements from T1 and T2, there was a strong indication that there is a more intrinsic and innate value associated with the River in these respondents, and connected to this a sense of personal responsibility in sustaining the River. This is not to imply that this same sense is not felt by other respondents from the other regions, but is reported with greater strength by upper Kat respondents. It is possible that the upper Kat's association with the River has been significantly influenced by the work of Rhodes University researchers, and therefore, it has been this input that has led the stronger expression of intrinsic association. In addition, this innate value expressed by respondents from the upper Kat does not appear to be directly linked to socio-economic values.

Although generally in agreement with the statement that the building of more dams and weirs is not a bad thing (22% SA and 40% A, N=92), respondents were not certain of this (Figure 4.26). In agreeing with this statement most respondents also admitted to a general lack of knowledge concerning the issue; weirs and dams are considered to be valuable socio-economic assets and, therefore, not seen as a bad thing from a social perspective.

In terms of perceptions of current management of the River and Dam, respondents displayed varying levels of confidence in and awareness of current management practices. Of the total sample, 30% (N=92) of respondents took a neutral stance on whether or not the way the Dam is managed at the moment allows all to benefit

(Figure 4.26); of these most were from the middle Kat (42%, N=36) (Table C.1). There were an equal percentage of respondents (20.63%, N=92) that either strongly agreed or disagreed with the statement (Figure 4.26). There is a lack of awareness amongst respondents as to how the Dam benefits the various communities in the Catchment (this appears especially true for middle Kat respondents); while upper Kat respondents often raised the issue of lack of warning associated with dam releases, there was a general belief amongst commercial citrus farmers that everyone is benefiting from current dam management practices.

A neutral stance was taken by 48% (N=92) of respondents in response to the statement that 'the KRWUA is doing a good job in managing the available water resources and River' (Figure 4.26). Like dam management, there was a lack of awareness amongst respondents of who the WUA was and what they did. Those that did know felt that given the circumstances and the resources available, the WUA was doing the best job it could. In the upper Kat 42% (N=29) of respondents indicated that they were neutral concerning this statement, because they said they did not know enough about what the WUA did (Table C.1). No lower Kat respondents were in strong agreement over this statement, and the 47% (N=19) that did indicate agreement with the statement were amongst those who felt they were doing what they could with what they had. Additionally there were a larger proportion of lower Kat respondents (21%, N=19) (than other voting area respondents) that disagreed with the statement and felt there needed to be improvement (Table C.1).

Most respondents disagreed with the statement that 'the way the River is managed at the moment is ok and does not need to be changed' (40% D and 35% SD, N=92) (Figure 4.26). Middle (44% D and 31% SD, N=36) and lower Kat (53% and 37%, N=19) respondents appeared to express this the strongest; no lower Kat respondent agreed with the statement. This opinion may be better contextualised relative to the observation that of the 58% (N=92) of respondents who strongly disagreed with the statement that 'water quality is not a problem' (Figure 4.26): 67% (N=36) were from the middle Kat and 79% (N=19) were from the lower Kat. Although, 28% (N=29) of upper Kat respondents indicated some agreement with this statement (*i.e.* felt water quality was not a problem in the upper Kat), only 11% (N=36) from the middle Kat

and no lower Kat respondents agreed with it. It appears that water quality is a concern in the middle and lower Kat; upper Kat respondents appeared less concerned about water quality issues in the River. Information pertaining to the responses of the different regions can be reviewed in Table C.1 in Appendix C.

Most respondents indicated that they were concerned about the management of the River and that it was fairly high on their list of priorities. In fact, 87% (N=92) of respondents disagreed (42% D and 45% SD, N= 92) with the statement that ‘concern about the way the River is run is the last thing they thought about’ (Figure 4.26). This was a response common to respondents throughout the Catchment; very few indicated that they were not concerned about the way the River was managed.

4.3.3.4 T4: *The Sense of Longitudinal Community that Respondents have down the River*

Theme 4 (T4) sought to investigate the respondents’ sense of connection and community associated with the linear nature of the River. The theme had four statements: the first looked at respondents’ opinions on the impact of upstream users on downstream users; the second assessed whether respondents felt the Kat River was a source of linkage between all the communities; the final two items looked at the consideration respondents give to the potential impact their actions could have on someone living downstream of them, and the extent to which they felt upstream users did consider downstream users. The results are presented in Figure 4.27 and information pertaining to the responses of the different regions can be reviewed in Table C.1 in Appendix C.

Respondents were in agreement over the statement ‘upstream users impact downstream users’; 50% (N=92) strongly agreed and 42% (N=92) agreed. A larger percentage of upper Kat respondents (63%, N=29) strongly agreed with the statement than either middle (42%, N=36) or lower Kat (47%, N=19) respondents; this is interesting as the upper Kat is the upstream user.

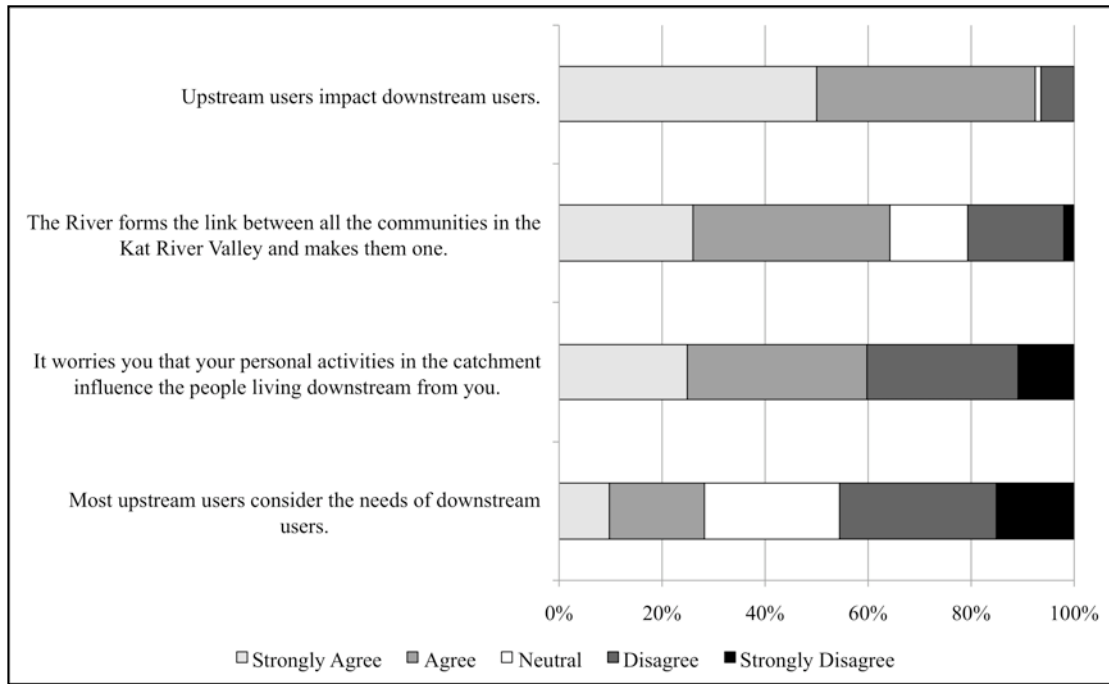


Figure 4.27 Statements exploring the sense of community respondents' have with longitudinal dimensions of the River (T4).

Most respondents agreed that 'the River forms the link between all the communities in the Catchment and made them one' (26% SA and 38% A, N=92). Once again upper Kat respondents felt this most strongly, with 55% (N=29) of upper Kat respondents strongly agreeing with the statement as opposed to 8% (N=36) of middle Kat respondents and 5% (N=19) of lower Kat respondents (Table C.1).

Respondents were split 60%:40% in their agreement:disagreement with the statement 'it worries you that your personal activities in the Catchment influence people living downstream from you'. Many respondents could not see how any of their activities would impact the River and, therefore, anyone living downstream of them. Others openly admitted that it was not something that they thought much about. As would be expected a large percentage of lower Kat respondents (42%, N=19) disagreed with the statement, the middle Kat displayed a mixture of responses that approximated to the ratio of 60:40 (Table C.1). The majority of upper Kat respondents (48%, N=29) strongly agreed with the statement.

There was a mixture of responses observed for the statement, 'in general upstream users consider the needs of downstream users'. Upper Kat respondents generally agreed with this statement (24% SA and 24% A, N=19), middle Kat respondents were

distributed between agree (17%, N=36), neutral (28%, N=36) and disagree (36%, N=36), and lower Kat respondents mostly disagreed (47% D and 26% SD, N=19) with the statement (Table C.1).

4.3.3.5 T5: *Perceptions Respondents' have of the River*

Theme 5 (T5) explored the general perceptions respondents have of the River, its value and its health. This theme aimed to establish respondents' attitudes concerning the River that cannot be associated directly with socio-economically based attitudes. The results are presented in Figure 4.28 and information pertaining to the responses of the different regions can be reviewed in Table C.1 in Appendix C.

Respondents in general see the River's value as coming from its use to people (35% SA and 43% A, N=92). Most (57% SA and 38% A, N=92), however, feel that the River is more than just water, and often elaborated on their response by explaining that the River was a habitat that contained fish and insects, thereby expressing the belief in a more intrinsic value associated with the River. In the upper Kat many respondents said that the River was the home to their ancestors and, interestingly enough, 86% (N=29) of upper Kat respondents strongly agreed with the statement, whereas the majority of middle (58%, N=36) and lower (53, N=19) Kat respondents only agreed with the statement (Table C.1).

Fewer respondents agreed that they 'saw the River as not just a source of water' (39% SA and 39% A, N=92), and 14% (N=92) said that they disagreed with the statement, thereby implying that they did only see the River as a source of water. The lower Kat had the largest percentage of respondents who disagreed with this statement (26%, N=19), followed by the upper Kat (14%, N=29), and lastly the middle Kat (11%, N=36) (Table C.1). It is interesting that most respondents recognise the River as not just water and express an understanding that the River is composed of life and provides habitat, and yet concurrently see it as a source of water that is most valuable to people because of its usability.

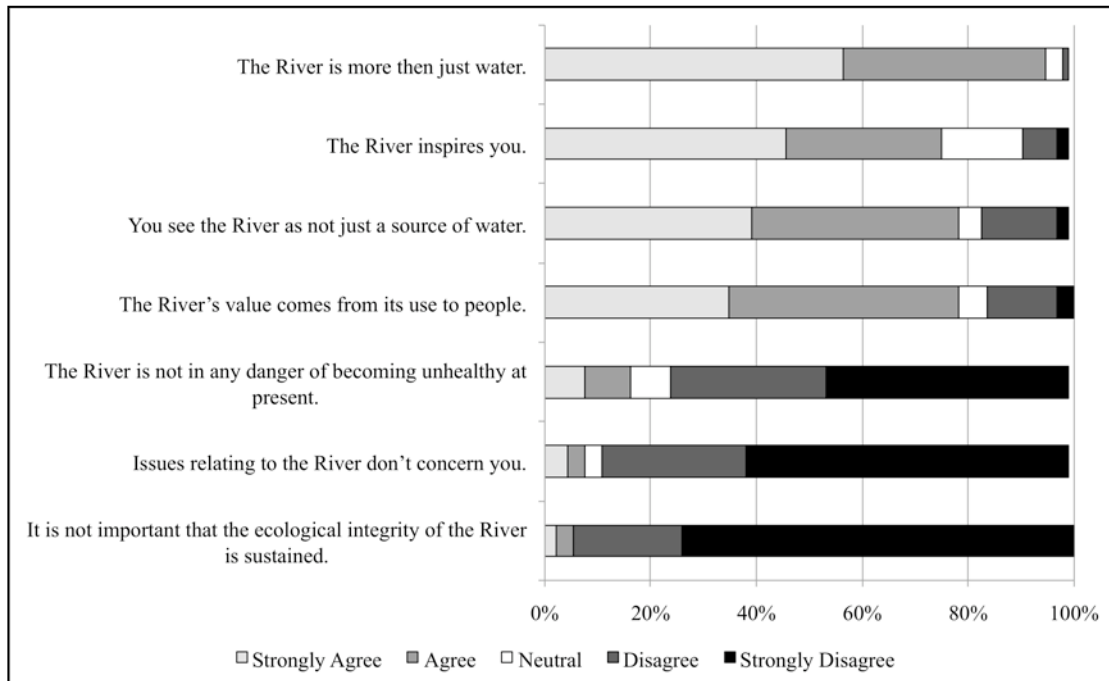


Figure 4.28 Statements exploring respondents' perceptions of the River (T5).

In general respondents (47%, N=92) strongly agreed or agreed (29%, N=92) with the statement that 'the River inspired them'. The majority of those who strongly agreed were upper Kat respondents (83%, N=29) (Table C.1). Reactions to this statement included: confusion, knowing smiles, apathy, and interest.

Respondents showed a strong concern for the River's health and 75% (46% SD and 30% D, N=92) indicated that they felt that the River was in present danger of becoming unhealthy. This concern appears to be most prevalent amongst lower Kat respondents, of which 63% (N=19) strongly disagreed with the statement that the River 'was not in any danger at present of becoming unhealthy' (Table C.1).

Most respondents, 88% (61% SD and 27% D, N= 92), said that issues relating to the River did concern them. Some respondents responded to this statement adamantly, and suggested that they would be very angry if anyone thought that it was true that issues relating to the River did not concern them. Upper Kat respondents disagreed the most strongly with this statement, with 86% of respondents strongly disagreeing with this statement (Table C.1).

The majority of respondents, 95% (74% SD and 21% D, N=92), disagreed with the statement that ‘its not important that the ecological integrity of the River is sustained’. Most respondents from throughout the Catchment were in strong disagreement with this statement: 90% (N=29) of respondents from the upper Kat strongly disagreed with this statement; 67% (N=36) from the middle; and 58% (N=19) from the Lower Kat (Table C.1).

4.3.3.6 T6: Respondents’ Opinions concerning Research into the River

Theme 6 (T6) looked at respondents’ opinions concerning research into the River. Items in this theme briefly explored respondents’ views on the importance of information about the River, the usefulness of scientific research, and the extent to which respondents felt resources were misallocated to research. The results are presented in Figure 4.29 and information pertaining to the responses of the different regions can be reviewed in Table C.1 in Appendix C.

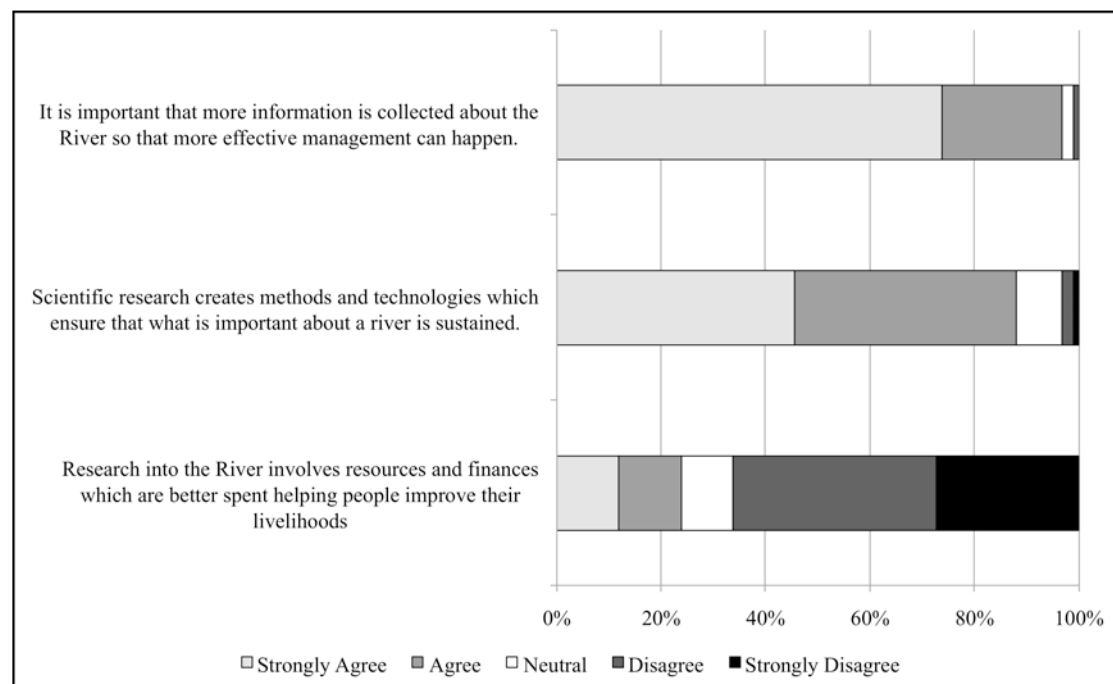


Figure 4.29 Statements exploring respondents’ attitudes concerning research into the River (T6).

Respondents in general (74%, N=92) said that they strongly agreed (and 23%, N=92, that they agreed) that it was important to collect more information about the River for effective management to happen. Respondents also felt that scientific research provides methods and technologies that help protect what is important about the River (46% SA and 42% A, N=92), and that resources and finances that are allocated for research into the River would not be better spent helping improve people's livelihoods (27% SD and 39% D, N=92). In fact a large proportion of respondents equated research into the River as helping improve people's livelihoods. A somewhat more negative attitude towards research was shown in the upper Kat, which had the largest percentage of respondents that either strongly agreed (17%, N=29) or agreed (17%, N=29) with the statement that 'resources that go towards research would be better spent going towards helping people's livelihoods' (Table C.1).

4.3.3.7 T7: Respondents' Opinions Related to Use Aspects of the River (personal and community).

Although theme 7 (T7) has statements that in many respects overlap with other themes' statements, it was decided to keep it as a separate theme because it explores aspects of respondents' reported behaviour in relation to the River and to other residents living in the Catchment. The responses to these items were assessed in comparison with respondents' responses to related items in other themes. These items have been placed under the title 'use aspects' as they examine respondents' opinions on: the ways they would use the River and water resources; what they would not do; what they believe about the possibility of individuals being able to use the River in a sustainable way; what they believe they are capable of promoting in terms of sustainable management; if they feel they consider the needs of others; who should be able to use the River; and whether or not they are concerned about the River. The results are presented in Figure 4.30 and information pertaining to the responses of the different regions can be reviewed in Table C.1 in Appendix C.

Most respondents (82% SA, N=92) indicated that they would definitely not knowingly throw harmful chemicals or materials into the River. Respondents were adamant concerning this response, and felt sad or angry over the thought of anyone

doing the opposite. Respondents' responses to items such as 'the river is not in any danger of becoming unhealthy at present' (T5, 29% D and 46% SD, N=92) (Figure 4.28) and 'water quality is not a problem' (T3, 22% D and 58% SD, N=92) (Figure 4.26) suggest that respondents are concerned about water quality issues and the health of the River. So although most respondents indicated that they would not knowingly throw materials into the River, they do believe that these materials are entering the River and causing water quality problems.

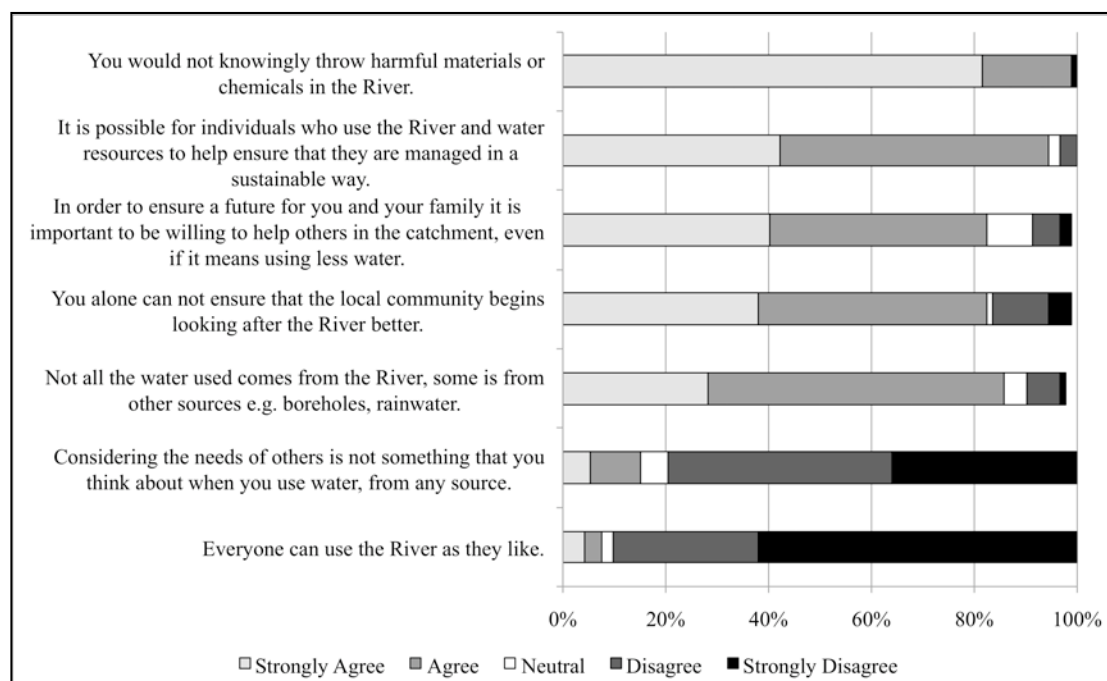


Figure 4.30 Statements exploring the use aspects of the River (T7).

Almost all respondents (95%, N=92) indicated agreement (42% SA and 52% A, N=92) with the statement that 'it is possible for individuals who use the River and water resources to help ensure that they are managed in a sustainable way'. Perhaps the greater percentage of respondents only agreeing with the statement reflects a degree of fatalism amongst respondents in terms of it actually ever happening. Of respondents from the middle and lower Kat, 67% (N=36) and 63% (N=19) respectively only agreed with the statement; however, 59% (N=29) of respondents in the upper Kat strongly agreed with the statement (Table C.1). If this fatalism or doubt does exist then it appears to be most prevalent among middle and lower Kat respondents.

Most (38% SA and 45% A, N=92) respondents felt that they alone could not ensure that the local community begins to look after the River better. This suggests that only a small proportion of respondents felt they had the ability, time or interest to encourage the local community to begin looking after the River better.

Respondents agreed (40% SA and 42% A, N=92) that ‘in order to ensure a future for themselves and their family it is important to be willing to help others in the Catchment, even if this means using less water’. Respondents from the upper Kat appeared to be in stronger agreement (69%, N=29) over this statement than respondents from the middle (61% A, N=36) and lower (47% A, N=19) Kat (Table C.1). A larger percentage of respondents from the lower Kat indicated a neutral (16%, N=19) opinion or disagreement (16%, N=19) with the statement than respondents from the other two regions (Table C.1). So although there is an overall agreement with this statement, the strength of it differs between the regions in the Catchment.

Respondents in general recognised alternative sources of water in the Catchment and agreed (28% SA and 58%, N=92) with the statement that ‘not all the water used comes from the River, some is from other sources *e.g.* boreholes, rainwater *etc.*’. Most respondents treated this item in a matter-of-fact way, some disagreed (7% D and 1% SD, N=92) with the statement saying that their only source was the River, others were very pleased that this statement was true.

Although most respondents said that they didn’t do it all the time, they did try to consider the needs of others in their use of water in the Catchment and, therefore, indicated some level of disagreement with the statement ‘considering the needs of others is not something that you think about when you use water, from any source’ (43% D and 36% SD, N=92). Again it was the upper Kat respondents who showed a stronger sense of disagreement (59%, N=29) than the middle (19%, N=36) and lower (37%, N=19) respondents who generally simply agreed (Table C.1).

In the total sample, 62% (N=92) of respondents strongly disagreed with the statement ‘everyone can use the River as they like’, and most often during interviews felt adamantly about this, and a little angry that anyone would think this. Although there is a general belief that everyone should have access to the River (T2), the way a person uses the River is obviously a more serious matter for respondents. Most respondents throughout the Catchment strongly disagreed with this statement (Table C.1).

4.3.4 Section D

Section D was called a ‘metaphysical’ question; it is a hypothetical question in which respondents were asked ‘what kind of a person they felt the River would be if it were a person’. This question sought to get past the economic association people have of the River, and explore their less explicit attitudes and beliefs concerning the River.

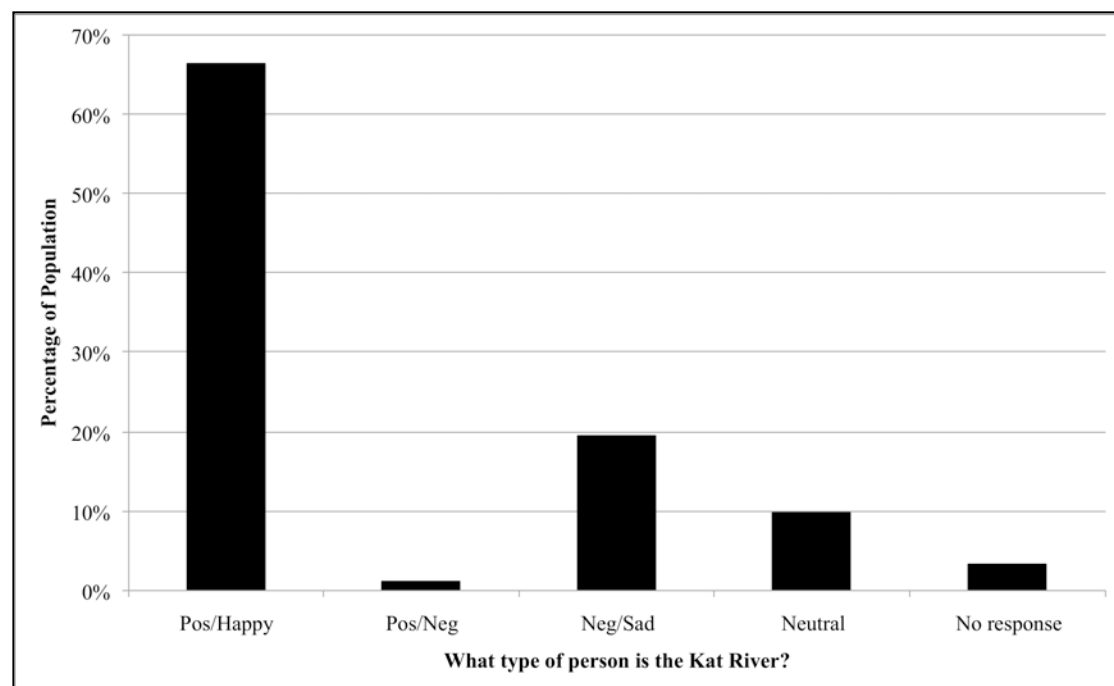


Figure 4.31 Valances related to the type of person respondents’ saw the River as being if a person.

Figure 4.31 shows respondents’ responses to the question; as can be seen 66% (N=92) of respondents described the River as a positive or happy sort of person, 20% (N=92) as a negative or sad person. Many of the respondent who described the River as a

positive/happy sort of person saw the River as a mother providing for her children. They saw it as a good and kind person who seeks to nurture and watch over the people of the Catchment, many said that they felt the River would be approachable and dependable. Those who described the River as being a negative or sad person often saw the River more as a male than female, and old as opposed to youthful, dirty, smelly and sick and in need of attention. Table 4.3 lists the positive and negative keywords used to describe the River. The above responses can be reviewed in Table D.1 in Appendix D.

Table 4.3 Positive and negative Keywords used by respondents to describe the Kat River (if it were a person).

Positive	Kind, forgiving, caring, good, helpful, life giver, mother, Jesus, provider, strong, dependable, reliable, leader, content, quite, calm, lovable, 'down-to-Earth', a friend, a healer, wise, spiritual, mystical, gentle, inspiring, powerful, resourceful, amiable, happy, vibrant, clean, warm, inviting, lively, supportive, virile, peaceful, hospitable, beautiful, tolerant, considerate, important, vulnerable.
Negative	Sick, concerned, smelly, dirty, hopeless, disturbed, angry, sad, tired, abused, worried, frustrated, ugly, wild, used, disrespected, unstable, a hawker, unkempt, old, a robber, a thief, a prisoner, unhealthy, volatile, unpredictable, emotive.

