

Riparian Management Guides:

Are they meeting the needs of the interested public?

A thesis

submitted in partial fulfilment

of the requirements for the Degree of

Masters of Natural Resource Management and Ecological Engineering

at

Lincoln University

by

M.S.T. Robertson

Lincoln University

2008

Abstract

In New Zealand, there are many published guidelines about the management of riparian areas. The question needs to be asked, are these guides useful? This research thesis investigates the extent to which riparian management guides meet the needs of the users. This research also considers the importance of riparian management (with regards to the appropriateness of educational guides) in assisting practitioners and the interested public in the management of riparian areas.

The main way of investigating this topic was with the help of discussion groups. Discussion groups were held with interested organisations. These groups fell into three categories; Urban groups, Rural groups and Interest groups. The groups were asked to define what would make a guide most useful and desirable to them under three major categories: 1) what the guide looked like, 2) what information was contained, and 3) how was the information accessed. An opportunity was also provided for any further comments. This information was used to create a list of the most popular criteria that existing guides and further publications could be examined against. Eleven criteria were identified as follows:

- Information should be available online
- Have pictures
- Include diagrams
- Is simple and easy to understand
- Contains how to and appropriate methods
- Has a plant list
- Considers maintenance issues
- Identifies where to locate further information
- How to contact experts
- Is available in libraries
- Is in booklet form.

The availability of existing information was investigated and its suitability assessed against the criteria. A list of all regional, territorial and unitary councils as well as 'other organisations' that were regarded as sources of environmental knowledge were investigated to see how many had produced information on riparian and wetland management issues. In terms of sources of

information, 'other organisations' produce the greatest rate of riparian management information, followed by regional/unitary authorities.

Two guides from Canterbury best meet the criteria identified by the interested parties, for the Canterbury region. Each scored 10/11 and failed on different criteria. This led to the conclusion that riparian management guides in Canterbury, while obviously still having room for improvement, are very close to meeting what interested parties feel is most important. Finally, a prototype (model) based on the research is provided for anyone who might be considering preparing a riparian management guide.

Keywords

Riparian, Communication, Effectiveness, Environment, Environmental management, Wetland, Water, Sustainability, New Zealand, Canterbury, Community, Environmental publication.

Contents

Full Title	i
Use of Thesis	ii
Declaration	iii
Abstract	iv
Keywords	v
Contents	vi
List of Figures	ix
List of Tables	x
Acknowledgements	xi
Chapter 1. Introduction	1
1.1 Introduction	
1.2 Problem Statement	
1.3 Research Objectives	
1.4 Outline of thesis	

Chapter 2. Methodology	5
2.1 Determining what interested parties would like to see in guides prepared for their use.	
2.2 Comparing how well existing guides available to interested parties are meeting these needs.	
2.3 Producing criteria which could be used by authorities when considering future publications.	
2.4 Comparing the contents of specific guides based on criteria determined by interested parties themselves to meet the needs of the interested parties	
2.5 Speculating on future validity of documents and their use and usefulness may change over time.	
2.6 Literature Review	
2.7 Research limitations and assumptions	
Chapter 3. Literature Review	11
3.1 Wetlands and Riparian Areas	
3.2 Development of Sustainability in New Zealand	
3.3 Legislation and protection of wetlands	
3.4 The importance of wetland and riparian management	
3.5 Cultural Concerns	
3.6 Riparian management	
3.7 Communication theory	
Chapter 4. Results	42
4.1 What interested parties want in a guide prepared for their use	
4.2 Does the information nationwide meet their needs?	
4.3 Prioritising the Criteria	
4.4 Does the information for Canterbury meet their needs?	

Chapter 5. Discussion	85
5.1 The importance of riparian areas and their management.	
5.2 Discussion of Methodology	
5.3 What interested parties want in guides prepared for their use	
5.4 Communication theory and barriers to communication	
5.5 Does the information nationwide meet their needs?	
5.6 Does the information available for Canterbury meet their needs?	
5.7 General discussion	
5.8 Changes to future publications	
5.9 Future validity	
Conclusions	131
Recommendations	133
References	134
Appendices	
List of Appendices	
Appendix 1: Definitions	142
Appendix 2: List of Acronyms and abbreviations	146
Appendix 3: Talk to accompany research	147
Appendix 4: Group discussion booklet	148
Appendix 5: Discussion group responses	153
Appendix 6: Prototype of management guide	171

List of Figures

Figure 1: Different riparian zones, including vegetation types	12
Figure 2: Typical New Zealand production landscape	23
Figure 3: Landscape incorporating integrated land management	23
Figure 4: What water means to Maori and non-Maori in comparative terms	29
Figure 5: Barriers to effective communication	38
Figure 6: Written Aspects of Presentation	45
Figure 7: Visual Aspects of Presentation	46
Figure 8: Content Aspects of Presentation	47
Figure 9: Size Aspects of Presentation	48
Figure 10: Other Aspects of Presentation	49
Figure 11: Basic Methods Aspects of Desired Information	51
Figure 12: Purpose Aspects of Desired Information	52
Figure 13: Detailed Aspects of Desired Information	53
Figure 14: Farming Aspects of Desired Information	54
Figure 15: Assistance Aspects of Desired Information	55
Figure 16: Flora and Fauna Aspects of Desired Information	56
Figure 17: Planting Aspects of Desired Information	57
Figure 18: Physical Aspects of Desired Information	58
Figure 19: Legal Aspects of Desired Information	59
Figure 20: Extra Aspects of Desired Information	60
Figure 21: Printed Forms of Accessibility	62
Figure 22: Computer Based Accessibility	63
Figure 23: Verbal Forms of Accessibility	64
Figure 24: Locations of Accessibility	65
Figure 25: Innovative Ideas for Accessibility	66
Figure 26: Other Thoughts on Accessibility	67
Figure 27: Comparative rates of information availability.	75
Figure 28: Cover of ‘Ecowater – The Guardians of the Mauri’ movie	88

List of Tables

Table 1: Relative benefits of different wet area management approaches	26
Table 2: Division of groups for the purpose of comparison	43
Table 3: Most Important Ideas for Presentation	44
Table 4: Most Important Ideas for Desired Information	50
Table 5: Most Important Ideas for Accessibility	61
Table 6: Other Suggestions from the Urban Groups	68
Table 7: Other Suggestions from the Rural Groups	68
Table 8: Other Suggestions from the Interest Groups	68
Table 9: Territorial Authorities in the South Island.	71
Table 10: Territorial Authorities in the North Island.	72
Table 11: Regional Authorities nationwide.	73
Table 12: Other Organisations that provide rural and environmental information.	74
Table13: Christchurch City Council – Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch. Comparison against the criteria.	80
Table 14: Environment Canterbury – A guide to managing waterways on Canterbury farms. Comparison against the criteria.	81
Table 15: Environment Canterbury – Riparian zones: a guide to the protection of Canterbury’s rivers, streams and wetlands. Comparison against the criteria.	82
Table 16: Department of Conservation – Protecting and restoring our natural heritage: a practical guide. Comparison against the criteria.	83
Table 17: Ministry for the Environment – Managing waterways on farms: a Guide to sustainable water management in New Zealand. Comparison against the criteria	84

Acknowledgements

First thanks must go to my parents, Kenneth and Heather Taylor, for encouraging me to pursue my passion and encouraging me on throughout my entire university career. Especially to my Father who first suggested I tried an ecology paper that ultimately led me to this thesis. My dear husband, Craig, who sacrificed so much so that I could pursue my Masters, including giving up a life in New Zealand to dash off to Austria with me. A large thanks to all my family who willingly reviewed my work so it could be the best possible, most particularly my mother-in-law, Margaret Robertson, who gave up so much time to listen to the final draft. Special thanks go to Mrs. Rosemary Thom who was willing to look over my work to help improve my grammar.

My supervisor Professor Ian Spellerberg who took me under his wing when I was finding it hard to make things work and encouraged me to keep going. Also to Professor Graeme Buchan who first introduced me to this degree and helped me out long before he became a supervisor. Particular thanks go to Lady Isaac who kindly provided a scholarship which allowed me to undertake this degree.

I would like to particularly to mention my appreciation for the groups who so kindly gave me their views – Otakau Crib Group, Lincoln Community Committee, Glenroy Farmers, Christchurch Estuary Association Inc., Selwyn Landcare group, Wright's Stream care group, Lincoln Environmental Organisation, Young Mothers, New Zealand Primary Industry Professionals, and North Canterbury Forest and Bird. Also the professionals who expressed their views and helped develop my research; Jason Arnold, Russell Langdon, Craig Pauling, David Hewson, Jorge Santos and most particularly Professor Keith Thompson who gave so freely of his wealth of knowledge on wetlands.

Finally my thesis is dedicated to my grandparents: Gerald Crampton who showed me the practicalities of farming and the miracles of bananas, Millie Crampton who never for one second stopped believing that I would achieve great things, Brenda Taylor who always challenged me to think, and Keith Taylor who has always been an amazing model of what with determination it is possible to achieve. This work is also dedicated to my father-in-law, Richard Robertson, who passed away shortly before this thesis was finished, but always had such enthusiasm for my work.

Chapter One: Introduction

1.1 Introduction

Humans are not the most logical of all creatures, though as individuals many have a high moral regard, a general sense of proportion, and a high survival instinct. However, as a collective group these traits are rarely seen. No where is this more obvious than in the general treatment and attitude towards wetlands and riparian areas. These areas are the kidneys of the planet, and yet they now make up less than 2% of the world's area. Through out the ages these areas have been being regarded as wastelands and destroyed with astonishing prejudice. This trend continues today, with wetland destruction happening worldwide primarily for financial reasons. If wetlands are considered the kidneys of a body, then the destruction for these reasons is like cutting out part of your own kidneys to make more room for your stomach. However it is most important to remember that Man cannot live by his stomach alone, nor can the world survive by its economy alone. Ultimately, the economy is merely the shifting around of our natural resources, and all resources are finite if not cared for.

Fresh, clean water is one of the greatest treasures in the world. Unfortunately for most people it is taken for granted, much like breathing. Clean water is becoming increasingly scarce as land use changes and the pressures on the freshwater system increase. There is a perception, particularly prevalent in New Zealand where we have abundant fresh surface waters in most areas, that polluting one waterway does not matter because there are plenty of others. However the problem is that if everyone thinks this way, then every waterway will soon be unusable, because everyone will have assumed that someone else will have kept their waterway clean.

Our society in a wide sense is trying to deal with both the concept and the reality of sustainable living, while coping with the environmental errors made in the past. Increased awareness is occurring through all areas of society and is creating a desire for a broader, more holistic approach to the environment in which we live. The Resource Management Act (1991) divided up the responsibility for caring for our natural resources between the Regional Councils, Local Authorities and the Department of Conservation. This has unfortunately meant that caring for some resources, particularly ones like water, has become very disjointed. All organisations feel

that they lack suitable funding to be able to cope adequately with the tasks required to manage the resources in their care.

Many human activities can negatively impact upon both the quality and the quantity of water available, and through the increased requirements for public participation and discussion, people are becoming increasingly aware of the true state of New Zealand's water resources. This has in turn has created a public who want more than to just be consulted, they want to be involved. To satisfy this need there is a lot of proactive work underway around the country; things like community groups caring for and restoring water bodies they have a special interest in, and the 'Clean Streams Accord' driven largely by Fonterra – the Dairy Industry Management Organisation. We also see individuals working on their own properties. To assist this many organisations, particularly regional and territorial authorities, have started producing management guides for many aspects of natural resources.

Management and restoration of riparian areas is a topic which has recently gained recognition and acknowledgement of its importance in relation to overall quality in the waterway. Typically with theory in a fast developing area such as water management, there is a gap between what is being researched and the knowledge of people using or wanting to use such knowledge. When this gap occurs it becomes a key task to ensure that there is effective communication between what is known and what is done.

1.2 Problem statement

In Canterbury, New Zealand it appears that there is now a wide variety of guides intended to assist people with an interest in riparian management. Within Canterbury there is also a diverse range of people who have an interest in riparian management, and with a diverse range of people come a diverse range of motivational factors behind riparian management. It appears that between the wide range of guides and the diverse range of people there is a gap of knowledge as to whether the guides are meeting the requirements of the people wanting to become involved in riparian management.

Ultimately the question is, does the existing information available on riparian management satisfy the needs of interested parties?

1.3 Research Objectives

The objectives of this study:

- Determine what interested parties would like to see in guides prepared for their use.
- Compare how well existing guides available to interested parties are meeting these needs
- Compare the contents of specific guides based on criteria determined by interested parties themselves to meet the needs of the interested parties
- Produce criteria which could be used by authorities when considering future publications
- Speculate as to the future validity of documents and how their use and usefulness may change over time.

1.4 Outline of thesis

This thesis is composed of five chapters. Chapter One is the Introduction, and discusses the relevance of this document, as well as the problem statement and research objectives. Chapter Two is the Methodology of how the research was conducted to allow for replication if desired. Chapter Three, the Literature Review, is made up of seven parts to discuss the relevance of this research to the wider picture. Chapter Four portrays the results of the research, by displaying the information gathered in verbal and visual (tables and charts) media. This chapter includes the ultimate research conclusion. Chapter Five is the discussion which puts the results into perspective, including discussing the relevance of the results. Chapter Five also looks at the future validity of this research, and the documents on which it is based. This is followed by the research conclusions and recommendations. More detailed information such as responses to the research, and the documents used in the research are included in the appendices. Finally, Appendix 6 is a prototype riparian management guide that demonstrates what a guide would need to be like to best meet the criteria.

Chapter Two: Methodology

To meet the objectives outlined in the previous section, the research was separated into five main parts. Although they were listed separately, they ran concurrently to meet the demands of the time constraints, and were all interconnected.

2.1 Determining what interested parties would like to see in guides prepared for their use

The purpose of this research was to determine what the ‘interested public’ want in guides prepared for their use. It was determined that the most reliable way of determining this would be to ask the interested people themselves. To do this it was decided that to achieve a broader perspective, small group discussions would be used. These discussion groups would have no less than two people and would ideally have no more than ten people, though larger groups could be split into multiple groups.

Discussion groups were favoured over the possibility of surveys, either conducted in person or by mail. Surveys are difficult to construct, requiring more time and professional input than was available. Surveys also have the disadvantage of being far more intrusive into people’s situations. As this topic is already sensitive within certain areas of society, it was decided that discussion groups were more neutral.

The Community Information Christchurch (CINCH) database run by the Christchurch City Council (CCC) was used to locate groups. It was likely that this would produce primarily urban organisations whereas for this research more rural groups would be desirable, however these constraints were deemed to be acceptable. Criteria for using the CINCH database were to locate organisations or associations who expressed an interest in environmental issues, or that exist in areas directly affected by waterways. Fifteen groups were initially contacted by mail; further groups were contacted as necessary. Fifteen groups had been selected to be contacted to try and ensure the participation of a minimum of ten groups, in the attempt to reduce bias in the results. This is not a high number, but as this thesis has a limited scope, and some groups are likely to produce multiple groups it was deemed as suitable.

If groups were willing to participate, the researcher arranged a suitable time to meet and facilitate the discussion. A four page booklet (Appendix 4) was produced with a single topic for discussion at the top, and a blank page for the groups' thoughts. Before the discussion began, the researcher gave a brief talk to clarify what qualified as a riparian area or wetland for the purposes of this research, and then outlined the guidelines for having a productive discussion group. These were adapted from Sakissian, Perlmut & Ballard (1986) and said that

- The aim is to generate ideas.
- Everyone should speak and their opinions should be listened to and respected.
- Avoid debate. Conflicting views are a healthy sign and should be recorded.
- Keep discussion moving – just toss in ideas.
- Creative and 'oddball' ideas are valuable too and should be recorded.
- Do not worry if it is feasible or not – just record it.
- Encourage everyone to speak.

Participants were assured that the information would not be referenced to any specific person. Identification of the groups would only be for this thesis and would not be specified in any subsequent publications. This is to ensure that the groups felt able to give their opinions freely. Contact details were also provided in case they later wished to change what they had said. The information was kept in written and digital forms, and will be destroyed when this research is completed. The groups who agreed to participate were acknowledged and thanked at the time, and given the option of finding out about the conclusions of the research and at the conclusion of the research will receive a thank you letter.

A failing of this research is that it invariably excluded unorganized groups because of the problems in contacting individuals to participate.

For the information to be analysed for this thesis, the answers provided by the groups were categorised as 'Urban', 'Rural' or 'Interest' depending on which category best describes the composition of the group.

2.2 Comparing how well existing guides, available to interested parties, are meeting these needs.

The purpose of this part of the research was to determine how much information is available, how readily available and its usefulness.

To determine the nationwide availability of guides, a list of all regional, unitary, district and city councils were created using the list of all local authorities as recorded by the Local Government webpage

http://www.localgovt.co.nz/site/Local_Government/find_a_council/by_region/byregionmenu.aspx

Each of the web pages of local authorities were visited in turn with the intention of determining; did the web page have any acknowledgement of a guide? Was the guide available either online or in a downloadable format? Did it offer the option of contacting the council for the purpose of receiving information or list where information could be obtained from? Other than these key points, another thing noted was how easy it was to get to the information in a logical manner. Then online library catalogues were used to locate printed riparian management guides available for the areas.

Following the review of the local government, a list was compiled of other relevant organisations that have an interest in waterways management or nature conservation. The list of organisations was created based on several 'brain storming sessions' with at least one other person as to what would be considered logical organisations to seek help from. These organisations were then subjected to the same questions as the local government.

Unfortunately, due to the limits of this research it was not be possible to visit each of the locations to see if information was available at service centres and it had to be limited to information that could be discerned by use of the internet. The use of this method was intended to gauge the amount of information that can be sourced throughout New Zealand. With so many organisations producing riparian management guides, it was thought that it would be interesting to note if any of them have used different communication styles and if there is any apparent reason for this, such as differing target audience.

2.3 Producing criteria which could be used by authorities when considering future publications.

The information collected in 2.1 was used to form the basis of criteria which could be taken into consideration by organisations planning future riparian management guides. Each of the three main questions

Q1: How will it be presented?

Q2: What information will it contain?

Q3: How will the information be accessed?

Were examined, and the top points were used to create the key criteria. It was believed that the most common points would be under the three main questions, rather than in the fourth question (Q4: Any further suggestions?).

There is also a section on what specific sectors of the interested public (such as ‘Rural group’) thought would be of importance to them. This was carefully done for the purposes of the research, to ensure that the privacy of the groups was preserved. This was done by means of a disclaimer in all research documentation, and for any publications outside the research thesis, using broad descriptive titles (such as ‘Interest group’) which are used in preference to specific titles.