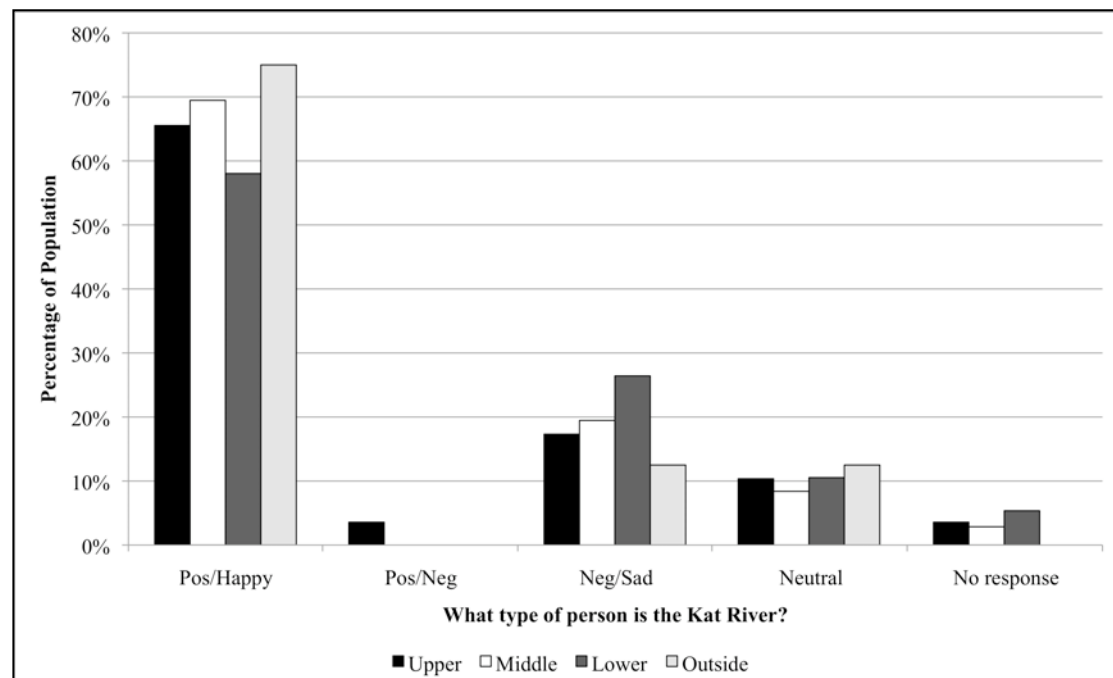


Figure 4.32 Comparison between respondents' responses to section D's question and voting regions.

Figure 4.32 shows the associations between respondents' descriptions and the region they are from. It appears that higher levels of negativity are present amongst town residents, as illustrated by responses of respondents from Seymour (in the upper Kat) and Fort Beaufort (middle Kat), who made up the total positive and negative and negative responses, respectively, for their various regions. Other than the above described observation, there appears to be a fairly uniform distribution of responses between the regions. There is no observable difference in themes between the respondents' responses from the three regions, except that there appears to be an increase in concern for and/or negative association with the River expressed in the responses from the middle and lower Kat (Table D.1).

4.4 INTERPRETATIONS OF FINDINGS

4.4.1 ‘Attitudes towards the Kat River’

Residents of the Kat River Catchment are in general positive about their River, they recognise the essential link they have with it and their responsibility to it. Most respondents feel that the River is part of the natural heritage of the area and that it is important to look after it for future generations. The spiritual significance of the River varies between races and regions, and is often connected with cultural and traditional norms. It is clear that the Kat River has important social, economic and spiritual value to the residents of the Catchment.

Although the provision of water was a primary focus of respondents’ attitudes, many indicated that they saw the River as more than just water, and recognised its ecological value as habitat for numerous other organisms. In addition, many upper Kat respondents said that the River was valuable because of the home it provided for their ancestors. Many respondents indicated that they recognised and enjoyed more intrinsic and aesthetic values associated with the River. Some openly could identify that the River was a source of inspiration; many commented that it was a place of rejuvenation and healing.

There are subtle differences between the attitudes held by upper Kat respondents and those held by middle and lower Kat respondents (there is some overlap in the middle Kat). Upper Kat respondents appear to acknowledge a more intrinsic value to the River, and have a more direct and stronger association with it. This is inferred from the strength of their responses to the Likert scale items, and their more positive descriptions and feelings towards the River and associated aspects. It is likely that the highly rural nature of this region of the Catchment, and the lack of water service provision, is chiefly responsible for fostering these attitudes amongst respondents. Residents in the upper Kat still make direct use of the River and, therefore, recognise it as the source of their water. In addition, residents in the upper Kat are predominately Xhosa and still have strong spiritual associations with the River (Fox, 2005). The political history and situation in the upper Kat has left the region under-

capacitated and with poor infrastructure for irrigation, water abstraction and storage. This situation has perhaps served to diminish western influence (the manner in which people organise themselves around water/resource management – characterised by the practices of western (e.g. United States; United Kingdom) countries and cultures) in this region, and supported some of the traditional practices that connected the people with the River, both in terms of physical and spiritual needs. If this is so, then it will be important that, coupled with service provision and the implementation of taps, municipalities should implement awareness campaigns on where the water comes from, and how ignoring or abusing the River can still affect residents.

Having access to water via taps appears to dissociate users from the resource base and limit the relationship they have with the River. This has been observed in the responses of several respondents, including those from Fort Beaufort. Respondents from this town are generally only aware of water quality issues, and have little to no personal interaction with the River itself – most of whom are now too concerned about the quality of the water to want to go near the River. In contrast, respondents from Seymour, the other small town in the Catchment (located in the upper Kat), demonstrated attitudes that expressed their confusion between understanding and appreciating the intrinsic worth of the River and the negative feelings they had over water quality issues. During interviews respondents from the upper Kat could provide more detailed descriptions of things they have seen happening at the River, and their own experiences with the River, as opposed to experiences purely with water supply, as was the case for Fort Beaufort respondents.

There is less of a focus on water quality issues in the upper Kat, and more of an interest in being made aware of how residents can help in protecting and looking after the River. The cry for personal education and capacitation is much louder in the upper Kat than in the parts of the middle Kat and the lower Kat; alternatively these two other regions readily identified the need for the ‘local people’ to be made more aware and educated on matters pertaining to water conservation and the River, but felt that they themselves were well equipped.

The middle Kat is definitely a transition region for shifts in attitudes in the Catchment, the further south one heads the more the attitudes reveal a western influence. The attitudes of respondents from the regions outside of the old Ciskei (which includes all lower Kat respondents) appear to be more heavily influenced by socio-economic considerations and more dissociated from their experiences of the River. There is more interest in either the potential or the loss of recreational value of the River amongst the attitudes of these respondents, many of whom grew up playing in and near the River. The present concern over water quality in these areas has put a stop to most of these activities, and subsequently taken away the last remaining reason for many residents, who get their water from taps and other sources, to actually interact personally with the River. The degree to which this is expressed amongst the attitudes of those living on commercial farms varies. The most obvious difference in attitudes amongst farming families comes between husband and wife. Wives most often showed concern for the health and enjoyment of their families, whereas the husband (the farmer) were more concerned about getting water for his crops and other economic needs.

Although lower Kat farmers have significant memories of playing in the River, and generally are positive about it, and grateful to it for what it provides, their struggles and fears about being deprived of water appear to have infiltrated their attitudes. The tension that exists between these farmers and upper and more specifically middle Kat farmers over water rights and allocations (Burt *et al.*, 2007) were often expressed by these farmers in many of their responses to the questions and during the interview process.

For many farmers in the middle and lower Kat, who did not fall within the old Ciskei, the Kat River became a political boundary between themselves and the Ciskei. This boundary entailed several security issues, as farmers would often have to deal with Ciskei residents crossing the River and stealing their fruit or poaching their animals. A farmer in the lower Kat described how he had set up his series of weirs to back up to each other in an attempt to prevent people from crossing over onto his farm. The political role the River played as a boundary between the Ciskei and South Africa, and the potential threats this posed for farmers, may have created negative attitudes

amongst farmers to the River – although the River will have remained of vital importance for their enterprises. Alternatively, the role the River played as a political boundary may not have altered farmers attitudes to it, but it did alter their relationships with the River in seeing it now not only as a source of water but a security threat or alternatively, a barrier that can protect their crops.

4.4.2 ‘Attitudes towards the Management of the Kat River’

There is an overall agreement that it is everyone’s (users of the River) responsibility to manage and look after the River, and that in light of this it is very important that local people be given the opportunity to participate in the management of the River. Respondents’ attitudes towards the management of the River varied, and there were mixed feelings about the present management structures. Most of the respondents said that something had to change in the management of the River, very few were able to pin-point exactly what this might be, but many pointed at the municipality and its apparent inability to manage and maintain local water resources. Interestingly, the middle (outside old Ciskei) and lower Kat respondents pointed at the municipality’s inability to maintain local infrastructure, and upper Kat respondents highlighted its poor service provision. It is clear from these responses that many residents of the Kat River Catchment are not happy with the job the municipality is doing.

Lower Kat respondents were the only group of respondents to have all heard of the WUA and know something of what this institution was about. Knowledge of the WUA varied amongst middle Kat respondents, and was poorly lacking amongst upper Kat respondents. Many of the respondents who knew something of the WUA thought they were doing the best job they could, given their available resources and time. In general, however, respondents selected neutral responses to the item about the WUA. Many upper Kat respondents saw management of the River as the work the ‘Working for Water’ program carries out. Whatever the perceptions of respondents as to who is doing the management, management of the River was a significant concern to respondents who could get quite irritated, frustrated and/or angry when statements implied that they were not concerned or that issues relating to the River did not concern them.

In general respondents said they felt negatively or had positive and negative feelings about the management of the River and water resources, and there were mixed perceptions on the current management of the Kat River Dam. Middle and lower Kat farmers talked of their concerns around the issues that currently surround water allocation in the Catchment (Burt *et al.*, 2007). The new NWA (Act 36, 1998) has changed the dynamics of water management and introduced several new players and partners to the process. Consequently the water management structures in the Catchment are in a state of flux. Based on general observations made throughout the WRC's CMP Project, the Catchment, in many respects, is where it is in terms of establishing new legislated water management institutions only because of the work done by Rhodes researchers and the willingness of local residents to be involved. This willingness for many commercial farmers is directly connected with ensuring water provision and securing water rights to the various regions. For subsistence and domestic users this willingness revolves around an interest in being involved in managing water resources, but also ensuring that the regions and user groups they represent do not get sidelined in the allocation process. Everyone needs water and this characteristic of the resource is significant in bringing together people from different cultural and social groups and backgrounds. Of course it also has the possibility of creating dangerous and hostile tensions and conflicts between these groups when access to water is denied or limited.

Water quality is a big concern amongst most middle and lower Kat residents. This issue not only poses significant health threats, but has also served to alter the relationships residents have with the River. The condition of the water in the River can be both an attraction and a repellent and such variables will have significant influences on the general opinions residents have about the River. This is highlighted by the loss of recreational options these residents have with the River. For Fort Beaufort and Seymour residents the water quality issue is the first things they think about when the River is mentioned, and its general value (aesthetic, economic and ecological) is diminished in their opinions because of this water quality issue. Residents, in Fort Beaufort, place the blame for the water quality problems primarily on the municipality. In addition, many implicated the lack of education and resources amongst the people in the rural areas and townships as aggravating the problem.

Others revealed concern for the management practices of the commercial citrus producers and the chemicals they use to look after their crops. An interesting observation made during the interview process, by the interviewers, was that for Fort Beaufort residents their perceptions of the Catchment's boundaries are the limits of the town itself. Most have not explored the full extent of the Catchment, and their experience of the Kat River is limited to the section that flows past the town. Yet their perceptions of who is to blame for the problems they experience are generally associated with communities outside the limits of the town, and the poor municipal management.

Most residents in the Catchment, especially in the middle and lower Kat, appear uneasy about the present management of the River, for whatever reasons; very few felt they could do anything about it. This sense of fatalism concerning the management of the River could have negative affects on present and future management initiatives and develop into apathetic attitudes.

4.4.3 'Attitudes towards the use of the Kat River'

Respondents strongly disagreed that everyone should be allowed to use the River as they liked, indicating that they felt that there was need for constraint and rules governing the ways people are allowed to use the River. Most, however, did not think that this should mean restricting the access people have to the River. In general respondents felt that the River's value came from its use to people but were concerned about exactly what uses people were making of the River.

More respondents indicated that they felt more negatively towards the ways 'local people' interact with the River than positively. They suggested that they did try for the most part to consider the needs of others in the Catchment, and recognised the link and influence residents and users of water resources had on each other throughout the Catchment. Although many did indicate unease at the thought of having to use less water to ensure the betterment of others in the area, most happily accepted the idea as a positive one. Most respondents indicated that they would not knowingly throw harmful materials into the River, but did recognise that such things were in the River;

this was most often accredited to someone else's actions and carelessness. Again the issue of educating the 'local people' on the consequences of their actions to the Catchment was raised as important in turning the tide on uses that resulted in negative outcomes.

Many Xhosa respondents lamented over the increased disrespect for the River in this and younger generations. They saw this disrespect as being a significant influence on the condition of both the River and local beliefs and customs. Many pointed at the increase in taps as the reason why younger generations no longer respected the River.

4.4.4 'Attitudes towards Personal Actions related to the River'

Respondents in general recognised that their personal activities in the Catchment had an influence on the River, and expressed some concern over the potential impacts. Several, however, had difficulty understanding how their actions could impact anyone else and the River.

There is recognition amongst residents that they are all connected by the River, but opinions varied as to whether or not they felt that upstream users consider their needs when using the River. Lower Kat respondents said that because of their position in the Catchment there was no one downstream of them who could be impacted, and upper Kat respondents suggested that they all consider other people when using water from any source. One upper Kat small-scale farmer suggested that it was not just downstream users who were affected by upstream users, he said that given the present management structure, upper Kat users were being influenced in their use of water resources by the interests of downstream users.

4.4.5 'Attitudes towards the Study of or Research into the River'

Almost all respondents indicated that they thought research into the River was important, and essential for monitoring and identifying water and River related problems and issues. Most saw the information generated through research activities as significant in establishing effective management structures and strategies. Very

few believed that the resources and finances that go into research are misspent and would be better spent on other social issues.

There appears to be a positive feeling in the Kat River Catchment towards research activities, and strong promotion of them. This may be related to the extensive research endeavours that have taken place in the Catchment over the last twelve years (Chapter 2). It is very likely that positive spin-offs and outcomes of this research have established a research-orientated culture amongst the residents of the Kat River Catchment. This culture has most likely been further promoted by the presence in the upper Kat of a strong desire to learn, and the established belief in science's ability to solve problems in western mind-sets in the middle and lower Kat.

In addition, most respondents in the Catchment indicated some desire to know more about various aspects of the River. This interest and research culture could be used pro-actively to help strengthen the regard and understanding residents have of the River. If contextualised and facilitated effectively such a process could be used to replace or enhance the lost recreational value of the River and help establish more direct relationships with residents who have no need to interact directly with the River. Interest walks and talks could be organised to create awareness around the many fascinating and important aspects.

4.4.6 Relationships between the People and the Kat River

The Kat River is an aspect of the environment in which the Kat River residents live and work. The River is an important source of water and, therefore, life and livelihood to these people. As such all of them hold it in high esteem because of what it provides and does for them. The relationships between the River and residents in the Kat River Catchment are value oriented; however, this does not need to be seen as a bad thing as it could be argued that it is our value associations that facilitate and sustain our relationships. Value orientations can be summarised as: recreation benefits and values; commodity benefits and values; ecological benefits and values; and moral/spiritual/aesthetic benefits and values (Bengston *et al.*, 1999).

The Kat River Catchment proved to be an excellent case study, as there are numerous examples of value associations between the people and the River, both from historical and present perspectives. Primarily the River has provided: it has given life to generations of people, crops, livestock and other animals; riverine resources such as mud and reeds have housed people; vegetation has provided food and medicine; the riverine environment has provided for spiritual and traditional customs; and biophysical properties have provided flood protection. It has provided a political boundary between settlers and Xhosas in the 19th Century and between the Ciskei and South Africa in the 20th Century. Fort Beaufort and Fort Armstrong were both established where they are because of the protection the physical meanders of the River provided against attacks. Many have found it to provide inspiration and recreational enjoyment.

Today the River is the focus of most of the awareness and capacity development programs and research that is and has taken place in the Catchment. Concern for the water resources has brought people from contrasting social and racial backgrounds together to negotiate and communicate around sustaining its ecological and socio-economical vitality. It has created jobs in the form of the Landcare program that was run by the Kat River Catchment Forum (Burt *et al.*, in press) and, given the necessary resources, might do so through the WUA. In addition it has given academic benefits to those students who have done their post-graduate research on it and around it, and the researchers who have gained experience working with it. There can be little doubt that the Kat River is of significant value to the residents of the Kat River Catchment and those who have worked with it.

Of key concern is the dissociation that is taking place between residents and the River as water service infrastructure outside of effective awareness programs diminishes the value associations people have with the River and, therefore, the relationships they have with it. Those people who still have active and direct interaction with the River were those who had the most positive attitudes towards it, whereas those who rely on taps for their water resources tend to see only the negative aspects. This dissociation between the River and people is an example of positive feed-back in the socio-ecological system. As people are desensitised to the needs of the River it becomes

easier to pollute it by dumping rubbish in and near it, especially where there is no awareness of water provision originating from the River. The degradation this causes to the health and condition of the River provides positive feed-back to people, motivating them not to want to go near it, and erodes the recreational value of it, often the last remaining direct source of connection between people and the River. The degree of dissociation is therefore increased.

4.4.7 Observations from and on the Study

It is very likely that different researchers will identify different relational variables depending on the perspective of their research field. This study has looked at the attitudes residents in the Kat River Catchment have towards aspects of the Kat River. Attitudes within this context have been used to examine and describe qualities and characteristics of the relationships these residents have with the Kat River. It must be pointed out that the use of verbally reported attitudes without a parallel study of the behaviour can present only part of the picture, and only that part expressed by respondents. A survey of actual behaviour towards the River would be more revealing of actual attitudes, although the relationship between attitude and behaviour is itself still seen as fairly intangible and needs to be substantiated (Fishbein & Middlestadt, 1987; Fazio & Roskos-Ewoldsen, 1994; Slocombe, 1999; Peterlin *et al.*, 2007).

It is interesting to note that the medium of the attitude survey provided information on people's perspectives of the River and was able to include more than purely utilitarian aspects. This study supports the literature view that attitude surveys appear, therefore, to be useful methods in the exploration of (psychological) social dynamics within human-environment relationships.

CHAPTER 5

HUMAN-RIVER RELATIONSHIP ASSESSMENT & THEORY DEVELOPMENT

5.1 INTRODUCTION

In the preceding chapters of this thesis, the information required to inductively explore the human-river relationships in the Kat River Catchment has been provided. In the current chapter the information evaluated in Chapter 4 is revisited from the perspectives of: what attitudes can reveal about the human-river relationships; the conceptual model described in Chapter 3 (Figure 3.3) and the implications for relational scenarios. The aim of the current chapter is the identification of core groups of attitudes that can be considered influential to human-river relationships in a system, and can be used as guides in accessing the orientation of these relationships in terms of management and relational scenarios.

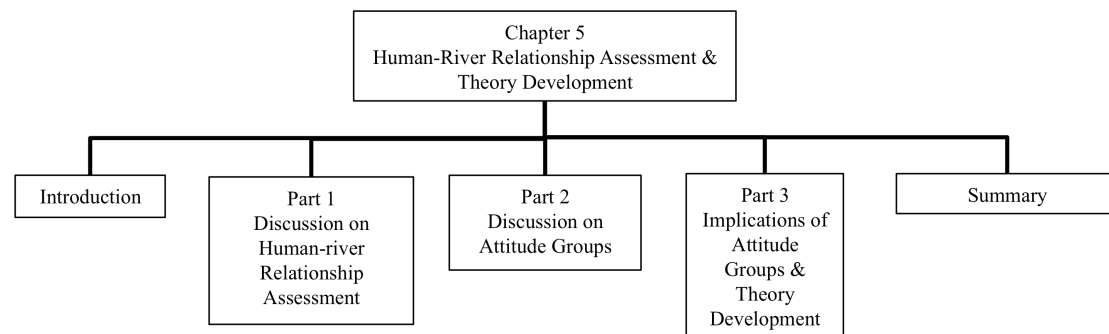


Figure 5.1 Chapter 5 Layout

Figure 5.1 present the layout of Chapter 5, which consists of three main parts: Part 1 discusses the process taken in assessing the human-river relationships; Part 2 discusses the attitude groups identified from the findings of the attitude survey; and Part 3 presents a conceptual discussion on the implications of these attitude groups and related theory.

5.2 PART 1: DISCUSSION ON THE PROCESS OF ASSESSING THE HUMAN-RIVER RELATIONSHIPS IN THE KAT RIVER CATCHMENT.

5.2.1 Human-River Relationship Assessment Framework

Human-river relationships in the Kat River Catchment are responsible both for that which threatens the Kat River ecosystems and that which protects them. Understanding these relationships is important in assessing how the relationship between threat and protection swings in favour of one or the other. This section discusses the process of assessing the human-river relationships in the Kat River Catchment.

Figure 5.2 illustrates the framework used to conceptualise the relationship between people and the River. The framework is conceptual and was developed as a consequence of the inductive research cycle. It was informed both by the literature and the research process (observations made during field work in the Kat). The objective of the framework is to provide the foundation for the exploration of human-river relationships, specifically the influence or role of attitudes within these relationships.

It is a given that establishing any understanding around human-river relationships will be a complex endeavour. In an attempt to simplify the task, the framework shown in Figure 5.2 presents a suggested pattern of association between aspects of both the social (in the framework represented by 'Human') and ecological (in the framework represented by 'River') systems, in the Kat River Catchment. Within this pattern emphasis is given to issues of space and time, space as the context in which the present array of human-river relationships are taking place, influenced by, for Humans: 'needs' (*i.e.* water, food, housing material, economic considerations, political & legal obligations, education *etc.*); 'challenges' (*i.e.* natural challenges: rain, drought, floods, wind *etc.*; social challenges: death, hunger, poverty, prejudice, war *etc.*); 'worldviews & culture' (*i.e.* Western, African, Eastern mindsets and culture: community dynamics, traditions, customs, institutions, history, laws, morals & ethics *etc.*); and 'religion &/or spirituality' (*i.e.* belief systems, Christianity,

animalistic, Islamic, morals & ethics); and for the River: ‘ecological health’ (*i.e.* biodiversity, water quality, ability to supple ecological goods and services *etc.*); ‘ecological resilience’ (*i.e.* the systems ability to resist or bounce back from disturbance; stability); and established infrastructure (*i.e.* dams, weirs, abstraction and irrigation equipment). Time is contextualised through the use of historic information to understand past trends in the above-mentioned aspects of space. In this way the framework highlights the importance of considering the historic situation in understanding the present situation (Medema & Jeffrey, 2005; Newell *et al.*, 2005; Dearing *et al.*, 2006).

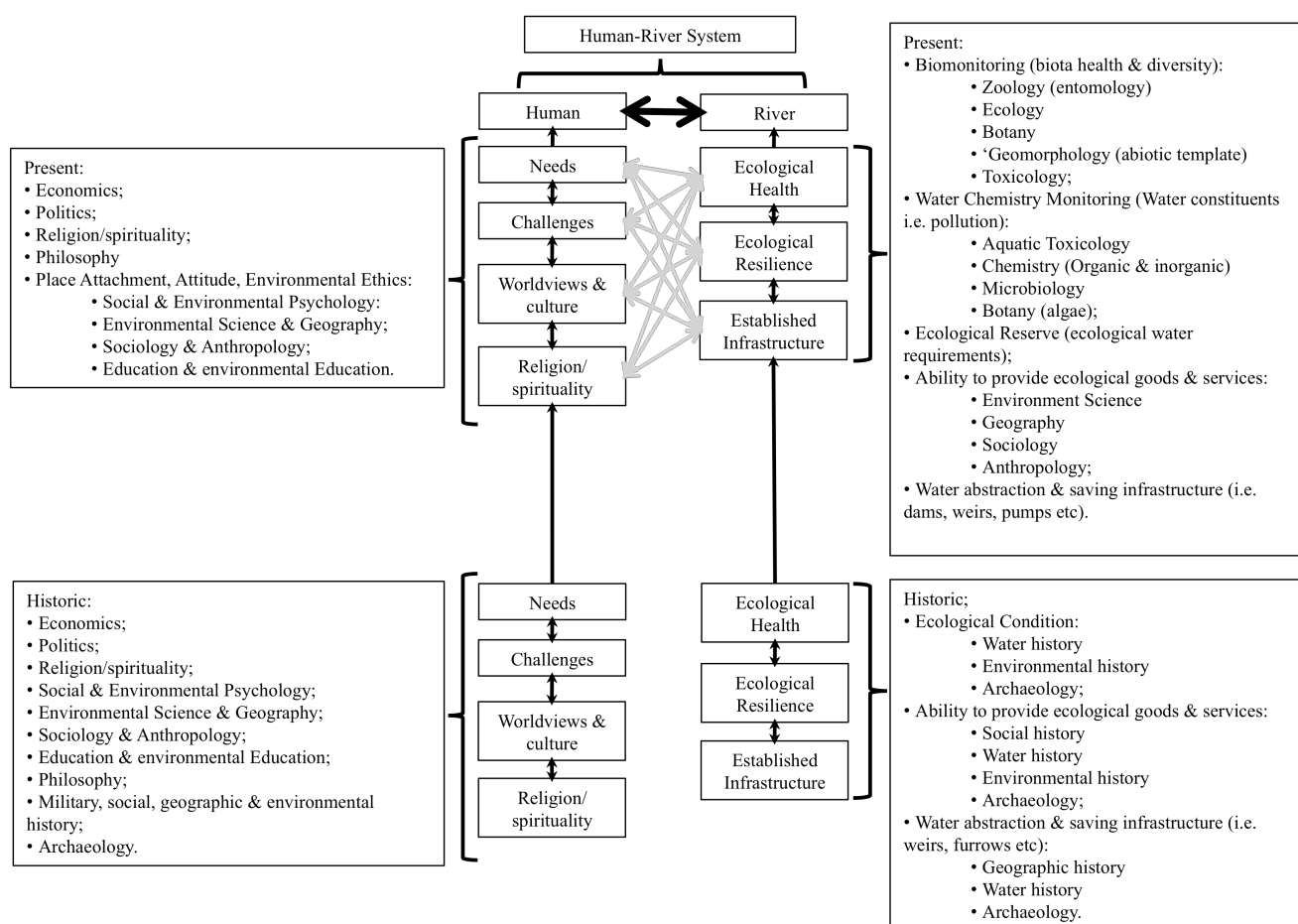


Figure 5.2 Framework for the assessment of Human-River Relationships in relation to information requirements. Thick Black arrow indicates synergy within human-river relationships, based on the collection of linkages between the social and ecological systems; thin black arrows indicate relationships between the different components and related disciplines within the separate systems; grey arrows indicate the relationships (linkages) between the components of the different systems.

The grey arrows, in Figure 5.2, are used to illustrate the relationship between the aspects of human and river systems, at any one point in time. An assessment of all these interactions, however, would be overly complicated. The complexity of system relationships lies in their dynamic and synergistic characteristics (Gunderson & Holling, 2002); therefore, it is assumed here that human-river relationships encompass not only these interactions but also synergy between these interactions. In most respects the objectives of this thesis focus on exploring the synergistic outcomes of human-river relationships; this synergy is represented by the black arrows, in Figure 5.2, linking 'human' and 'river' in the framework.

The framework incorporates human-environment theory (here represented by the human-river system (Inglis, 2008) or socio-ecological theory (Berkes & Folke, 1998; Bohenksy, 2006) (*i.e.* that humans and natural systems are coupled and because of this each system is capable of impacting the other both constructively and destructively). Because of the incorporation of socio-ecological philosophy the assessment processes must make use of information and theory from a range of disciplines. In the boxes on either side of the framework, in Figure 5.2, are listed the various topics (and associated disciplines) relevant to providing knowledge and/or understanding on the aspects of human and river systems described. The top two boxes consider those topics that are concerned with generating knowledge around the present situation of these systems, and the bottom two boxes consider the generation of historic situations that have been present between the two systems. The framework functions under the assumption that knowledge of historic situations is important to better understand and contextualise the present situations, and to strengthen the basis on which future scenarios and models can be generated.

Inter-disciplinary projects, as Figure 5.2 illustrates, by definition require information from a wide range of academic disciplines and should be undertaken by a team of specialists from the different disciplines. This, unfortunately, could not be the case for this study. The type and depth of information collected for each area, therefore, had to vary according to my training and capabilities (in terms of time and resources). Figure 5.3 again shows the assessment framework, but the boxes on either side of the framework have been changed to reflect the methods I utilised in gathering the

required information. The different shades of the boxes illustrate the degree of detail I was able to work at relative to the different parts of the framework. In illustrating the degree of detail I was able to achieve in each section, Figure 5.3 effectively highlights some of the weaknesses of my study, as it reflects the areas that require more information.

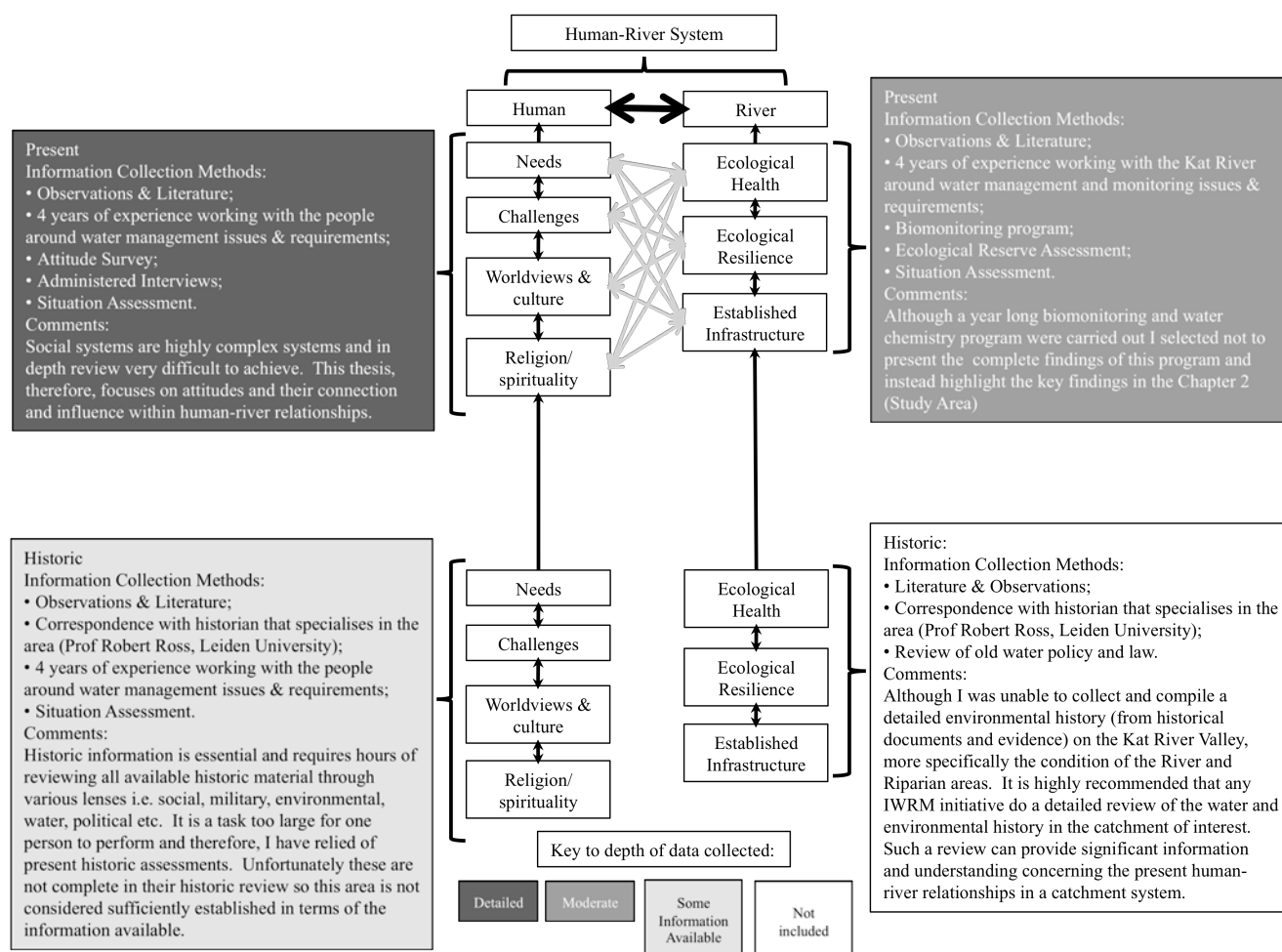


Figure 5.3 Framework for the assessment of human-river relationships, relative to information obtained for this thesis. Thick Black arrow indicates synergy within human-river relationships, based on the collection of linkages between the social and ecological systems; thin black arrows indicate relationships between the different components and related disciplines within the separate systems; grey arrows indicate the relationships (linkages) between the components of the different systems.

The main focus of my research was the role of attitudes in human-river relationships; as such I collected the most detailed data for the present ‘human’ situation (dark grey) (Figure 5.3). It was important that I get some understanding of the situation in the other four sections in order to more effectively contextualise my findings in the present ‘human’ section. To generate this understanding I used the results of a year-

long biomonitoring and water chemistry monitoring program to ascertain the ecological health of the River (part of the larger WRC's CMP project, Chapter 2). During this time I was also able to identify the chief water abstraction and storage infrastructure. The key findings of this monitoring are described in Chapter 2 or can be read in detail in Birkholz (2007); this information was considered in less detail in comparison to the present human information collected (grey) (Chapter 4). Several sources were available (Logie *et al.*, 2000; Motteux, 2002; Ross, 2003; Ross, 2004) that provided information on the social historic context (light grey) (see Chapter 2). Unfortunately little work has been done to establish a water history or environmental history of the Kat River Catchment; as such there was little information from which to contextualise the River's present situation (white). To develop such a review was beyond the scope of this thesis.

5.2.2 Use of Attitude Variables in Human-River Relationship Assessment

The social system, as any system, is complex and composed of a myriad variety of possible components and relationships. It is also a system that is structured around the connection between both physical (geographic and anatomical) and conceptual (psychology and spiritual) 'landscapes' (Cordell, 1995). In this thesis the focus is on the latter, and assumes that the influence and relevance of the physical landscapes will also be reflected in the conceptual. In order study the conceptual landscapes of the social system in the Kat River Catchment, relative to the place of the River in them, I had to select a group of 'Attitude Variables' that could act as indicators of key features of these landscapes. Inglis (2008, pg. 10) says that '*the Human World Relationship is expressed through a person's views and behaviour towards the natural world, which can be either constructive or destructive*'. The specific focus of this chapter is to provide insight into human river relationship dynamics and the expression of relational outcomes (*i.e.* 'constructive or destructive'), through an exploration of people's 'views', as expressed through the attitude survey (Chapter 4).

Figure 5.4 illustrates the selected attitude variables, and how I foresaw these being connected to the social system. All aspects in the social system are interrelated, and in turn both influenced by and influential to the attitudes the community hold towards the River. Attitudes are always connected to an object (Shaw & Wright, 1967); the

object can be a material thing, living being, or conceptual idea (*i.e.* an issue, a problem, a theory *etc.*); in terms of this study the attitude object is the Kat River. The attitude variables were developed to help explore the attitudes Kat River residents hold towards the River and various aspects connected with it and its links to them. Such exploration can deepen the understanding we have of what significance the Kat River has to the Catchment residents; in turn this understanding provides a way of assessing not only the nature of the relationships residents have with the River, but also the likely outcomes of these relationships. In Figure 5.4 relational outcomes are shown as either being ‘constructive’ – *i.e.* in terms of this thesis representing a move towards IWRM (and mutually beneficial human-river relationships), or destructive – *i.e.* in terms of this thesis representing the likelihood of the ‘Tragedy of the commons’ (and parasitic human-river relationships) playing out.

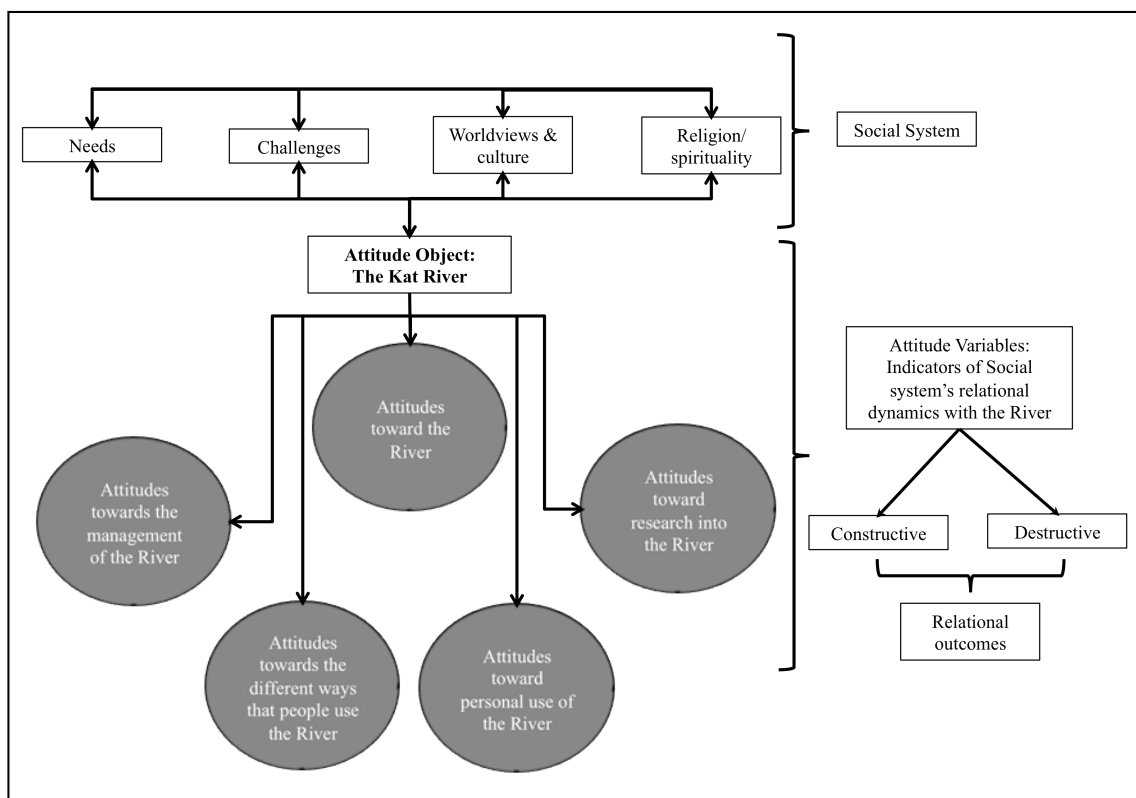


Figure 5.4 Diagram of the use of the Attitude Variables as indicators of the social system's relational dynamics with the River.

It is beyond the scope of this thesis to describe the social system in any detail beyond the contextual information provided in Chapter 2. It is within the scope of this thesis to describe the attitude variables as has been done in Chapter 4 (Interpretation of

findings). Table 5.1 presents the next step in utilising the attitude variables in determining key relational features that provide information on relational characteristics between the people and the River. The first three columns are identical to Table 4.1 that presents the foundations for the development and design of the survey instrument and the analysis of the findings. The second-to-last column in Table 5.1 lists keywords and phrases identified from the interpretation of findings as indicative of relational characteristics in the Kat River Catchment. From this list three main attitude groups considered representative of the relational outcomes of interest were identified: associative attitudes, dissociative attitudes and utilitarian attitudes. These attitude groups are listed in the last column of Table 5.1, and are used to categorise the lists in the previous column relative to keywords and phrases that help to identify the groups.

Table 5.1 Process for determining attitude groups.

Attitudes Variables	Related Concepts and Theory	Analysis Themes	Keywords & phrases from the Findings	Attitude Groups
1. Attitudes toward the River:	•Place attachment (Backlund, 2005; Kyle <i>et al.</i>, 2005; Todd & Anderson, 2005); •Environmental Ethics (Inglis, 2008); •Traditional, cultural, spiritual connections to the river (Fox, 2005; Bernard, 2003); •Stewardship & heritage. •General beliefs held concerning the river;	•T1: Sense of connection with River; •T2: Perceptions of the cultural and generational significance of the River; •T5: Perceptions of the River;	•Positive; •Community connection with the River; •Community connection via the River •Responsibility; •Natural heritage; •Spiritually significant; •Nostalgic connections; •Place of inspiration and healing; •Personal experience with the River; •Interest in learning more; •Interest in conserving and protecting the Rive.	•Associative
			•Recreational value; •Ecological importance; •Use value; •Water provision; •Interest in being involved in looking after; •Impact of western influence; •Socio-economic benefits; •Tensions between user groups; •Focus on water quality issues.	•Utilitarian
			•Affect of taps; •Diminished personal interaction with the River; •Affects of River as a Socio-political boundary.	•Dissociative

Attitudes Variables	Related Concepts and Theory	Analysis Themes	Keywords & phrases from the Findings	Attitude Groups
2. Attitudes towards the management of the River:	•Public Participation (Davidson & Cotter, 1991; White <i>et al.</i>, 2005; Burt <i>et al.</i>, in press) •General Resource Management (Heywood, 1995; Flora, 2000; Lal <i>et al.</i>, 2001; Inglis, 2008); •IWRM (GWP, 2000; Jonch-Clausen, 2004; UNDP/GWP, 2004; Medema & Jeffrey, 2005; Pahl-Wostl & Sendzimir, 2005); •Water & related infrastructure management (GWP, 2004; Hart & Hart, 2006); •Environmental Risk Management & Perception (Gregory <i>et al.</i>, 2006); •Environmental Ethics (Inglis, 2008).	•T3: Perceptions of management of the River & water resources; •T2: Perceptions of the cultural and generational significance of the River;	•Everyone's responsibility; •Belief in the importance of free and open local participation;	•Associative •
			•Management a significant concern; •Interest and willingness in being involved; •Mixed feelings around present management structures; •Interest in ensured water provision; •Dissatisfaction with present management (feel negative about it); •Concern around water allocation process; •Fear amongst users groups of being sidelined; •Recognition of elements of ineffectiveness;	•Utilitarian
			•Negativity towards local municipality; •Limited awareness of management structures and institutions (<i>e.g.</i> KRWUA); •Subtle degrees of fatalism in consideration of the effectiveness of local institutions (<i>e.g.</i> KRWUA); •Water quality fears and concerns; •Fatalistic feelings amongst residents towards changing the present situation.	•Dissociative

Attitudes Variables	Related Concepts and Theory	Analysis Themes	Keywords & phrases from the Findings	Attitude Groups
3. Attitudes towards the use others make of the Kat River:	•Sense of Community (Davidson & Cotter, 1998; Davidson & Cotter, 1991); •Environmental Risk Management & Perception (Gregory <i>et al.</i>, 2006); •Environmental Ethics (Inglis, 2008). •Socio-economic Judgements; •Types of use (basic human need vs. economical; use of water saving technology vs. inefficient water use technologies).	•T4: Sense of community respondents have longitudinally down the River; •T7: Opinions into use aspects related to the River.	•People should not be allowed to use the River as they like; •People should not be restricted in having access to the River; •Recognition of community connection via the River; •Would not knowingly throw harmful materials into the River.	•Associative
			•Recognition that harmful materials do enter into the River; •Lack of acknowledging responsibility for materials in the River (always someone else's fault); •Use value; •Attempt to consider others in their use of the River; •Concern over use activities (negative feelings about the way local people interact with the River).	•Utilitarian
			•Lack of awareness concerning the consequences of personal activities in the Catchment; •Growing disrespect for the River in younger generations.	•Dissociative

Attitudes Variables	Related Concepts and Theory	Analysis Themes	Keywords & phrases from the Findings	Attitude Groups
4. Attitudes towards personal uses of the Kat River:	•Sense of community (Davidson & Cotter, 1998; Davidson & Cotter, 1991); •Place attachment (Backlund, 2005; Kyle <i>et al.</i>, 2005; Todd & Anderson, 2005); •Environmental Ethics (Inglis, 2008); •Spiritual and religious values (Crystal & Harris, 1995). •Altruism vs. Self-interest; •Ability to change to better water and river management practices; •Degree of fatalism within oneself towards being able to ‘make a difference’.	•T1: Sense of connection with River; •T4: Sense of community respondents have longitudinally down the River; •T7: Opinions into use aspects related to the River.	•Recognition of the link between personal activities and the River’s condition.	•Associative
			•Difficulty in establishing a link between personal activities and other users in the Catchment (upstream-downstream relationship).	•Utilitarian
			•No awareness of connection between personal use of water and the River’s condition, or potential affects to other users.	•Dissociative
5. Attitudes towards research:	•Recognition of its importance and benefit; •Identification of it as not being in competition with development needs.	•T6: Opinions concerning research into the River.	•Positive; •Strong research culture; •Interest in knowing more about the River; •Research into the River considered important.	•Associative
			•Recognise benefits of the research for management and River conservation; •Research into the River seen as an essential part of improving local livelihoods.	•Utilitarian

5.3 PART 2: DISCUSSION ON THE IDENTIFIED ATTITUDE GROUPS

5.3.1 Identifying Attitudes in the Kat River Catchment

The dominant discourse of this thesis has been around the attitudes Kat River residents hold towards the Kat River and the role these attitudes play in structuring the various human-river relationships in the Catchment. Attitudes present a useful and potentially measurable social characteristic, a characteristic that provides a description of local feelings, opinions, values, beliefs and knowledge that plays a significant role. As pointed out in Chapter 1, there is on-going debate around the relationship between attitude and behaviour (Fazio & Roskos-Ewoldsen, 1994; Peterlin *et al.*, 2007); however, attitudes are still seen to play a significant role in shaping the interactions people have with both the social and ecological environments (Visser & Cooper, 2003).

The conceptual nature of attitudes makes identifying specific attitudes difficult. Descriptions of attitudes do, however, have some general characteristics that enable a degree of identification. These characteristics directly relate to the definition of attitudes as environmental evaluations (Jonas *et al.*, 1994; Petty *et al.*, 1997; Ajzen, 2001; Bell *et al.*, 2001), and the understanding of their role in enabling people to relate to various aspects of their environment and potentially protecting them from negative or harmful situations (Osgood *et al.*, 1957; Olson & Zanna, 1993; Blair *et al.*, 1996). The associations people have with an object can be viewed as either associative or dissociative, associative associations promoting contact and positive opinions, where as dissociative associations create feelings of aversion, fear and negative opinions.

Attitudes can be described relative to associative and dissociative associations. The information gathered and reviewed in Chapter 4 was re-assessed based on those characteristics of attitudes, and central attitude groups, believed important to the relational scenarios between the River and people. In this study attitudes are categorised into primary attitude groups, associative and dissociative, and a third utilitarian attitude group. Utilitarian attitudes are essentially associative attitudes, but

because of their highly influential qualities (Xu *et al.*, 1995; Bengston, 2000) and ability to elicit quite unique and significant outcomes, they need to be looked at as a separate group. The full definitions and explanations of these groups will be reviewed in section 5.3.3.

5.3.2 Attitude Groups and Social System dynamics

Before going into a more detailed discussion on the different attitude groups, I stop here to present a conceptual look at not only the generation of these groups as part of the synergistic relationship between the various aspects of the social system, but also highlight significant philosophies that I foresee having the largest influence on the nature of the attitude groups. Figure 5.5 presents a view of attitude groups as synergistic expressions of these philosophies, which, in turn, I have labeled as ‘expressions of the social system’s relationship with the natural environment’. Within such labels I intend to present the idea that knowledge of attitude groups will provide insight into the outcomes of the social system’s relationship with, and views on, the natural environment.

Many of the ideas behind Figure 5.5 and the perceived relationships presented within it, I adapted from Inglis’ (2008) doctorate thesis. The schematic is conceptual and will need some more development, but is included at this point to show how the attitude groups can provide a synergistic perspective of the likely opinions held within the social system concerning the Kat River (and any natural environment in general). Considered important to this perspective is how these groups are influenced by issues of ethics and the concept of ‘sense of place’ or place attachment.

Both the theories of Environmental Ethics and Place Attachment have been discussed in Chapter 1 of this thesis; however, I take the opportunity to expand on these theories here. From my experience of working with these attitude groups and the Kat River residents I suggest that the primary differences between these attitude groups lies in the intent behind them, and that this intent is principally related to the issues of ethics and Place Attachment. A similar opinion is held and discussed by Inglis (2008) who utilized environmental ethics and place attachment theory to evaluate the significance

of human-environment theory to protected area conservation and management strategies.

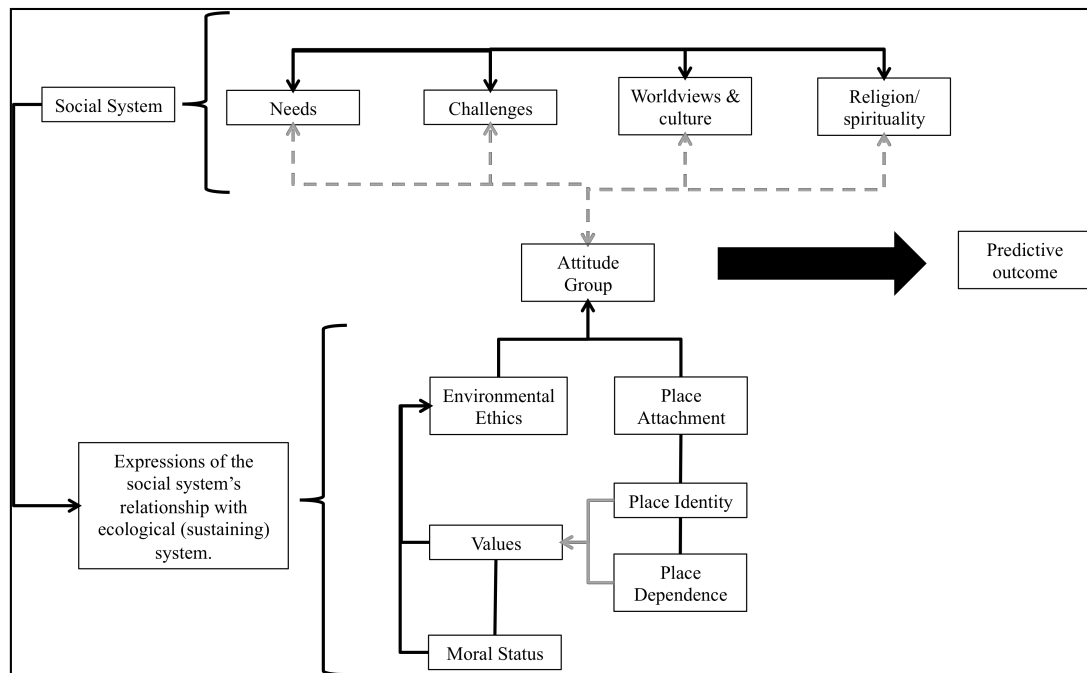


Figure 5.5 Conceptual view of the place of an Attitude Group in relation to the social system and expressions of the social system relationship with the ecological system. Grey-solid arrows represent indirect relationships, and grey-dashed arrows highlight that attitude groups are expressions of the social system but considered here to be clearer expressions of the relationships between environmental ethics and place attachment elements in the social system. Black arrows indicate direct relationships.

Figure 5.6 presents a breakdown of the principal components of the two theories. An individual or community's environmental ethics tie closely with their ecological orientation or worldview (Inglis, 2008). A person's ecological orientation is made up of a relationship between how they value nature (instrumental or intrinsic) and the moral status they give ecological components, living and non-living (*i.e.* anthropocentric, ecocentric, sentientric, and biocentric) (Inglis, 2008). It is these components that I have observed to be the principle variables behind the intent of the attitude groups, and which direct how the attitude holder makes related decisions. Although several moral status' have been theorised, this thesis considers only anthropocentric and ecocentric orientations.

Place Attachment can be broken down into two components: Place Identity and Place Dependence. Place dependence refers to the dependence a community or individual has on a certain place to provide for specific activities and functions (*e.g.* recreation, livelihood support, ecological goods and services) (Inglis, 2008). Place Identity on the other hand involves a community or individual's reliance on a place because of emotional or symbolic associations they have with it (Inglis, 2008). Inglis (2008) highlights the role of past experience in the development of a person's identity with a place, and the significance this experience can play in how a person thinks and behaves towards a place in the present. It is my thesis that in the Kat River Catchment place attachment components play a significant role in terms of influencing the orientation of the attitude groups a person or group holds. As such it is assumed that disruption of the attachment a person has to a place can cause a shift in attitude group regardless of the moral status a person holds concerning the natural world.

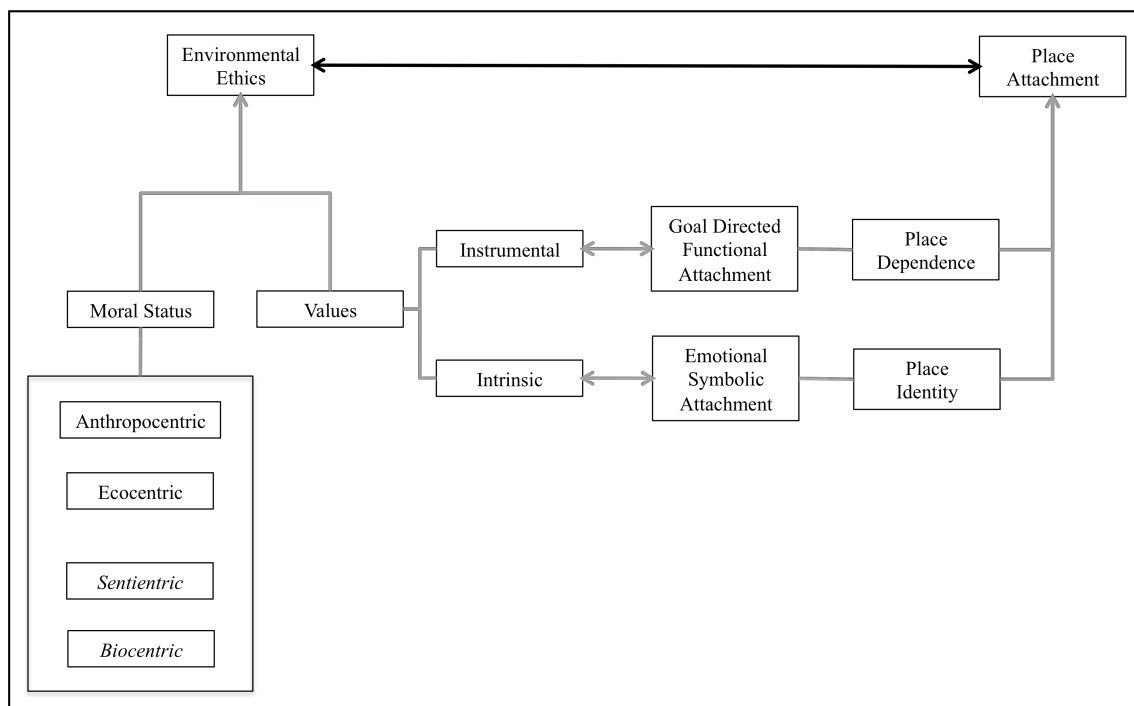


Figure 5.6 Breakdown of Environmental Ethics and Place Attachment into principal components and the relationship between them. (Black arrow represents synergistic relationships and grey arrows individual relationships between components) (adapted from Inglis, 2008).

In summary each attitude group will in some way be based on or influenced by the relationship between a person's or community's environmental ethics and place attachment. Most often the only difference between the groups is based on the expression of an attitude from a varying ethical standpoint or sense of place. For example: many of the commercial farmers in the Kat have utilitarian attitudes, their ethical perspective of the River are anthropocentric and their value orientation instrumental. Water quality issues have stopped many of these farmers and their families from interacting with the River apart from water abstraction and management issues; therefore, they lack inclination to enjoy the River beyond its use (instrumental) values. Most of these farmers, however, do have fond memories of playing in the River and exploring its many reaches as children. As such, in spite of their present utilitarian attitudes, they demonstrate several associative opinions concerning the River, *i.e.* they have some place identity. This place identity was seen to add associative qualities to their opinions of the River and the reasons for its management and conservation.

Another example is amongst the residents of Fort Beaufort, many of whom demonstrated both instrumental and intrinsic value orientations and a mixture of anthropocentric and ecocentric ethical views. Given this combination it is difficult to assume how much interest in the River's management they might have. It was observed that the lack of direct interaction these residents have with the River, chiefly due to water service provision (*i.e.* taps and sanitation systems), has disrupted their sense of place and has developed opinions in which the River and their concern for the poor water quality and associated health problems have become linked. In addition the apathy and negativity that they demonstrate concerning municipal management also appears to be part of how they identify with the River. These residents in general were observed to hold dissociative attitudes towards the River and lacked interest in being involved in its conservation and management.

Having looked at the foundation theories behind attitude groups and a few examples, let us now look at the groups themselves.

5.3.3 Attitude Groups

5.3.3.1 *Utilitarian Attitudes*

5.3.3.1.1 *Conceptual Definition & Characteristics of Utilitarian Attitudes*

Utilitarian attitudes are concerned with the utility of an environment or resource in achieving human objectives, and ultimately revolve around the goal of maximising the satisfaction of individual preferences (Xu *et al.*, 1995; Bengston, 2000; Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, 2004). Such satisfaction of individual preferences is often seen in terms of human ‘welfare’ without any judgement as to whether the preferences are ‘good’ or ‘bad’ (Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, 2004). Economic conceptions of the value of nature often act as points of judgment, and focus on the usefulness of ‘nature’ (Xu *et al.*, 1995).

Attitudes within this attitude group revolve around the use associations and values people have concerning an environment or resource. They promote direct associative relationships based generally on socio-economic and anthropocentric perceptions and opinions. It is speculated that in the Kat River Catchment place dependence considerations play a larger role in the expression of utilitarian attitudes as opposed to place identity considerations.

Physical expression of utilitarian attitudes, in respect to water and rivers, can be observed through: the building of dams and weirs (and other water storage devices and structures); the establishment of abstraction and water-use technologies (*e.g.* water pumps, micro-drip irrigation, furrows, pipes, sewage and sanitation works); the alteration of river channels and flood plains (*e.g.* draining of wetlands, canalization of streams in urban centers); the construction of recreational platforms (*e.g.* boat jetties, piers); and in part the establishment of water management boards, associations.