2.4 Comparing the contents of specific guides based on criteria determined by interested parties themselves to meet the needs of the interested parties.

The method used here is very similar to 2.2 but was more detailed, since this study was intended to be more for the rural lowlands of Canterbury. Each of the guides located was compared to the criteria created by 2.3. Each of the guides received a rating as well as comments for the overall guide. The available guides were then examined to see how they compared, especially on where they are best meeting the needs of the interested parties, and where improvement might be needed.

Also, as the intention is to gain a real perspective of what it would be like to a member of the public wishing to improve riparian management. To this end, places identified by brain storms as being likely to be canvassed by landowners wanting information on riparian issues were noted, and then the researcher went to these places and requested information on wetlands and riparian areas. The information gained from this was included in the discussion.

2.5 Speculating on future validity of documents and how their use and usefulness may change over time.

The final part of the research involved looking at the future validity and usefulness of riparian management guides. This discussion considered changes that might alter the importance of riparian management and thus riparian management guides. The purpose of this section was to question if there is justification in producing the guides if they become quickly outdated, or if the forms it is currently being conveyed in are likely to endure for a sufficient time to justify their creation.

2.6 Literature Review.

To ensure that this work is original and relevant a literature review was undertaken. This literature review looked into basic practices of waterway management, working with community groups, communication theory, and effectiveness of communication. This literature review was not exhaustive, though it attempted to be thorough. It particularly focused on works after 1991. This is the year the Resource Management Act was passed and is now the definitive legislation with regards to waterway management.

2.7 Research limitations and assumptions.

The scope of the detailed study was limited to lowland rural Canterbury, New Zealand. An assumption of this research was that riparian planting means the preferential native riparian planting as opposed to the preferential exotic planting of riparian areas.

Chapter Three: Literature Review.

3.1 Wetlands and Riparian Areas

The term wetland conjures up many different images and feelings for humans. As was noted in Hovell Environmental Planning (2003), many wetlands are seen as wastelands, useless land or even a place to be despised and feared. To some people however, they are seen as a vanishing treasure, beautiful and fragile or as a bountiful place for resources. But to everyone, the word 'wetland' will produce some kind of distinct image built of their own experience and education. Gray (1990) commented on the difficulties in locating a completely satisfactory definition for wetlands because of the broad continuum of geographical features that can be classified in this way. However, for the purposes of this study an extremely broad definition will be used because there are many terms used with relation to wetlands. This basic definition refers to: all shallow water bodies, either permanently or intermittently wet, including but not limited to shallow lakes, streams, swamps, bogs, fens, estuaries, tarns, gullies, creeks, seeps and ponds. They can be small such as a seep, or large in size such as Lake Ellesmere (Te Waihora).

For life to continue on Earth, wetlands are essential. They are essential to plants and animals for food, habitat and ecosystem services. Wetlands and rainforests have much in common. They are both important for the ecosystem services they provide for wildlife and humans, and both are most threatened by the activities of mankind (McMillan, 1992). Interestingly enough, wetlands have never received the same emotive publicity as rainforests.

Riparian areas are a type of wetland, but because of their nature they are special in their own right. They exist beside water bodies, whereas wetlands are normally water bodies in their own right. Riparian areas are normally vegetated and are intermittently underwater. In pristine areas, the riparian vegetation can extend several metres from the normal water level. Riparian areas are also known by many names and descriptions such as buffer zone, riparian zone, and river or water margin. Wetlands and riparian areas are particularly exceptional amongst ecosystems in that they are the boundary between two different environments. This study looks more specifically at riparian areas but also looks more generally at wetlands. For the purposes of this thesis, all terms are treated as equal but riparian area is the preferred term or wetland areas for the broader context.

Figure one defining the differing riparian zones has been removed but was adapted from the version shown in '*A guide to managing waterways on Canterbury farms*' from Environment Canterbury (2005), and can be located at <http://www.ecan.govt.nz/NR/rdonlyres/4B9BC0E7-8482-4D03-8AE6-DBB07966038A/0/Managingwaterways.pdf>

Throughout history wetland areas have often been forgotten, changed or destroyed. However, they are slowly gaining international recognition for the environmental importance they hold. Smale (1983) commented that wetlands in lowland areas are rapidly becoming some of the rarest ecosystems in New Zealand. Slowly the increasing scarcity is entering into general awareness. In Hovell Environmental Planning (2003) there is the comment that there is now approximately only 2% of New Zealand's land area as wetlands. According to Hovell Environmental Planning (2003) and Stephenson (1986), in the last 200 years New Zealand has lost over 90% of its wetlands to make way for industry, agriculture and urban development. This is one of the largest wetland losses in the world (Hovell Environmental Planning, 2003).

Wetlands are extremely valuable as agricultural land. Some of the best farmland and many of our settlements (such as Christchurch) were once wetlands. As was noted by Sullivan (1998), this is not an uncommon activity as many other cultures have lived amongst and reaped great benefits from the wetlands they rested upon (such as cultures on the Nile i.e. Egypt). Likewise most cities of the modern world have been built on estuaries or rivers. The main problems facing wetlands (as suggested by Trueman, 2002) are the filling, draining or flooding of wetlands, diverting or straightening running water bodies, piping waterways, removing natural riparian vegetation, creating weirs or artificial drains to control the water table and the prevailing negative attitude towards wetlands.

Within New Zealand, riparian management is promoted as being a good method of improving water quality and aquatic health, as it has been shown that the quality of waterways is significantly affected by what happens on the river banks. Riparian areas can act as a buffer to the waterway against contaminants. They provide quite tangible benefits for farm management. Smale (1983) observed that not only did they provide benefit for contemporary commercial production, but in their own right wetlands and riparian areas are amongst some of the most productive habitats in the world, being particularly beneficial for wildlife as was observed by Adams, Dove & National Institute for Urban Wildlife (1989).

One of the major contributors to the wetland losses in the past was a perception, that is still held today by many people that wetlands are merely 'wastelands' with little or no practical use or value. Adams et al. (1989) remarked that in more modern times, there have been concerns about the nuisances, hazards, potential health issues and maintenance problems associated with these areas when near human occupation. Wetlands are not helped by the difficulties in defining the boundaries of wetlands, because the transition is a gradual and seasonal one between wet and dry lands. Stephenson (1986) noted that as an ecosystem, wetlands are not very hospitable, they do not welcome un-adapted visitors or yield their secrets willingly which no doubt does little to improve their 'image'. Stephenson (1986) particularly felt that they are perhaps one of the few things we have left that approach total wilderness, which is yet another reason why they are so special.

3.2 Development of Sustainability in New Zealand

Wetlands and riparian areas have always been important, but ‘society’ has only recently accepted this. Management of wetland areas would not have achieved such widespread recognition if it was not for a vast body of literature on the functions of wet areas and for the development of the concept of sustainability. The ‘social’ world in which we operate is becoming increasingly aware of the importance of sustainability, but this has not always been the case. The current social and political atmosphere of ‘environmentalism’ has been a long, slow progression. Human history has shown that, in general, civilisation has not been a wise custodian of nature and its resources. Up until the 1960s in New Zealand, the prevailing public attitude was expansionist, developmental and exploitative (Wells & University of Waikato Department of Accounting, 1998) with little or no regard for the environment. However, this was a time when the world was ‘ripe’ for change. Increasing prosperity, particularly within the middle class allowed people to look beyond the drive for economic progress and see that in some cases progress came with too high an environmental cost. Since then, there has been a shift in acceptance of this behaviour to the current preference to have conservation integrated with development (Astbury et al., 1988).

New Zealand was very fortunate in that, due to its late European colonization, it had an abundance of clean air, water and public reserves, with fewer or less severe problems than had become associated with the industrialized countries in Europe, such as permanent smog, traffic congestion, and lifeless rivers. It is widely believed that the raising of Lake Manapouri in Fiordland National Park (South Island) for the purposes of hydro electrical production in the 1960-70s marked the beginning of environmental awareness in New Zealand (P. Whiting pers comm., September 2004). It is commonly believed that New Zealanders are generally a quiet, compliant nation with a general underlying belief that the central government is acting in the best interest of all and thus should not be questioned, a belief no doubt encouraged by the politicians. This system was highly centralised and politically motivated decisions dominated resource development. It was a system that had no room for non-government organisations, Maori and/or individual views. The development ethic which dominated the economic arena and politics was a remnant of the European-dominated society and economy from New Zealand’s colonial history (Wells & University of Waikato Department of Accounting, 1998).

Perhaps Manapouri really showed not the beginnings of conservation, which really had been established earlier with the first national parks, but the beginnings of what is now known as the concept of sustainability. Conservation and economic development, co-existing under the idea of 'wise-use' despite what the original parties set out to achieve. Both sides won and both sides lost, because sustainability will always be a compromise. The power plant was built but the lake was not raised. It was undeniably a triumph for conservation and it was the first major environmental campaign and set the stage for further successful environmental campaigns (Wells & University of Waikato Department of Accounting, 1998). It was also the dawning of the revelation that not everything coming from the government is necessarily good and right. The government, because of this change in attitudes, had to change its role and its views on environmental management (Astbury et. al., 1988).

3.3 Legislation and protection of wetlands

Any modern society operates within the bounds and requirements of their legal system. One of the increasingly important areas of law in New Zealand is now environmental management. It tells society what is acceptable, what is required and gives protection to the environment in which we live. Society is at times similar to a large committee, even though we may have the same ultimate goal; it is most unlikely that there will consensus on any given topic. Without environmental law, the views of a few could easily undo or destroy the work of many. This section discusses what legislation exists in New Zealand with regards to wetland and riparian areas and how, in turn, legal and non-legislative methods can protect our wetland areas.

In New Zealand, wetlands are protected by a variety of legislative and non-legislative means. The most important of the legislative means is the Resource Management Act (1991). The Resource Management Act (RMA) was designed to create a streamlined and focused environmental goal and process, replacing a large number of inconsistent and overlapping separate statutes with regards to the use of resources in New Zealand (Memon, 1996). The overall purpose of this Act is ‘to promote the sustainable management of natural and physical resources’ (Pt 2 s5 (1)) (New Zealand Central Government, 1991). In particular, it lists that in matters of national importance that ‘all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources shall recognise and provide for the...preservation of the natural character of...wetlands, lakes and rivers and their margins’ (Pt 2 s6 (a)) (New Zealand Central Government, 1991). This clause has added to natural resource management an entirely new and important requirement to consider not just water bodies but also their margins. This is particularly of interest because the management era before the RMA was one characterised by the desire to replace nature with ‘safe’ and ‘better’ engineering solutions particularly along water bodies. It marked the beginning in New Zealand of using ‘soft’ and ‘natural’ solutions to manage the environment which humans operate within.

According to New Zealand Audit Office (2001) at the national level, there is no single body responsible for wetland policy. There are two agencies with major roles; the Ministry for the Environment and the Department of Conservation as well as many smaller organisations. The Ministry for the Environment (MfE) is limited in its regulatory abilities, primarily existing to report and provide advice on policy for the Central Government. The Department of

Conservation has more of the on the ground responsibility, and is responsible for managing the public conservation estate, including a large number of wetlands, waterways and their margins as was noted by Freegard & Owen (1988). Curiously the Department of Conservation's specific statutory mandate for water is not from the RMA, but from the Conservation Act (1987), Pt2 s6 (ab) where it is 'to preserve, as far as practical, all indigenous freshwater fisheries, and protect recreational freshwater fisheries and freshwater fish habitats (New Zealand Central Government, 1987) as well as a broader responsibility to act as an advocate for the conservation of natural and historic resources, and to promote the conservation of wet areas throughout New Zealand, regardless of their tenure. The Conservation Act (1987) also allows for the creation and protection of conservation estate for significant areas under several categories (i.e. scientific, ecological etc.).

In New Zealand, at a regional level, the Regional Councils and Unitary Authorities are responsible for natural hazard mitigation, water and soil conservation under the RMA section 13, The single most important task of these organisations is to seek acceptable means to protect and enhance water quality, though as was noted by Sullivan (1998), there is no specific mention of wetlands. It was astutely noticed by Memon (1996) that although there is clear direction for who has responsibility for water, the responsibility for riparian areas is fragmented amongst regional councils, territorial local authorities, and Department of Conservation. Technically under section 14 of the RMA district councils are supposed to have responsibility for managing river banks, although wetlands are still not mentioned.

P. Whiting observed (pers comm. September 2004) that for the best results, close collaboration is needed, between agencies whose traditional relationships are marred with misunderstanding and distrust. Communication between organisations is vital for the ultimate success of riparian management, not only because waterways often cross legal boundaries but also so organisations do not work at cross-purposes. For example if the regional council is planting willows to maintain a river channel, and Department of Conservation is removing willows to provide appropriate habitat for riverine birds in the same location, this scenario will result in neither goal succeeding.

Amongst the non-legislative means, there are incentives which can be offered to protect wetland and riparian areas, but most are area specific and are the result of local organisations encouraging

environmentally desirable behaviours (by using incentives such as environmental enhancement funds). However, on more specific sites of particular significance, more than this is needed. There are also industrial innovations such as the non-legally binding ‘Dairying and Clean Streams Accord’ which was created following greater appreciation of the impacts of dairying on the quality of waterways (Fonterra Co-operative Group et al., 2003). According to Fonterra Co-operative Group et al. (2003) it is an agreement that all parties interested in waterway quality will work together to achieve clean, healthy waterways in dairying areas.

For smaller locally or nationally significant sites, landowners (either private or public entities) can choose to covenant significant areas under the Reserves Act (1977), which can protect areas from inappropriate development. Conservation covenants are legally binding agreements of partnership between landowners and the Crown’s representative to protect an area of value. Some disadvantages of this protection, particularly for working lands, include the potential problems of people wishing to gain public access to the land and the fact that the covenant can severely restrict or restrain what the landowner is able to do on/with the land. Public access is not always allowed, and sites require monitoring (even though the land is not publicly owned). Advantages include the fact that there is no purchase of land, the land is protected into perpetuity, it allows for flexibility of management style and public access is negotiable.

Wetlands of International Importance have another protection method available to them. This is by way of a Ramsar convention designation. The Convention on Wetlands of International Importance especially for Waterfowl Habitat, commonly known as the Ramsar Convention, provides a framework for the protection and ‘wise’ management of all wetlands. It is a voluntary, inter-governmental convention that allows signatories to list wetlands of international importance that the countries then promise to protect from improper use, development and to maintain its ecological integrity. This requires the designation of at least one wetland of international importance per country. Multilateral environmental agreements are the main way that global environmental concerns can be addressed (other examples are the Kyoto Protocol on Climate Change, Convention on International Trade of Endangered Species (CITES) etc.) (New Zealand Audit Office, 2001). New Zealand became a signatory to the Ramsar convention in 1976 (Hovell Environmental Planning, 2003) and had the honour of providing the first site to be recognised by Ramsar. New Zealand has listed a total of five sites; examples include the Firth of Thames and Waituna Lagoon. This treaty is administered by Department of Conservation under their powers

Pt2 s6(c) (iii) where they are required to provide ‘international co-operation on matters relating to conservation’ in the Conservation Act (1987).

The major disadvantage of Ramsar designations is that the designation actually holds no legal weight except whatever member countries choose to give it. This has meant that in many international situations, economics has won over the designation. New Zealand has given Ramsar no legal weight, except what Department of Conservation has in its own right. However, it has created the New Zealand wetland management policy which was adopted in 1986, which the Department of Conservation (created the subsequent year) is responsible for implementing. The objectives of the management policy are to ‘promote and protect wetlands, to maintain a wetland inventory and to promote public awareness of wetland values’.

3.4 The importance of wetland and riparian management

The world in which we live is a beautiful and fascinating place. It is also a cyclical place, for in nature everything is cycled, keeping the Earth in a perfect, albeit buffered balance. One of the most important cycles that the Earth keeps in balance is the hydrological (water) cycle. As Adams et al. (1989) explained one of the most important mechanisms in this cycle is wetlands. They have the capacity to retain water, control floods and erosion, purify water, recharge groundwater supplies, and this is completely regardless of their recreational and aesthetic values. Costanza et al. (1997) discussed how wetland areas provide important ecological services, which not only provides for our survival and well-being, but also directly and in-directly contributes to economic viability, all with no cost to the consumers.

Otago Regional Council (2005) stated that there are many reasons why riparian management is being promoted as a good method of improving waterways. It has been shown that the quality of water in waterways is significantly affected by what happens on the banks. This is largely because wetlands are extremely sensitive, far more so than terrestrial environments, to the activities of the surrounding area. Otago Regional Council (2005) said that this is particularly true when animals have direct access to waterways. Animals are capable of damaging the natural habitat, eroding or accelerating erosion of banks and markedly reducing the water quality. Hicks & Howard-Williams (1990) observed that managers of water quality, fisheries and wildlife have had a long-standing interest and concern in managing riparian areas and their vegetation because of their importance. Riparian management has long been endorsed by the Department of Conservation, and Fish and Game Councils as noted by Memon (1996).

In the past, most waterways flowed through forested catchments. However, the landscape is now highly modified. O'Brien & Department of Conservation (1995) commented that riverine landscapes now transect rural, urban and industrial developments, which have often been stripped of their natural features. Hicks (1997) observed that some waterways that pass through farmland still have high water quality, comparable to that of forested catchments. However, others have very poor water quality, with eroded banks, silted beds and weed infestations. Memon (1996) stated that the most detrimental land practices that are still commonly impacting on water quality include; burning, land clearance and drainage, top-dressing, grazing along waterways and spraying of pesticides. According to Otago Regional Council (2005), it is possible to help

minimise the risks posed to the water environment by many land uses by riparian management, as well as by enhancing farm and stock management. Memon (1996) commented that for the population of New Zealand, water pollution is alarmingly high, particularly in lowland agricultural and coastal areas.

Environmental concerns

When animals have free access to the water, faecal bacteria are deposited directly into the waterway. This can be reduced by simply fencing the animals out of waterways. Another issue created by animals in riparian areas, as was raised by Reeves & Champion (2004) is soil trampling, which reduces the ability of the riparian areas to function properly. Unfortunately (according to Hicks & Howard-Williams, 1990), riparian vegetation tends to be very lush and is very susceptible to grazing.

It is well documented (e.g. Environment Canterbury, 2005; MacGibbon & MfE, 2001; Otago Regional Council, 2005) that nutrients can also enter the waterway by direct, uncontrolled runoff. Waterways with high levels of nutrients can become eutrophic (overloaded with nutrients, often resulting in algal blooms, leading to loss of oxygen and a decline in aquatic life). The major contributors are nitrogen (N) often in the form of ammonia and phosphorus (P). Both phosphate and nitrogen are common components of fertiliser. Otago Regional Council (2005) noted that a vegetated wet area filters surface runoff and plants take up nutrients through their roots.