5.3.3.1.2 *Expression of Utilitarian Attitudes in the Kat River Catchment*

The relationships that the Kat River residents have with the Kat River are primarily utilitarian in nature. Although the degree to which utilitarian attitudes and opinions are expressed varies with the different regions and cultures in the Catchment, most residents value the River based on what they get from it (Figure 4.28 & Table 5.1). This is not to say that they do not hold the River in high regard, or disregard the intrinsic and spiritual value of it, but the anthropocentric view appears to be stronger than the eco-centric. Such observations are not restricted to the present study, but have also been observed in research into attitudes of farmers working in wetlands (Pyrovetsi & Daoutopoulos, 1997; Sah & Heinen, 2001), residents in coastal areas (Peterlin *et al.*, 2007), and general public environmental attitudes across several European Countries (Witherspoon *et al.*, 1995). As in the Kat River study, these studies have found utilitarian and economic considerations to dominate and significantly influence conservation and management concerns.

5.3.3.1.3 *Outcomes of the Expression of Utilitarian Attitudes*

Table 5.2 details concepts considered to be related to the different attitude groups (first row), the characteristics of the expression of utilitarian attitudes as observed from the findings of the attitude survey (Chapter 4) (second row), and lastly the variables believed to influence the expression of these attitude groups (last row). In terms of the outcomes of the expression of utilitarian attitudes (second row), the outcomes were observed to include: an interest in learning more (or staying informed) about the River and issues concerning it (*i.e.* management and use); an active concern for the condition of the River and the potential implication of this on socio-economic considerations; active concern about other user groups and their use practices and activities; an interest in being involved, or being kept informed, on management institutions and their decisions; concern over local involvement of the community in management of the River.

Table 5.2 Characteristics of Attitude Groups

	Utilitarian Attitudes	Associative Attitudes	Dissociative Attitudes
Concepts Considered:	• Socio-Economic; • User perceptions (Figure 4.28, T5); • Positive and Negative emotions towards resource.	• Sense of place (place attachment) (Figure 4.24, T1 ; Figure 4.28, T5); • Sense of Community (Figure 4.25, T2; Figure 4.28, T4; Figure 4.30, T7); • Environmental Ethics (intrinsic value associations) (Figure 4.26, T3; Figure 4.28, T5); • Positive emotions towards resource.	• Hopelessness & Apathy (Lackadaisical attitude); • Disgust & Negative emotions towards resource.
Outcomes (Evidence of attitude):	• Interest in learning more (staying informed) (Figure 4.21, section B; Table B.6& B.7; Figure 4.28, T5; Figure 4.29, T6); • Suspicion (potentially conflict) (Table B.7 & B.9, Section B); • Delay tactics; • Development of technology and infrastructure associated with maximising use (Figure 4.26, T3); • Active concern for resource condition (Table B.6, B.7, B.8 & B.9; Figure 4.26, T3; Figure 4.28, T5); • Concern over other user groups and their use practices and activities (Table B.8 & B.9; Figure 4.24, T1; Figure 4.28, T5; Figure 4.30, T7); • Active interest (and often involvement) in management institutions and decisions (Figure 4.26, T3; Figure 4.28, T5);	• Sense of connection and responsibility with resource (Figure 4.25, T2; Figure 4.28, T5); • See the River in a positive light and have a sense of hope connected with it (Figure 4.31, Section D; Table D.1; Table 4.3); • Concern for intrinsic value and worth of river (Figure 4.26, T3); • Interest in learning more (staying informed) (Figure 4.21, Section B; Table B.6; Figure 4.28, T5; Figure 4.29, T6); • Interesting in being involved in the management and conservation of the resource (Figure 4.26, T3; Figure 4.28, T5); • Concern for local involvement of community (Figure 4.21, Section B; Figure 4.26, T3); • Concern over resources condition	• Disinterest in matters connected with resource or related ecosystem; • Anger (suspicion); • Sense of fatalism (Figure 4.30, T7); • See the River in a negative light and have a sense of hopelessness connected with it (Figure 4.31, Section D; Table 4.3); • Sense of disregard in connection with use patterns of other users (<i>i.e.</i> other users don't consider their needs) (Figure 4.27, T4); • Distrust with government and management efforts or confusion and lack of awareness of management institutions and efforts (Figure 4.15 & 4.21, Section B; Figure B.5; Figure 4.26, T3); • Loss of sense of place (place attachment); • Loss of sense of

	• Concern for local involvement of community (Figure 4.21, Section B; Figure 4.26, T3).	(Figure 4.24, T1; Figure 4.25, T2; Figure 4.26, T3; Figure 4.28, T5); • Concern over other user groups and their use practices and activities (Table B.8 & B.9; Figure 4.24, T1; Figure 4.28, T5; Figure 4.30, T7).	community related to the River (Figure 4.30, T7); • Disinterest or cautionary interest in being personally involved in management and conservation of resource.
Influencing Variables:	• Amount of water available; • Geographic location in the Catchment; • Local knowledge systems and practices; • Educational levels and understanding of situations; • Political situation; • Cultural and traditional beliefs relating to the resource (Fox, 2005); • Spiritual beliefs connected to the resource (Bernard, 2003; Fox, 2005).	• Direct interaction with resource base; • Cultural and traditional beliefs relating to the resource (Fox, 2005; Figure 4.25, T2); • Spiritual beliefs connected to the resource (Bernard, 2003; Fox, 2005); • Awareness around resource and related ecosystems (Motteux, 2002); • Local knowledge systems; • Sense of nostalgia and good (positive) memories with resource; • Type and effectiveness of service provision; • Recreational use of resource.	• Municipality's (and government's) lack of effectiveness or apparent interest (Figure 4.15 Section B; Figure 4.26, T3); • Sense of not being heard; • Development of service provision that separates users from resource base (<i>e.g.</i> taps); • Lack of awareness campaigns around water and its source; • Poor education and knowledge concerning the dynamics of aquatic ecosystems; • Decreasing quality of resource (water), increased disinterest in directly interacting with it (<i>e.g.</i> recreationally, spiritually <i>etc.</i>); • Erosion of traditional beliefs by western influence and technologies.

Additional observations, from the KRWUA meetings, and from conversations with stakeholders outside of and in connection with the survey, revealed that the presence of utilitarian attitudes held the potential to promote conflict or suspicion between users in the Kat River Catchment. There appears to be a strong aspect of self-interest underlying these attitudes in the Kat River Catchment and, when personal use is

potentially influenced or compromised by other users or situations, users can become suspicious of other users' motives and activities. This suspicion can extend to the advice and input of outside researchers, government officials, and partners, and elicit: delay tactics (around negotiations); doubt over information provided; unwillingness to come to a decision; and potentially conflict and distrust between stakeholders.

A physical expression of utilitarian attitudes – as mentioned above – is the construction of water abstraction and storage infrastructure and channel reconstruction (Table 5.2). In the Kat River Catchment the Kat River Dam is the largest storage facility in the Catchment and in many regards a reflection of the synergistic expression of utilitarian attitudes throughout the Catchment. Other examples include: the large weir cascade that exists along the River; the numerous smaller off-stream storage dams; the historic network of furrows (part of which are still utilised in the middle Kat); and the irrigation systems utilised throughout the Catchment (and associated abstraction pumps and mechanisms). The organisation of the KRWUA, and the Catchment Forum (in the upper & middle Kat), can also be considered as a social expression of these attitudes; as such institutions are run fundamentally on the participants' desire to ensure clean water access and supply to meet their personal and economic needs.

5.3.3.1.4 Variables Observed to Influence the Expression of Utilitarian Attitudes

The last row of Table 5.2 lists the variables that were observed to influence the expression of utilitarian attitudes in the Kat River Catchment; such observations have been made through participation in KRWUA and CF meetings, visits to farms and villages, informal interviews with stakeholders, being part of the negotiation facilitation team for the Kat River Project. A variable of considerable influence in how these attitudes are expressed is the amount of water available in the system. As long as the system is open (there is more water available than in demand) stakeholders appear willing to participate and co-operate. As the demand begins to exceed the system's capacity these utilitarian attitudes begin to promote feelings of suspicion, caution and potentially conflict.

Linked to this, the geographic location of an individual or groups of individuals in the Catchment was observed to influence the expression of utilitarian attitudes. Proximity to the dam and position in the Catchment (*i.e.* biophysical and climatic variables) directly influences the amount and type of water a resident is likely to receive. Those residents closer to the Dam are also those residents that are situated in the upper catchment area; in general these residents are likely to receive more rainfall, and have first option from the water in the River after a Dam release. Alternatively those residents living in the lower Kat are not only those furthest away from the Dam but also those in the driest part of the Catchment. The lower Kat residents were observed to express utilitarian attitudes that reflect their fears associated with their position in the Catchment. Upper Kat residents in contrast identify the potential benefit their position in the Catchment has, but lack the infrastructure and resources to utilise it. The hopes, frustrations and fears these residents (upper Kat) have concerning this situation are expressed in their attitudes.

In terms of utilitarian attitudes education and knowledge based variables influence the ability of Kat River Residents to understand the negotiation process and the information provided concerning the system's ability to sustain local needs and issues relating to it. The more information a stakeholder had the more able they were to ensure that their utilitarian requirements were met and, therefore, felt less at risk of from being manipulated by other users. Alternatively those that were less informed (because of social class, economic standing, or culture and language) were more inclined to want to push for a slower negotiation process, or move straight to conflict and/or prohibit certain use in the areas over which they have authority. Knowledge around the River, its condition, its capacity and its management provides power that is funnelled and in effect administered relative to the utilitarian attitudes held by an individual or group of individuals.

Lastly the cultural, traditional and spiritual beliefs of an individual appeared to influence the degree to which the River has more intrinsic worth to that individual and, therefore, incorporates the influence of associative attitudes (to be discussed next). The incorporation of these attitudes potentially moderates the economic self-

interest (anthropocentrism) underlying utilitarian attitudes and their expression in the Kat River Catchment.

5.3.3.2 *Associative Attitudes*

5.3.3.2.1 *Conceptual Definition & Characteristics of Associative Attitudes*

Associative attitudes promote direct association between people and their environments. This association is most often based on positive feelings and perceptions of the resource and, therefore, includes feelings of concern for and interest in it. Such attitudes also elicit opinions in, and regards for, more intrinsic value associations with the resource and/or resource base. This attitude group is associated with: a strong place attachment (Crystal & Harris, 1995; Todd & Anderson, 2005; Inglis, 2008); promotion of sense of community (Crystal & Harris, 1995; Davidson & Cotter, 1998; Davidson & Cotter, 1991); and intrinsic value associations (Crystal & Harris, 1995).

Very often associative attitudes are linked to spiritual, religious and traditional associations related to a place or resource (Crystal & Harris, 1995). Recreational aspects can also be included in this, as any activity that promotes direct interaction between a person and a place (provided it does not have negative outcomes *e.g.* drowning, fear, illness, social disruption) should promote an associative attitude (Crystal & Harris, 1995; Todd & Anderson, 2005). There is a dynamic relationship between place dependence and identity within the expression of these attitudes; however, place identity most often appears to have a stronger influence than place dependence. Such attitudes also appear to operate from a desire or willingness to consider the natural environments and their components from more ecocentric perspectives. Such willingness is often associated with a sense of altruism (*i.e.* looking to the benefit of others *e.g.* the next generation, ecological health, other users *etc.*).

5.3.3.2.2 *Expression of Associative Attitudes in the Kat River Catchment*

Associative attitudes in the Kat River Catchment vary in strength and expression as one moves down the Catchment (north to south). There appears to be a strong cultural influence on the strength and expression of associative attitudes. One possible observation is that the old Ciskei border is a good delineator of associative climate in the Catchment. The border effectively prevented western economic interest from overly influencing the attitudes in those areas that fell within the old homeland (relative to what development had occurred prior to the establishment of the homeland). An alternative reason for the geographic patterns of associative attitudes relative to the Ciskei border is that Xhosa people moved into the homeland, and the original commercial farmers were forced to move out, thereby changing the population balance and cultural influences governing the relationships people have with the River. What ever the reason traditional spiritual and cultural beliefs and institutions still govern the interactions the people have with the River. For example: in the upper Kat there appears to be a strong sense of association with the River, people in this region are predominantly Xhosa and still believe and follow traditional beliefs and customs (Fox, 2005).

This does not mean that in those areas outside of the Ciskei there are no associative attitudes, rather that in these areas associative attitudes appear to be linked much more with memory and experience than cultural beliefs and traditions. People in this area recall playing in the River, the River was a site for families and friends to come together, and many spent a lot of time exploring it and its various tributaries and landmarks. Unfortunately water quality and health concerns have curtailed many of these activities and it will be interesting to see how the attitudes of the next generation are expressed, since they will not have these memories and experiences.

5.3.3.2.3 *Outcomes of the Expression of Associative Attitudes*

Outcomes of the expression of associative attitudes are listed in Table 5.2 and were observed to include: sense of connection with, and responsibility for, the River; concern for intrinsic value and worth of the River; interest in learning more (staying

informed); interest in being involved in the management and conservation of the River; concern for local involvement of community; concern over the River's condition; concern over other user groups and their use practices and activities; and an interest in seeking ways to ensure that the local community can be made more aware of how they can keep the River clean and healthy. It appeared, from the survey results (Chapter 4) that in general those individuals that expressed an associative attitude still saw the River in a positive light and had a sense of hope connected with it.

Associative attitudes have been seen to play a supportive role in natural conservation of ecological environments (Berke & Folke, 1998; Fox, 2005). Relative to the Present Ecological State (PES) assessments done for the determination of the ecological Reserve for the Catchment (Louw & Koekemoer, 2006), the upper Kat appears to be in a better PES (B/C) than the middle (C) and lower (C) Kat (Table 2.1). This appears to support the above observation that associative attitudes promote conservation as an outcome of their expression in human-river relationships. However, this is a loosely based observation at this point and more direct research into the relationship between the expression of attitude groups and ecological conditions should be undertaken.

5.3.3.2.4 Variables Observed to influence the Expression of Associative Attitudes

The last row of Table 5.2 lists the variables that were observed to influence the expression of associative attitudes in the Kat River Catchment. In general any direct positive interaction with the River appears to promote the expression of associative attitudes. This was clearly seen in the disrupted association the residents of Fort Beaufort have with the River. These individuals have little to no direct interaction or personal experience with the River and consequently appeared to demonstrate very little attachment to it, both in terms of place dependence and identity. Variables that have been observed (both in this study and in the referenced literature) to promote either direct connection with the River, or association with it include: cultural and traditional beliefs relating to the resource (Fox, 2005); spiritual beliefs connected to the resource (Bernard, 2003; Fox, 2005); awareness around resource and related

ecosystems (Motteux, 2002); local knowledge systems; sense of nostalgia and good (positive) memories (Inglis, 2008); and recreational use of the resource or environment (Crystal & Harris, 1995).

Fundamentally anything that disrupts the individual's sense of place can influence the expression of associative attitudes in their relationship with the River (Crystal & Harris, 1995). Crystal & Harris (1995) describe some variables that might influence the place- attachment individuals have for an environment or resource (Box 5.1). Access is described as a key factor; the type of access to an area will influence the use and interactions that can take place between individuals and the area. It can also influence the number and type of people who do interact with it. Types of land use practices in, around or associated with the area or resource can influence the experiences individuals have; and again affect the type of people who would seek non-commercial experiences. The amount and type of modification of an area coupled with the extent to which this modification is apparent can affect people's sense of place. The amount of information an individual has concerning an area, its history, its make up, and its uses can also affect the associations they have with the place. The absence or presence of on-site management, *i.e.* the posting of signs and regulations, can promote or constrain a person's experience of an area. Visitor or user impacts, the uniqueness of the area or resource, and the personal symbolism an area holds for a person all influence the types of interactions and experiences they associate with a place.

Box 5.1 Variables influencing Place Attachment (adapted from Crystal & Harris, 1995).

- Access to an area;
- Types of land use practices;
- Modification of the area;
- Amount of Information an individual has or has access to;
- On-site management;
- Evidence of visitor or user impacts;
- Uniqueness of an area;
- Personal symbolism.

Todd & Anderson (2005), in their review of place attachment, point out that place attachment appears to develop along a continuum, with knowledge of and exposure to place being the first steps. In terms of associative attitudes, awareness and knowledge would provide individuals and groups with a greater understanding of the functioning, structure, history and character of the River. Such understanding can indirectly promote association and attachment between the knowledge holder and the River, even if the holder does not have cause to ordinarily interact with the River and its related environments. In addition, such understanding can promote direct interaction, as knowledge holders can be encouraged by what they learn to go and ‘explore’ and discover for themselves the role and value of the River in their lives.

The last variable is the type and effectiveness of service provision. In general the lower the service provision in the Kat River Catchment the greater the associative attitude with respect to the Kat River. Water service provision in this area, and South Africa in general, aims to provide all people with taps and water in their homes. However, in the absence of a awareness as to where the water comes from, the link and association between people and the River is degraded (see Chapter 4). It is, therefore, important to ensure that with the provision of taps and sanitation water users are made more aware of the source of their water and the ways their activities can affect and harm it.

5.3.3.3 *Dissociative Attitudes*

5.3.3.3.1 *Conceptual Definition & Characteristics of Dissociative Attitudes*

Dissociative attitudes have the opposite effect to associative attitudes; for whatever reason a person develops negative or neutral feelings or perceptions of a resource or resource base and begins to separate from it, or indirectly interact or relate to it. Disinterest concerning the resource and its source environment develops along with a decreased awareness of it and its condition. The creation of dissociative attitudes in the Kat River Catchment appears to be influenced considerably by disruption of the sense of place individuals have concerning the River. In the promotion of these attitudes, individuals take on anthropocentric perspectives of nature and value it

relative to its uses (*i.e.* instrumental values). Like utilitarian attitudes there is a strong influence of self-interest, but unlike utilitarian attitudes little desire to learn more or willingness to change.

5.3.3.3.2 *Expression of Dissociative Attitudes in the Kat River Catchment*

Pin-pointing dissociative attitudes is difficult, but in the Kat the clearest expression of these attitudes was amongst Fort Beaufort residents. The situation in this town has been described previously in this chapter and in Chapter 3. It appears that the expression of these attitudes in this area, and to lesser degrees amongst commercial farmers in the lower Kat, is highly influenced by feelings of apathy and hopelessness. Kollmuss & Agyeman (2002) point out that people often use apathy, resignation and sarcasm as a means of defence against a situation in which they feel helpless to change. Such psychological reactions encourage a person to stop informing him or herself about environmental issues and to focus on other aspects of their lives (Kollmuss & Agyeman, 2002). Such people, although they might perform pro-environmental actions out of a sense of obligation, are unlikely to become very proactive in seeking solutions for improving the situation (Kollmuss & Agyeman, 2002).

5.3.3.3.3 *Outcomes of the Expression of Dissociative Attitudes*

The second row of Table 5.2 details characteristics of the expression of dissociative attitudes as observed from the findings of the attitude survey (Chapter 4). Outcomes of the expression of dissociative attitudes were observed to include: disinterest in matters connected with the River; anger and suspicion; sense of fatalism; individuals see the River in a negative light and have a sense of hopelessness connected with it; sense of disregard in connection with use patterns of other users (*i.e.* other users don't consider their needs); distrust with government and management efforts or confusion, and lack of awareness of management institutions and efforts; loss of sense of place; loss of sense of community related to the River; and disinterest or cautionary interest in being personally involved in management and conservation of the resource.

In terms of the physical expression of these attitudes it is difficult to differentiate between the outcomes of utilitarian attitudes and dissociative attitudes, but it is likely that any sign of neglect or disinterest is a result of the expression of dissociative attitudes in human-river relationships. Examples can include: bank erosion; rubbish and litter; broken infrastructure; degraded riparian vegetation *etc.* In suggesting these examples I need to point out that more research would be required to differentiate the effects of dissociative attitudes from those of political and social issues (*i.e.* poverty, historical variables, lack of awareness).

5.3.3.3.4 *Variables Observed to influence the Expression of Dissociative Attitudes*

The last row of Table 5.2 lists the variables that were observed to influence the expression of dissociative attitudes in the Kat River Catchment. These variables include: lack of awareness campaigns around water and its source; poor education and knowledge concerning the dynamics of aquatic freshwater ecosystems; erosion of traditional beliefs by western influences and technologies.

In addition to those listed above, three other (related) variables appear to be influencing the generation and expression of dissociative attitudes in the Kat River Catchment. Firstly, the development of water service infrastructure inadvertently separates the water users from the water source. Although there is a strong need for water services, having to get water from the River appears to create a situation where users have an appreciation for, and association with, it. Direct interaction with the River in terms of water provision creates awareness in users of where their water comes from; additionally such interaction provides the user with direct experience of the nature and beauty of the River system, and thereby develops a personal local knowledge of the River and its roles in their lives. Presently it appears that this variable has only really affected the residents of urban areas like Fort Beaufort. Most of the rural areas are still waiting for water service infrastructure, although several older Xhosa respondents of the attitude survey suggested that taps are part of the reason the younger generation has an increasing disrespect for the River (Table B.6).

The second variable that appears to be chiefly responsible for the spread and development of apathy and hopelessness is the local municipality's (and government's) perceived lack of effectiveness or interest in: 1. maintaining the present infrastructure (Table B.8 & B.9); and 2. getting involved in assisting users in establishing functional management institutions. These factors may have generated a sense of not being heard amongst the residents of the Catchment and consequently have led to their gradual withdrawal of interest in being involved or participating in making a difference. Dissociative attitudes influenced by this variable were, in varying degrees, expressed throughout the Catchment, amongst all user groups. In the upper Kat respondents are concerned over lack of provision of water services, in the middle and lower Kat respondents were concerned about the deterioration of the water quality, the deterioration of the sanitation system in Fort Beaufort, and are frustrated about government's perceived lack of participation and co-operation in assisting in the establishment of functional water management institutions.

Water quality concerns dominated the last variable, and these concerns are closely related to the first two variables (*i.e.* water service provision & government's inability to fulfil its management requirements): in terms of the first variable many attributed the water quality problems being experienced to the growing disrespect for the River; and in terms of the second variable many residents suggested that municipal neglect was chiefly responsible. Decreasing quality of water has led to increased disinterest in directly interacting with it (*e.g.* recreationally, spiritually *etc.*). Whether for health or aesthetic reasons people prefer not to be around a polluted water body. In addition, sickness due to using contaminated/polluted water is likely to lead to negative associations between the user and the resource.

In the upper Kat there was little mention of water quality issues apart from the activities people observe others doing around the River (*i.e.* washing clothes, bathing, diesel from abstraction pumps leaking). Some upper Kat respondents pointed out that they had concerns around the freedom livestock had in accessing and utilising the water. They suggested that several dead carcasses have been observed decomposing in the River (survey respondents, 2007). In the middle Kat above Fort Beaufort water quality was not mentioned as an overall concern. Within Fort Beaufort, however, it is

the principal concern and chief reason people no longer want to use the River for recreational purposes. As pointed out previously, residents of Fort Beaufort appear to have developed an association between the River and their water quality problems. This association was clear in that when asked about what they felt about the 'River' they immediately assumed I meant 'water quality'. Lower Kat farmers are very concerned about water quality. Being situated below Fort Beaufort these farmers have to deal with the outcomes of ill maintained sanitation infrastructure, and the accumulated pollution from the upper and middle catchment. Several lower Kat farmers spoke of how they would not allow their children anywhere near the River, and only ever went in it to fix abstraction equipment in their weirs. One farmer commented on how he had experienced a series of health problems (*e.g.* stomach complaints and styes on his eyelids) after having to dive into the River to fix an abstraction pipe (pers. comms. Lower Kat Farmer, 2005).

5.4 PART 3: IMPLICATIONS OF ATTITUDE GROUPS & HYPOTHESIS DEVELOPMENT

Having identified and described these attitude groups the next question is ‘so what’? What do these groups tell us, and how do they assist in better understanding human-river relationships? Before answering these questions I believe it is important to begin by outlining some thoughts and observations concerning the limitations of these groups. Firstly, to utilise these attitude groups as any sort of definitive assessment variables would be difficult and probably incorrect. The social system is complex and the people that make it up even more so. Each person is an individual and will most likely hold a collection of attitudes concerning the River and, therefore, a co-operative of attitude groups. In this regard these groups are seen largely as guides to the preliminary or baseline understanding of a situation in a Catchment.

Secondly, and related to the above mentioned complexity, these groups do not separate effectively at the individual level of assessment, but should be seen as community expressions. Determining the general attitude groups held by user groups or stakeholder communities is far more effective than working with individual assessments. This means that collection of information needs to be carefully orchestrated in order to include a minimal amount of people from all user groups of interest.

Developing the definition of these groups was substantially assisted by my work in the Catchment with the stakeholders. Four years of research working around water management issues with the Kat River user groups provided me with substantial insight and observation of the outcomes and expressions of these attitudes within management and non-management context. Such insight greatly aided me in developing an intuitive sense of the types of attitudes held by the different user groups. This length of time may not be available in many IWRM initiatives, especially where the management structure is undergoing change as is the case in South Africa.

In many regards much more research into the specific relationship between ecological condition of the Kat River and the expression of these attitude groups in the Catchment (both temporally and spatially) needs to be undertaken. Lack of this knowledge makes it difficult to forecast future management scenarios and adequately assess the implication of the expression of the different groups. In the descriptions of the groups I have attempted to include certain factors I foresee as being physical, social and conceptual outcomes of the expression of these attitude groups, but understanding of these factors can be increased with specifically developed monitoring and assessment studies of the Riverine landscapes.

The Kat River Catchment is a relatively small tertiary catchment, and much of the social dynamics are contained within the boundaries of the Catchment. It is inappropriate to speculate on the value of using these groups as guides at larger scales (*i.e.* primary catchments). In addition, the Kat River Catchment is an agricultural catchment, with little other industry present. Furthermore it is a rural catchment with no large urban areas (Fort Beaufort can be considered urban). The attitude groups have been identified and described relative to these factors; further case studies in other catchments with varying combinations of industry and urban activities will have to be undertaken to assess the expression of these attitudes in other areas.

How can these groups help us?

The following lists the various ways that I foresee knowledge of attitude groups in an area assisting researchers and water resource managers.

- They can indicate the potential for the active and interested participation (involvement) of stakeholders in water management.
- They point to the fundamental morals and value systems influencing the perspectives and opinions of stakeholders around water resource management.
- They can provide an indication of dynamics around water use in a catchment.
- They can reveal potentially disruptive factors and the associated spread of dissociative attitudes, connected with water management.

- They help assess the likelihood of success of negotiation processes, or, at least, suggest when caution and external facilitative measures might be required to help promote open and fair negotiations.
- They can provide insight into the progress made by IWRM initiatives, *i.e.* they can act as social monitoring variables.
- They may be able to provide information on the likely ecological condition of a resource in different regions (for desktop assessment) (more research required).

How can they assist in better understanding human-river relationships?

At this point I need to go back to the conceptual model on which I have based my inquiry so far (Figure 3.3). The theory and principles behind the two relational scenarios (*i.e.* IWRM and the tragedy of the commons) have been discussed in Chapter 1. Here I provide a speculative view of how knowledge of these attitude groups can be used to identify the conditions conducive for the promotion of either of these relational scenarios. Figure 5.7 presents a guiding framework to how I foresee that knowledge of the strength and nature of the attitude groups (collectively referred to as ‘attitude climate’) expressed in an area can provide insight into the likely promotion of either constructive (IWRM) or destructive (the tragedy of the commons) human-river relational outcomes. The central pivot of this framework is the balance and relationship between the three attitude groups in an area or amongst a group of users. Depending on the way the three attitude groups are observed to be present in a study area, a researcher might identify or predict the various factors (*e.g.* morals, degree of self-interest, influencing values *etc.*) that correspond with the observed relationship between the attitude groups. The factors suggested in this thesis to correspond with attitude expression are represented in Figure 5.7 by the five bars (or scales) on either side of the attitude groups. These bars can be shifted to help describe the nature and potential outcomes of the relationships between the attitude groups.

The horizontal bars in the top half of the diagram (Figure 5.7) consider/represent the moral status or perspectives; the degree to which user groups look to their own interests or present altruistic tendencies; and the attachment of place, are considered. The two horizontal bars in the bottom half of the diagram consider the ways in which

user groups are most likely to value the resource and its base; and the projected level of participation and/or interest in participating, are considered. The direction of influence (associative, utilitarian or dissociative) likely to be exerted by these various factors is assessed relative to their position on the bars.

By shifting these factors along their various bars, assessment of the factors that are likely to promote IWRM can be made. A catchment that shows a good balance between utilitarian and associative attitudes, with little to no evidence of dissociative influences, should present a case that might be supportive of the implementation and establishment of IWRM in the area. If, however, there is a strong lean to utilitarian attitudes, and limited evidence of associative attitudes, than stakeholders are unlikely to overly consider the ecological requirements and needs of the River. Although in this case stakeholders might still work towards the active implementation of IWRM, there will be a need for objectives to be set in place that attempt to re-establish some form of place identity elements (*e.g.* awareness programs, remediation of recreational areas, specific emphasis given to spiritual or cultural customs *etc.*). Alternatively the presence of overly dissociative or utilitarian attitudes may already attest to poor management of a common resource, with little consideration for the sustainable use of the resource and other users.

In the next section I briefly describe the development of an assessment compass, which builds on what has been described in Figure 5.7.