Phosphate causes problems because it supports high levels of algae and aquatic plants and is commonly associated with high levels of sedimentation in water bodies (MacGibbon & MfE, 2001). However, as noted by Otago Regional Council (2005), phosphate can be removed by as little as having a fenced grass strip, as phosphate is often 'attached' to soil particulates.

According to MacGibbon & MfE (2001) nitrogen causes problems because it creates prolific plant and algae growth, as well as sustaining high levels of ammonia in the aquatic environment which is toxic to fish and in extreme cases to humans also. Nitrogen can be taken up by all living plants that have roots interacting with groundwater, as well as undergoing denitrification in saturated soils (Quinn & McKergow, 2007). Parkyn & MAF (2004) and Quinn & McKergow (2007) both noted that the headwaters and riparian wetlands are particular hotspots for the

removal of nutrients. Nitrogen, in particular, can be efficiently removed by bacteria present in wetland areas accepting runoff or resurfacing groundwater (springs) (Otago Regional Council, 2005). It is less commonly mentioned that riparian areas also alter the microclimate of the surrounding area as well as filtering polluted air as was mentioned by Mander, Kuusemets & Hayakawa (2005).

Cuff & South Canterbury Catchment Board and Regional Water Board (1988) described how waterways with too much sediment are not conducive to healthy aquatic life, for example erosion and that the sediments then entering waterways have been known to detrimentally affect trout spawning. Sediment will enter waterways through runoff which without a vegetated riparian area has easy and direct access to waterways. Sediment entering waterways is a natural and normal process. However, as Trueman (2002) noted up to ten times as much soil is lost from pasture land as opposed to forested areas. However, runoff is slowed and reduced by the buffer plants which allows for the sediment to settle out, thus reducing the quantity that enters water bodies. It is well documented (such as Environment Canterbury, 2005; MacGibbon & MfE, 2001; Otago Regional Council, 2001) that sediment also enters through erosion when appropriate plants are not present. This is because plants bind together highly prone, unstable banks. Otago Regional Council (2005) described how riparian management has been shown to reduce bank erosion from as little as fencing animals out of the area, with greater results from more intensive riparian management.

Cuff & South Canterbury Catchment Board (1988) mentioned that hydroelectric lakes can have a real problem with sediment reducing their storage capacity. This is an issue which may not seem to be caused by small water bodies, but as the saying goes 'it was the final straw which broke the camel's back not the heavy load.' However, it would be an unusual farmer who was not concerned about their productive top-soil vanishing. Riparian management has been shown to help in the conservation of soil. However, according to Quinn & McKergow (2007), for effective management, dense groundcover is required, as well as active management to avoid channelisation and compaction, both of which will drastically reduce effectiveness of riparian areas. Faecal bacteria entering waterways through runoff can be unpleasant and hazardous, but can be substantially reduced by having basic riparian management such as a fenced grass riparian margin. Good riparian management can reduce stock losses and improve stock health and has also been shown to positively influence stock and grazing management.

Otago Regional Council (2005) observed that riparian vegetation shades streams and reduces the growth of nuisance plants as well as benefiting temperature sensitive freshwater species by reducing overall temperature. There have been concerns raised about the negative effects of shade in reducing available food for the aquatic environment. As a general statement, the benefits of low temperatures and habitat complexity outweigh the negative issues, particularly for salmonid production (Hicks & Howard-Williams, 1990). Hicks (1997) discussed how, having mature trees to provide shade, will also allow for diversity of income with timber production, and provide shelter and shade for stock. Parkyn & MAF (2004) described some other potential uses of riparian areas such as planting fruit or nut trees, high value native plants for future selective harvesting, or planting flax for weaving. Otago Regional Council (2005) commented that riparian management should also ultimately reduce the need for clearing of drains and other waterways.

Although wetlands are able to be drained, and often have been to produce fertile agricultural land, they have many other values. Smale (1983) commented that landowners and the general public are beginning to have a growing appreciation of these values. Planted areas enhance the farming landscape by creating diversity in the landscape. It is important not to underestimate the scenic value of a 'pleasant' farmed countryside to domestic and international travellers. As Smale (1983) commented that this is a fact that is recognised and protected in many other countries such as Austria. Unfortunately, one problem with trying to evaluate aesthetic values is that landscape appreciation, like beauty, is largely in the eyes of the beholder. Cuff & South Canterbury Catchment Board and Regional Water Board (1988) believed that clean, unspoiled lands and waterways are generally appreciated by most of society.

'Weaving resilience into our working lands: recommendations for the future roles of native plants' by Clover & Parliamentary Commission for the Environment in 2002 contained some very apt pictures regarding the working environment which were the basis of Figures 2 and 3 and these can be located at http://www.pce.govt.nz/reports/allreports/1_877274_05_4.shtml. Figure 2 shows an artistic representation of the current working landscape common throughout lowland New Zealand. The lowland rural areas are largely 'bland', exposed to the wind, and with little riparian vegetation. It could be argued to be perceived as mundane, and lacking in interest.

However, in Figure 3 there is an artistic representation of a working landscape that incorporates integrated management and sustainability principles. The tall vegetation will reduce wind speed, sheltering stock and crops. It has active riparian management which will maintain low flows, attenuate flood peaks and create diversity in the landscape, as will the established wetland. Sutherland (1987) theorized that four key elements of landscape design; unity, diversity, naturalness and mystery combine to create a satisfying outlook. Though the artistic representation is somewhat exaggerated of what is likely to be achieved, it shows what a diverse and 'interesting' landscape could be created.

One issue mentioned by Hicks & Howard-Williams (1990) which has been questioned, is that planting up riparian margins for landscaping reasons, particularly with trees, can restrict recreational activities such as access for angling. However, given that the planting of trees is likely to increase fish populations, it would be assumed that most fishermen would be willing to work a little harder to locate trails.

Increasing native wildlife

Rivers and gullies are natural corridors for movement of species, humans included. With suitable riparian vegetation, native fauna and flora are capable of moving between geographically separate areas naturally as is widely noted (i.e. Parkyn & MAF, 2004; Hicks & Howard-Williams, 1990; Simpson, 1995). Waterways provide an appropriate corridor to traverse a sequence of environments from the mountains to the coast. Otago Regional Council (2005) commented that these areas also provide habitats for native birds and insects while helping natural regeneration, requiring minimal human assistance due to the fertile topsoil and abundant water (Simpson, 1995). Riparian margins are areas of particularly high species richness, with many species present in New Zealand capable of living in or utilising riparian areas, including a high number of specialist riparian species such as the blue duck (*Hymenolaimus malacorhynchos*) and Marlborough weeping broom (*Notospartium carmichaeliae*) as was observed by Simpson (1995). According to Hovell Environmental Planning (2003), of all natural habitats throughout New Zealand, wetland areas support the greatest concentration of bird species as well as large numbers of plant species. The main disadvantage of these areas (as noted by Parkyn & MAF (2004) and Hicks & Howard-Williams (1990)) is that pest species (both plant and animal) also have the potential of utilising these corridors.

Otago Regional Council (2005) explained that many important fish species need riparian areas. They seek out areas that have cover under vegetation, banks overhanging waterways, or require riparian areas for spawning such as inanga/whitebait (*Galaxias* sp.). For anyone wanting to increase fish species, riparian management is vital, particularly for fish that are known to travel. This is because no creature capable of movement will stay in an inhospitable environment. Replanting will provide food sources, habitat and repair natural food webs as noted by MacGibbon & MfE (2001).

Industry concerns and/or requirements

New Zealand is renowned globally for its 'clean, green' image, but this is now being called into question. With good stream bank management, there is better product quality, and marketing advantages (as has been observed by many authors such as Hicks, 1997, Otago Regional Council, 2005). Being able to prove sustainable land management is likely to increase in importance in the future, and riparian management will certainly be part of that.

Where there is clean water, management of rural land improves in a very practical sense. Hicks (1997) discussed how clean water will produce fewer pipe blockages, particularly where water is drawn for irrigation or stock and this will reduce the wear and tear on pumps and spray-lines. This would be an additional benefit of riparian management. However, farmers, no doubt, would appreciate having less work tasks to complete and therefore makes it an area of interest to them at the very least. Organisations that draw their water supply directly from a surface water body are also likely to be interested in this side benefit of riparian management and maintaining existing riparian areas. Studies (such as the one by Adams et al., 1989) have shown that when, without being required to personally undertake management, people are informed of the benefits they feel that the benefits outweigh any associated negatives.

As Hicks (1997) said the ultimate aim of stream bank management is not to achieve pristine water quality but to improve areas of degradation, enhance wildlife habitat, create recreational opportunities as well as improving farm production and management.

Undertaking riparian management

In a lot of cases, there are alternative engineering solutions which could be used (such as screens, drainage channels, or mechanical clearance). However, these tend to have a limited useful lifespan and an unnatural impact on the environment. This has caused a shift in management practices towards strategies which integrate management into the environment with minimal impacts.

According to Otago Regional Council (2005) there are several key approaches to basic riparian management, all of which have their own advantages and benefits. It is important to understand that working in the agricultural environment is an extremely complex scenario. There is no one solution that will fit all situations. Table 1 summarises the benefits that can be gained by the potential management strategies for riparian areas. As mentioned previously, not all the points will suit every circumstance. They will depend on the land, the existing land use and the intended goals of management

3.5 Cultural Concerns

'In the same way that the waves and wind wash footprints from the sand, a walk on the shores of a lake seems to wipe clean our souls and gives our minds a clean slate'

– Jeff Rennie

MacGibbon & MfE (2001) once said, that clean water is a vital element for all human life but to people of all cultural descents, water is so much more than just a physical substance. This was reaffirmed by Trueman (2002) who described water and the natural areas surrounding water as part of the past, present and future. As was noted by Sullivan (1998) many great civilisations have only been possible because of their dependence on water. The quote at the beginning of this section shows the presence of water uplifts refreshes, and cleanses the soul. Water has inspired many through the ages as is shown by the 'Water Music' written by G.F. Handel or the poetry collections such as 'Water Voices' by L. Norris.

The growing recognition of this 'use' of water is becoming more evident in the increasing incorporation of water into the working and living environment after a period of diminished use. Cultural concerns also include the importance of intrinsic values. As Astbury et al. (1988) said this is the recognition that nature has the right simply to exist. He goes on to say that it is not required to do anything for us, for it to deserve to be there. Astbury et al. (1988) also said that regarding intrinsic values is to consider a valuation that is separate from and not dependent upon human valuation. He suggested that concepts like this are difficult for society as a broad group to understand and are unlikely to be easily accepted.

As more water resources are developed, the remaining unmodified water bodies become more valuable with each new development. Wet areas are important recreational areas for many people (e.g. fishermen, white baiters, waterfowl hunters, water sports and for people wanting to enjoy natural areas). These areas are often unrecognised for their overall societal importance, particularly not when considered in the wider picture of water resources.

However, for New Zealanders of Maori descent, water holds particular cultural attachment and responsibilities. This is widely documented as being prominent in later traditional and contemporary Maori society (see for example Hovell Environmental Planning, 2003). Such an attachment is many faceted; it ties into the Maori spiritual view of the world, gives Iwi (tribal groups) and hapu (sub-tribes) a sense of identity and place, and is very commonly a source of food (mahinga kai) enabling the offering of suitable hospitality to guests. If the degraded areas once supported particularly significant species of food or cultural resources (i.e. a fish species only found in that area), then the degradation of these areas by external forces is a major insult to the Iwi or hapu and leads to a sense of humiliation for these groups that they can no longer provide their 'best' for guests.

Riparian areas also provide a link to their past by way of retaining the cultural and spiritual connections with their ancestors and early Maori communities, and tauranga waka (canoe landing) sites. According to O'Brien & Department of Conservation (1995), many important events took place at or near wetland such as burials and thus have preserved some lost relics of our Maori heritage. Parsonson (1988) drew attention to the belief of descendants seeking blessings from tribal rivers such as the Waikato. Is this really so different to Indian nationals seeking blessing from the Ganges and thus should it not be given similar honour and protection? As the recognition of the importance of Maori culture to New Zealand society increases, so does the importance of mitigating any insult to what is held as important to them. To this end, riparian management has also increased in importance. However, as with other 'New World' societies, there are long-standing grievances and racial disputes over ownership and management of environmental resources.

MacGibbon & MfE (2001) discussed the Maori perception that each waterway has its own mauri (spiritual life-force), mana (roughly equating to prestige or respect), and most have at least one Taniwha (spiritual guardian of water bodies, commonly regarded as being a type of water monster). These can be severely damaged or degraded if riparian areas are no longer intact. From an ecological perspective, any living species including those species valuable for food or cultural resources are likely to be damaged or diminished from previous levels if the riparian area has been altered substantially. According to Taylor & Patrick (1987) the Maori people place many values on water which are non-technical, non-scientific and in the most practical sense, immeasurable. Water and associated resources are believed to confirm life to man, and form the

basis of their identification, belonging and mana. This all stems from original Maori cosmogony which has humans as a part of a personified, spiritually imbued 'environmental family' where humans are related to all other parts of the natural world as is discussed by Roberts et al. (1995). The most notable differences between Maori and non-Maori views on the importance of water for its various uses are displayed in Figure 4 which was taken from a paper present in '*Soil and Water*' (23(4)) under the title 'Look at water through different eyes - the Maori perspective'. *Soil and Water*. by Taylor & Patrick in 1987. It portrayed concepts displayed on a continuum based upon whether the concepts were considered more important to Maori or Non-Maori sectors of society. Concepts sitting on the middle line are ideas that are of similar importance to both of these world views. It shows that many features such as wilderness, meditation, cleanliness and beauty are values held in common, while recreation is more a non-Maori concept. On the other side values relating to tradition, mana and life force are more important to Maori.

There is some debate within the literature about the importance of tapu (sacred or restricted areas) and rahui (temporary bans) to Maori tribes. Many note that tapu were extremely strong religious barriers, that few would dare to breach for fear of divine retribution such as failing harvests, losing in battle, and in the specific case of water resources, incurring the wrath of the Taniwha, or failing that, human retribution (as discussed in Roberts et al., 1995). However, records from the Maori Land Court note that pre-1840 (before Christian missionaries arrived) hapu used these merely as practical and hostile, not spiritual or religious, ways to try and prevent would-be rivals from gaining access to areas such as shellfish beds, fishing grounds, eel weirs, beaches or means of access to them. According to Parsonson (1988) strong hapu were known to pay scant attention to even the perceived strongest tapu if it did not suit their purposes.

O'Brien & Department of Conservation (1995) said that 'New Zealand's natural areas are an irreplaceable treasure, a taonga (something of extreme value, not necessarily physical), to be handed unspoilt from one generation to another.' With changing community values there is now a need to consider the quality of the environment, regional development, social well-being, including recognition of issues of cultural importance, as well as considering national economic development. This is because many non-Maori New Zealanders are now embracing the Maori world view. The Maori perception of natural resource management is perhaps best summed up in the following quote, reminding us that we are called to be wise custodians of the land, because we only briefly here.

Whakangarongaro te tangata toitu te whenua – Man passes but the land endures from Greenaway, Department of Conservation (Tongariro/Taupo Conservatory & Tongariro Natural History Society, 1998).

3.6 Riparian Management

Who is doing riparian work and why?

There are many reasons why people and organisations undertake riparian management. Forgie et al. (2001) suggested reasons often included the following:

- statutory responsibility
- legal requirements
- mitigation activities
- to proactively protect something deemed important or of value to either individuals or organisations, such as
 - ➔ improving fishing
 - ➔ returning native birds to an area
 - ➔ improving water quality
 - ➔ reducing erosion.

Overall riparian management appears to be increasing throughout New Zealand in both popularity and awareness. This section will discuss the major players leading the charge.

Regional councils

Regional councils have been given responsibility under the Resource Management Act (1991) for managing national waterways. They are responsible for the continued well-being of our waterways. If this research demonstrates nothing else, it would be hoped that it shows that managing even a little of New Zealand's wet areas is not an easy or simple task. Regional Councils are also in charge of responsibly managing the demands on our waters for all purposes (industrial, domestic, agricultural, and environmental purposes).

Water bodies containing and distributing the finite and limited amount of water must maintain a delicate balance. There is a constant danger of treating waterways individually which can allow for the regional balance to be disrupted and important public values destroyed. However, Memon (1996) expressed the belief that Regional Councils also tend to be cautious in taking a strong stance on riparian management. This was suggested to be because they do not wish to be

perceived as too interventionist by sectors such as the farming community. Regional Councils often create environmental educational information. Naiman, Décamps & McClain (2005) noted that particularly for riparian areas and systems, where new discoveries continue to be made, it is a daunting task to try and synthesize the vast collection of literature into any form that can be readable and understandable for the general public.

Central and Local Government

The Government (meant here in the most general sense of overall governance) is responsible for managing the long term survival of our society. However, this includes (in a broader sense of responsibility), being concerned about the ecological systems that provide services and natural capital stocks critical to the life-supporting functions of the earth. Smale (1983) perceived that the government is also technically responsible for protecting the tourism industry which is unconsciously highly dependant on a 'pleasant' environment including wetlands. Davies et al. (1997) described how some councils run programmes for managing wetland areas such as the community based 'Waterway enhancement programme'. This is based at the Christchurch City Council, and the team includes a co-ordinator, a landscape architect, an engineer and an ecologist.

Not surprisingly developers and landscape architects have taken an interest in riparian and wetland planting and restoration because water always provides a focal element. With more modern developments, storm water retention areas are often needed and riparian planting can make a normally sterile and purely functional area into an 'attractive' feature. A good example of this can be found at the Wigram Retention Ponds in Christchurch.

Landowners

Farm management can also benefit from riparian replanting of natives, and farmers may also have a better environment for recreational pursuits, sports and a working landscape that is visually enhanced. Who wants to work and live in an unattractive setting? Everyone would appreciate a pleasant work environment. There are many substantial benefits for landowners managing their wetland areas, but it can be one extra demand on a farmers' time. According to Marchand (2006) farmers feel that requiring riparian management is an unreasonable pressure

which does not regard their financial struggles, particularly when the land can provide valuable feed during periods of drought. Also, there is the somewhat confusing and daunting mass of information that can be obtained. Despite this, some landowners have done amazing things on their properties. The pride they feel justifies any struggles along the way. They, at least, feel they have reaped the benefits. The number of landowners who are covenanting significant areas of their lands to protect them and their dreams for the future is encouraging.