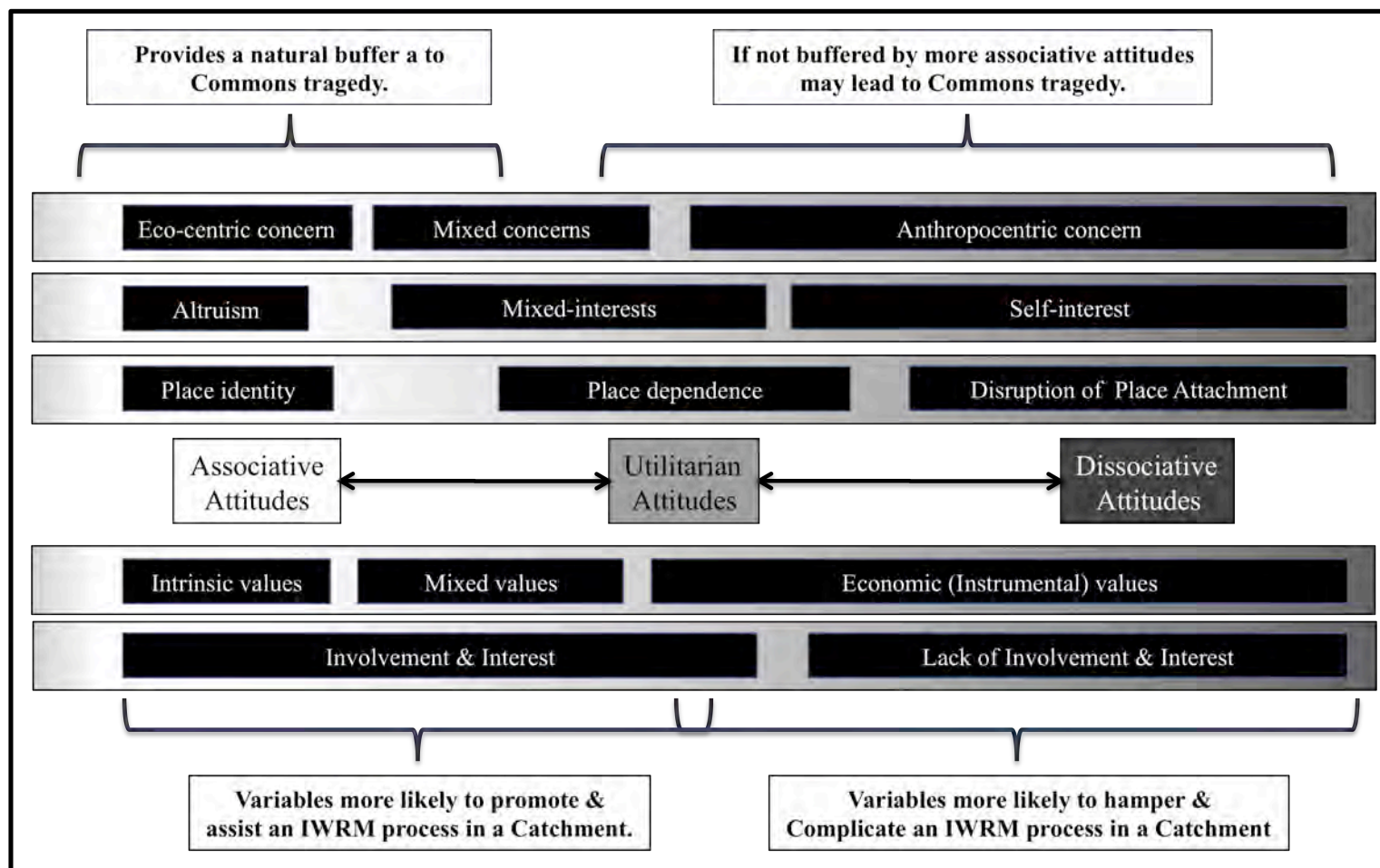


Figure 5.7 Sliding-scale guide to the assessment of attitudes climate in a catchment system.

5.4.1 Assessment Compass

The central point of the framework presented in Figure 5.7 has been set up as a linear relationship between the various attitude groups; it is, however, more accurate to work with the groups in terms of a cyclic relationship. To facilitate this, I developed the idea of an assessment compass, a conceptual version of which I present here in Figure 5.8. Ideally such a compass will require more research into the emotions people or community groups appear to attach to various aspects related to the attitude variables (Figure 5.4). This observation has been made relative to some of the emotional response information I collected during the attitude survey (Chapter 4). Given, however, that this information has not been included in this study I mention it only as a point of observation.

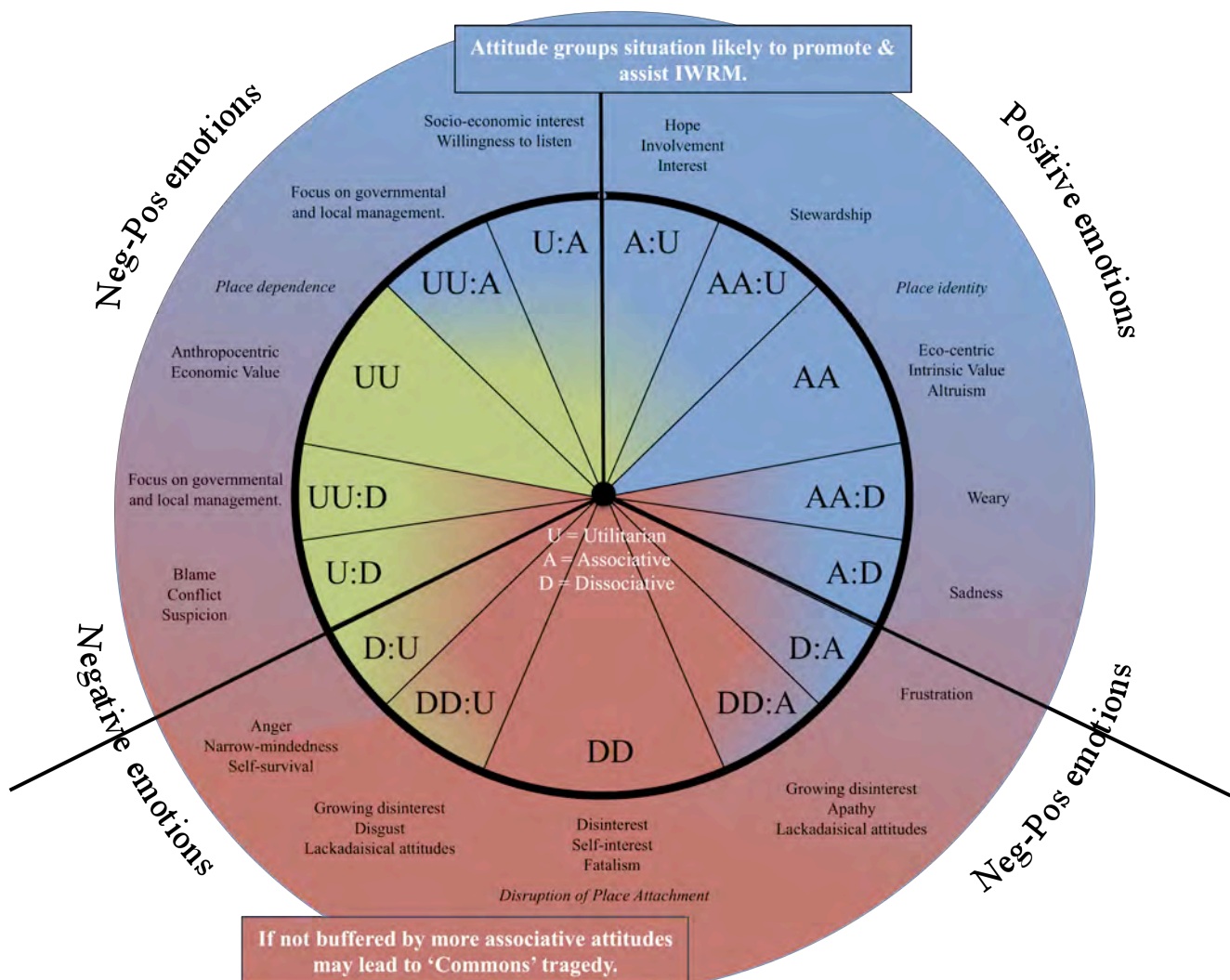


Figure 5.8 Conceptual version of the Attitude Group Assessment Compass

Figure 5.8 demonstrates that the relationship between the various attitude groups is seen to function on a continuum, with each degree of the compass representing strength of expression and relationship between the various groups. The letters before the colon represent the dominant attitude, the one most obvious in expression. The letter following the colon indicates the next most obvious attitude group present, for example: U:A and UU:A. In these examples utilitarian attitudes are balanced with an associative influence. The strength of the balance between the two attitude groups is indicated by the number of letters before the colon; UU:A, for example, indicates that the strength of the utilitarian attitude is high relative to the associative attitude; U:A suggests a more balanced relationship between the influence of both attitude groups, only slightly tipped in favour of utilitarian interests. The area of the various pie sections of the compass are all equal except for those of UU, AA & DD. This indicates that if these attitudes are expressed, they are fairly overriding and likely to dominate.

In the following discussion I have attempted to provide some indication of the attitude climate within the different regions of the Kat River Catchment, as I perceived it in 2007 just after completing the attitude survey. There is a strong expression of utilitarian attitudes in all three of the regions. In the upper Kat these attitudes tend to be balanced with strong place identity variables still evident in the local culture (*i.e.* ancestor worship – the ancestors are seen to live in the River – have both spiritual and traditional associations with the River); the attitude group relationship in this region of the Catchment most likely shifts between U:A and A:U on the attitude compass. In the middle Kat there is a balance between utilitarian and dissociative attitudes, this is mostly due to the contrast between the rural (subsistence and commercial farms) and urban (Fort Beaufort) environments present in this regions of the Catchment and the attitude group relationship can be considered to shift between UU and UU:D on the attitude compass. Lastly the lower Kat appears to present a balance between utilitarian and associative attitudes, although the strength of expression of utilitarian attitudes in this region are stronger than those demonstrated in the upper Kat (although the division between the two is approximate), the associative edge appears to have developed relative to sentiment and positive childhood experiences and memories with the River; the attitude group relationship in this region of the

Catchment most likely shifts between UU and UU:A on the attitude compass. It is probable that a degree of dissociative association does exist in both the upper and lower Kat, especially in light of growing water quality concerns in the latter region. In addition, with shifts in recreational use of the River in the lower Kat, the attitudes are most likely shifting towards UU:D as opposed to UU:A in this region – this is the expected attitude group relationship for the next generation of farmers in the lower Kat. In the upper Kat water service provision is expected to shift the relationship from U:A to UU:A. In Fort Beaufort, if the local municipality does not improve the services it is providing, the attitude relationship is expected to shift into the dissociative region, going from UU:D to U:D and eventually D:U. In the more rural areas in the middle Kat, nothing was observed within this study to suggest future shifts in attitude group relationship, and it is expected that they will continue to oscillate around UU.

Knowing this geographic expression of attitude now allows for the estimation of the likely dynamics of the human-river relationships in the Catchment. Users from the upper Kat are far more likely to want to be actively involved in the management of the River, and potentially to have a more innate intrinsic appreciation of the River and, therefore, interest in seeing its needs met. In the other two regions there is likely to be involvement, but with caution and suspicion. Users from these regions of the Catchment will be primarily interested in obtaining use rights to the water. Negotiations around water allocation is likely to be promoted by present users, but will be driven by utilitarian concerns and opinions.

In terms of the study's conceptual model (Figure 3.3), we can now bring in some of the available ecological information to assess the expression of human-river relationships in the Catchment from both what the social system is saying and the ecological. The model indicates two potential relational scenarios for the outcomes of human-river relationships; the constructive scenarios is represented by IWRM where as the deconstructive scenario is represented by Hardin's (1968) 'Tragedy of the Commons'. There is a general indication that IWRM might be promoted amongst the user groups, although there will be a need for facilitative and capacity development initiatives to run along side it. The River itself, in terms of its ecological condition

(Chapter 2), still shows some resilience and with proper management can be sustained at its current condition (it is unlikely that it will improve given current management and related land uses). The growing concern for water quality, although not considered a threat relative to the findings of the ecological monitoring (Birkholz, 2007), does suggest that there are some elements of the Tragedy of the Commons occurring in the Catchment (most likely due to poor awareness and education around the implications of land use practices *etc.* on the River). In addition the presence of strong dissociative attitudes in the middle and lower Kat is also a point of concern and likely to result in unabated utilitarian use of the River. To some extent (although related to several fears the farmers have *e.g.* provision of water, and security) the extensive cascade of weirs in the lower Kat are already a sign of this. It is my opinion that the Kat River sits on a threshold point, where decisions made presently around its management will determine its ability to sustainably provide into the future. Present issues associated with its management are complicated by the presence of strong utilitarian and dissociative attitudes. If handled correctly the Kat is a good case for the implementation of IWRM and long-term monitoring of its success. Poor co-operation on the part of governmental partners could just as easily shift the balance in favour of the expression of the Tragedy of the Commons in the Catchment.

5.5 SUMMARY

In the present chapter I have sought to identify key variables and principles that can provide insight into the dynamics of human-river relationships in the Kat River Catchment. My focus within this analysis phase has been to explore these relationships in terms of variables and factors that might influence the likely nature of relational scenarios in the Catchment. In undertaking this analysis I utilised a series of conceptual frameworks and analysis tables to: 1. Better understand key aspects of human-river relationships from the perspective of social and ecological systems (in time and space) (Figure 5.2); 2. Explain my use of attitude variables in interpreting the survey data and providing input to the current analysis (Figure 5.4); 3. Identify and describe the attitude groups I foresaw influencing the dynamics between people and how they use and relate to a river – connected with this description I outline the principal philosophies I believe underlie these attitude groups and influence human-river interactions (Figure 5.5); 4. Present possible ways knowledge concerning attitude groups can provide insight into the nature and probable outcomes of human-river relationships in a catchment system, and how these attitude groups in turn stand to influence the likely relational scenarios that develop (Figure 5.7 & Figure 5.8).

Throughout this chapter I have made use of the conceptual model first presented in Chapter 3 (Figure 3.3). Relative to the assessment stages in this chapter and the various outcomes, I present a re-evaluated model in Figure 5.9. The new model can be viewed as two parts, the first half, contained within the border, traces the various components that are believed to influence the type of human-river relationships in a catchment. This half of the model summaries the theoretical framework that has been developed in this chapter; the model illustrates the breakdown and linkages (direct, indirect and synergistic) between the different theories and variables discussed in the preceding sections of this chapter. The relationships between the components of ‘Environmental Ethics’ and ‘Place Attachment’ are indicated with gray arrows, dashed arrows indicate indirect relationships and solid arrows direct relationships; brackets indicate the relationship between groups of components. Thick arrows indicate the expression of synergistic relationships (*i.e.* the expression of a collection of relationships functioning together in synergy) and ‘Attitude climate’ is defined as

the synergistic expression of the active attitude groups amongst the population of interest. The various components of the social system are shown to link directly in a synergistic relationship with those of the ecological and together influence the nature of human-river relationships and the related relational scenario.

The second half of the framework illustrated in Figure 5.9 presents a re-evaluated view of the conceptual model described in Chapter 3 (Figure 3.3). The model now utilises the various attitude groups to provide points of orientation (relative to present human-river relationships and underlining attitude climate) by which the determination of relational scenarios can be made. The model presents the theory that the various attitude groups will be inter-relating with each other, but based on their relative strength of expression of any one, or two, group/s the reader can begin to speculate on the relational dynamics most likely playing out in a catchment. This knowledge should help researchers and water managers to identify broad essential issues that could impact or hinder the promotion of IWRM in a catchment.

The probable hypotheses that have been generated from this analysis are:

- Attitude groups influence the outcomes and dynamics of human-river relationships in a catchment.
- Attitude groups provide useful information for the assessment of water resource management activities, specifically the likely promotion of IWRM in a catchment.

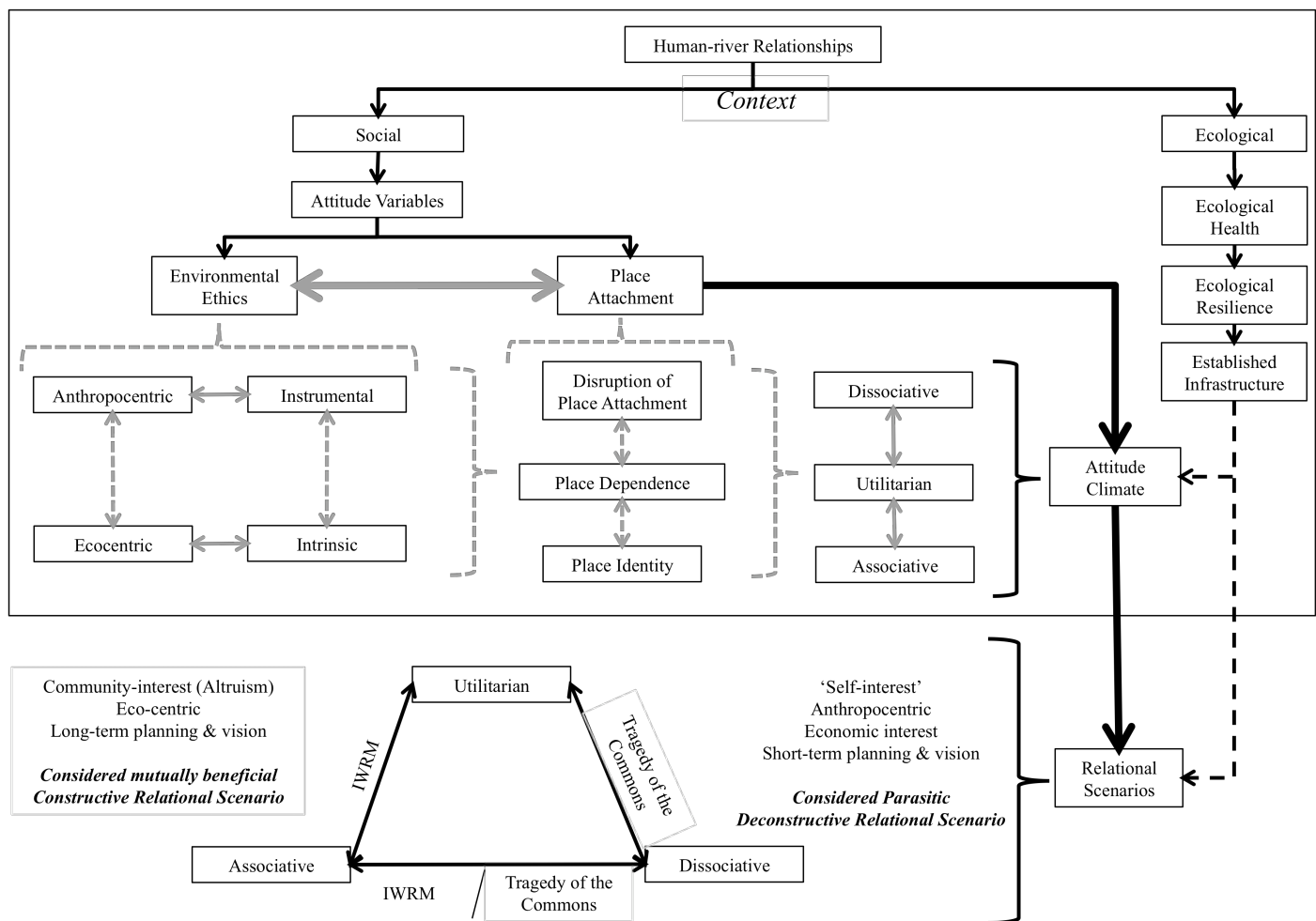


Figure 5.9 Theoretical Framework developed through this study and the Re-evaluated conceptual model. The area delineated by the black border represents the Theoretical Framework: the gray arrows trace the relationships between the different components of the social system, *i.e.* Environmental Ethics and Place Attachment. Dashed lines represent indirect relationships, solid lines direct, and brackets grouped expressions. Thick solid lines indicate synergy between inter-relating components. The un-bordered section, shows the re-evaluated conceptual model, now orientated around the relationship between the various attitude groups determined in this thesis.

CHAPTER 6

CONCLUSIONS & RECOMMENDATIONS

6.1 INTRODUCTION

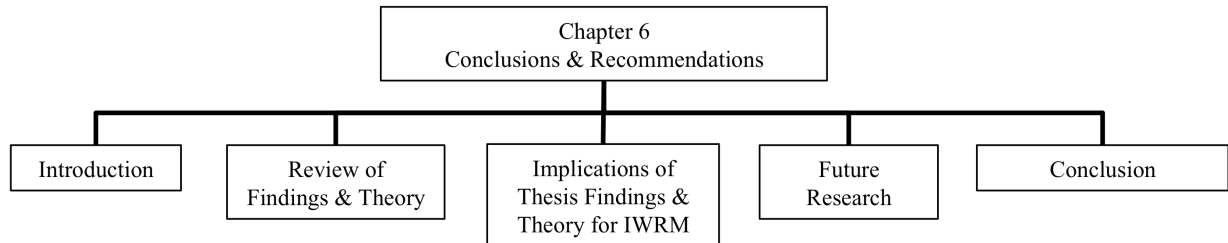


Figure 6.1 **Layout of Chapter 6**

This chapter provides an overview of the findings of the study and the implications. Figure 6.1 provides a layout of the chapter, which includes: a review of the inferred implications for IWRM; a review of the significant findings and recommendations; a list of possible future research arising from this study; and finally the thesis conclusion.

6.2 REVIEW OF FINDINGS & THEORY

6.2.1 Significant Findings

This thesis has utilised a study of attitudes towards the Kat River to explore the human-river relationships in the Catchment from the perspective of likely relational scenarios *i.e.* IWRM and the Tragedy of the Commons. The following section lists and summaries the significant findings of this study.

6.2.1.1 *Human-River Relationships in the Kat River Catchment*

Human-river relationships are synergistic expressions of the myriad collection of interactions that occur between the riparian environment and the people who rely on it. The complexity that accompanies such a collection of interactions and role-players naturally makes description and definition of these relationships difficult. In the Kat River Catchment the River is the ‘life-blood’ of the area, and the people recognise it as such. Nearly all Kat River residents will have some experience of the River, whether it is spiritual, recreational, historical, social or based around economics; the people of the Catchment depend on, and work with the River. Human-river relationships constitute the interface between users and resource and as such are instrumental in the outcomes to both the social and ecological system. Generating understanding around them is, therefore, fundamental to determining likely relational scenarios for a resource and its supporting environment. The following section lists some of the more general observations made concerning human-river relationships from the Kat River Catchment.

Human-river relationships are:

- Influenced by both time and space.
- Influenced by culture and religion (spirituality).
- Significantly influenced by aspects of use (goods and services, utilitarian).
- Significantly influenced by history (both social and ecological).
- Apparently able to influence the ways people talk and think about the River and, therefore, the ways they negotiate around, and manage, it.

- Influenced by the types of interactions that people have with the River, and the opportunity for such interactions.

These relationships appear to vary geographically:

In the upper Kat:

- Social requirements and needs, *i.e.* water for cleaning, drinking, eating *etc.*, promote direct connections between the people and the River.
- Cultural and spiritual associations promote and drive many of the human-river relationships.
- Historically the traditional customs and beliefs of the local people have been largely maintained by establishment of the old Ciskei homeland.
- There is evidence to suggest that there is a weakening relationship with the River amongst the younger generation ('growing disrespect').

In the middle Kat:

- A mixture of relationship types occurs, largely resulting from the influence of the Ciskei.
- In the rural areas, a mixture of cultural, spiritual and nostalgic associations promotes and drives the human-river relationships.
- In the urban centre of Fort Beaufort human-river relationships are indirect and weak.

In the lower Kat:

- Very few cultural or spiritual associations were inferred to be influencing the human-river relationships in this region of the Catchment (due to the fact that only the west bank of the River was included in the study, and the population here is primarily white-English speakers).
- Nostalgic associations were observed to promote associative attitudes within the human-river relationships, in spite of the strong utilitarian considerations in the area.

6.2.1.2 *Attitude Groups*

The findings of the attitude survey led to the identification of three main attitude groups believed to function in connection with people's relationship with the River and water resources: associative attitudes, dissociative attitudes and utilitarian attitudes. The following section lists some of the general findings and observations made concerning these groups.

- The three identified attitude groups appear to differ based on the relationship between a person's environmental ethic (moral status and values) and sense of place (place identity and dependence).
- In the Kat River the predominant environmental ethic appeared to be anthropocentric with underlying instrumental values.
- Culture, religion, spirituality, and some form of positive direct interaction or association with the River were seen to influence the expression of these ethics:
 - In the upper Kat the River is still used as a source of domestic water, there is still strong consideration and regard for traditional values and beliefs (of which the River plays a significant part), and there was a demonstration of more ecocentric, intrinsic ethics expressed.
 - In the middle and lower Kat there is direct use by the people in the rural areas for irrigation and domestic needs; however, in the town there is little to no direct interaction between the people and the River. In the middle and lower Kat the predominant ethic was anthropocentric, with a mixture of instrumental and intrinsic value associations.
- Residents' sense of place was influenced by the nature of interaction that occurred between the River and the people. Sense of place was most influenced by culture and spirituality in the upper Kat, and by nostalgia and water quality issues in the middle and lower Kat (predominantly amongst the white farmers).
- An individual could exhibit a number of attitudes towards the River; collectively these were seen to influence the way a person thought about and responded to issues concerning the River and associated resources.

- The different regions in the Catchment were seen to express collective attitude groups, which worked synergistically to create the ‘attitude climate’ in the Catchment, as well as in the different regions.
- Taps and water service provision without relative awareness building programs were seen to be, separating people from direct interaction or association with the River and promoting dissociative attitudes.
- Water quality is a significant concern throughout the Catchment, and quality of the River was seen to be both a promoter of associative attitudes or a disruptive variable that promoted dissociative attitudes. The promotion of dissociative attitudes was observed to promote, in turn, a lack of interest in helping correct the water quality issues and, therefore, add to the problem.
- Perceived lack of interest and/or poor management behaviour, by Government agencies, was observed to directly affect the sense of apathy and hopelessness residents felt concerning the condition of the River and the potential of improving it.

6.2.2 Significant Theory

The previous section presented a review of the significant findings of this thesis; in this section a review of the theory generated concerning attitude groups and their use in determining relational scenarios for the outcomes of human-river relationships will be discussed.

6.2.2.1 Relational Scenarios

Through out this thesis relational scenarios were seen as the possible outcomes of the expression of human-river relationships in a catchment. Working within Inglis’s (2008, pg. 10) comment that ‘*the Human World Relationship is expressed through a person’s views and behaviour towards the natural world, which can be either constructive or destructive*’, two relational scenarios were selected to represent these two predicted outcomes of human-environment relationships: IWRM, seen as constructive and mutually beneficial to both the social and ecological system, and the Tragedy of the Commons, seen as destructive and parasitic in nature. Figure 3.3

illustrates the conceptual framework or model utilised to guide the inductive process of this thesis. The Model portrays the two possible outcomes (relational scenarios) of human-river relationships, as well as suggesting that the two scenarios are not necessarily mutually exclusive, but given the complexity associated with catchment systems, it is likely that there could be overlap between them (Figure 3.3).

The main findings of this thesis were derived from the exploration of social attitudes, variables that can be argued are related to the expression of '*Human World Relationships*' namely '*values and behaviour*' (Inglis, 2008, pg. 10). As the previous section illustrated, the findings of this thesis indicate that attitudes are important components of human-river relationships in the Kat River Catchment. They have the potential to influence the ways people interact with the River and associated resources, and are in turn influenced by the condition of the River and connections people have or make with the River within their daily lives. Such relationships in turn affect the management of the River and its water resources and influence how individuals approach the water-related issues and undertake the associated activities. Given this understanding it was then proposed that attitudes could provide information that enables the prediction of likely relational scenarios in an area. The findings appear to support this proposal, and the three main attitude groups determined from the study were discussed further to ascertain how they might be used in predicting possible relational scenarios based on human-river relationships.

As outlined in the previous section, and Chapter 5, the breakdown of variables that might influence attitude groups are related to aspects of environmental ethics and place attachment (Figure 5.6). Figures 5.7 and 5.8 illustrated proposed assessment frameworks that might (they are in need of further testing and validation) be used to determine the likely relational scenarios in a catchment and the potential implications of these for water resource management. These frameworks were generated from the theory that knowledge of attitude groups in a catchment, in connection with the relative degrees to which moral values and worldviews are expressed, could provide insight into the readiness of a catchment system for the implementation of IWRM and/or the facilitative steps needed to shift the influence of unfavourable attitude

groups (*i.e.* dissociative attitudes). Such steps would most likely involve extensive educational, awareness and capacity building programs.