Unfortunately, there appears to be a perception amongst landowners and many rural professionals (according to MacGibbon & MfE, 2001) that investing in riparian management results in a decline in farm productivity. In other words, the costs have little chance of returns and riparian management is an obstruction to farm management. The message that farms benefit directly from improved soil and water management practises is not yet common knowledge. MacGibbon & MfE (2001) believe that many landowners have misconceptions arising from inaccurate or incomplete information about water and riparian management.

They have identified four areas where they feel that landowners require more empowering knowledge. These are;

- To have the information to understand how water becomes contaminated instead of being told what remedial actions to take
- To become active participants in the development of solutions and alternative management practises
- To have access to a range of management options so they can choose the option best suited to their financial and farm management situation
- Positive results can only be achieved through consultation and voluntary approaches rather than regulation.

Marchand (2006) reaffirmed that there was a strong feeling by landowners against being told what to do with their land, as well as a prevalent distrust of external agencies. This is a sizeable hurdle for the progress of riparian management.

Community groups

One of the reasons that involvement of community groups in conservation issues is so important is that there appears to be an increasing call and movement for public involvement in important issues such as caring for our planet. Simpson (1995) suggested another reason, which is that many river and wetland margins are in public ownership or traverse many land titles and that all water is publicly owned in New Zealand. In other words, they are not anyone's private responsibility and are available for the public to become involved in. Simpson (1995) noted that it is a widely held belief that the only way there can be feasible ecological restoration in anything other than individual, small-scale situations, is for the concept to achieve community support. The conservation philosophy must be believed by the community for it to be sustained, though currently the attitude is struggling to remain in peoples' minds. Penny (1988) observed that those who do persevere often face formidable legalistic barriers in trying to protect and stand up for what is ultimately the survival of our species.

Another very important community power is recreational fishermen. According to McMillan (1992), anglers are keen waterway conservationists because it is in their best interests to keep waterways healthy. If all types of fishermen realised how closely their industry or hobby is linked to the condition of wetland areas, it would be hoped that they would also be compelled to act. This is because, as was noted by Finlayson & Moser (1991), two thirds of all fish that we use in any form, require wetlands for at least some of their life.

Of course, in many cases the people involved fall into more than one of these categories. After all it would be hoped that most environmental resource managers employed by government organisations would also have a high personal interest in environmental well-being.

Multiple uses and end goals

In a lot of cases it is possible that interested groups have multiple end goals in mind for what their planting work will achieve. Committees are created for this reason. Any body of people is always going to have some difference in opinion within their group and those differences need to be expressed. In ideal situations, these would be incorporated into decisions. Some examples of multiple uses are involving a landowner wanting to improve their farm management and have a

good fishing spot, or a conservation group wanting an area to attract birds and be aesthetically pleasing. Because of this, it is important not to just consider how one section of society might deal with riparian management but to realise that there are many different goals and solutions. Broughton (1976) noted that the disadvantage of multiple end goals or uses is that there is always an increasing competition for resources, and that means that situations are often delicate and require multi-objective planning, as well as a realistic view on how much can really be achieved.

Integrated management and Industry Innovation

One of the more notable actions has been undertaken between Fonterra Co-operative group (the organisation responsible for dairying in New Zealand) and the Regional Councils with the voluntary and industry-led 'Clean Streams Accord'. This was designed to send an important message to consumers and the general public about the importance of environmental management. Dairying is well known as an important land-use in New Zealand, resulting in 20% of New Zealand's total export income (Fonterra Co-operative Group et al., 2003). However, it is also one of the most intensive land uses with potentially significant impacts on water environments, especially with the increasing intensification and expansion of dairying. It is an accord that is only relevant in dairying areas but is, by participating organisations, believed to be capable of achieving a real difference while still being cost effective (Fonterra Co-operative Group et al., 2003). Although the accord is intended to be adapted for different areas (reflecting the different catchment characteristics) there are some overarching priorities including:

- Excluding 90% of dairy cattle from waterways and their banks by 2012
- To appropriately manage effluent (90% by 2012)
- Manage 100% nutrient losses to ground and surface waters effectively by 2007
- To protect 90% of significant wetland areas by 2007

(Fonterra Co-operative Group et al., 2003).

This accord, if it actually works, has the potential to achieve greatness, raising the mark for the industry and setting an example to similar industries. The fact that it was created in the first place shows that wetland area management is making its way into public and corporate knowledge.

Hindrances against Riparian Management.

Professional views

It would appear that environmental practitioners from all organisations are expected to have the knowledge and understanding about how to best manage wet areas. However, it would be dangerous to assume that this is necessarily correct. If managing water resources is outside their field of study or primary area of work, environmental practitioners could lack consistent knowledge, and still be called on to supply technical advice. This is not a problem in itself, because they can always ask another professional. However, if their advice is inaccurate then it could do more harm than good. Therefore it is important for organisations to ensure that their staff are in possession of correct and relevant information, requiring continuing professional development.

Environmental practitioners also have the possibility and perception of being arrogant in their knowledge. This is a dangerous perception for anyone trying to work with communities. Public participation is not an easy area to work in. It often demands unusual hours or even giving up personal time to meet the needs of the community that they are trying to serve. It has been documented that some environmental practitioners do feel that resource management could be easier if they were not required to involve the public and could just get on with their jobs. Others, however, see the great potential that is lying in wait within the community, such as volunteer labour, other professionals with a passion for community causes (such as lawyers, horticulturists etc.) and the determination to continue, in a way that is not dictated by budgeting cycles.

Community views

O'Brien & Department of Conservation (1995) felt that community views are not well understood because their views are often linked to emotions, which are hard to describe and quantify. This is perhaps more difficult than understanding cultural views because they are protected (even if sometimes difficult to define) in legislation, whereas how does one protect views such as 'it makes me feel happy to see the river looking nice'. There are many initiatives from community groups. However, in some cases there is an extreme level of fear mainly directed against the 'authorities' in general. There appears to be a belief (observed by O'Brien &

Department of Conservation, 1995) that once communities have done all the work, the ‘authorities’ will take the land from them. It was noted that this belief exists to the extent that communities may choose not to do anything rather than risk losing their land. This, sadly enough, is a sentiment echoed by large portions of the rural workforce. O’Brien & Department of Conservation (1995) explained that rural communities do not wish to see water margins publicly owned, preferring to have them in private ownership and responsibility, and have ‘authorities’ provide no more than education on riparian management. Though in this situation there is also a pervading fear of the ‘authorities’ letting them keep their land but taking control of it.

Riparian Management Guides

Riparian and wetland management guides are sources of information about managing riparian areas. They are often, but not exclusively, available in a printed form and increasingly on the internet. They are produced by organisations that have an interest or statutory requirement to encourage riparian work, such as the Ministry for the Environment, Department of Conservation, Regional Councils or Dexcel. O’Brien & Department of Conservation (1995) suggests that it has been known for some time that there was an increasing gap between the scientific knowledge of riparian management and the ‘putting in practice’ of this knowledge, this no doubt is what has spurred on the increase in the number of riparian management guides available in recent times. There are now very few regions of New Zealand that do not have riparian management guides of some description.

Summary

There are many reasons why people might undertake riparian management. These include diverse interests from environmental, to cultural or business concerns. Riparian management is slowly becoming more popular as a water management technique (in contrast to engineering solutions). When interested groups do invest in riparian plantings, they often have more than one end goal in mind. To assist people, it is important that accessible and understandable information is available to them. To this end, organisations involved with water management have produced riparian management guides to try and meet these needs.

3.7 Communication Theory

'Communication occurs when, the right person, says the right thing, to the right people, at the right place, at the right time, and in the right way to be heard and understood, and to produce the desired response' – Nido R. Qubein. (From The Main Report, 1998).

Communication is the ability to transfer information and views from one person to another through some medium (writing, speaking or visually). Probably for most people, sending and receiving information is instinctive. To others, such as in the advertisement or public relations industries it is far more constructed. Ludlow & Panton (1992) suggests that as humans we communicate to achieve greater effectiveness, to inform others, to get others involved, to build relationships, to improve understanding and to try and implement change. It is important to note that whatever medium the information passes through, information is prone to distortions, misinterpretations and communication barriers.

Fraser (2002) suggested that many issues influence whether or not recipients will accept a message from any medium. These issues include; personal relevance, level of literacy (if written), education, as well as cultural and social factors. All of these can prevent information from being successfully transferred. Just because the information is divulged does not mean it is heard, understood, or accepted. These (according to Ludlow & Panton, 1992) barriers are commonly of three types; barriers to reception which can include issues such as pre-conceived ideas, opinions or understanding; barriers to understanding such as language used, length of communication or status (and cultural) issues; and finally barriers to acceptance which include prejudices or interpersonal conflicts. Figure 5 can be located in *'Essence of Effective Communication'* by Ludlow & Panton, 1992; and portrays how all these issues interact to interfere with the appropriate conveyance of a message.

It is often a problem that communicators send a message they themselves would receive rather than the target audience, adding to the barriers of communication (The Main Report, 1998). Ideally, anyone trying to effectively communicate needs to try and minimise the barriers, though they are impossible to completely eliminate.

Ludlow & Panton (1992) identified six simple points to follow

- Who is the message for?
- What are the motives for this communication?
- Clearly communicate the key points, avoiding ambiguity
- When is this likely to be best received by the target audience?
- What is the best medium to convey this information?
- What language will be best understood by the receiver?
- Check with the target audience how well it is being received.

The Main Report (1998) highlighted that another important area to consider is the three main sensory modes that people use to understand their world. These are visual, auditory, and kinaesthetic. Most people are visual (about 50% of people) who like shortened information like bullet points or checklists with visual displays such as charts and tables. This is the standard European manner. Auditory people (about 20% of people) receive information by people talking with them, using stories to illustrate points and avoiding too much visual information. This is preferred by oral cultures such as Maori. Then there are kinaesthetic people (about 25% of people) who are hands-on, show them the problem and how to solve it, minimise written or verbal communication and emphasis the message in terms of feelings.

According to the New Zealand Audit Office (2004), communications can be a delicate and risky area. Careful consideration must be given to the exact way to convey information and to transfer it with no room for ambiguity which could lead to conflict or misrepresentation. Despite this, it is important to communicate. It is not only a legal requirement, it is morally responsible to inform and consult people about issues that will affect them directly, and though the bulk of any population will always be non-participants, people want to be informed. As suggested by the Ministry for the Environment (1992), communications and consultation should not be manipulative, but allow for people to make reasonable and rational decisions based on the available information. Booth (1984) made the useful suggestion that anything written should always be done with the intention that someone who is not a native speaker will be able to understand the information. Added to this, in New Zealand it becomes important to convey the information in a culturally 'appropriate' manner. Those of European descent most commonly expect to receive information through a written medium such as reports, pamphlets or media

articles. Whereas those of Maori descent feel it is more important that the information passes through the oral medium. They are more likely to want to hear the issues explained by a person of suitable knowledge (such as managers, planners, or scientists) and to allow for issues to be explored through debate as was observed by James & Department of Conservation (1991).

Simpson (1995) is concerned that the community at large lacks the understanding and commitment to the conservation ethic. This is because the public attitude to important issues (such as general conservation) determines what will be tolerated. Studies have shown that there is a vast quantity of information on undertaking riparian management but very little of this knowledge has become firmly rooted on a local level or even entered the realm of policy and planning (Simpson, 1995). Also, as mentioned by O'Brien & Department of Conservation (1995) there is also concern that inaccurate information may be influencing public attitude. Word of mouth has incredible power, in rural communities particularly.

Fraser (2002) noted that in New Zealand, brochures are the most common communication means, as they are relatively low-effort and cost-effective. However, a false assumption that frequently accompanies the production of brochures; is that once distributed, the message will be read and accepted. As a printed product the information can be read and responded to, but the message can also be easily avoided (Fraser, 2002). Though brochures are a popular means of communication, the study by Fraser (2002) showed that the positive effect on attitudes and perceptions was limited and brochures caused no increase in environmental knowledge.

Cuff & South Canterbury Catchment Board and Regional Water Board (1988) wrote following the knowledge gained during the major soil conservation era, that it was believed that it was important to transfer information on four levels – National, Regional, Local, and Individual. These four levels have different methods to use for appropriate communication. On the National level, the mass media (such as television, radio, or newspapers) can be utilised to provide general facts about the depletion of natural resources and what can be done. National concerns also allow for the use of the education system to instil values. McKeown et al. (2002) said that it is widely believed that if issues of national importance such as soil conservation and water quality (including riparian management) are to make a difference for a sustainable and long-term change, they need to be included in the basic education system. On a Regional level, information can be specific to issues affecting the area and can make use of field trips and open days, media articles,

liaising with schools for talks or field trips, displays and regional multimedia. On a Local level, interest groups can be interacted with directly, discussions can be held with landowners, and demonstrations are possible as well as a presence at local shows (Cuff & South Canterbury Catchment Board and Regional Water Board, 1988). The Ministry for the Environment (1992) suggested positive ways to inform communities such as;

- Advertisements
- Public notices
- Community notices
- Media articles
- Mass mailing – in limited circumstances.

Cuff & South Canterbury Catchment Board and Regional Water Board (1988) said that on the Individual level, one-on-one advice and demonstrations can be given, financial incentives provided, or indirect financial aids such as supplying trees, or free landscape design, or non-financial aids such as conservation awards can be created. The Ministry for the Environment (1992) also suggested using personal mediums such as targeting community leaders, contacting special interest groups who can then carry the message, or having manned information services available.

It is paramount that all communications (according to the New Zealand Audit Office, 2004), particularly by organisations that people naturally turn to (such as Governmental departments) be based on accurate and ascertainable facts. Information needs to be complete to allow for appropriate assessment, objective, unbiased, fairly expressed and free of exaggeration as well as being politically neutral. As suggested by the New Zealand Inland Revenue Department (1998), it is important that the information is as clear and concise as possible without involving unnecessary information. Information should be conveyed using the most appropriate medium of communication, and above all that any organisation producing information should be as transparent as possible, with integrity of purpose and without hidden agendas in their communications.

‘Communication begins when the receiver seeks a message, not when the sender sends it. People expose themselves to messages they want to hear and nobody can influence the attitudes of others. We can tell people what to think about, but not what to think’ – Max Bowden. (From The Main Report, 1998).

Chapter Four: Results

This chapter is composed of four parts. 4.1 presents the results of the first research question that is ‘what interested parties want in a guide prepared for their use’. This main question was further divided into four sub-questions within this. Question One (How will it be presented?), Question Two (What information does it contain?) and Question Three (What forms will it be in or how will the information be accessed?). These all begin with a table displaying the top characteristics for each of the smaller questions. In these tables are the number of occurrences of each characteristic from all participating groups. These are followed by a series of graphs for different aspects of each of the smaller questions, the values for these questions are the number of times the characteristic has come up in a group divided by the number of participant groups in that category. These values were then divided by the total number of groups to determine the overall average importance. Question Four is displayed by three tables for each category of people in the research.

4.2 looks at the question ‘Does the information nationwide meet the needs of the interested parties’. This was done by looking at the organisations that were mentioned during this research as being places or organisations where people would look to for advice. This part contains four tables showing which organisations have information on riparian management followed by a graph showing which organisations are the best to look to for information.

In 4.3 the information from 4.1 is used to create criteria for any organisation producing guides for the management of wetland and riparian areas.

Lastly, 4.4 uses the Criteria created in 4.3 and the information gained in 4.2, to determine if the information available in Canterbury is meeting the needs of the interested parties.

4.1 What interested parties want in a guide prepared for their use

A full list of what each organisation considered would be ideal for their groups' riparian management guide is in Appendix 5; this should be regarded as the views of individuals and should not be used to imply that this is the view of the whole organisation or group. For analysis, all the groups were divided into three categories depending on what sector they best represented. The groups that were listed as 'Urban' were Lincoln Community Committee, Christchurch Estuary Association Inc., and the Young Mothers group. Groups that made up the 'Rural' category were Glenroy Farmers, Selwyn group, and the Wright's Stream group. The final category was 'Interest' and was composed of people who had some interest in the management of waterways but were unlikely to be directly involved in a riparian management situations in the near future. The Otakau Holiday Homes group, Lincoln Environmental Organisation (linked to Lincoln University), North Canterbury Forest and Bird and the New Zealand Primary Industry Management group were in this category. Eight of the groups were made up of representatives of lowland Canterbury with the exceptions of the New Zealand Primary Industry Management group (South Island rural consultants/professionals), and the Otakau Holiday Homes group (Previous residents of lowland Canterbury).

Table 2: Division of groups for the purpose of comparison.

<u>Groups</u>	<u>Participant Groups</u>			
Urban	Lincoln Community Committee	Christchurch Estuary Association Inc	Christchurch Young Mothers group	
Rural	Glenroy Farmers	Selwyn stream care group	Wright's Stream group	
Interest	Otakau Holiday Homes group	Lincoln Environmental Organisation	North Canterbury Forest and Bird	New Zealand Primary Industry Management

Question 1: How will it be presented?

<u>Table 3: Most Important Ideas for Presentation</u>	Totals
Pictures	8
Diagrams	7
Simple/Easy to understand	7
Colourful	5
Bullet points	4
Easy to read	4
A4 size	3
Glossy/Water resistant	3
Half an A4 size (A5)	3
Photos	3
Short	3

Table 3 shows the ideas that received the highest rating of importance. The total is the number of participant groups who listed this as being important to them. A full list of all ideas given by the groups can be seen in Appendix 5. Table 3 shows that the most important criteria is ‘pictures’ which has the highest frequency (8 of 10 groups thought it important). The next most important ideas were ‘diagrams’ and information that was ‘simple and easy to understand’. These three are likely to be the most important concepts as all the remaining ideas are at or below half the groups in agreement. However, other concepts included were that the ‘guide should be colourful’, ‘be in bullet point form’, ‘easy to read’, ‘A4 size’, ‘water resistant’, ‘half A4 (A5) size’, ‘contain photos’ and ‘be short’. It is interesting to note that three groups thought that ‘A4 size’ would be best, and yet an equal number thought that it should be ‘half A4 (A5) size’.

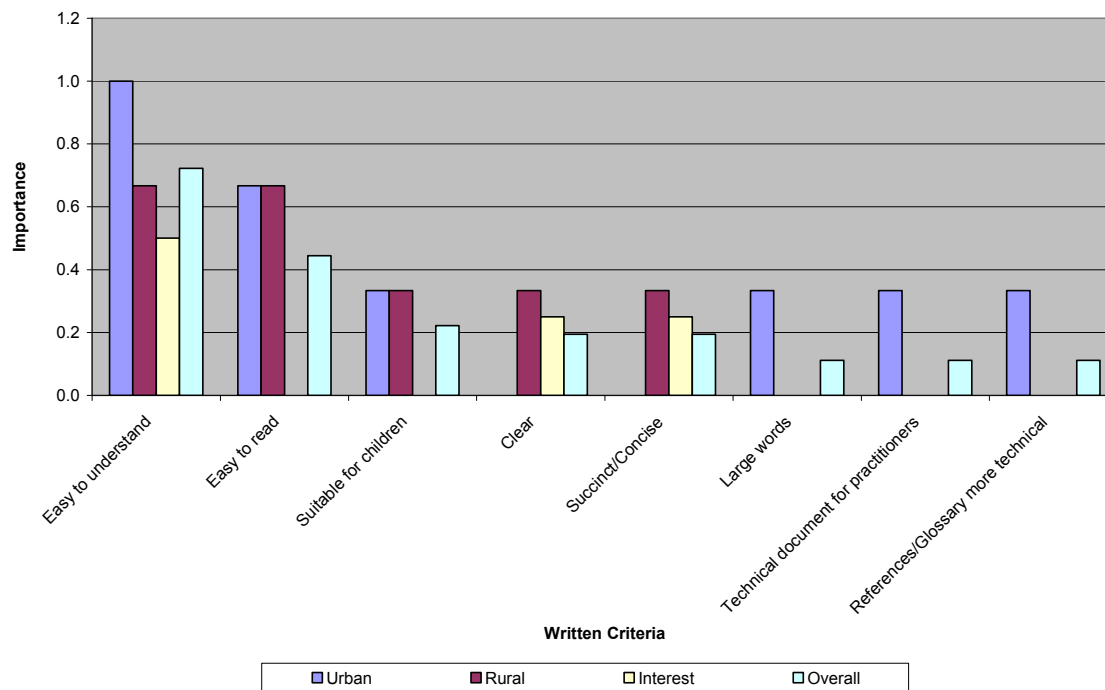


Figure 6: Written Aspects of Presentation

Figure 6 shows the written aspects of presentation. All groups felt that it was important for the guide to be ‘easy to understand’. This is shown as having high levels of importance with individual groups and also the groups’ average. The Urban and Rural groups both indicated that they felt it was important to have the guide ‘easy to read’ and also to be ‘suitable for children’. The Rural and Interest groups placed importance on having the information in a ‘clear and concise’ fashion. Only the Urban group felt that having the ‘writing in large font’, having ‘further information at a higher reading level’ or ‘specific separate documents for practitioners’ as important. Overall, the writing should be ‘easy to understand’ which was seen as the most important with an average of (0.7), this was followed by the information being ‘easy to read’ at (0.4).

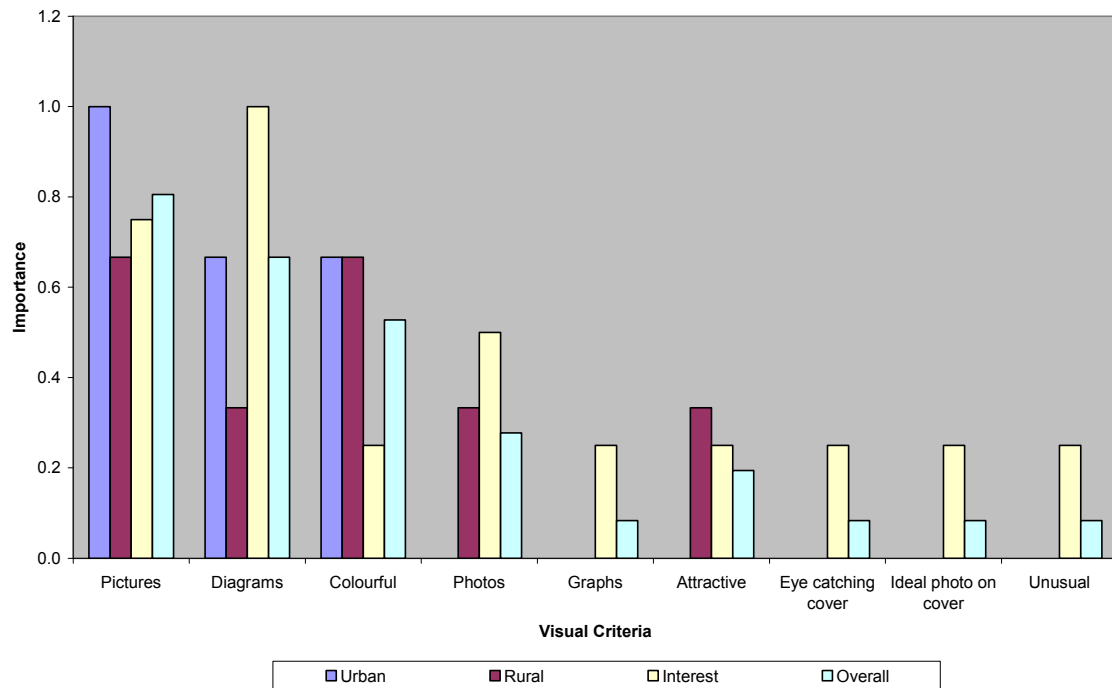


Figure 7: Visual Aspects of Presentation

Figure 7 displays the visual aspects of presentation. All groups felt that the guide should have ‘pictures’, ‘diagrams’ and be ‘colourful’. There is a strong feeling of importance for ‘diagrams’ to be included. Both the Rural and Interest groups felt that the guide should be ‘attractive’ and ‘have photos’. The inclusion of ‘graphs’, having an ‘eye catching cover’, ‘having an ideal picture on the cover’ and being ‘unusual’ were only regarded as important by the Interest group. In terms of averages ‘pictures’ were seen as the most important (0.8), closely followed by ‘diagrams’ (0.7).

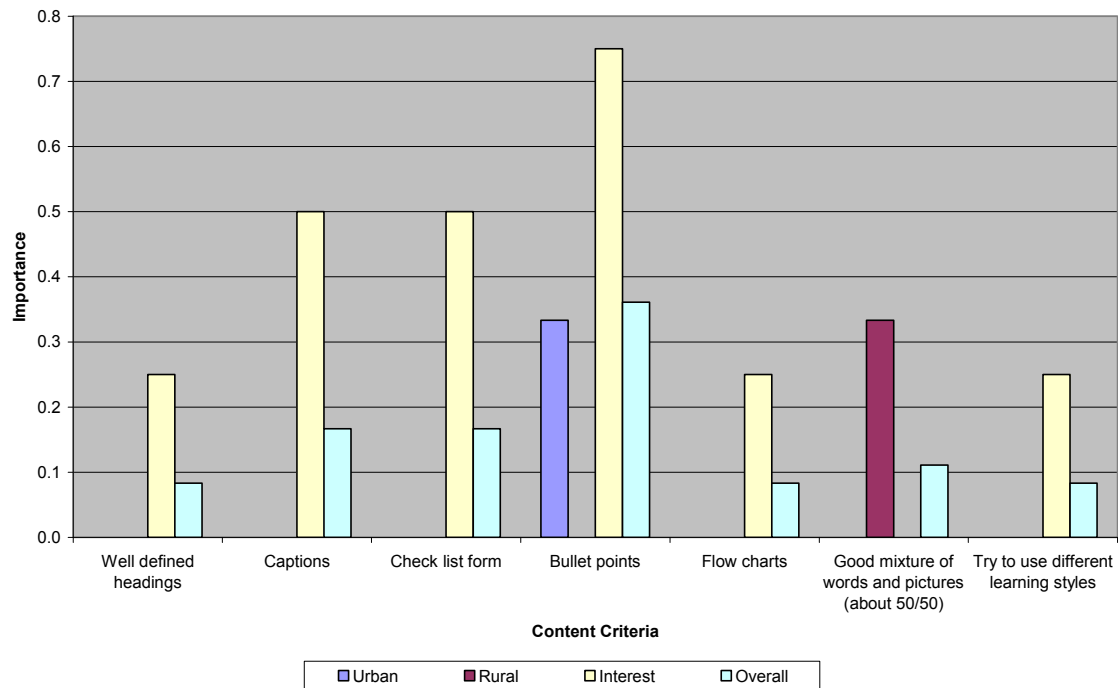


Figure 8: Content Aspects of Presentation

Figure 8 shows the importance of the content aspects. This area had little in terms of consensus of importance. Interest group had the most ideas, but only shared the criteria of ‘bullet points’ with the Urban group. The Interest group placed quite strong importance on ‘captions’ and having the information in ‘checklist form’. There is some feeling of the importance for ‘well defined headings’, ‘flow charts’ and trying to ‘use different learning styles’. The Rural group felt that a ‘good mixture of words and pictures’ was important. For the averages, the importance of ‘bullet points’ came out as most important (0.4).

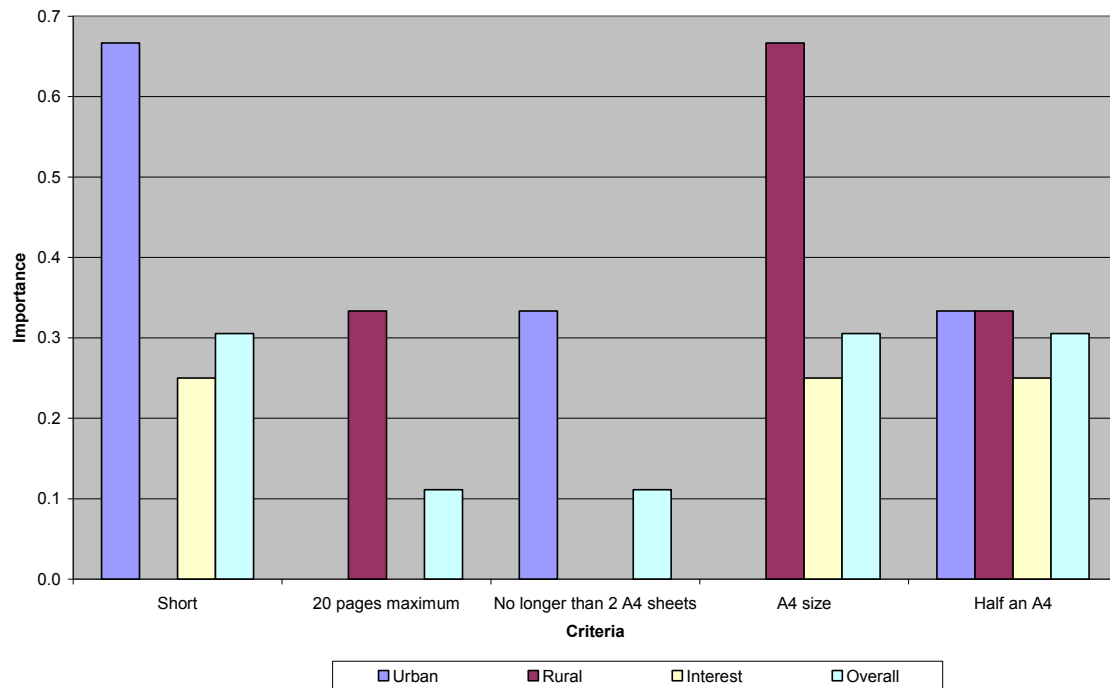


Figure 9: Size Aspects of Presentation

Figure 9 displays the size aspects of presentation. All groups felt that ‘half an A4 (or A5) size’ would be an appropriate paper size. Rural and Interest groups felt that ‘A4 size’ would work well but there was a stronger feeling from the Rural group (0.7). Urban and Interest groups felt that the document should be ‘short’ and with the stronger feeling being displayed by the Urban group (0.7). The Rural group felt the document should be ‘20 pages as a maximum’ while the Urban group felt that ‘no longer than 2 A4 sheets’ was a good length. In terms of averages, both ‘A4 size’ and ‘A5 size’ came out at 0.3. The importance of it being ‘short’ also came out at 0.3.

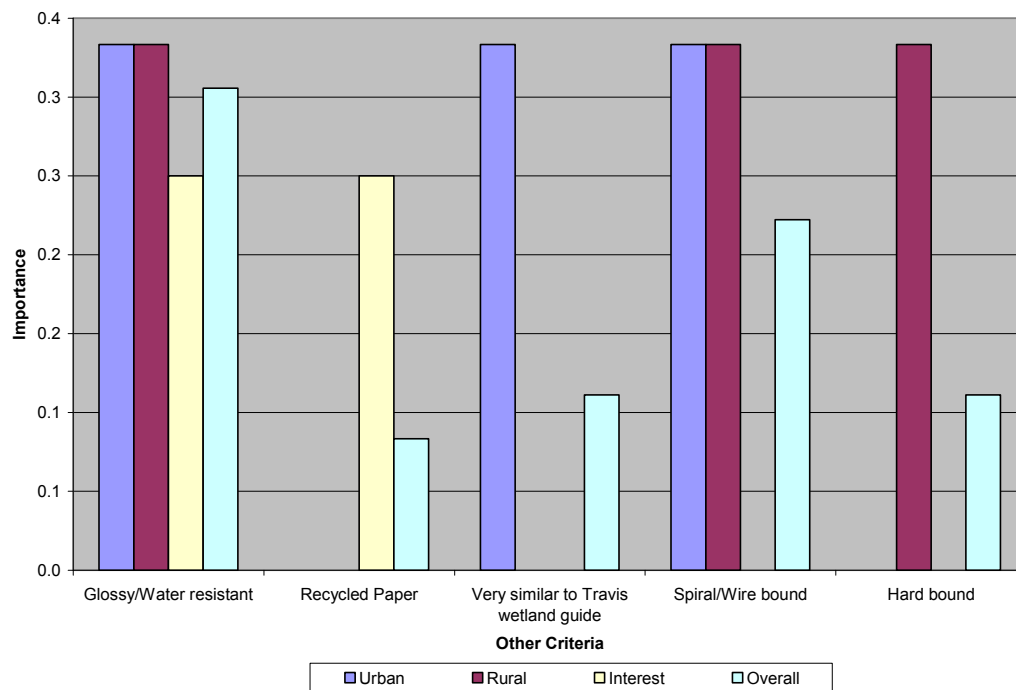


Figure 10: Other Aspects of Presentation

Figure 10 shows the importance of other aspects of presentation. All groups felt that it was important for the guide to be ‘glossy or water resistant’. Both Urban and Rural groups felt that it was important to have the guide ‘spiral or wire bound’. The Urban group thought that producing a guide in a similar style to the ‘Travis wetlands’ guide would be desirable. The Rural group felt that a ‘hard bound’ guide would be important. While the Interest group suggested that using ‘recycled paper’ for a guide was important. In terms of averages, being ‘water resistant or glossy’ was most important (0.3), followed by ‘wire or spiral binding’ (0.2).

Question 2: What information does the guide contain?

<u>Table 4: Most Important Ideas for Desired Information</u>	Total
How to guide/appropriate methods	7
List of plants	7
Maintenance issues	7
Further information	6
How to contact experts	6
Area specific	5
Planting zones	5
Real stream success example	5
Reasons for cleaning up waterways	5
Resources available	4
Vision of what waterway could be like	4
Weed list	4
Where to get plants	4

Table 4 shows that there was a high level of consensus with nine criteria being above the 50% mark (five out of 10 groups in agreement). The top three ('appropriate methods', 'list of plants', 'maintenance issues') were at seven. However, this could mean that an entire group had disagreed with the point. 'Further information' and 'how to contact experts' are both at six. Having the guide being 'area specific', 'displaying planting zones', 'explaining reasons for cleaning up the waterways' and 'a real stream success example' all sit on the boundary of five. Finally at four are a 'vision of what the waterway could be like', 'the resources available', 'where to get plants' and a 'weed list'. This indicates a high level of consensus between groups.

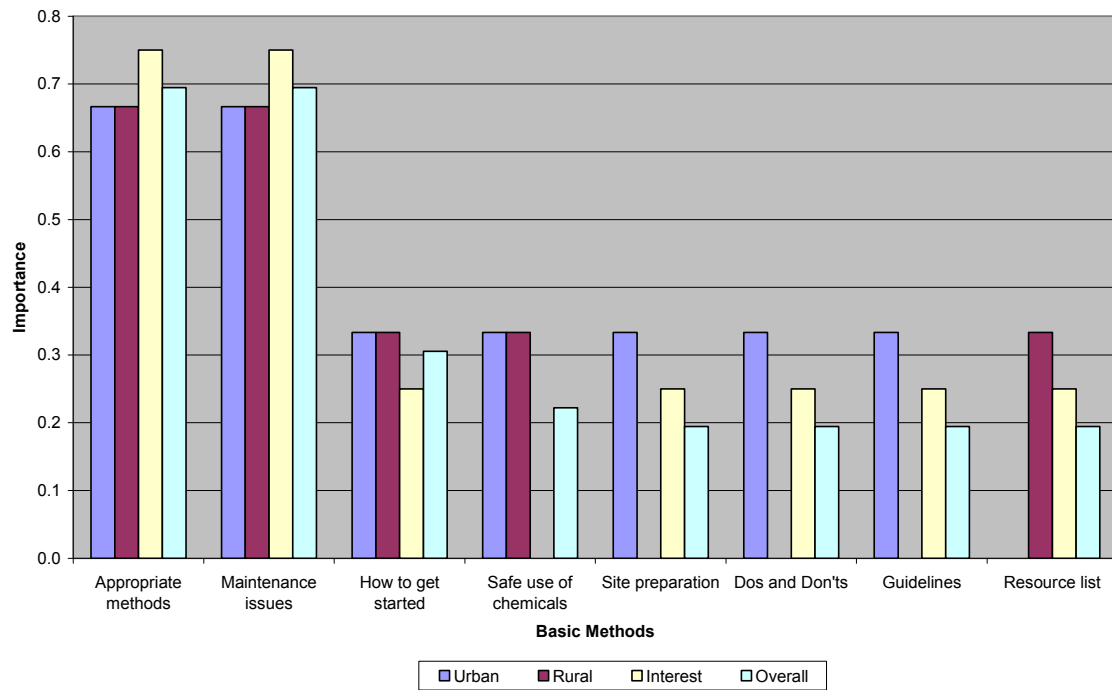


Figure 11: Basic Methods Aspects of Desired Information

Figure 11 displays results for basic methods aspects. All three groups felt that it was important to have ‘appropriate methods’, ‘maintenance issues’ and ‘how to get started’. Both the ‘appropriate methods’ and ‘maintenance issues’ are over twice as important as ‘how to get started’. The Urban and Rural groups both felt that the ‘safe use of chemicals’ was important. Both the Urban and Interest groups felt that information on ‘site preparation’, ‘guidelines’ and ‘Do and Don’ts’ were important. Including a ‘list of resources needed’ was considered important by both the Rural and Interest groups. In terms of averages, having ‘appropriate methods’ and covering the ‘maintenance issues’ were the most important at 0.7.