Finally, given the above theoretical framework the conceptual model was re-evaluated and extended to include the thesis findings and theory (Figure 5.9). It is proposed that in a catchment where there is a balance between the expression of utilitarian and associative attitude groups, then there is a high probability of finding present evidence of mutually beneficial human-river relationships already in play, as well as ‘fertile soil’ for the promotion of IWRM and philosophies and skills that generate such relationships. Alternatively in an area with a strong expression of dissociative attitudes, it is more likely to find evidence of destructive, more parasitic-like relationships being expressed, and a lack of commitment and interest in being involved in changing the status quo. It is likely that where both associative and dissociative attitudes are present there will be an overlap of elements of both scenarios – a situation that is probable in most catchments – depending on the strength of expression of either attitude group the balance will shift (be shifting) between the two scenarios.

6.3 IMPLICATIONS OF THESIS FINDINGS & THEORY FOR IWRM

In the preceding section the findings and theory of this thesis were reviewed and discussed in terms of their implications for the prediction of relational scenarios in a catchment. Of the two relational scenarios discussed, *i.e.* IWRM and the Tragedy of the Commons, I assume that the constructive one is the most desirable, especially in terms of the long-term sustainability of water (indeed any environmental) resources. In this section I expand on the implications of the findings of this thesis for IWRM.

6.3.1 Implications of Human-Environment Relationships for IWRM

Human-environment relationships are the functional (and often structural) units of geographic, cultural, spiritual, economic, political, psychological and ecological landscapes (Cordell, 1995; Berkes & Folke, 1998; Berkes *et al.*, 2003; Fox, 2005; Bohensky, 2006; Inglis, 2008). It stands to reason that these relationships can also be considered as the functional units in natural resource management, especially management where sustainable development is the desired outcome. These relationships represent a detailed network of key system drivers; drivers which often dictate the nature of the final outcome of the interactions between social and ecological systems (*i.e.* constructive – mutually beneficial or destructive – parasitic).

Human-environment relationships present significant, conceptual expressions of the integration that naturally occurs between the social and ecological systems. These relationships, therefore, present an ideal framework for IWRM initiatives to work with. They represent the direct connection between people and their resources and, as implied above, sustainability stands to be strongly influenced by human-river relationships. Because these relationships include all issues of politics, economics, ecology and social welfare, the question over what exactly should be integrated need not be overly worried about. Although they are complex representations of the synergistic outcomes of many people relating with the natural world, we can comprehend them and describe them. In order to better achieve this, however, we will need to identify qualitative and quantitative traits and variables.

Some present limitations of the application of these relationships in IWRM are: the lack of data and knowledge concerning them and their roles within socio-ecological space and time; the amount of time and resources that will be required to gather such knowledge; these relationships are dynamic and will vary with time and location; lack of current methodologies for the effective utilization of these relationships in management practice.

6.3.2 Implications of Human-River Relationships for IWRM

Human-river relationships are a specific aspect of human-environment relationships that are of direct concern to water managers. Rivers represent the centre of survival and life in agricultural catchments, indeed in most catchments. The resource (*i.e.* water) they provide is essential to all growth and agricultural production, as such the relationships people have with their river will be a significant factor in the management and sustainability of that river. These relationships represent both conceptual and physical aspects and go beyond mere discussions concerning the use of the river, into human psychological and spiritual well being (Cordell, 1995).

Using human-river relational dynamics as the building blocks for both informing and developing IWRM practices provides much of what has been described as benefits detailed in Table 6.1. In addition such knowledge enables practitioners, researchers and managers to work with and around the needs, challenges and social connections people have with their river and the riparian resources it provides. It provides insight into potentially stressful or negative areas of influence, knowledge that is particularly useful in the context of negotiation and in developing water management institutions. Assessment of such relationships in time and space present an illustration of the likely present and future locations in the catchment of 'hot spots', in terms of ecological degradation and impact.

Table 6.1 Summary of benefits and limitations of human-river relationships for IWRM.

Benefits of human-river relationships for IWRM:	• Represent the functional units (inclusive of key system drivers) of socio-ecological landscapes and associated resource management; • Provide integrated expressions of the interactions between the social and ecological system (explicitly influential in determining the likely success of establishing sustainable use in a system); • Provide identifiable variables that can be used in monitoring system dynamics and providing system feedback for adaptive management reflectivity; • Provide points of assessment for baseline studies and reviews of an area; • Provide required information needed to develop back-casts and forecasts for future management scenario development; • Such knowledge enables practitioners, researchers and managers to work with and around the needs, challenges and social connections people have with their river and the riparian resources it provides; • It provides insight into potentially stressful or negative areas of influence, knowledge that is particularly useful in negotiation settings and in the development of water management institutions; • Assessment of such relationships in time and space present an illustration of the likely location of ‘hot spots’, in terms of ecological degradation and impact, in a catchment, and where they are likely to be in the future (given present relational dynamics).
Current limitations of human-river relationships for IWRM:	• Lack of data and knowledge concerning them and their roles within socio-ecological space and time; • The amount of time and resources that are required to effectively develop holistic and detailed description and understandings relative to specific areas and management initiatives; • These relationships are dynamic and will vary with time and location; • Lack of current methodologies for the effective utilization of these relationships in management practice; • More information is required on the dynamics of compositional relationships within the active human-river relationships <i>i.e.</i> psychological aspects (<i>e.g.</i> attitudes, values, beliefs <i>etc.</i>) and their expression on the river environment and the environment’s influence on them, cultural relationships (<i>e.g.</i> local, indigenous, knowledge; community traditions <i>etc.</i>) and the river’s response <i>etc.</i>; • There is a need for increased input from historical specialists and data sources as to past relationships and their dynamics (<i>e.g.</i> social and environmental history).

Limitations concerning the use of human-river relationships in IWRM are listed in Table 6.1. Furthermore, more information is required on the dynamics of compositional relationships within the active human-river relationships *i.e.* psychological aspects (*e.g.* attitudes, values, beliefs *etc.*) and their expression on the river environment and the environment's influence on them, cultural relationships (*e.g.* local, indigenous, knowledge; community traditions *etc.*) and the river's response *etc.* There is a need for increased input from historical specialists and data sources as to past relationships and their dynamics (*e.g.* social and environmental history).

6.3.3 Implications of Attitude Groups for IWRM

Attitude groups can be seen as functional units of human-environment/river relationship, as such they both interact with and affect the environments they are associated with. Likewise these environments can be seen to be influencing the strength and nature of the attitude groups present in a user community/group. In addition, these groups are potentially quantifiable, through further refinement and testing and, therefore, measurable. In light of this potential quality these groups can be used: for social monitoring; in the assessment of the effectiveness of IWRM initiatives; in developing user friendly tools for the assessment of attitude climate (*i.e.* the assessment compass Figure 5.8); and in mapping (using GIS techniques and science) the geographic layout of the various attitude climates in a catchment (Table 6.2).

One last benefit of attitude groups for IWRM may be seen from both positive and negative perspectives. Attitude groups do not function at the level of the individual, but at the level of community or user groups. Although this may be seen as a limitation, in terms of IWRM I do not see it as one. IWRM will inevitably have to function above the 'synergy' line: that point in a system where the relationships are producing outcomes on/in both social and ecological systems, which are more than the sum of the parts. Assessing the relationships between people and a river from the level of an individual might fall below this line and produce a lot of noise/static in terms of understanding how a group of users are relating to a river (*i.e.* each

individual is unique and will have their own set of attitudes and strengths at which they are expressed). This will then require substantial data sets and extra research to begin to ‘fine tune’ what is being expressed at the individual level in terms of human-river relationship dynamics. Working at the level of user group or community takes you above this line and requires smaller data sets and less ‘fine tuning’ to begin to be able to see and assess the attitude climate and its influences in the system.

Many of the limitations of the attitude groups have been discussed in Chapter 5. Here I list them with some others in terms of their implications for IWRM. Table 6.2 provides the summarised list of the limitation of the attitude groups from IWRM.

Table 6.2 Summary of benefits and limitations of attitude groups for IWRM

Benefits of attitude groups for IWRM:	• Act as a functional unit within the social system, that is both influenced by the environment and influences the environment; • Potentially a quantitative (measurable) variable that provides some insight into the nature of human-river (human-environment) relationships; • Useful variable for social monitoring; • Can be used to judge the success of an IWRM initiative; • Describe community, user group or area’s attitudes towards the River, does not function at smaller scales (<i>i.e.</i> individual).
Current limitations of attitude groups for IWRM:	• Relies heavily on the assumption that there is a relationship between attitudes and behavior; • Use of the groups might to spatially limited (<i>i.e.</i> to small agricultural catchments); • Data collection is demanding and can be labor and resource (time & financial) intensive; • Need for further testing and reflection on the usability of attitude group theory in IWRM initiatives; • These groups are dynamic and synergistic and will vary with time and location.

6.3.4 Implications of the Kat River Case Study for IWRM

The lack of available case studies and lessons from on-the-ground implementation of IWRM is at present a serious problem (Biswas, 2004; Medema & Jeffrey, 2005). Without such case studies it is difficult to assess and evaluate: the applicability of this research for water management (across all contexts); the effectiveness of IWRM-influenced policy and legislation; the efficacy of IWRM initiatives *etc.* In this regard the Kat River Catchment is valuable as an example of the early stages of

implementation of an IWRM approach within a rural-agricultural context in a developing country. The extent and nature of the work (McMasters, 2002; Motteux, 2002; Burt *et al.*, 2007; Burt *et al.*, in press) that has been undertaken in this Catchment towards implementing IWRM provides valuable information and insight on the process of IWRM and many of the difficulties experienced in implementing IWRM in rural South Africa. The following observations, in terms of the benefits and limitations of the Kat River case for IWRM, are offered with respect to the current study.

Progress in implementing IWRM in the Kat River Catchment owes much of its success and significance to the fact that there is active participation on the part of the stakeholders. In many respects it is the Kat River residents and users groups themselves (aided by Rhodes University Researchers) who have spearheaded the drive towards initiating and encouraging the IWRM process (relative to the requirements of the NWA) in their catchment (Motteux, 2002; Burt *et al.*, in press). The process of institutional development (of the KRWUA) has progressed to a stage where initial water-allocation negotiations have already happened (Burt *et al.*, 2007). Reaching the stage of negotiation (even just preliminary ones) means that: a significant amount of people (especially in the upper Kat) have shown an interest in being involved; the user groups have been identified and there is information on the various histories and tensions between them; and there is information available on both social and ecological aspects.

In addition to these significant qualities, the Kat River Catchment is small (in comparison to most South African rivers) and not industrially diverse, leading to a simplified IWRM situation. This situation is further simplified by the clear differences in environmental and social conditions between the geographical regions of the Catchment (*i.e.* upper, middle and lower). These differences and the available information provide useful socio-ecological groups from which to assess the varying approaches to, and opinions around, water management.

Lastly there is a strong research culture in the Catchment, promoted by the years of research and capacity development that have been carried out in the area. Today

people are willing to participate in research projects (*i.e.* be interviewed, give information *etc.*) and recognize the value of research into their situation and now largely promote it whenever possible (resources permitting). Table 6.3 presents a summary of the benefits and limitations of this case study for IWRM.

Table 6.3 Summary of benefits and limitations of Kat River Case Study for IWRM.

Benefits of Kat River Case Study for IWRM:	• The Kat River represents a case in which there is participation on the part of the stakeholders towards, initiating and encouraging the IWRM process along (relative to the requirements of the National Water Act); • The process of institutional development (of the KRWUA) has progressed to a stage where initial water allocation negotiations between stakeholders has already happened; • The catchment is small (in comparison to most South African rivers) and not industrially diverse; • There are clear differences in environmental and social conditions between the geographical regions of the Catchment (<i>i.e.</i> upper, middle and lower); • People are interested in being involved (for the most part - especially in the upper Kat); • There are clear user groups with information on the various histories and tensions between them; • Information is available on both social and ecological aspects; • There is a strong research culture in the Catchment.
Current limitations of Kat River Case Study for IWRM:	• There needs to be a central archive or library of the information gathered and available (active information management); • Present research needs to be written up and published (backlogs); • Need for further research; • Funding for continued research.

So how does having this knowledge assist any new IWRM initiative? To answer this question I had to reflect back on the start of the WRC's CMP Project and consider how my current theories might have assisted us back then. The Kat River case study is an unusual one, the extent of research that has gone into IWRM and public participation, facilitates many studies that could not be carried out in most other catchments in South Africa. In many ways I believe that this store of knowledge gave researchers considerable insight into several of the issues and relationships that this study has confirmed. I believe, however, that a more in depth understanding of the attitudes influencing human-river relationships, would have given us the ability to select more effective tools and approaches in building awareness and facilitating the

process of negotiation amongst the KRWUA members; we would have had more insight into how the various water user groups were thinking and feeling – in other words we would have been working less blindly.

For any new IWRM initiative it is most likely that there will not be 10-12 years of previous research to lean on, and learn from. In light of this one of the first requirements of any new IWRM program is to begin engaging with the local residents and gathering knowledge in terms of both their socio-economic situations, and the state of the river or wetland that they are dependent on. An attitude survey is a good way of facilitating this process: I recommend, however, that you don't make it your first task. To get people to give you the kind of information you require, you need to firstly spend time building their trust and introducing your intentions. My attitude survey was made possible because people knew me and my co-worker, they trusted us enough to give out names and contact details for friends and family, and even more so to honestly answer some potentially touchy questions, *e.g.* the spiritual beliefs of the Xhosa are considered a very private matter, and they are not always readily willing to disclose information pertaining to them to just anyone, especially a white person. In addition some intensive field study is required to establish an understanding of the geographical situation of the catchment at various levels of scale (*i.e.* the situation and layout of the catchment, the catchment in the context of its local, national and international position). Without this understanding it is difficult to adequately contextualise and understand people's responses in terms of their human-water (resource) relationships.

When you have gathered the information on people's attitudes, have some understanding of the attitude groups active in the catchment, and estimated the most likely relational scenarios playing out in the different regions of the catchment; then you can begin to move forward in selecting capacitation approaches to implementing IWRM. The attitude survey should give some indication of how easily the people in the catchment, or at least different regions in the catchment will accept the concept of IWRM and become willing participants. In addition you will most likely have identified the types of awareness and information you need to provide to the participants in order to facilitate their understanding of the process, and identified

‘delicate’ issues and/or situations that you and your team needs to handle with care. At this point it is advisable to have someone working on establishing a detailed water history for the area/s, this information will enable you to begin to develop potential future scenarios given the present attitude climate. Generating these (future scenarios) as a team will enable you to begin to identify key focus areas that need to be addressed in order to work towards establishing an ethos of sustainable development in the catchment. From here you should have a good idea of the issues that are most relevant and/or need to be addressed, the people who are most likely to be willing participants and potential IWRM champions and managers in the catchment and can plan the facilitation methods and approaches to take.

6.4 FUTURE RESEARCH AND LIMITATION OF THE PRESENT STUDY

It is the nature of an inductive study to end up with potentially more questions than answers and, therefore, the need for more research. As I have written up this study and its findings I have tried to show clearly that proposed theories need to be developed still further or tested using deductive methods. The following lists some of the areas where future research would stand to benefit from further development of the ideas and hypotheses presented in this study.

Table 6.4 Future Research topics, related ideas, and associated limitation of the present study.

Future Research Topics	Ideas connected with future topics	Limitations of Present study
Further testing and refinement of the attitude survey instrument for the assessment of peoples' (users') attitudes towards their chief source of water (<i>i.e.</i> River, groundwater, lake, wetland, <i>etc.</i>).	• Develop a less specific (in terms of location) survey instrument that can provide information on attitudes people have towards their chief source of water. • Incorporate techniques of assessing the general attitude climate in a catchment, and a preliminary assessment of the most likely relational scenario active in the catchment at present. • Shorten and refine the questions of the instrument. • Involved in such development would be the statical testing of the questionnaire for reliability and validity, and the assessment of translation concerns.	• The present study has been limited by the financial and human resources available, these resources, as this study has shown, did not allow for full testing of reliability and validity of the developed survey instrument or questionnaire. All measures were taken to try to ensure reliability and validity, see Chapter 4. • Eligibility criteria were established based on knowledge of the Catchment and its residents, and available resources and skills. Eligibility criteria will by definition influence sample representivity and as the sample demographics have shown, in Chapter 4, the sample population used in this study was not representative of the Catchment population. • In addition both the eligibility criteria and the lack of population list encouraged the use of snow-ball sampling. This sampling method guided the sample towards the selection of those individuals considered most influential or knowledgeable about the River and water resources. Snow-ball sampling is a non-probability sample method and creates a non-random sample, this complicates and limits any further statistical analysis of the sample.

Water History (Environmental History) of the Kat River Catchment.	• Research and construction of the water history of the Kat River Catchment can provide insight into the past human-river relational dynamics, these will assist in the development of present management plans and scenario development. • Water History should include: - An overview of the history of the Catchment with a focus on water relationships within policy, social and economic events; - Evidence of previous attitudes towards the River, riparian resources and water resources, and where available descriptions of the events that influenced either the development or shift in these attitudes; - Descriptions of environmental quality; - Description of past water and river management policies.	• Historical context for this study came from the broad historical description provided by available literature and summarised Chapter 2. As indicated by Figure 5.3, the information available was not considered detailed enough to provide adequate insight into past water relational trends.
Research into the relationship between attitude groups and ecological condition.	• More in depth exploration into the connection between attitudes (specifically attitude groups) and ecological condition is needed. • Under the assumption that the social and ecological systems, to a degree, reflect one another, exploring the forces that create this reflection will provide valuable insight and understanding for the development of sustainable management strategies and plans.	• Biophysical or ecological context for this study came from the broad situation assessment done for the WRC's CMP Project (Birkholz, 2006) and the biomonitoring program that was undertaken for that study (Birkholz, 2007). As indicated by Figure 5.3, the information available was only considered moderately detailed, and did not provide adequate insight into socio-ecological water relationship trends.
Clearer definitions of the attitude groups and their characteristics and outcomes.	• Present definitions of the attitude groups have been developed around the findings of this study. These findings are confined to the perspectives of the Kat River, and as listed in this table and relevant chapters constrained by the limitations of the study. Further research with a specific focus on testing these attitude groups and related theory needs to be undertaken.	• This has been an inductive study so the exploration and generation of theory was its underlining aim. To adequately be able to utilise the hypotheses generated here, concerning attitude groups and their role in determining relational scenarios, the theory needs to be tested more deductively. • Eligibility criteria (i.e. non-

	• Include an assessment of the attitudes external water managers (e.g. Government Departments, local municipalities, NGOs <i>etc.</i>) have. Compare external to internal attitudes and assess how the two align, as it is important for both to be interacting and co-operating within and IWRM management paradigm. From this assessment and comparison the usefulness of the attitude groups can be further established.	English speaking people and water managers from outside the Catchment were excluded) prevented the inclusion of the attitudes of a wide range of important stakeholders in this study.
Further case studies to verify attitude groups and their usefulness for resource management.	• This research topic is connected with the above one, concerning the further testing and defining of attitude groups. The present definitions have been developed relative to the Kat River, further studies in other catchments will be required to test and refine the present theory. • A series of comparative case studies done, at local, national and perhaps even international levels would provide considerable insight into the usefulness and applicability of attitude groups to water resource management; • These case studies will need to select catchments of varying sizes, and with contrasting economic activities (<i>i.e.</i> extent of agriculture, industry, mining, <i>etc.</i>); • An idea could be to start locally, in the Eastern Cape, and take the Great Fish River Primary catchment, select several of its tertiary tributary catchments to compare. This may provide insight into the cumulative effort for the primary catchment.	• The present study has focused on the Kat River case study. The theoretical framework developed in this study will therefore be based on the socio-ecological landscape of this Catchment. Further studies in other catchments will be required to test and refine the present hypotheses.
Increase the number of participants and include government and additional water management partners (<i>e.g.</i> NGOS, development agencies <i>etc.</i>)	• Broader surveys made up of a more representative sample, inclusive of: government and external partners would need to be carried out.	• The conceptual model revised from the survey findings is limited by the type and amount of participants interviewed.

6.5 CONCLUSION

This study has used an inductive approach to examine the significance of human-river relationships for catchment management, specifically IWRM, from a socio-ecological perspective. Specifically, it has explored the role of attitudes within these relationships and developed theory, relative to the Kat River Catchment, concerning their implications for relational scenarios. Inglis (2008, pg. 297) quotes Stephen Jay Gould (quoted from Orr, 1994) in saying, *‘We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well – for we will not fight to save what we do not love.’* At its core such thinking effectively reflects the main findings of this study. Without direct knowledge of, and association with, our water sources we stand to allow for our riparian environments to waste away. This is especially true for those urban dwellers whose main water source has become a tap in a kitchen or a faucet in a bathroom. The ideal of IWRM can never become a reality without people having as much reason to give back as to take from. Allowing the erosion of the ‘emotional bond’ that connects people to rivers is tantamount to signing a death certificate for these environments. Such erosion will promote tragedy-of-the-commons thinking and lead to harmful parasitic-like human-river relationships.

The Kat River Catchment case has shown that there are still areas in which the erosion of such bonds has not reached a threshold of no return. Stakeholders in the Kat River Catchment still demonstrate a somewhat innate desire to protect and conserve their riparian assets, as well as ensure water for all. The stakeholders all said they would like to have a clean healthy river, one in which they can allow their children to play, receive their domestic and commercial water, and not fear for their health after using it.

This study has shown that attitudes significantly reveal information about how the Kat River stakeholders think and feel about their River and its associated resources. Such information provides insight into the degrees of association that exist between the people and the River, and consequently the likelihood for either the promotion of IWRM in the Catchment, or the outplaying of the Tragedy of the Commons.

It is at the direct interface between the user and the resource, *i.e.* the human-river relationships, that the resource stands to be most affected. Although, the dynamics of the interface are influenced by varying levels of politics (both internal and external), economics and social belief systems, resource conservation needs to begin at this point. Human-river relationships are functional units within river catchments; they represent the interface between water users and their rivers. Further research into these relationships will significantly enhance how we understand the variables that lead to destruction or conservation of riparian environments. As functional units within these relationships, further research into attitudes, specifically attitude groups, might aid in the development of tools and methods that help promote understanding about human-river connections, which should then help support the implementation of the IWRM philosophy and process.

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APPENDIX A

A.1 SURVEY QUESTIONNAIRE

A.1.1 Cover Letter

The items in this survey have been developed to provide the researchers with a better understanding of the attitudes present in the Kat River Valley towards the River and its management. Certain items and techniques ask personal and challenging questions. If you become in anyway uncomfortable with responding to the items presented in this survey, please indicate as such and the interview will either stop completely or move on to the next item.

I _____ the undersigned, acknowledge that I have been made aware of the details concerning the content of this survey, and the aims and objectives of the research it is connected with. I hereby allow for the information captured in this survey to be utilised in the research, and in any publications arising from it.

Signature: _____

Date: _____

Place: _____

I also acknowledge that I have given my permission for any recording, filming or photography done during the survey to be used in the outputs of the research.

Signature: _____

A.1.2 Interview Information

Name of Surveyor: _____

Place surveyed : _____
(please include the town/village *etc.* name, and whether you are in the Upper, Lower or Middle Kat)

Date: _____

Time Started: _____
(please record the time the interview began, and remember to fill in at the end of the questionnaire when it finished)

Initial Observations about individual about to interview or comments made:

A.1.3 Section A. Information about Informant

A.1 Name (optional): _____

A.2 Gender: Male / Female

A.3 Age: _____

A.4 Occupation:

[illegible]

A.5 Level of Education:

Less than Grade 10 (Std 8).	
Grade 10	
Matric	
Technikon training and/or diplomas	
Tertiary degrees and/or diplomas	

A.6 Race:

Xhosa	
Coloured	
White	
Asian	
Other	

A.7 Mother Language:

Xhosa	
Afrikaans	
English	
Other	

A.8 Where do you live?

A.9 How long have you lived in the Kat:

All Life	
Less then 5 years	
Less then 10 years	
Less then 20 years	
20 – 30 years	
30 – 40 years	
Other:	

A.10 Reason for coming to the Kat if not born here:

A.11 Where did you grow up (fill in name of area, town, city, or nearest town or city next to relevant answer, and tick appropriate right-hand box):

Rural village:	
Commercial farm:	
Subsistence farm:	
Small town:	
Large town:	
City:	
Township:	

A.12a Do you have any spiritual or religious beliefs you wouldn't mind sharing?

Christian	
Islamic/ Moslem	
Hindu	
Buddhist	
Agnostic	
Atheist	
Other:	

A.12b Do you believe the river has spiritual significance?

Yes	
No	

A.13 Where do you get your water from?

Directly from River	
From storage dams off river	
Rainwater tanks	
Municipal community taps	
Borehole	
In dwelling taps	

A.14 Are you involved in any local community catchment management institution
e.g. Catchment Forum or Water User Association?

Yes	
No	

A.15 Have you been involved on one of these institutions in the past, if so why did you stop?

Yes	
No	

--

A.16 Would you like to be involved in the future?

Yes	
No	

A.1.4 Section B Questions

B.1. Are your personal feelings towards the river positive or negative?
Why?

Positive
Negative

B.2. Are your feelings towards the ways local people interact with the river positive or negative? Why?

Positive
Negative

B.3. Are the feelings local people have towards the river positive or negative?
Why?

Positive
Negative

B.4. Do you think the local community's feelings towards the river have changed
in the last 10 years? How have they changed?

Yes	No

B.5. What is important about the river to you?

B.6 How do you feel about the present management of the river and its resources?

B.7. What do you think needs to be changed or improved about the management of the river?

B.8. Do you believe it is important for the local community to be involved in the management of the river and water resources in the catchment?

B.9. Would you like to learn more about the river? If so can you name any aspect you may be interested in?

B.10 Do you think it is important to study the river? Why?

A.1.5

Section C.

A.1.5.1

Emoticon Exercise

	Happy
	Neutral
	Content
	Unhappy
	Sad
	Confuse
	Angry
	Concerned
	Surprised

A.1.5.1**Section C Scale Statements**

On the above sheet please connect the emotion you feel the face indicates to the word on the corresponding column. If you can not, for any reason, please record this in your observer notes. Please use the coloured version to assist in answering how you felt in relation to the statements below, if you feel something other than what is suggested tick the blank face and please write what emotion it is, in the tick box as well.

Which of the following 5 categories (Strongly agree – Strongly disagree) come closes to how you feel about the statement.

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
1.	The river is essential to the well being of all people in the catchment.						
2.	It is the responsibility of the government to manage and conserve the river's health and condition.						
3.	It worries you that your personal activities in the catchment may affect the people living downstream from you.						
4.	It is important that more information is collected about the river so that more effective management can happen.						
5.	Everyone can use the river as they like.						

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
6.	It is possible for individuals who use the river and water resources to help ensure that they are managed in a sustainable way.						
7.	Local people impact the quality of the water in the river.						
8.	Issues relating to the river don't concern you.						
9.	Scientific research creates methods and technologies which ensure that what is important about a river is sustained.						
10.	The river's value comes from its use to people.						
11.	The way the river is managed at the moment is ok, and does not need to be changed.						
12.	Upstream users impact downstream users.						
13.	You would not knowingly throw harmful materials or chemicals in the river.						

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
14.	Research into the river involves resources and finances which would be better spent helping people improve their livelihoods						
15.	Sustaining the ecological health of the river is important for the livelihoods of all.						
16.	Building more dams and weirs is not a bad thing.						
17.	Considering the needs of others is not something that you think about when you use water, from any source.						
18.	The river forms the link between all the communities in the Kat River Valley and makes them one.						
19.	The river is part of everyone's heritage.						
20.	It is not important that the ecological integrity of the river be sustained.						
21.	Most upstream water users consider the needs of downstream water users.						

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
22.	You see the river as not just a source of water.						
23.	The river inspires you.						
24.	The current way the dam is managed does not allow for all to benefit.						
25.	In order to ensure a future for you and your family it is important to be willing to help others in the catchment, even if it means using less water.						
26.	You alone can not ensure that the local community begins looking after the river better.						
27.	Only certain people should be allowed near the river.						
28.	It is important that local people be given the opportunity to participate in the management of the river.						
29.	Respect towards the river has changed since your mother's time.						

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
30.	It is important to manage and look after the river for the next generation.						
31.	Disrespecting the river can result in negative consequences to the local community.						
32.	The river is not in any danger of becoming unhealthy at present.						
33.	The river is more than just water.						
34.	It is everyone's responsibility to look after their river and water resources.						
35.	The river was here first and will be here in the end.						
36.	Not all the water used comes from the river, some is from other sources <i>e.g.</i> boreholes, rainwater.						
37.	Reducing the health of the river, reduces the health of the community.						

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Emotion
38.	The Kat River Water User Association is doing a good job in managing the available water resources and river.						
39.	Many of the local community's memories are tied to the river.						
40.	Water quality is not a problem.						
41.	The river is an important part of the local community's traditions and culture.						
42.	Concern about the way the river is managed is the last thing I think about.						

A.1.6 Section D Metaphysical Questions

D.1 If the River was a person, what kind of a person would it be and why?

[illegible]

D.2 What sort of person would you like it to be?

[illegible]

A.1.7 Section E. Photos

E.1 Select the ten photos you like the most and the ten you dislike the most.

Photo	Like
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

E.2 Can you identify in which area of the catchment each photo is taken.

Photo	Area
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

A.1.8 Section F Observation & Names

To Be Filled in by Interviewer

Next 3-5 possible participants

	Name	Contact Info.
1		
2		
3		
4		
5		

Anything observed about the informant while interviewing in regards to their responses/reactions to answering the questions, please include any of your own feelings you may have experienced while carrying out the interview (make use of the emoticon scale below – faces). Please remember to record under each face what emotion it represents to you:

[illegible]

Time Completed: _____



The End THANKS

A.2 'RESOURCE PACK'

A.2.1 Section C Emotion List

Adamant
Angry
Annoyed
Caution
Complacent
Concern
Confused
Considerate
Content
Conviction
Hopeless
Relief
Cynical
Dislike
Excited
Frustration
Happy
Hesitant
Hopeful
Irritation
Neutral
of course not'
Optimism mixed with sadness
Passionate
Perplexed
Sad
Strongly convicted
Unhappy
Unsure
Weary
wish it was like that'
Worried

A.2.2 Section E Photos

A.2.2.1 Place Locations

- 1 Amherst – Upper Kat
- 2 Bum-slide (below dam) – Upper Kat
- 3 Amherst – Upper Kat (Eric's farm)
- 4 Whites Weir – Upper Kat
- 5 Amherst – Upper Kat
- 6 Warden's weir upstream view – Lower Kat
- 7 Sheshgo/ Bushkloof – Lower Kat
- 8 Ntilini – Middle Kat
- 9 Fort Beaufort Barrage – Middle Kat
- 10 Fairbairn – Upper Kat
- 11 Fairbairn – Upper Kat
- 12 Kat River Dam – Upper Kat
- 13 Ntlini – Middle Kat
- 14 Fairbairn – Upper Kat
- 15 Tamboekiesvlei – Upper Kat (below Kat River Dam)
- 16 Hertzog/Fairbairn – Upper Kat
- 17/25 Warden's weir – Lower Kat
- 18 Balfour – Upper Kat
- 19 Bushkloof – Lower Kat
- 20 Charlgrove – Lower Kat
- 21 Fairbairn – Upper Kat
- 22 Amherst – Upper Kat
- 23 Fairbairn – Upper Kat
- 24 Bath Farm – Lower Kat

A.2.2.2 Photos



Figure A.1 Amherst (Upper Kat).



Figure A.2 ‘The Bum Slid’ (below Kat Dam, Upper Kat).



Figure A.3 Amherst (Konzi Farm, Upper Kat).



Figure A.4 Whites Weir (Upper Kat).



Figure A.5 Amherst (below Picardy, Upper Kat).



Figure A.6 Warden's Weir (Lower Kat).



Figure A.7 Sheshego (east bank, right side of picture)/ Bushkloof farm (west bank, left side of picture) (Lower Kat).



Figure A.8 Ntilini (Middle Kat).



Figure A.9 Fort Beaufort Barrage (Middle Kat).



Figure A.10 Fairbairn (Upper Kat).



Figure A.11 Fairbain (Upper Kat).



Figure A.12 Kat River Dam (Upper Kat).



13

Figure A.13 Ntlini (Middle Kat).



14

Figure A.14 Fairbairn (Upper Kat).



Figure A.15 Tamboekiesvlei (Upper Kat).

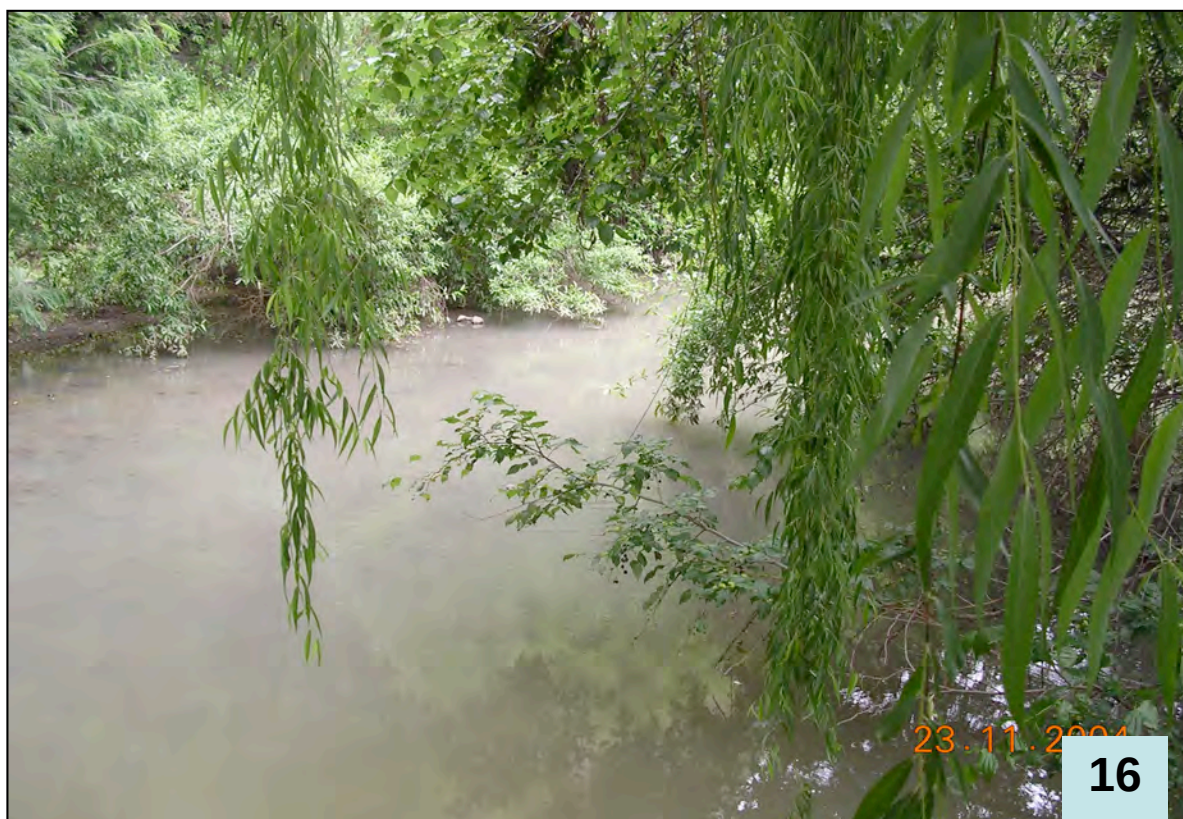


Figure A.16 Hertzog (Upper Kat).



18

Figure A.17 Balfour (Upper Kat).



19

Figure A.18 Bushkloof Farm (Lower Kat).



Figure A.19 Charlgrove Farm (Lower Kat).



Figure A.20 Fairbairn Bridge (Upper Kat).



22

Figure A.21 Amherst (Upper Kat).



23

Figure A.22 Fairbairn (Upper Kat).



Figure A.23 Bath Farm (Upper Kat).



Figure A.24 Wardens Weir (Lower Kat).

APPENDIX B

Table B.1 Section A proportions of responses by respondents.

Table B.1

Section A: Proportions of Responses by Respondents.

Gender		Male	Female				
	Total	53	39				
	Upper Kat	20	9				
	Middle Kat	19	17				
	Lower Kat	10	9				
	Outside	4	4				
Age		18-30	30-50	50-60	>60		
	Total	12	52	14	14		
	Upper Kat	4	18	5	2		
	Middle Kat	4	18	8	6		
	Lower Kat	1	12	0	6		
	Outside	3	4	1	0		
Level of Education		< Grade 10	Grade 10	Matric	Technikon training	Tertiary degrees	
	Total	4	7	25	28	28	
	Upper Kat	0	4	9	9	7	
	Middle Kat	4	2	11	8	11	
	Lower Kat	0	1	5	7	6	
	Outside	0	0	0	4	4	
Race		Xhosa	Coloured	White			
	Total	31	6	55			
	Upper Kat	23	0	6			
	Middle Kat	4	5	27			
	Lower Kat	0	1	18			
	Outside	4	0	4			

Mother Language		Xhosa	Afrikaans	English	No response			
	Total	30	9	49	4			
	Upper Kat	23	1	5	0			
	Middle Kat	3	7	22	4			
	Lower Kat	0	1	18	0			
	Outside	4	0	4	0			
Where they live		Rural Village	Commercial farm	Subsistence farm	Small town	Large town	City	Township
	Total	12	38	8	21	2	5	6
	Upper Kat	11	7	8	3	0	0	0
	Middle Kat	1	12	0	17	0	1	5
	Lower Kat	0	19	0	0	0	0	0
	Outside	0	0	0	1	2	4	1
Time lived or worked in catchment		<5years	<10years	<20 years	20-30 years	30-40 years	All life	Other
	Total	12	20	13	9	4	32	2
	Upper Kat	5	6	5	2	0	11	0
	Middle Kat	1	5	8	7	3	11	1
	Lower Kat	3	4	0	0	1	10	1
	Outside	3	5	0	0	0	0	0
Reason for coming to the catchment		Family	Married	Work	All Life			
	Total	10	14	36	32			
	Upper Kat	0	0	18	11			
	Middle Kat	9	6	10	11			
	Lower Kat	1	8	0	10			
	Outside	0	0	8	0			

Type of place grown up in		Rural Village	Commercial farm	Subsistence farm	Small town	Large town	City	Township
	Total	14	25	5	17	8	18	5
	Upper Kat	8	4	5	4	4	4	0
	Middle Kat	3	10	0	9	3	8	3
	Lower Kat	2	11	0	3	0	3	0
	Outside	1	0	0	1	1	3	2
Religious belief		Christian	Buddhist	Agnostic	Atheist	Other	Mixture	
	Total	59	2	3	2	13	13	
	Upper Kat	11	1	1	0	6	10	
	Middle Kat	27	0	2	1	5	1	
	Lower Kat	18	0	0	1	0	0	
	Outside	3	1	0	0	2	2	
Believe that the river has spiritual significance		Yes	No	No response				
	Total	43	34	15				
	Upper Kat	24	4	1				
	Middle Kat	10	16	10				
	Lower Kat	4	14	1				
	Outside	5	0	3				

Number of water sources available to respondent		1 sources	2 sources	3 sources	4 sources	
	Total	25	23	31	13	
	Upper Kat	9	10	7	3	
	Middle Kat	10	11	11	4	
	Lower Kat	0	1	12	6	
	Outside	6	1	1	0	
Present involvement in a catchment management institution		Yes	No	No response		
	Upper Kat	10	19	0		
	Middle Kat	6	30	0		
	Lower Kat	4	15	0		
	Outside	2	5	1		
	Total	22	69	1		
Previous involvement in a catchment management institution		Yes	No	No response		
	Upper Kat	6	13	10		
	Middle Kat	8	24	4		
	Lower Kat	4	7	8		
	Outside	0	6	2		
	Total	18	50	24		

Future involvement in a catchment management institution		Yes	No	No response	
	Upper Kat	24	4	1	
	Middle Kat	7	19	10	
	Lower Kat	3	11	5	
	Outside	2	2	4	
	Total	36	36	20	

Table B.2 A selection of respondents' responses to why they felt positively towards the Kat River.

Reasons for Feelings valance
It's like home, as kids we spent time there fishing swimming and boating. It's our life source. Before the dam it used to dry up often and these were great times of anxiety.
My feelings about the river? I respect it because it is the beautiful and God made it.
Hadn't thought about it. But am happy with what it looks like.
When I was growing up, we relied on the river because we had no taps. I love the river.
The river has intrinsic value and should be respected for its self and not for what it provides. It is an amazing creation and vitally important to everything's survival.
I have always loved water in all forms. Rivers are my favorite form of water. Nothing more soothing or peaceful then a river. And if I can allow myself to be quiet enough my thoughts flow with it. Rivers are like the blood stream of the planet.
Complex, because I have strong association with the river, after several years of research. Would like to see it as a happy river, but at present feel it is being abused. But am not directly connected because I don't live in the catchment so I don't feel its my place to say anything. I have a positive feeling about the catchment and the landscape in the river is situated and it means quite a lot to me.
Its here for the sustainability of economic prosperity of our area. There are a large number of economic spin offs because of our river.
Source of water; we have the hope of future scheduling, where there is hope then that is positive.
It's cleansing, if you are dirty what do you do - go and wash.
Get water from Kat River, people clean with it.
Life-blood of the valley and our farming - whole community.
Is a vital part to the well being of the area.
When I see the river I see life. I believe without water there would be no life.
Livelihood and for citrus production.
It's important for our production - irrigation and it's an integral part of our livelihoods.
When its quiet here its like classical music coming from the river. Its like the river speaks to you. One must have respect for the river.
Without water you can't live, water is everything to you.
Because I belong to the river.
The river is nice and healthy and its alive, its continuous is always flowing, brings life to the valley.
Because we get water 365 days a year. This river has never been dry.
Without the river we wouldn't exist.
Don't worry about it much as we are spoilt with water - runs 365 days of the year. Would love wattles to be out of the river - only concern. Luckily don't have anyone above us.
Never really given it much thought, because we don't really use the river.
Need water, management of dam pretty well last 10 years. Always been water.
Positive about the river and dam, but municipality don't treat the water so quality very bad.
Flow from Kat River Dam and people using it.

Very positive - have always loved rivers. Always dreamt of living next to a river - physical beauty of flowing water, tranquility of it.
Well its, we have an endless supply of water there at the moment, it just hasn't stopped running. Our whole farming set-up is based on irrigation, we could do with out it, and we are in an area where you can't really grow citrus without irrigation.
Seems to be trying. It's a good river has a lot of potential and flows well.
Love water and am keen on the environment, I love birding and walking by the river (it is peaceful).
Everything that grows here, is part of the river, it feeds the system. Without it nothing would be here.
Its an essential item/ element of life.
I need it for farming.
The source of our livelihood.
Supplies farmers with water for irrigation and stock.
Have always loved rivers. Always dreamt of living next to a river - physical beauty of flowing water, tranquility of it.

Table B.3 A selection of respondents' responses to why they felt negatively towards the Kat River.

Reasons for Feelings valance
We need to clean up the catchment area, keep exotic plants out and clean water (improve water quality).
Wont put my foot in it, I am worried about the quality. Children are being taught in the local syllabus how to treat water. I am worried about the quality for drinking and use filters on all my taps. The chlorophyll levels are high.
Its most important that the state of the water is good, there has been a decrease in quality, I used to swim in this river as a boy, now I wouldn't swim in it. There is a lot of degradation by erosion and alien plants and this is a concern.
Polluted.
Pollution and sewage problem.
According to my feelings about the river, if you have a lot of electricity in your blood the water reacts with me. As African you can't go near the river at night as spiritual you should not disturb the spiritual animals.
Municipality allows all sorts of things to run into the river, polluting it.
Colour and silting of the river is disappointing, it shows that there is lots of erosion in the catchment.
It's dirty and filled with raw sewage.
The state of the river in terms of pollution and the chemicals that are in it. When they spray the citrus you can smell the chemicals in the water when you shower and/or bath. There is sewage in the river. The fish population had dropped.
The water appears to be very polluted and I don't know if they are managing erosion in best way. After the rain, the water is red, red, red. Just need to drive along to see the erosion on the banks. It's a long-term problem and will need a long-term solution.
During the Ciskei time, they would cross the river and come and hunt on our land and steal our goats. It was a negative boundary to a certain extent. If you could use the ground then it is not negative, because you will put up a high fence to keep everything out. But our ground is low lying and we can't use it for anything everything, water, everything just goes right over it. It is useful to a certain extent.

Table B.4 A selection of respondents' responses to why they felt both positive and negative feelings towards the Kat River.

Reasons for Feelings valance
Pos: Fortunate to have a river on the farm. Neg: because of the sewage and waste which comes down it.
Pos: Brings life. Neg: Water needs to be tested more often, and there needs to be more information available.
Pos: A wonderful natural asset completely under utilized. Neg: Sad about aliens, pollution, water quality/ sewage system, and the way the river is neglected.
Pos: We get water from the river. Neg: The river is not clean so we have to purify the water before we use it
Pos: It's a beautiful river. People have a strong attachment to it; it meets so many of the local peoples needs. It is in relatively good condition. Neg: Have heard some horrific stories about some of the things which have been put into the river, and I wouldn't drink the water, and this makes me feel sad.
Pos: Because it is our life-line. Neg: To see the way raw sewage comes down and the determination of the water quality because of municipal miss-management.
Pos: Known it all my life. Neg: Pollution.
Pos: Very pretty and adds aesthetic value to the farm. Provides some water for my cattle. Neg: Polluted but doesn't affect me.
Pos: If the river was not here I would not be able to have the garden I love. The river also brings pleasure to the coloured children from New Town, who swim in it. Neg: Sometimes the sewage pipes are broken and burst into the river; we can't water then because the stench is terrible.
Pos: Towards the river itself. Neg: Towards getting water.
Pos: Helps us considerably, I would have quite a hefty water bill with out it. Neg: Often see it as badly polluted; don't often see it as a clean streams up in the mountain.

Table B.5 A selection of respondents' responses to the question: 'What's Important about the River to you?'

Upper Kat	Middle Kat	Lower Kat
It never denies us, it's always clean and drinkable, our water comes straight from the mountain.	Overall management (all aspects of the catchment) of ecosystem is important and should be well managed so that it can be utilized as a tourist asset and that it is safe and clean. Hospital sewage flows straight into the river, and this is a great source of pollution. There doesn't seem to be a health inspector.	We only use it for watering the cattle, but what is important is that it starts healthy and clean.
I could speak until sunset its important for the animals, people and farming. There should be weirs in the river so that people can capture the water running down the river day and night.	Very important that it should be preserved and looked after.	Keeping the river clean, as in no sewage, and trying to reverse the overgrazing in the upper Kat.
Drink and wash myself, irrigate, clothes, and gives me a sense of respect. I believe my ancestors are in the river.	Fort Beaufort's survival - drinking water, irrigation for citrus.	Whole livelihood is dependent on the river. Without the river we would be nothing.
Important that it keeps flowing and that it's stays clean. Is able to maintain its ecological integrity.	Our supply of clean water, irrigation for fruit trees.	It's our life support system for the farm (citrus and agriculture)
This place is an agricultural place. If people can get pipes, water can be used to reduce poverty. Proper management of the river improves people's livelihoods.	Source of irrigation water.	That we are able to get water from it, there are a lot of insecurities at present, about what is going to happen over the next few years.
When I feel stressed and uptight, I go to the river it's soothing and comforting, I fall asleep to it. It's important for Crops, and we are lucky to have an abundance of water.	Well its proximity, and really its our life-blood, if we don't have the river where are we going to get out water from. As I say we could catch a lot of rainwater, but we would need a lot of tanks.	A source of water for out citrus, also recreation, we canoe on some sections of the river. I also enjoy watching the river it has aesthetic value.
That we have a water source – availability; Beauty important to me, clean; Would really like aliens out and replant indigenous.	Its water.	Source of water, it only serves one camp, but that is the water supply for that camp.

Domestic source of water. Source of immense power/energy that can be transformed into energy (mechanical) - sustainable energy source. I draw a lot of energy from the river, it gives me energy majestic when in flood, fascinated by it.	Memories	Aesthetic value, stock watering, boundary between ourselves & old Ciskei
Getting water when hot can relax near river	A steady supply of good quality water.	
Our supply of clean water, and irrigation for fruit trees.	Sense of... I think of the dam and all of us relying on it for the water. It's important how people manage the dam. Saving, preserving and conserving water.	
	Source of drinking water and has the potential to help develop businesses in town.	
	It's Fort Beaufort's only source of water.	
	We need water to survive and for drinking and irrigation very important.	
	That it flows and that we have sufficient water to continue with out farming activities. I don't know what lives in the river, but if there are fish and birds we can only benefit from having the river so close to us.	
	To water my roses, roses are water-holics. In the 17 years we have been here, only once have I not been able to use water from the river, which is fantastic. When the river comes down in flood, its quite frightening to see the surge in water. It's quite a sight, I've seen it a least five times. It can get to be about 100m wide.	

Table B.6 A selection of respondents' responses to why they felt positively towards the ways local people interact with the Kat River.

Reasons for Feelings valance
We like the river, and I am happy with the relations we have with the river
I think other's relationships <i>e.g.</i> commercial and subsistence users use the river water to get an income. Some use it to fish and then sell the fish, especially those who are unemployed.
In Africa the river plays a major part in many communities lives, especially where infrastructure is not in place to bring water to them directly they have to still collect it directly from the river.
Because most local people enjoy the river.
A bit of apathy: although through the Rhodes initiative and the new legislation, we have defiantly become more organised.
I see that they are concerned and positive.
Spiritually connected positively. Farmers don't feel they are getting enough water, but the WUA is helping and the investigations into people's situations are being carried out.
I don't think they are misusing water. The communities around me use very little water, and all the farmers in my area don't use diesel pumps.
Local people draw water because they don't have taps and the river provides for their needs. They are my brothers and sisters I am happy when they are happy.
Farmers need the river to irrigate out of so I feel their use is very necessary there is a lot of dumping next to river. In four things has really deteriorate - all along the river banks they dump rubbish, so definitely people who don't have respect - building materials for the river
I think it is a need for them.
I think in general it is used positively especially by those in the middle Kat.
Its not the way they use the water that's the problem, it's what they use around the river that's the problem.
I don't think they have much interaction with it

Table B.7 A selection of respondents' responses to why they felt negatively towards the ways local people interact with the Kat River.

Reasons for Feelings valance
Farmers need to be made more aware of their usage of fertilizers and pesticides.
A lot of stuff comes down the river that shouldn't.
Upper & Middle farmers against us getting more water; they generalize about the amount of development which has been happening.
Using it for washing or ablutions.
Because you find animals drink from the river, both animals and people urinate in the river, wash in the river, wash their cars by the river.
They treat the river badly. Children they used to swim in the summer and this not good because others further downstream drink the water.
The water's pure when it starts, but then there are pigs, people washing, swimming in it <i>etc.</i> If you want river water must get up early so it's cleaner. (A lack of respect, we are supposed to look after these things).
Concern, people aren't aware as they should be, have unmaintained furrows and they need education
Worry about the negative way it is being treated. Authority Working for Water and how locals ignore the fact that there are other users.

Strong feelings towards their spiritual beliefs about river. There is a disregard for other people's spiritual beliefs, therefore bringing a sort of spiritual pollution to the area especially at the barrage a few times a year.
Because they do washing in the river and people downstream have to use this water
I know friends of mine complain about the river because there's quite a lot of pollution.
Municipality doesn't look after drains, and a couple of sewerage leaks, cleanliness of streets off which rubbish flows into the river during storms. Not management of river but management of surrounding area.
Not impressed by the way blacks use it.
They are spoiling it.
Local authority, I don't think, monitor, care or control the sewage and purification works, its poorly managed. Antagonistic towards local fishermen who fish on banks adjoining our land, owing to poaching, snaring, stock theft and security breaches.
People treat the river negatively; they pollute it and dump stuff in it.
They are adding to the pollution problem.
I think people just expect it to be there. There's no respect.

Table B.8 A selection of respondents' responses to why they felt both positively and negatively towards the ways local people interact with the Kat River.

Reasons for Feelings valance
I am worried about the Upper Kat and the spread of alien species through the system. There appears to be no form of control or governing body to take care of the problem. I have only a localised experience and am not sure what others are doing. There appears to be increased siltation and denuding from overgrazing.
I feel pity for those who believe that their ancestors are there because they are no longer there. I grew up with these customs, but when I had grown up I made my own decisions, and decided to go with the bible because it doesn't have a link with such customs.
I think people have different relationships to the river. Some still respect the river especially the elders, but youngsters don't. They used to be taught how to respect the river but now not. Don't know why.
My feelings are that some people don't care about the river, but the river helps us all. Having taps reduces the love people have for the river.
I am saddened by the decline in respect people show towards this dynamic system. Its intrinsic value is overshadowed by utilitarian philosophies and attitudes that set it up for being abused and seen as a commodity to be used add lib.
Different types of relationships: children seem automatically drawn to it and it promotes a playful feeling in them. Of course the closeness or direct use of it influences the relationships. Industry has a very utilitarian feeling, however, they still find that they can go fishing and relax by a river.
I feel that the commercial farmers have lost their organic relationships with the river. Although they have childhood memories of a personal relationship with the river, they have lost this. While the people in the upper Kat have much more personal and caring relationship with the river. Because they are using riverine resources for their own household use.
Upstream agricultural practices push silt into the river. Generally positive
Pos: get water; Neg: sometimes people put too much chlorine in the water.
Pos: towards the farming communities. Neg towards the locations that are dumping in the river - even if it's in ignorance.

It's important to everyone and for the most part everyone is responsible with their water use, and there is very little waste. People respect the river it has social and economic benefits.
Pos: They have a respect for the river. Neg: pollute (perceptions of pollution is rather primitive don't conceptualize, biodegradable...)
Up here positive, in Balfour negative as they pollute the river
Pos: I feel people do value the river deep down and really want to see it healthy and want to look after it well. I feel positive about the way they really utilize the river and really value it. It's central to their lives, so they understand it. Neg: Being the type of Christian I am, I am a little uneasy on some of the spiritual interactions linked to their culture and traditions. These are based a lot on fear. Things they dump into the river aren't great.
Pos: Farmers doing what they can, they rely on the river. Neg: Municipality not doing its job, streets need to be kept clean, as everything ends up from them in the river to.
Pos & Neg: This valley has changed, in the 1990s, the whole farming structure higher up in the valley broke down. They are using only a fraction of what they should be using and not officially either. As far as I know we have paid water levies here for many, many years, and we still pay levies and no body else does because they can't afford to. This was a thriving valley, a beautiful little valley at one stage and now most of it has been abandoned. Through lack of knowledge and lack of finance mostly, I think. You know that people have never been given title to their ground. That is a big question. Had they been given title and stake in their land they might have done something I think. A thousand people wondering around doing nothing, surviving on grants from the state.
Pos: More towards neutral, the local people aren't doing anything to harm or improve the river. Neg: Overgrazing above Fort Beaufort resulting in increased silt in the river and consequently in our weirs.
Pos: They have always used it. Neg: There are dipping tanks right by the river, as well as the citrus orchards when they spray you can smell it in the water.
Pos: As farmers we respect and appreciate the river. Neg: There are repeated incidences of raw sewage being put in the river, and they say they have no money to fix their pumps.
Pos: from Fort Beaufort downwards positive, but Neg: where it was handed over to the Ciskei negative, because everything was virtually ruined up there, the citrus trees have died, they were given everything, and everything has gone to h...

Table B.9 A selection of respondents' responses to the question: 'Do you think the local community's feelings towards the River have changed in the last 10 years?'

Upper Kat	Middle Kat	Lower Kat
I think they now know what's in the river; they have a greater understanding of what's expected of them; they have been given the opportunity to participate in the affairs of running the river; they have had a chance to be involved in things like Landcare and have found that they could get jobs through it. There is a greater awareness of what is going on, where before they didn't know what was going on.	Am satisfied, they are doing a good job' - municipality with the provision of taps.	No: However, only thing that has changed is that they know they have rights to the water, but they don't fight for them. Staff live in township and frequently they get their water cut off for 4 to 5 days...
I think the young people have changed but not the elderly people. The older people are used to going to get water from the river, but the younger generation want taps right next to their houses. Older people use to wash by the river, but the younger generation say it's not healthy.	It has changed for commercial farmers, but am not sure how important it is to communities who have taps, as their responsibility to the river has be absolved. As long as water is coming out of the tap they are happy. There has been a change in thinking amongst the developing communities.	Yes: Never used to be so much pollution and the in the last 10years lots of informal settlements have sprung up.
Feel all right when I see people testing the quality of the water, I feel good that people are concerned.	Yes, I think people who use the river have fields which are now closer to the river so their attitudes have changed and they feel that being closer enables them to use it better.	Yes: for better and for worse. The influence of research and environment. Workshops. Some look after the river but there are people who just don't care or respect the river or have good feelings towards it.
Dam has created a continuous flow.	Have become more concerned about water quality. Insufficient information to tell whether this is so for quantity.	Yes: very little change relative to the whole population. There has, however, been a change due to the political changes, and a lessening of spiritual value.
I think that as they loose their own customs they loose their relationship with the river.	No: With government having provided better facilities many no longer have to go to the river directly. But still do.	That's difficult to judge. I don't think I can answer that, as I am not close enough to the people involved. Would like to think they have positively changed with all the work we have done with them.