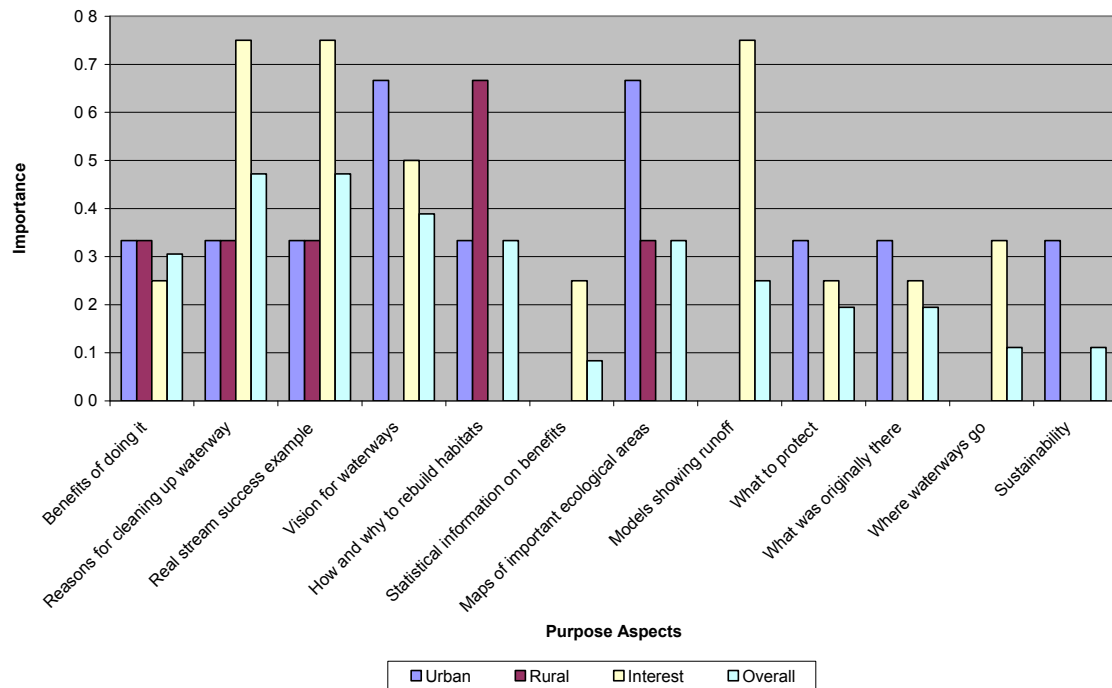


Figure 12: Purpose Aspects of Desired Information

Figure 12 displays how important people felt it was to explain the purpose of the guide and caring about riparian areas. All groups felt that the ‘benefits of doing it’, ‘the reasons for cleaning up waterways’, and ‘having a real stream success example’ were important information to be included. The Interest group placed particular importance on having the ‘reasons for cleaning up waterways’ and ‘real stream success examples’ (0.8). The Urban and Interest groups felt that it was important to include a ‘vision for waterways’, ‘what to protect’, and ‘what was originally there’. Urban and Rural groups both felt that it was important to ‘express how and why to rebuild habitats’ and to ‘include maps of important ecological areas’. The Urban group thought that it was important to ‘discuss sustainability’. The Interest group alone thought that it would be beneficial to include ‘statistical information on the benefits’, ‘models showing runoff’ and to ‘explain where waterways go’. In terms of averages, it is most important to have information on ‘reasons for cleaning up waterways’ and a ‘real stream success example’ (0.5).

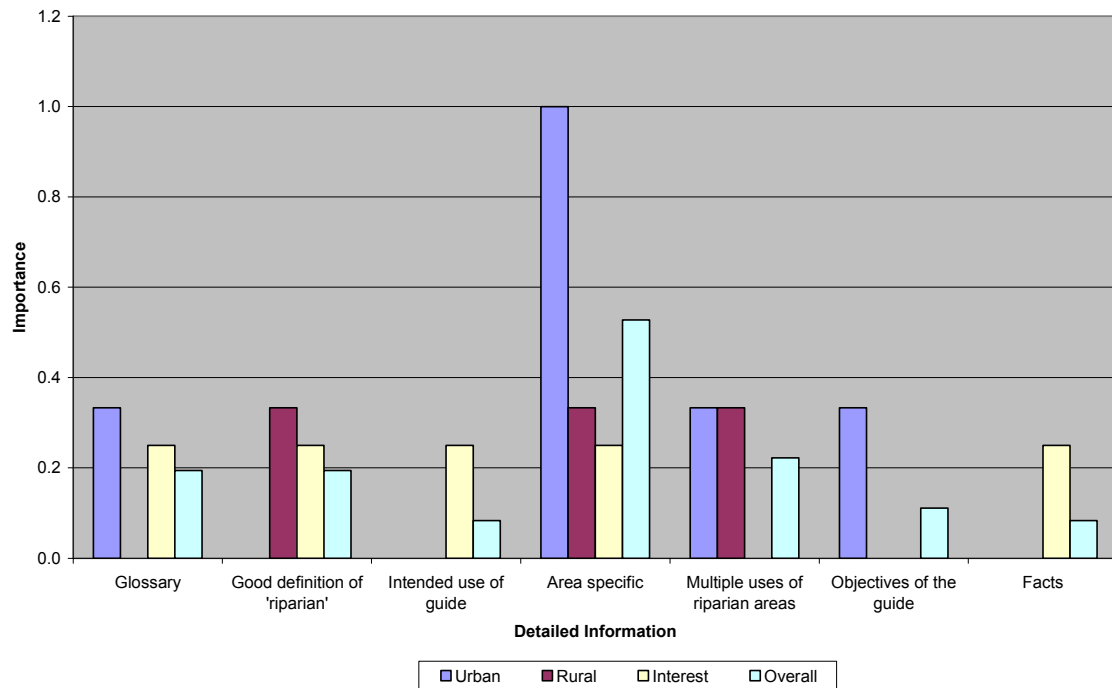


Figure 13: Detailed Aspects of Desired Information

Figure 13 shows how important the groups felt some of the more detailed information would be for a guide. The only area in which all groups agreed was that the guide needs to be 'area specific'. All the participants of the Urban group listed this as important. The Urban group felt that it would be important to include the 'objectives of the guide'. The Urban and Rural groups felt the guide should discuss the 'multiple uses of riparian areas'. The Urban and Interest groups thought the guide should include a 'glossary'. The Rural and Interest groups felt the guide needed a 'good definition of the word 'riparian''. The Interest group alone felt the guide should give the 'facts' and the 'intended use' of the guide. In terms of averages the most important idea was that the guide needed to be 'area specific' (0.5).

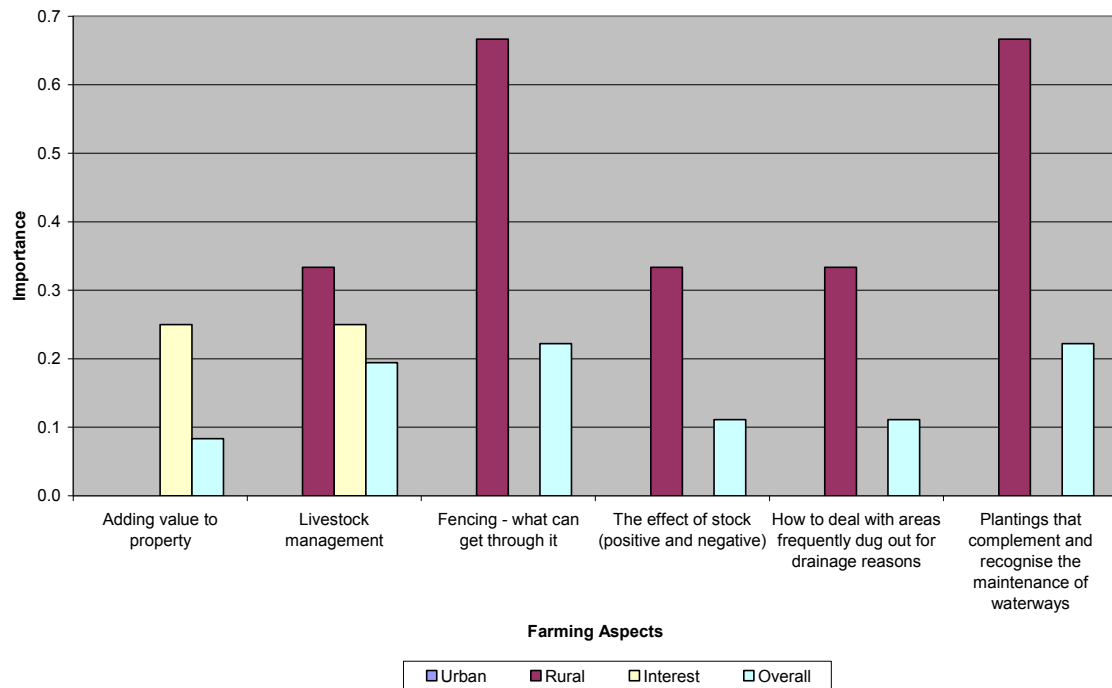


Figure 14: Farming Aspects of Desired Information

Figure 14 is an interesting graph, in that it displays the information contained in a guide that would be most relevant for Rural property owners. It is particularly interesting because there is no representation of any of the participants of the Urban group. The Interest group thought the guide should discuss how riparian areas ‘add value to a property’. The Interest and Rural groups felt that the guide should discuss ‘livestock management’. The Rural group thought that the guide should discuss ‘fencing and what can get through the different types of fencing’, ‘the effects of stock in both a positive and negative ways’, ‘how to get plantings that complement and recognise the maintenance of waterways’ and ‘how to deal with areas frequently dug out for drainage reasons’. The two that had the most attention were the ‘fencing’ and ‘how to get plantings that complement the maintenance of waterways’.

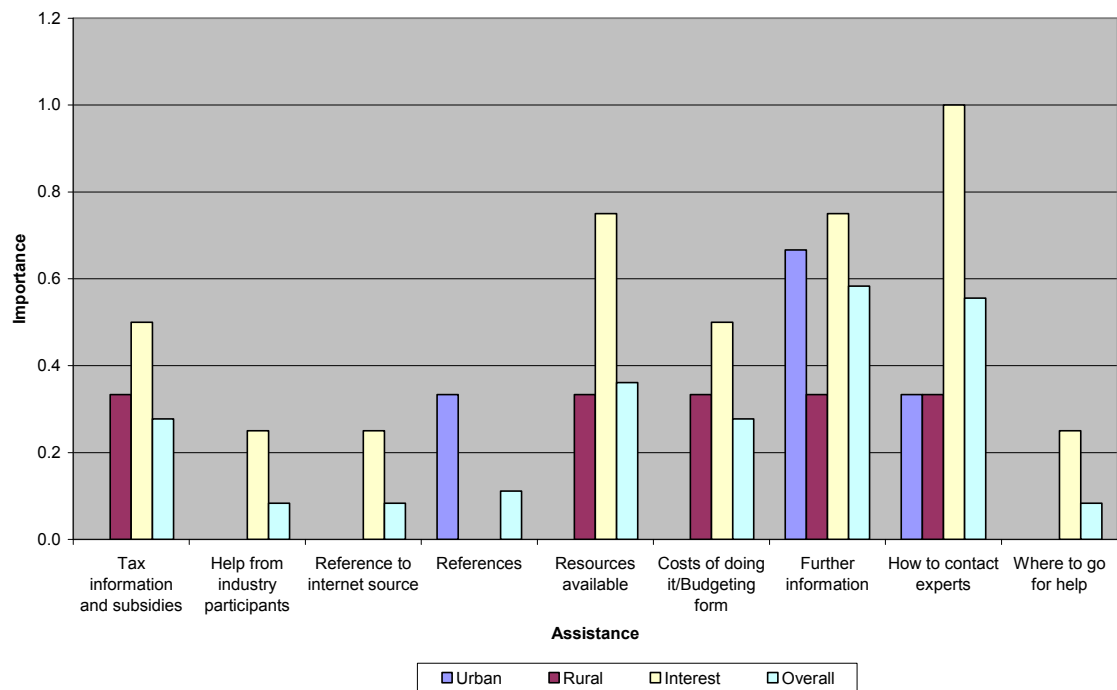


Figure 15: Assistance Aspects of Desired Information

Figure 15 displays what information about assistance a guide should include. The Interest group had the most to say about this topic, and thought that the guide should discuss ‘help from industry participants’, ‘references to internet sources’ and ‘where to go for help’. The Urban group thought that ‘references’ should be included. All groups felt that it would be important to have ‘suggestions for further information’ and ‘how to contact experts’. The Rural and Interest groups felt there should be information about ‘taxes and subsidies’, the ‘resources available’, and the ‘costs of doing riparian work’. In terms of averages, the most important are both ‘further information’ and ‘how to contact the experts’ (0.6).

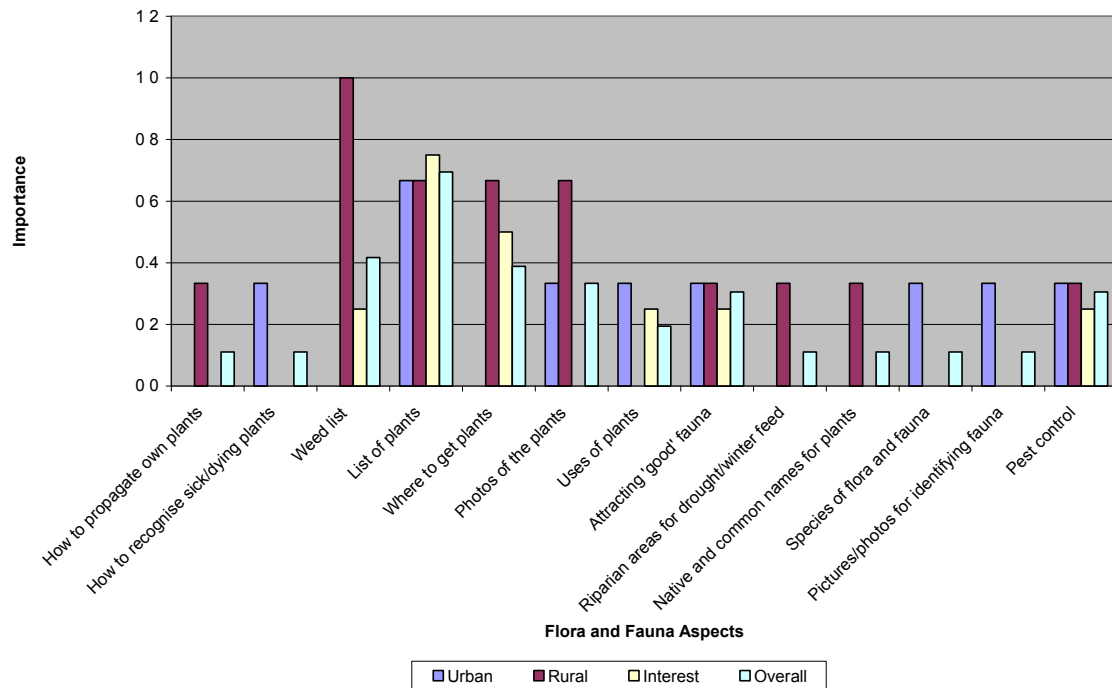


Figure 16: Flora and Fauna Aspects of Desired Information

Figure 16 displays the importance on information about flora and fauna in a riparian management guide. Every group felt that it was important that the guide contained a ‘list of plants’, ‘how to attract ‘good’ fauna’ and ‘dealing with pest control’. The Urban group thought that it would be important to have information about ‘how to recognise sick or dying plants’, ‘species of flora and fauna that may be found in such areas’, and ‘pictures or photos for identifying fauna’. The Rural group felt that it was important to know ‘how to propagate your own plants’, to have the ‘native and common names for plants’ and ‘how to use riparian areas for drought or winter feed’. Urban and Rural groups felt it would be good to have ‘photos of the plants’. Rural and Interest groups thought it would be a good idea to have a ‘weed list’. There was a particularly strong feeling from the Rural group for this. These two groups also thought it would be useful to know ‘where to get plants from’. Urban and Interest groups felt the guide should cover the ‘uses of plants’. In terms of averages, the most important is to have a ‘list of plants’ (0.7), followed by having a ‘weed list’ and ‘where to get plants from’ (0.4).

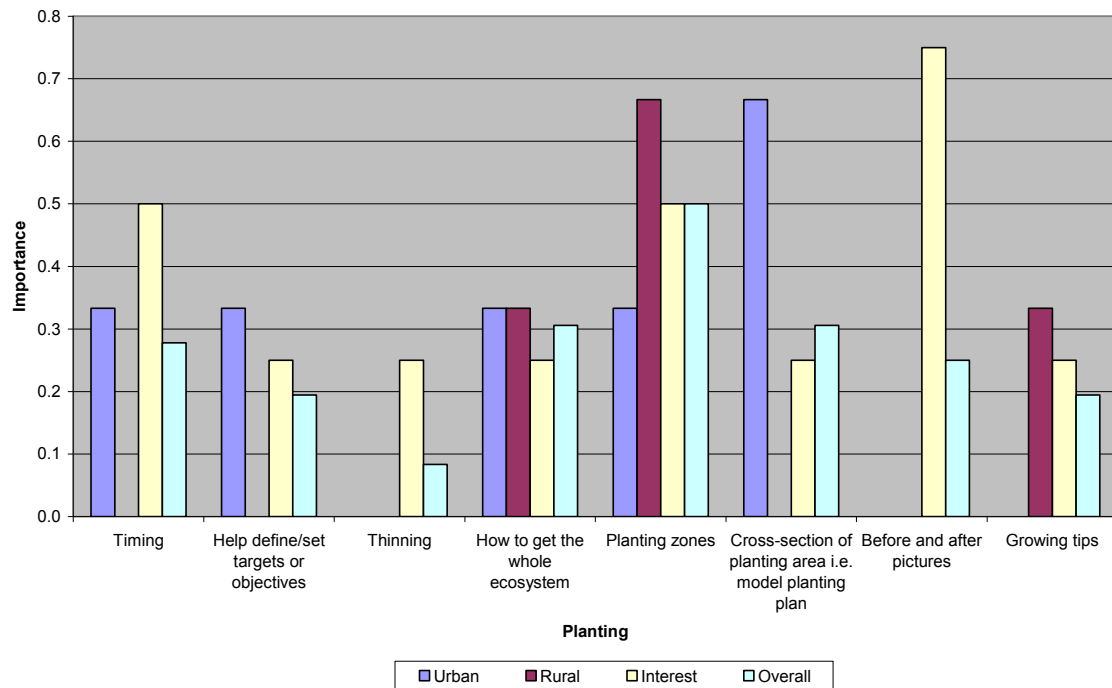


Figure 17: Planting Aspects of Desired Information

Figure 17 shows the information about planting that people would like to know. All groups agreed that it was important to know ‘how to create the whole ecosystem’, and to know about ‘planting zones’. The Urban and Interest groups felt it was important to know about ‘timing’, to have a ‘cross-section of the planting area as a model planting plan’, and that it would be useful to have help to ‘define and set targets or objectives’. The Interest group expressed interest in information on ‘thinning’ and having ‘before and after pictures’. Both the Rural and Interest groups were interested in having some ‘growing tips’. In terms of averages, it was most important to have information on ‘planting zones’ (0.5), followed by ‘how to create the whole ecosystem’ and having a ‘model planting plan’ (0.3).