Not yet, but a little. Since we are getting taps we are no longer collecting water from the river as much as in past	Most people complaining about water it's not ok. Other people complaining that others put rubbish in the water.	Might have changed because of the change of government. In the olden days we wouldn't go near the river at night, but these days a lot of these beliefs have changed.
	Yes: Due to the new legislation that has forced different communities and areas of the valley to work together. The river has increasingly become the meeting point for all the groups to come together. It has made me more aware of the poverty of the other groups. The river has the ability to empower people, but all this can't be done in isolation and requires outside interventions.	Yes: Farmers used to see it as a place of recreation and enjoyment. But now it is a place of fear and weariness - a possible source of disease Xhosa, I think there is a real loss of respect for the river, but at the same time, I believe that Nikki's work has helped many of them think about the river dynamics and how to steward from a western perspective (they are starting to think about environmental management from a western perspective, and have come to place importance on that).
	Yes: 20yrs, Well it's broken down, quit farming. They live in a bad time. They have had drought and much of other things. And basically it's just too many people. Ulimicor ran this valley for a few years -fairly successfully I think. But politics got into it. And I think there might have been people who were just not quite straight. You know stealing implements and various other things, fencing material were going, and just ran down. Old houses were broken down, the valley is full of old farmhouses, and very nice people lived in them, and we miss them a lot.	Yes: I believe that as infrastructure has improved and people have no longer had to go to the river itself for their water the local respect for the river has decreased. Additionally, cultural and spiritual connections to the river have diminished in the face of western influence and superstitious conservation of the system has changed. In summation I think there is a decrease in the local respect of the river, and perhaps type of respect. It's possible that the place attachment has decreased as well.
	Yes: Because of the media, 50/50 and those types of stories have educated people a little bit. Have made people more aware of what is happening around. Media Intervention.	

	Yes: I should imagine they have changed, especially due to all the work and research that has happened. There has been more outreach and people are more 'water wise'. And the workshops have developed positive feelings.	
	I think there is increased awareness of environmental issues, and this brings positive results as people become more concerned about how their behaviour will effect the environment. There is defiantly a greater inter-dependence between different economic groups now.	
	Yes: It's as polluted as it is because people are not aware, there needs to be real changes in attitudes, and greater awareness around the changes in governance and uses of water.	
	Don't really know, but think the farmers' attitudes have in that they have to start to negotiate and sort out water allocations / government and the scare that there is not water. General man no real effect, except they have been supplied with water and no longer have to fetch and areas have consequently become more populated because of water supply	
	Should be a difference between river and drinking water. Drinking water definitely changed in last 10 years - deteriorate, but not the river. People's feelings changed accordingly.	
	Ten years ago the Kat was a need, recreation use	
	Yes: Got worse - more careless	

	I really wouldn't know, you know one doesn't often discuss the river, except that it is useful to us. A lot of people say that we are lucky being on the river, for the garden. So perhaps they are envious of us being on the river, but really couldn't say.	
	No: I don't think so they let animals walk around in the river.	
	Yes: Pollution shows a decreased respect for it and there is an increasing lack of trust of it	
	No: Our generation use to use the river as a playground for recreation, however the next generation stays clear, 'they don't even put a foot into the river'.	
	It depends on whether they get title deeds to their land, then their outlook on the river will defiantly change.	
	There are still no apparent changes, they still feel it's owed to them and are still not paying for it.	
	No: Especially the urban residents, who are not in direct contact with the river.	
	Things are breaking and not (sewage works/ pipes broken) being fixed.	
	Yes: Lower Kat more positive, before 94' the irrigation board was extremely strict, and not too sympathetic. Present WUA seems more approachable and accommodating, they are less strict and more sympathetic	

Table B.10 A selection of responses from respondents who said ‘yes’ to the question: ‘*Would you like to know more about the River? If so can you name any aspect you may be interested in?*’

Upper Kat	Middle Kat	Lower Kat
Yes: General management and general overview on the environment.	Yes: The kind of chemical purification they use, as the water is used in food preparation. And about the system they use to get the water from the dam to us.	Yes: About how many people would be able to use it, and what the actually capacity is. In the old days they worked on flood irrigation, but now they work with micro-jets and much less water is being used. Re-assessment of allocation, and optimization of the resources we have available to us, it no good having 50ha when you can plant a 1000ha.
No/yes: Only thing I want from river is to have access and need good quality water. Just want to make sure I am getting good quality for irrigation. However, I would like to know of ways in how not to pollute river water.	Yes: Fish species, as kids the river was pristine, but since the IBT from the Fish, Barbel entered the system in the 70s and 80s. I would like to know how this is impacting the local communities. Am interested in the potential for aquaculture. And the fish seem to be a good indicator of river health.	Yes: Quality, what causes what <i>e.g.</i> salinity, bloomings <i>etc.</i> , and the possible results of these on the system.
Would like to know what the little insects in the river are.	Yes: How to use the water and create a plan for cleaning it, if I had the knowledge I would get the stuff and clean the weirs.	Our interest is in who uses what. And recreational uses of the river.
Yes: A lot about weirs, things to divert and store water.	Yes: The environment of the river.	Yes: Status of the river, water quality variables, Reserve, fish spp.
Yes: I want to learn more, I want to know more about the ecological Reserve.	Yes: Learn more about management of water. The river fascinates, it provides us with water and water is important to us all. I love the river. In times of drought people go to mountains and pray that God brings rain.	Would like to know more about how the sewage system works & the kinds of monitoring that there is to ensure quality is maintained.

Yes: Within reason I'm a busy person. Would like to know what's in the river (minerals, what is the ecology of the river) and how healthy is the river.	I would like to if I had more time. The living creatures in the river, curious about what is there.	Yes: Kinds of fish, and general interest about the environment.
Yes: But so old. Would love to learn more about it. My main concern is that water is the main thing- we can't live without water. If purified. Interested in the proper management of the river and to make people aware of how NB water is.	Yes: How do they clean the water; how much chlorine do they put into the river. What do they do?	Yes: I would like to know more about how it's going to be allocated and how they come up with their conclusions about how it is going to be allocated.
Yes: Its source, life in and around the river. I would like to learn about how we can better co-exist. If there is anything I am doing or could be doing that could help.	Yes: Info. on development relative to the impact on jobs and socio-economic growth.	Yes: Would like to know more about its history and how it was utilized in the past; how the vegetation in the catchment has changed in the last 100years
Yes: Indigenous population of fish - what exists in the river and what level of pollution is in the river. And how to protect our water sources - <i>e.g.</i> my grandfather asked to fence off his springs. So is NB to educate people particularly farmers on how to protect seeps/ springs - cattle trampling it causes long-term damage.	Yes: Would love to know, I think children have to be taught in schools and made more aware of the importance of water.	
Yes: How water gets 'stored' in a mountain How to read the river and see when its healthy Moving water and moods.	Yes: Quality and Hydrology.	
Where does the water in the river come from and go to.	Yes: Defiantly clean up campaigns- would be very happy to be part of a clean-up campaign.	
Yes: The fauna of the river	Yes: In the fauna of the river.	
	Yes: To try to get it cleaner or keep it cleaner.	
	Yes: Water quality.	
	Yes: Would like to know the effect the pollution has on it.	

	Yes: Would be interested in getting feed-back on research that is be undertaken: outlining the Reserve in a way which is easy to understand.	
	Yes: Where the river starts and how it changes as it moves down the valley. And why is it so muddy.	
	I would just like for it to be come a pleasure to look at and for it to be clean, for there to be less pollution and for the sewage to stop being put in it.	
	Yes: I would like to learn as one can only benefit from the knowledge. From our farming point of view to maintain a good water supply and quality.	

APPENDIX C

Table C.1 Numbers and Percentages of respondents' responses to Section C survey items relative to the different regions. SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree; C = concept (the 5 main concepts the instrument was designed around); T = theme (the 7 sub-themes uses in describing the findings); 'N' = total of population.

				Numbers						Percentage						
	Item	Voting Region	N	SA	A	N	D	SD	NR	SA	A	N	D	SD	NR	T
1	The River is essential to the well being of all people in the Catchment.	Upper Kat	29	26	2	0	1	0	0	89.66	6.90	0.00	3.45	0.00	0.00	T1
		Middle Kat	36	29	6	0	0	1	0	80.56	16.67	0.00	0.00	2.78	0.00	
		Lower Kat	19	16	3	0	0	0	0	84.21	15.79	0.00	0.00	0.00	0.00	
2	It is the responsibility of the government to manage and conserve the River’s health and condition.	Upper Kat	29	14	4	3	7	1	0	48.28	13.79	10.34	24.14	3.45	0.00	T3
		Middle Kat	36	15	13	3	5	0	0	41.67	36.11	8.33	13.89	0.00	0.00	
		Lower Kat	19	10	6	1	1	1	0	52.63	31.58	5.26	5.26	5.26	0.00	
3	It worries you that your personal activities in the Catchment may affect the people living downstream from you.	Upper Kat	29	14	9	0	5	1	0	48.28	31.03	0.00	17.24	3.45	0.00	T4
		Middle Kat	36	6	15	0	11	4	0	16.67	41.67	0.00	30.56	11.11	0.00	
		Lower Kat	19	1	7	0	8	3	0	5.26	36.84	0.00	42.11	15.79	0.00	

4	It is important that more information is collected about the River so that more effective management can happen.	Upper Kat	29	26	3	0	0	0	0	89.66	10.34	0.00	0.00	0.00	0.00	T7
		Middle Kat	36	23	12	1	0	0	0	63.89	33.33	2.78	0.00	0.00	0.00	
		Lower Kat	19	13	5	0	1	0	0	68.42	26.32	0.00	5.26	0.00	0.00	
5	Everyone can use the River as they like.	Upper Kat	29	1	1	0	2	25	0	3.45	3.45	0.00	6.90	86.21	0.00	T5/T6
		Middle Kat	36	2	0	1	14	19	0	5.56	0.00	2.78	38.89	52.78	0.00	
		Lower Kat	19	0	2	0	7	10	0	0.00	10.53	0.00	36.84	52.63	0.00	
6	It is possible for individuals who use the River and water resources to help ensure that they are managed in a sustainable way.	Upper Kat	29	17	11	0	1	0	0	58.62	37.93	0.00	3.45	0.00	0.00	T5/T3
		Middle Kat	36	9	24	1	2	0	0	25.00	66.67	2.78	5.56	0.00	0.00	
		Lower Kat	19	7	12	0	0	0	0	36.84	63.16	0.00	0.00	0.00	0.00	
7	Local people impact the quality of the water in the River.	Upper Kat	29	17	10	0	2	0	0	58.62	34.48	0.00	6.90	0.00	0.00	T1
		Middle Kat	36	13	20	1	1	1	0	36.11	55.56	2.78	2.78	2.78	0.00	
		Lower Kat	19	11	8	0	0	0	0	57.89	42.11	0.00	0.00	0.00	0.00	

8	Issues relating to the River don't concern you.	Upper Kat	29	2	0	0	2	25	0	6.90	0.00	0.00	6.90	86.21	0.00	T5/T4
		Middle Kat	36	1	1	2	15	17	0	2.78	2.78	5.56	41.67	47.22	0.00	
		Lower Kat	19	1	2	1	5	9	1	5.26	10.53	5.26	26.32	47.37	5.26	
9	Scientific research creates methods and technologies which ensure that what is important about a River is sustained.	Upper Kat	29	17	10	2	0	0	0	58.62	34.48	6.90	0.00	0.00	0.00	T7
		Middle Kat	36	13	19	3	1	0	0	36.11	52.78	8.33	2.78	0.00	0.00	
		Lower Kat	19	9	8	0	1	1	0	47.37	42.11	0.00	5.26	5.26	0.00	
10	The River's value comes from its use to people.	Upper Kat	29	16	10	1	1	1	0	55.17	34.48	3.45	3.45	3.45	0.00	T6
		Middle Kat	36	11	17	1	6	1	0	30.56	47.22	2.78	16.67	2.78	0.00	
		Lower Kat	19	4	10	1	4	0	0	21.05	52.63	5.26	21.05	0.00	0.00	
11	The way the River is managed at the moment is ok, and does not need to be changed.	Upper Kat	29	4	2	3	9	11	0	13.79	6.90	10.34	31.03	37.93	0.00	T3
		Middle Kat	36	1	5	3	16	11	0	2.78	13.89	8.33	44.44	30.56	0.00	
		Lower Kat	19	0	0	2	10	7	0	0.00	0.00	10.53	52.63	36.84	0.00	
12	Upstream users impact downstream users.	Upper Kat	29	19	7	0	3	0	0	65.52	24.14	0.00	10.34	0.00	0.00	T4
		Middle Kat	36	15	18	1	2	0	0	41.67	50.00	2.78	5.56	0.00	0.00	
		Lower Kat	19	9	10	0	0	0	0	47.37	52.63	0.00	0.00	0.00	0.00	

13	You would not knowingly throw harmful materials or chemicals in the River.	Upper Kat	29	24	5	0	0	0	0	82.76	17.24	0.00	0.00	0.00	0.00	T5
		Middle Kat	36	28	8	0	0	0	0	77.78	22.22	0.00	0.00	0.00	0.00	
		Lower Kat	19	17	2	0	0	0	0	89.47	10.53	0.00	0.00	0.00	0.00	
14	Research into the River involves resources and finances which would be better spent helping people improve their livelihoods	Upper Kat	29	5	5	1	5	13	0	17.24	17.24	3.45	17.24	44.83	0.00	T7
		Middle Kat	36	5	4	3	20	4	0	13.89	11.11	8.33	55.56	11.11	0.00	
		Lower Kat	19	1	2	2	9	5	0	5.26	10.53	10.53	47.37	26.32	0.00	
15	Sustaining the ecological health of the River is important for the livelihoods of all.	Upper Kat	29	23	6	0	0	0	0	79.31	20.69	0.00	0.00	0.00	0.00	T1
		Middle Kat	36	24	12	0	0	0	0	66.67	33.33	0.00	0.00	0.00	0.00	
		Lower Kat	19	16	3	0	0	0	0	84.21	15.79	0.00	0.00	0.00	0.00	
16	Building more dams and weirs is not a bad thing.	Upper Kat	29	8	11	6	2	2	0	27.59	37.93	20.69	6.90	6.90	0.00	T3
		Middle Kat	36	5	17	7	7	0	0	13.89	47.22	19.44	19.44	0.00	0.00	
		Lower Kat	19	5	8	6	0	0	0	26.32	42.11	31.58	0.00	0.00	0.00	

17	Considering the needs of others is not something that you think about when you use water, from any source.	Upper Kat	29	2	2	1	7	17	0	6.90	6.90	3.45	24.14	58.62	0.00	T5
		Middle Kat	36	3	6	2	18	7	0	8.33	16.67	5.56	50.00	19.44	0.00	
		Lower Kat	19	0	0	1	11	7	0	0.00	0.00	5.26	57.89	36.84	0.00	
18	The River forms the link between all the communities in the Kat River Valley and makes them one.	Upper Kat	29	16	5	2	5	1	0	55.17	17.24	6.90	17.24	3.45	0.00	T4
		Middle Kat	36	3	19	5	8	1	0	8.33	52.78	13.89	22.22	2.78	0.00	
		Lower Kat	19	1	7	7	4	0	0	5.26	36.84	36.84	21.05	0.00	0.00	
19	The River is part of everyone’s heritage.	Upper Kat	29	24	4	0	0	1	0	82.76	13.79	0.00	0.00	3.45	0.00	T2
		Middle Kat	36	15	17	3	1	0	0	41.67	47.22	8.33	2.78	0.00	0.00	
		Lower Kat	19	9	7	1	1	1	0	47.37	36.84	5.26	5.26	5.26	0.00	
20	It is not important that the ecological integrity of the River be sustained.	Upper Kat	29	0	0	0	3	26	0	0.00	0.00	0.00	10.34	89.66	0.00	T6
		Middle Kat	36	0	3	0	9	24	0	0.00	8.33	0.00	25.00	66.67	0.00	
		Lower Kat	19	1	0	0	7	11	0	5.26	0.00	0.00	36.84	57.89	0.00	

21	Most upstream water users consider the needs of downstream water users.	Upper Kat	29	7	7	9	3	3	0	24.14	24.14	31.03	10.34	10.34	0.00	T4
		Middle Kat	36	2	6	10	13	5	0	5.56	16.67	27.78	36.11	13.89	0.00	
		Lower Kat	19	0	2	3	9	5	0	0.00	10.53	15.79	47.37	26.32	0.00	
22	You see the River as not just a source of water.	Upper Kat	29	19	6	0	4	0	0	65.52	20.69	0.00	13.79	0.00	0.00	T6
		Middle Kat	36	8	19	3	4	2	0	22.22	52.78	8.33	11.11	5.56	0.00	
		Lower Kat	19	4	8	1	5	0	1	21.05	42.11	5.26	26.32	0.00	5.26	
23	The River inspires you.	Upper Kat	29	24	3	1	0	1	0	82.76	10.34	3.45	0.00	3.45	0.00	T6
		Middle Kat	36	10	15	8	2	1	0	27.78	41.67	22.22	5.56	2.78	0.00	
		Lower Kat	19	3	7	5	3	0	1	15.79	36.84	26.32	15.79	0.00	5.26	
24	The current way the dam is managed does not allow for all to benefit.	Upper Kat	29	10	2	8	3	6	0	34.48	6.90	27.59	10.34	20.69	0.00	T3
		Middle Kat	36	1	9	15	10	1	0	2.78	25.00	41.67	27.78	2.78	0.00	
		Lower Kat	19	6	5	3	4	0	1	31.58	26.32	15.79	21.05	0.00	5.26	

25	In order to ensure a future for you and your family it is important to be willing to help others in the Catchment, even if it means using less water.	Upper Kat	29	20	5	2	1	1	0	68.97	17.24	6.90	3.45	3.45	0.00	T5
		Middle Kat	36	11	22	1	1	1	0	30.56	61.11	2.78	2.78	2.78	0.00	
		Lower Kat	19	3	9	3	3	0	1	15.79	47.37	15.79	15.79	0.00	5.26	
26	You alone can not ensure that the local community begins looking after the River better.	Upper Kat	29	12	12	0	2	3	0	41.38	41.38	0.00	6.90	10.34	0.00	T5
		Middle Kat	36	16	14	1	4	1	0	44.44	38.89	2.78	11.11	2.78	0.00	
		Lower Kat	19	4	12	0	2	0	1	21.05	63.16	0.00	10.53	0.00	5.26	
27	Only certain people should be allowed near the River.	Upper Kat	29	5	3	2	8	11	0	17.24	10.34	6.90	27.59	37.93	0.00	T2
		Middle Kat	36	2	5	2	20	7	0	5.56	13.89	5.56	55.56	19.44	0.00	
		Lower Kat	19	0	1	2	11	4	1	0.00	5.26	10.53	57.89	21.05	5.26	
28	It is important that local people be given the opportunity to participate in the management of the River.	Upper Kat	29	23	5	0	0	1	0	79.31	17.24	0.00	0.00	3.45	0.00	T3
		Middle Kat	36	9	20	0	4	3	0	25.00	55.56	0.00	11.11	8.33	0.00	
		Lower Kat	19	7	7	2	2	0	1	36.84	36.84	10.53	10.53	0.00	5.26	

29	Respect towards the River has changed since your mother's time.	Upper Kat	29	18	3	5	3	0	0	62.07	10.34	17.24	10.34	0.00	0.00	T2
		Middle Kat	36	14	10	5	7	0	0	38.89	27.78	13.89	19.44	0.00	0.00	
		Lower Kat	19	3	7	5	3	0	1	15.79	36.84	26.32	15.79	0.00	5.26	
30	It is important to manage and look after the River for the next generation.	Upper Kat	29	29	0	0	0	0	0	100.00	0.00	0.00	0.00	0.00	0.00	T2
		Middle Kat	36	30	5	0	1	0	0	83.33	13.89	0.00	2.78	0.00	0.00	
		Lower Kat	19	17	1	0	0	0	1	89.47	5.26	0.00	0.00	0.00	5.26	
31	Disrespecting the River can result in negative consequences to the local community.	Upper Kat	29	25	4	0	0	0	0	86.21	13.79	0.00	0.00	0.00	0.00	T1
		Middle Kat	36	20	16	0	0	0	0	55.56	44.44	0.00	0.00	0.00	0.00	
		Lower Kat	19	13	5	0	0	0	1	68.42	26.32	0.00	0.00	0.00	5.26	
32	The River is not in any danger of becoming unhealthy at present.	Upper Kat	29	3	3	3	7	13	0	10.34	10.34	10.34	24.14	44.83	0.00	T6
		Middle Kat	36	2	4	2	14	14	0	5.56	11.11	5.56	38.89	38.89	0.00	
		Lower Kat	19	0	0	1	5	12	1	0.00	0.00	5.26	26.32	63.16	5.26	
33	The River is more than just water.	Upper Kat	29	25	4	0	0	0	0	86.21	13.79	0.00	0.00	0.00	0.00	T6
		Middle Kat	36	12	21	2	1	0	0	33.33	58.33	5.56	2.78	0.00	0.00	
		Lower Kat	19	7	10	1	0	0	1	36.84	52.63	5.26	0.00	0.00	5.26	

34	It is everyone’s responsibility to look after their River and water resources.	Upper Kat	29	26	3	0	0	0	0	89.66	10.34	0.00	0.00	0.00	0.00	T3
		Middle Kat	36	23	13	0	0	0	0	63.89	36.11	0.00	0.00	0.00	0.00	
		Lower Kat	19	10	8	0	0	0	1	52.63	42.11	0.00	0.00	0.00	5.26	
35	The River was here first and will be here in the end.	Upper Kat	29	19	6	3	1	0	0	65.52	20.69	10.34	3.45	0.00	0.00	T2
		Middle Kat	36	12	19	2	3	0	0	33.33	52.78	5.56	8.33	0.00	0.00	
		Lower Kat	19	5	13	0	0	0	1	26.32	68.42	0.00	0.00	0.00	5.26	
36	Not all the water used comes from the River; some is from other sources <i>e.g.</i> boreholes, rainwater.	Upper Kat	29	14	12	1	1	1	0	48.28	41.38	3.45	3.45	3.45	0.00	T6
		Middle Kat	36	5	22	3	5	0	1	13.89	61.11	8.33	13.89	0.00	2.78	
		Lower Kat	19	3	15	0	0	0	1	15.79	78.95	0.00	0.00	0.00	5.26	
37	Reducing the health of the River, reduces the health of the community.	Upper Kat	29	25	4	0	0	0	0	86.21	13.79	0.00	0.00	0.00	0.00	T1
		Middle Kat	36	24	12	0	0	0	0	66.67	33.33	0.00	0.00	0.00	0.00	
		Lower Kat	19	13	5	0	0	0	1	68.42	26.32	0.00	0.00	0.00	5.26	

38	The Kat River Water User Association is doing a good job in managing the available water resources and River.	Upper Kat	29	7	4	18	0	0	0	24.14	13.79	62.07	0.00	0.00	0.00	T3
		Middle Kat	36	4	12	15	2	3	0	11.11	33.33	41.67	5.56	8.33	0.00	
		Lower Kat	19	0	9	6	4	0	0	0.00	47.37	31.58	21.05	0.00	0.00	
39	Many of the local community's memories are tied to the River.	Upper Kat	29	13	10	5	0	1	0	44.83	34.48	17.24	0.00	3.45	0.00	T2
		Middle Kat	36	5	15	8	7	1	0	13.89	41.67	22.22	19.44	2.78	0.00	
		Lower Kat	19	1	11	6	1	0	0	5.26	57.89	31.58	5.26	0.00	0.00	
40	Water quality is not a problem.	Upper Kat	29	4	4	3	6	12	0	13.79	13.79	10.34	20.69	41.38	0.00	T3
		Middle Kat	36	0	4	2	6	24	0	0.00	11.11	5.56	16.67	66.67	0.00	
		Lower Kat	19	0	0	0	4	15	0	0.00	0.00	0.00	21.05	78.95	0.00	
41	The River is an important part of the local community's traditions and culture.	Upper Kat	29	19	5	5	0	0	0	65.52	17.24	17.24	0.00	0.00	0.00	T2
		Middle Kat	36	8	13	9	4	2	0	22.22	36.11	25.00	11.11	5.56	0.00	
		Lower Kat	19	2	7	9	1	0	0	10.53	36.84	47.37	5.26	0.00	0.00	
42	Concern about the way the River is managed is the last thing I think about.	Upper Kat	29	1	0	0	3	25	0	3.45	0.00	0.00	10.34	86.21	0.00	T3
		Middle Kat	36	2	5	3	21	5	0	5.56	13.89	8.33	58.33	13.89	0.00	
		Lower Kat	19	0	0	0	12	7	0	0.00	0.00	0.00	63.16	36.84	0.00	

APPENDIX D

Table D.1 A selection of respondents' responses to the question: 'If the River was a person what kind of a person would it be and why?'

Upper Kat	Middle Kat	Lower Kat
A kind and forgiving person that cares about all living things. A smart and clean person.	A good person who helps out a lot.	I would compare it to Jesus in the sense that it is the giver of life. In the sense that we all rely on it and have to look after it and nurture it.
The River is a mother. Everything depends on her, because everything depends on water. We use water in everything and the mother makes sure that all of these things happen.	Strong and dependable, someone you could rely on. They do get sick, so you can't rely on them without helping out. It's a leader among people, and is prone to abuse. They can be asked to work too hard because they are so conscientious.	Content and giving person.
Sometimes the river is quite and calm, and at other times it is strong and angry. Male, because it is strong, Female when calm (so its both).	A disturbed person in need of a few antibiotics, but most of the time is a healthy person. A gentle person. Would be the type of person who would be calm in most situations. Would be the type of person who can attract the attention of people from different communities.	A 'volatile anything-could-happen' type of person. It would like to be a happy person.
I would shake hands with it, as it is very good (it does its job). Water is important for every type of food. Both genders.	A lovable person, a down-to-earth type of person.	Very wise with a lot of experience, 'it's been here forever'. But it would be concerned about the future.
The river is like a doctor to us, because the river is giving us health. Woman, get a lot from the river.	It would be a woman, a deeply giving person.	It's a good friend.
A spiritual person, mystical, it has the ability to communicate with other realms. I sometimes see the river as a portal to other worlds.	The river is like a mother who breast-feeds all her children from the same breast.	Smelly, dirty, a man with no future.
It would be a top person because without water there wouldn't be anything - the best kind of person - female.	A good person.	I am sure quite an angry and sad person.
Wise, wizard of a person, origin of life (Merlin) awe inspiring.	A good person.	Extremely sick.

Old and wise, somewhat disheveled - a little bit despondent & sad, powerful, resourceful and tired. Male - normally consider nature female.	Wakes up in the morning it's happy but by 12:00 it becomes very sad and unhappy because of the way it's feeling.	A very amiable sort of person; keeps most people happy.
Happy, vibrant person.	A clean, friendly, warm and inviting.	Lively, supportive, emotive, virile, & sustaining.
A loving and nice person, somebody who is reliable and friendly (approachable).	It would be a Goliath,	A sick mother.
A peaceful type of a person - the river is a very gentle kind of thing. And it is so beneficial to people.	It would be spirit - part of collective consciousness. A creation that is part of the whole that is evolving and changing with cosmos.	Unpredictable.
A woman, hospitality. Sometime it's a happy mother. A strict person, in that it has to obey the laws. It sometimes gets angry. It's a healer.	A person who is angry at times and passive at other times, depending on how it's flowing. In flood times it's very angry.	Much like my wife - changes all the time someone who is emotionally unstable (bad way). Female - providing us with livelihood (mother)
A beautiful lady, a mother you get everything from your mother. The river gives us life and its beauty is associated with a beautiful woman.	A frustrated and sad person. A concerned person frustrated at the pollution and quality, the miss-use of it. The fact that it can't be enjoyed, which could be directly linked to other socio-economic issues such as high levels of crimes.	It would be an ugly person, a wild person, it would be everything that a person can be, it would be a happy and unhappy person, a vicious person (floods) and hungry (drought).
I think the river will fight back at the people abusing it. It's a worried lady. It not a happy. A mother, it mothers.	An abused person, because everyone just takes advantage of it, takes and don't return.	
A mother to feed everybody. Also a lifeline for the people's existence. I compare the river to the breast of a woman feeding whole nations	Wild and woolly, temperamental (it changes) can be placid and gentle, depending on season and rain.	
A person with whom you can share your worries and who gives you peace of mind. A friend.	A neutral 'go-with-the flow' type of person.	
Very tolerant person, considerate. Female - who takes care of the family, river cares for you.	A used person, very sad because it's got a whole heap of rubbish being thrown into it. Happy to find that the water is being used by people and for crop growth. Content to find it is being used for positive things. Very angry that all the fish are dying.	

Caring and kind person. Female – mother. It's a bit dead.	An important person, crucial to the development of town.	
A mother - because it's a resource where we are getting our water.	Hawker, overgrown.	
A considerate person. Both male and female - active not passive.	A lovely person because you can bath your body and be relaxed after that. Female – caring.	
A very important person. Don't want to say male or female - someone who has both sexes.	It can be kind and it can be cruel.	
Good, good person who is needed by everyone. Woman.	A sad river.	
A good person because it supplies things to people. Neither male nor female - looks more like an angel to me.	An old man.	
A physically fit person, a smiling person, a happy person. Male - sometime the river becomes angry in times of flood.	It would feel sad to see that people disrespect it very often and rubbish and things are being dumped and people pollute it.	
An active person, it's female because it feeds.	A sickly person, someone who is very unhealthy.	
A kind person, not cruel man or woman.	It would probably be in jail, a robber or thief.	
Like your mother and father because we use that water day and night. It helps us and our children, animals and everything that is alive. Also when we want to stop burning fires it also helps us - so can never stay without water	The river keeps us alive all our resources come from the river. It's been very kind to us over the last few years. However, it can be a killer when in flood.	
	Schizophrenic.	
	A very happy person.	
	A smelly, fast moving one.	