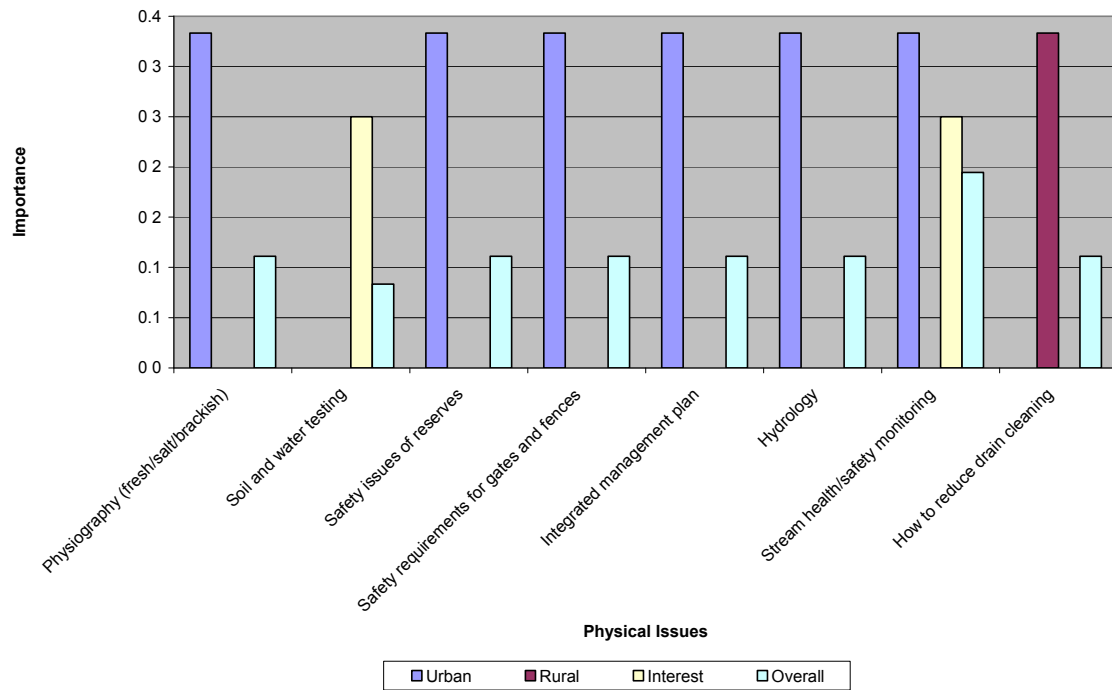


Figure 18: Physical Aspects of Desired Information

Figure 18 displays information that would be desired with regards to the physical side of riparian management. This area was mainly dominated by the Urban group who felt that it was important to have information on ‘physiography (fresh/salt/brackish water)’, the ‘safety issues of reserves’, the ‘safety requirements for gates and fences’, ‘hydrology’, and having an ‘integrated management plan’. Both the Urban and Interest groups thought it was important to know about ‘stream health and safety monitoring’. The Interest group mentioned the importance of ‘soil and water testing’. The Rural group was interested in ‘how to reduce drain cleaning’. In terms of averages it was most important to have information about ‘stream health and safety monitoring’ (0.2).

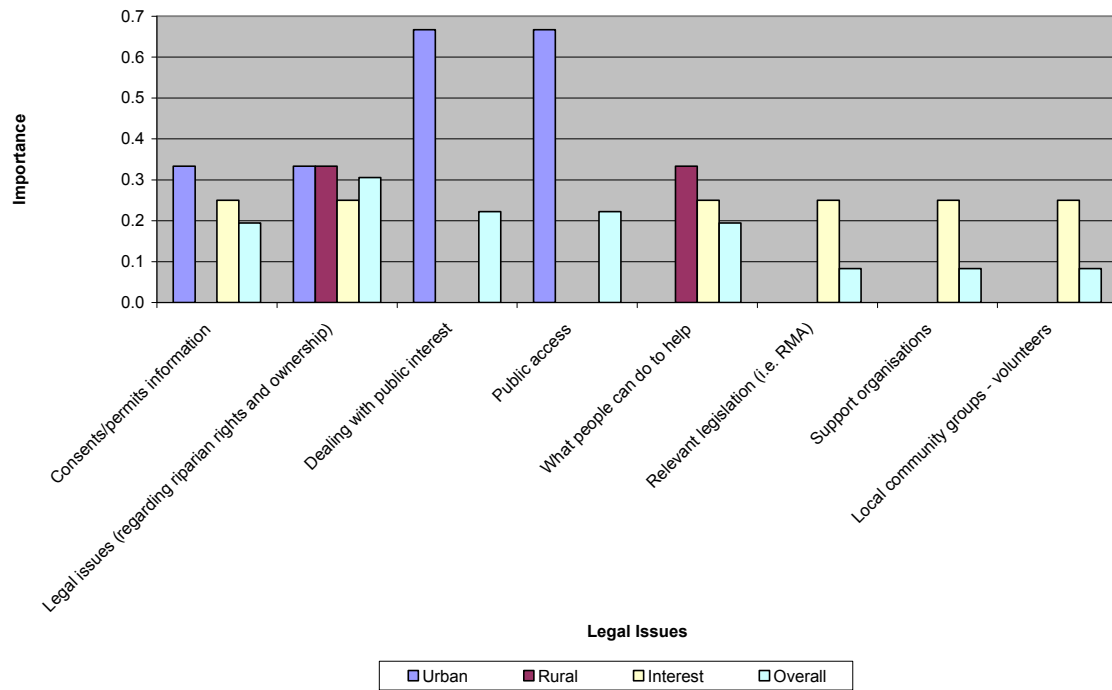


Figure 19: Legal Aspects of Desired Information

Figure 19 shows the legal issues that groups felt should be discussed. All the groups were concerned about legal issues with regards to riparian rights and ownership. The Urban group were concerned about how to deal with ‘public interest’ and ‘public access’. Urban and Interest groups were interested in ‘consents and permits’ information. Rural and Interest groups were interested in ‘what people can do to help’. The Interest group expressed interest in knowing the ‘relevant legislation’, any ‘support organisations’ and ‘getting volunteers from local community groups’. In terms of averages, the most important was ‘legal issues around riparian rights and ownership’ (0.3).

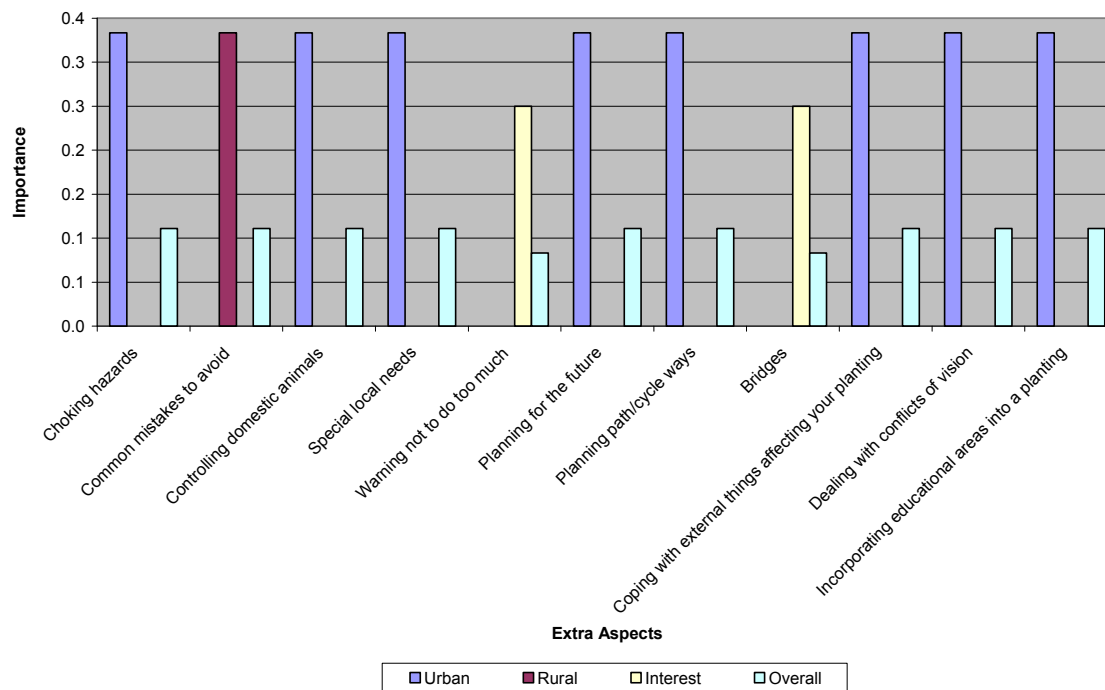


Figure 20: Extra Aspects of Desired Information

Figure 20 shows extra topics that people felt should be included. All topics are ones that only one group felt was important. The Urban group was interested in information in ‘choking hazards’, the ‘control of domestic animals’, ‘coping with special local needs’, ‘planning for the future’, ‘planning for path or cycle ways’, ‘coping with external things affecting your planting’, ‘dealing with conflicts in vision’ and ‘incorporating educational areas into the plantings’. The Rural group was interested in ‘common mistakes to avoid’. The Interest group was most interested in knowledge about ‘bridges’ and having a ‘warning not to try to do too much at once’.

Question 3: What form/s will it be in? How will the information be accessed?

<u>Table 5: Most Important Ideas for Accessibility</u>	Totals
Website	9
Available in libraries	6
Booklets	6
Hardcopy/Book	5
Pamphlets	4
Powerpoint/pdf - downloadable	4
Available from Local Authorities	3
Available in schools	3
Compact disc	3
Free in at least one form	3
Multimedia/Video/DVD	3
Summary should be widely distributed to relevant landowners	3

Table 5 shows the most important ideas for accessibility. A full list of ideas is in Appendix 5. This is the area that received the highest level of agreement. All but one group felt that it was important for the riparian guide to have or be locatable on a 'website'. However, the agreement quickly drops off with eight ideas below the 50% level. Following a 'website', respondents felt it was most important that guides be 'available in libraries' and 'in a booklet form'. Slightly less important is that the guide can be 'accessible in a hardcopy or book form'. Four groups out of 10 wanted to have a 'pamphlet' or to have it in 'PowerPoint or pdf form which could be downloaded'. The suggestion that the guide could be found from 'local authorities', 'through schools', on 'compact disc', as 'multimedia or video/DVD', 'should be widely distributed to relevant landowners' and that it was important to 'be free in at least one form', was important to three groups.

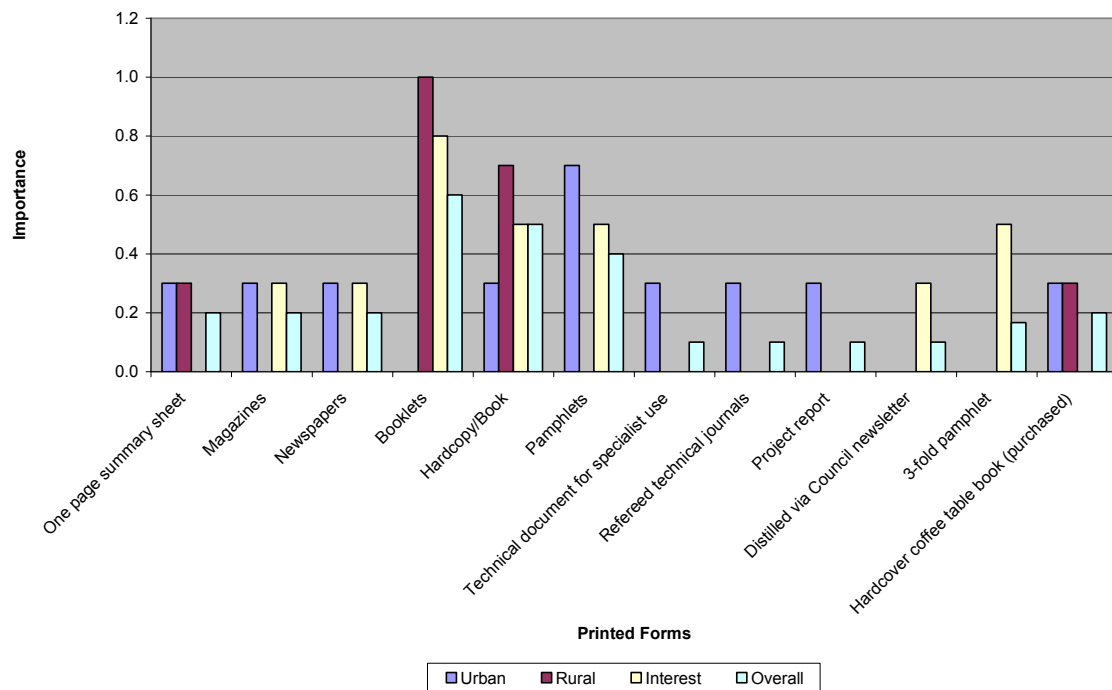


Figure 21: Printed Forms of Accessibility

Figure 21 shows the printed forms that were suggested by the groups. All groups thought it should be available in a ‘hardcopy or book form’. The Urban and Rural groups thought it would be most effective as a ‘one page summary sheet’ and as a ‘published hardcover coffee table book’. Both Urban and Interest groups felt it could be effective in ‘magazines’, ‘newspapers’ and as ‘pamphlets’. Rural and Interest groups preferred ‘booklets’. The Urban group also liked the idea of a ‘technical document for special use such as in refereed technical journals’ and as ‘project reports’. The Interest group thought it could be ‘distilled via the Council newsletter’ and as a ‘3-fold pamphlet’. In terms of averages, ‘booklets’ were most popular (0.6), followed by a ‘hardcopy or book’ (0.5) and then ‘pamphlets’ (0.4).

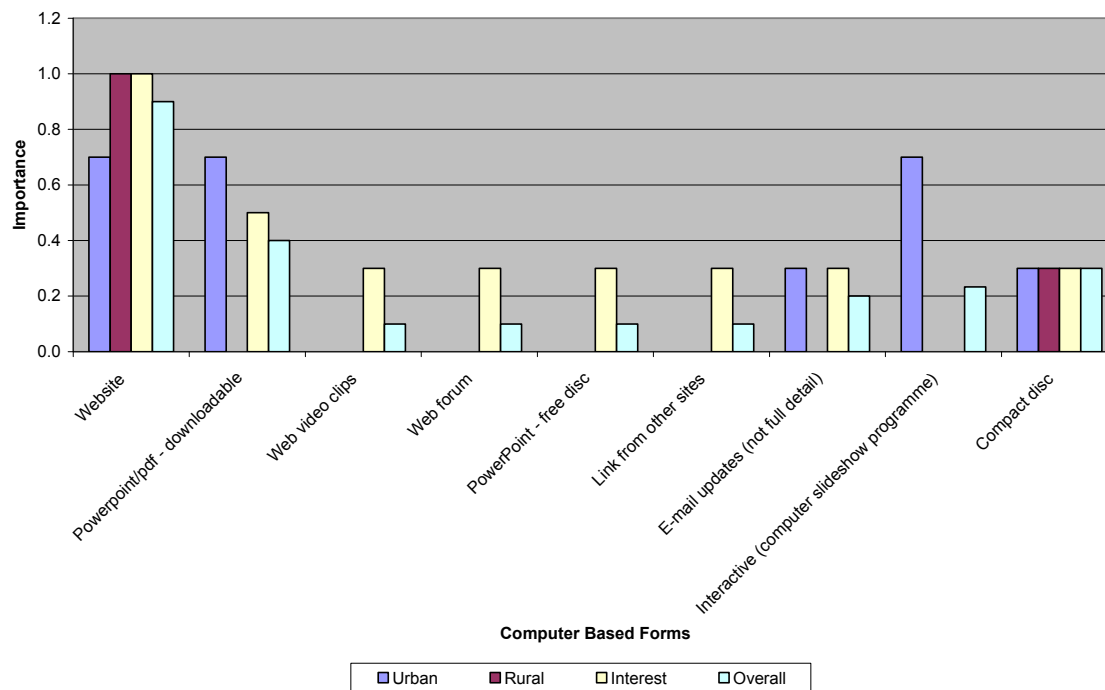


Figure 22: Computer Based Accessibility

Figure 22 displays the various ways the information could be accessed by using computers. All groups felt it should be available on a 'website' and of lesser importance on a 'compact disc'. The Urban group expressed interest in having an 'interactive computer slideshow programme'. Urban and Interest groups were interested in having it available as a 'PowerPoint or pdf that could be downloaded' or having 'E-mail updates sent out'. The Interest group had by far the most ideas of ways to access the information including having 'web video clips', 'web forums', 'having a free disc' and having 'links from other sites'. In terms of averages it was most important to have a 'website' (0.9) followed by having it available for 'downloading' (0.4).

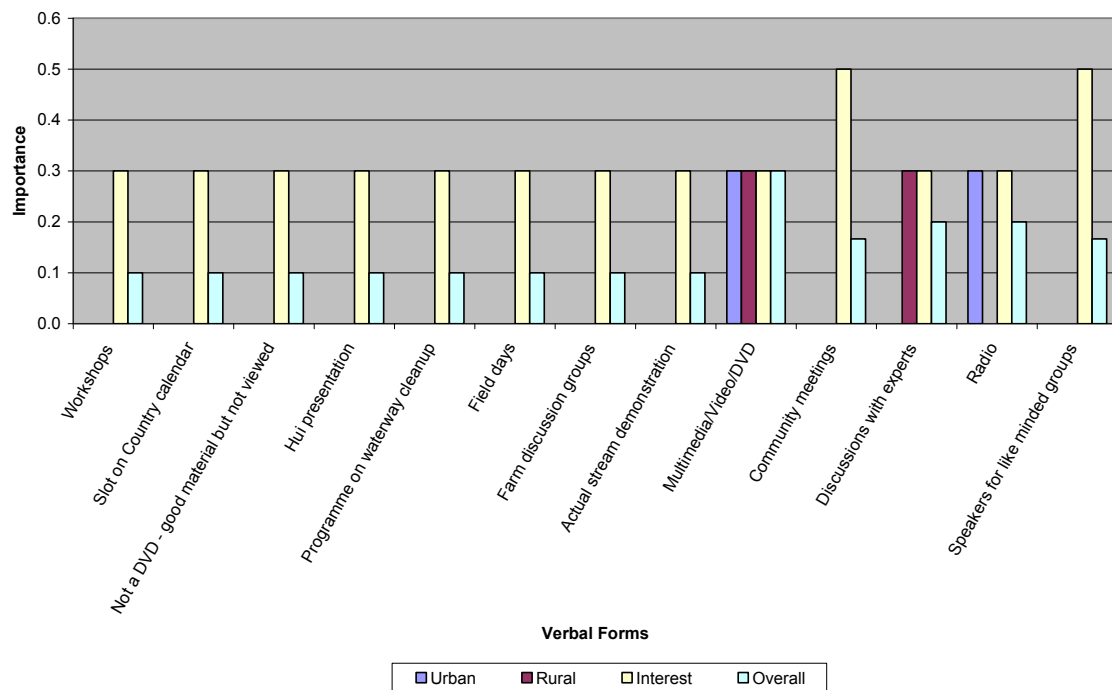


Figure 23: Verbal Forms of Accessibility

Figure 23 presents how the groups thought that the information could be presented through a verbal medium. This section was particularly dominated by the Interest group. All the groups felt that it would be useful to have it in a ‘multimedia form’ (either video or DVD). The Urban and Interest groups suggested ‘talk-back radio’ could be used. Rural and Interest groups suggested that ‘discussions with experts’ would be most useful. Other suggestions made by the Interest group were ‘workshops’, ‘a slot on Country Calendar (Rural New Zealand programming)’, ‘Hui presentations’, ‘a programme on waterway cleanup’, ‘field days’, ‘farm discussion groups’, have an ‘actual stream demonstration’, ‘community meetings’, ‘speakers going to like-minded groups’, and interestingly enough a request that it would ‘not be on a DVD/video’. This was qualified by the belief that though many informative DVD/videos have been created, they are often never viewed by the intended audience. In terms of averages, it is most important that the information is available in a ‘multimedia form’ (0.3).

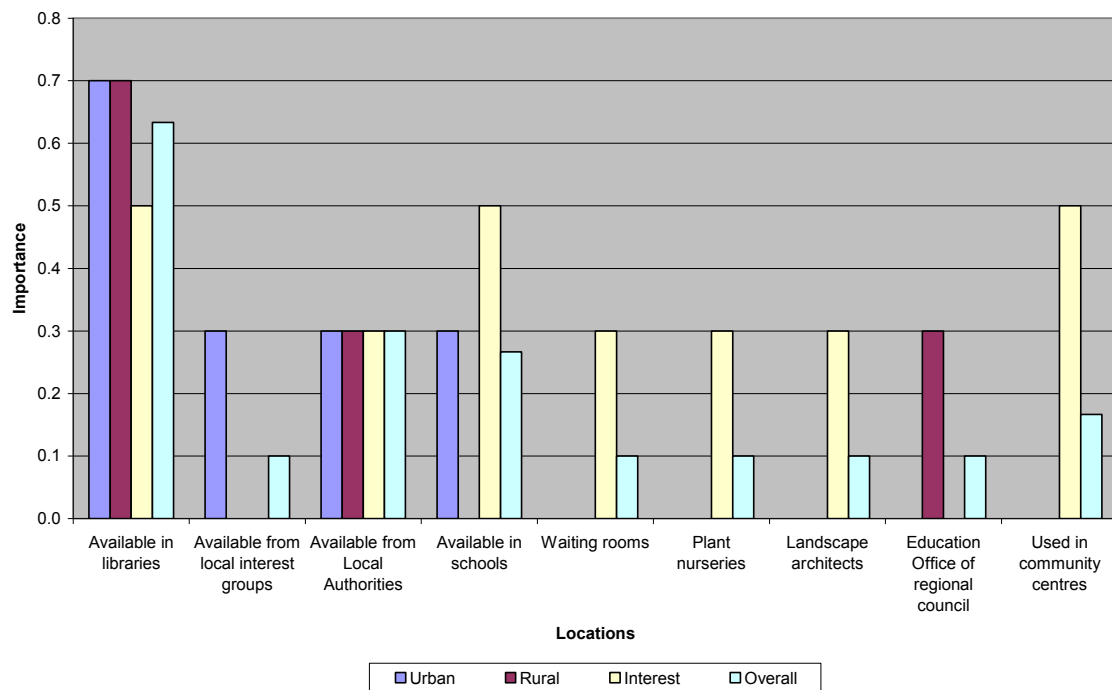


Figure 24: Locations of Accessibility

Figure 24 shows locations where the groups felt the information should be available from. All groups thought riparian management guides should be available in ‘libraries’, and to a lesser extent from ‘local authorities’. Both Urban and Interest groups thought that it would be useful if guides were available ‘from schools’. The Urban group suggested guides being available from ‘local interest groups’. The Rural group thought the ‘education office of the regional council’ was a good location. The Interest group thought that guides should be in ‘waiting rooms’, ‘plant nurseries’, ‘from landscape architects’ and ‘used in community centres’. In terms of averages it was most important to have them in ‘libraries’ (0.6), and then ‘local authorities’ and ‘schools’ (0.3).

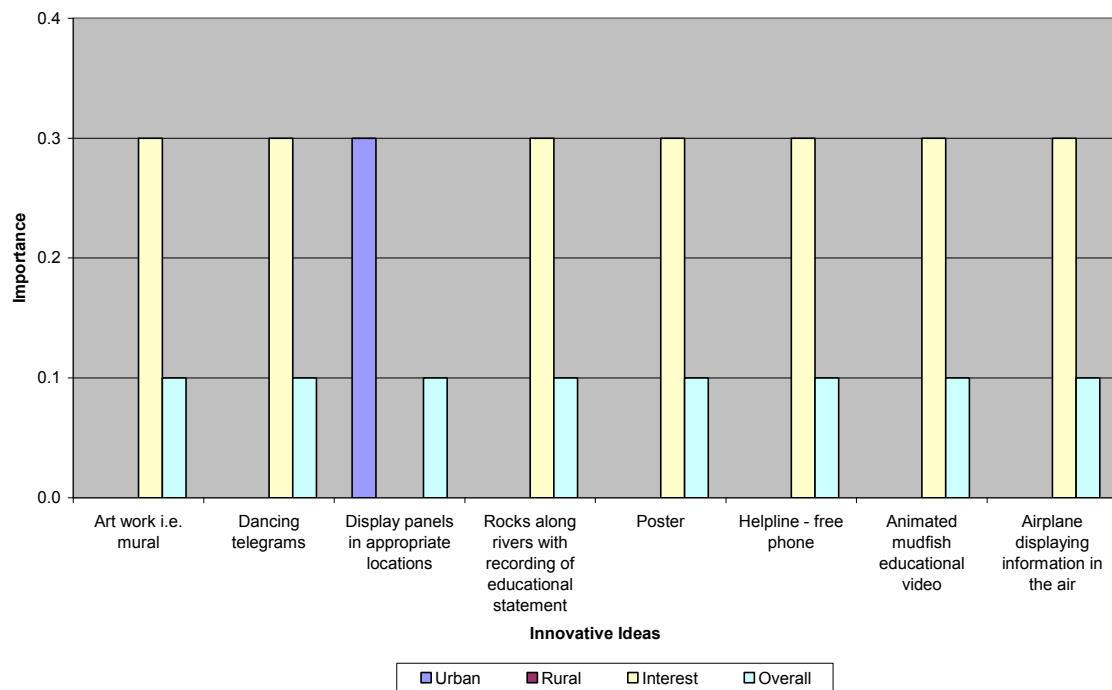


Figure 25: Innovative Ideas for Accessibility

Figure 25 displays one of the more interesting categories in terms of accessibility with lots of innovative ideas. The Urban group suggested ‘display panels in appropriate locations’ would be a good idea. The Interest group produced the rest of the results and they include; ‘creating artworks such as murals’, having ‘dancing telegrams’, have ‘rocks alongside waterways with a recording of an educational statement’, ‘create posters’, have a ‘helpline which would be free phone’, ‘create an animated mudfish to present an educational video’, and have ‘an aeroplane display the information from the air’.

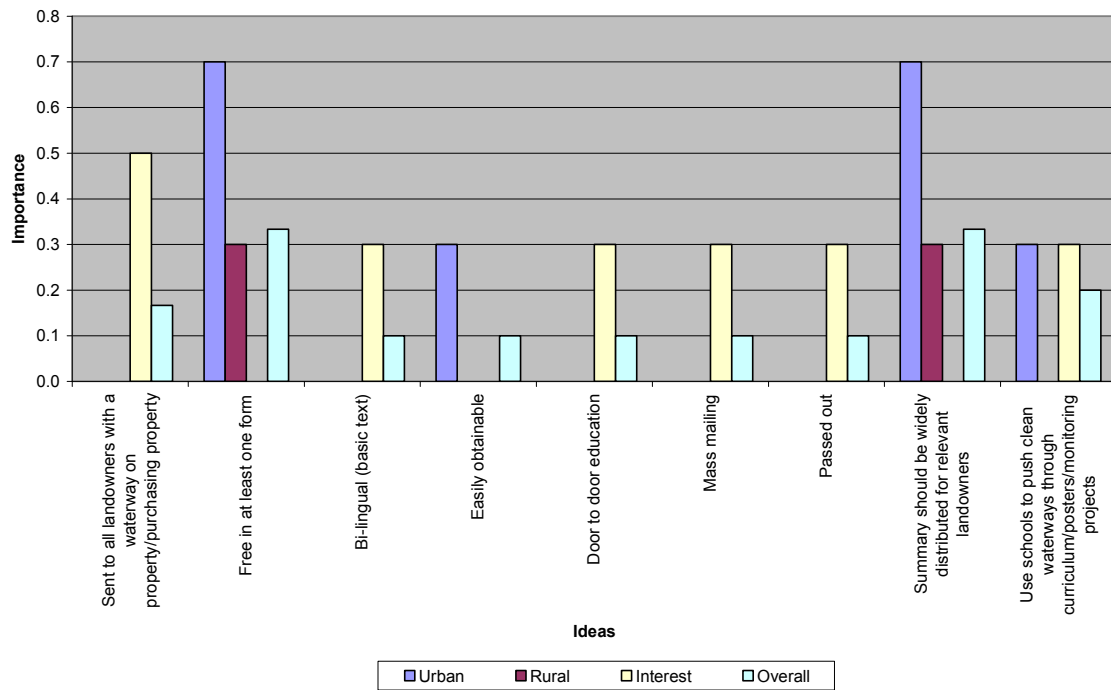


Figure 26: Other Thoughts on Accessibility

Figure 26 presents the other suggestions the groups had on accessibility. Urban and Rural groups suggested that it should be ‘free in at least one form’, and that ‘a summary should be widely distributed to relevant landowners’. Urban and Interest groups thought it was important to ‘use schools to promote clean waterways through the education curriculum’, using ‘posters’ and ‘monitoring projects’. The Urban group said it needed to be ‘easy to obtain’. The Interest group said it should be ‘sent to all landowners with a waterway on their property or purchasing property’, and the ‘basic text should be bi-lingual’. The Interest group also suggested that the ‘information should be given out’, was ‘mass mailed’, and was ‘delivered in a door to door education program’.

Question 4: Other features for suggestions for your guide

Table 6, Table 7 and Table 8 Display the results for the fourth question ‘Any other suggestions or recommendations for your guide’.

Table 6: Other Suggestions from the Urban Group	Totals
Implementation is key	1
Important to have different types of reserves within an area	1
Joint to NZ Landcare Trust	1
Built in redundancy (regular updating or as a 'living' book)	1
Nice if updates could be added to existing book	1
Book should be both hard and soft cover	1
Games for children	1

Table 7: Other Suggestions from the Rural Group	Totals
Department of Conservation and ECan have information on planting riparian areas	1
Environmental Canterbury Education office was very helpful	1
Landcare Research is also good for information	1
Other regional councils are good sources as well	1

Table 8: Other Suggestions from the Interest Group	Totals
Aimed at the general public	1
Different approaches for urban and rural situations	1
Needs to be backed by legislation or fines for polluting	1
Target developers	1
Non confrontational	1
Have separate plant list	1
Information must be from credible sources and cited at the end	1
Needs to be able to be produced quickly	1
Must be suitably priced for groups to be able to obtain	1
Needs a webmaster to ensure electronic guide is still current	1
Not another compliance issue	1
Department of Conservation needs more funding	1
Fonterra needs to be lobbied to do more	1
Stencil for marking local drains	1

All suggestions received only one recommendation each. Table 6 displays the suggestions of the Urban group. Other than the suggestion that people should be able to easily update their existing guide, there are no similarities between suggestions. Table 7 (Rural group) has the least suggestions. However, all the suggestions are comments on who has been shown to be useful in providing information. Table 8 (Interest group) produced the most profuse answers and has some similarities with various specific groups being targeted as needing to do more (five occurrences). There are also four occurrences of issues referring to making the information more accessible.

4.2 Does the information nationwide meet their needs

Although territorial authorities have a responsibility to act and promote sustainable actions they are not directly responsible for water quality in their regions. They are responsible under the Resource Management Act (1991) for controlling the land use in their area. Table 9 and Table 10 deal with which territorial authorities had information about riparian management readily available. The Councils are organised in roughly geographical order (from the South to the North). This section does not include the four unitary authorities (Tasman District, Nelson City, Marlborough District and Gisborne City Councils), as they fulfil the tasks of both a territorial and regional authority.

Table 11 has the information on the Regional authorities which includes the unitary authorities. The unitary authorities were included here because the Regional authorities under the Resource Management Act (1991) are the primary organisation responsible for general water quality. Table 12 shows other organisations that have an interest in riparian management and were deemed as places people might turn to for information. Figure 24 compares the level of information available between the three groups.

Table 9: Territorial Authorities in the South Island.

Southern Local Authorities	Has a guide online	Easy to locate online	Guide in other locations
Chatham Islands Council	-	-	-
Southland District Council	-	-	-
Invercargill City Council	-	-	Yes
Gore District Council	-	-	-
Waitaki District Council	-	-	-
Queenstown-Lakes District Council	-	-	Link to Regional Council
Dunedin City Council	-	-	-
Clutha District Council	-	-	-
Central Otago District Council	-	-	-
Waimate District Council	-	-	-
Waimakariri District Council	-	-	-
Timaru District Council	-	-	-
Selwyn District Council	-	-	Link to Regional Council
Mackenzie District Council	-	-	-
Kaikoura District Council	-	-	-
Hurunui District Council	-	-	-
Christchurch City Council	Yes	Easy	-
Ashburton District Council	-	-	-
Westland District Council	-	-	-
Grey District Council	-	-	-
Buller District Council	-	-	-
Totals	1		3

Table 9 shows that in the South Island, there is one territorial authority (Christchurch City) that produces its own guide and is available online. Hurunui District Council contributed to Christchurch City Council's but is not listed as either an author or publisher and does not have the information available online. Another territorial authority (Invercargill City) has a guide that is not available online. Two councils (Queenstown-Lakes District & Selwyn District) link from their webpage through to their local regional authority.

Table 10: Territorial Authorities in the North Island

Northern Local Authorities	Has a guide online	Easy to locate online	Guide in other locations
Wellington City Council	-	-	Yes
Upper Hutt City Council	-	-	-
South Wairarapa District Council	-	-	-
Porirua City Council	-	-	-
Masterton District Council	-	-	-
Kapiti Coast District Council	-	-	-
Hutt City Council	-	-	-
Carterton District Council	-	-	-
Wanganui District Council	-	-	-
Tararua District Council	-	-	-
Ruapehu District Council	-	-	-
Rangitikei District Council	-	-	-
Palmerston North City Council	-	-	-
Manawatu District Council	-	-	-
Horowhenua District Council	-	-	-
Stratford District Council	-	-	-
South Taranaki District Council	-	-	-
New Plymouth District Council	-	-	-
Wairoa District Council	-	-	-
Napier City Council	-	-	-
Hastings District Council	-	-	-
Central Hawke's Bay District Council	-	-	-
Whakatane District Council	-	-	Link to Regional Council
Western Bay of Plenty District Council	-	-	-
Tauranga City Council	-	-	-
Taupo District Council	-	-	-
Rotorua District Council	-	-	-
Opotiki District Council	-	-	-
Kawerau District Council	-	-	-
Waitomo District Council	-	-	-
Waipa District Council	-	-	-
Waikato District Council	-	-	-
Thames-Coromandel District Council	-	-	-
South Waikato District Council	-	-	-
Otorohanga District Council	-	-	-
Matamata Piako District Council	-	-	-
Hauraki District Council	-	-	-
Hamilton City Council	Yes	Moderate	Yes
Waitakere City Council	-	-	Yes
Rodney District Council	Yes	Difficult	-
Papakura District Council	Yes	Difficult	-
North Shore City Council	Yes	Difficult	-
Manukau City Council	Yes	Yes	-
Franklin District Council	-	-	-
Auckland City Council	-	-	-
Whangarei District Council	-	-	-
Kaipara District Council	-	-	-
Far North District Council	-	-	-
Totals	5		4

Table 10 shows that in the North Island, there are five territorial authorities that have information about riparian management available online. Three have information that is available, but not online, and one has links to their local regional authority. There is a particularly high accumulation that seems to be centred on the Greater Auckland area and four of the five online guides come from Auckland councils.

Table 11: Regional Authorities nationwide.

Regional Authorities	Has a guide online	Easy to locate online	Guide in other locations
Environment Southland	Yes	Moderate	Yes
Otago Regional Council	Yes	Difficult	Yes
Environment Canterbury	Yes	Easy	Yes
West Coast Regional Council	Yes	Easy	-
Tasman District Council	Yes	Moderate	-
Nelson City Council	Yes	Moderate	-
Marlborough District Council	-	-	-
Greater Wellington Regional Council	Yes	Moderate	Yes
Horizons Regional Council	Yes	Moderate	Yes
Taranaki Regional Council	Yes	Easy	Yes
Hawke's Bay Regional Council	-	-	-
Gisborne District Council	-	-	-
Environment Bay of Plenty	-	-	Yes
Environment Waikato	Yes	Easy	Yes
Greater Auckland Regional Council	-	-	Yes
Northland Regional Council	-	-	Yes
Totals	10		10

Table 11 shows that 10 of the Regional Councils have guides online, including two of the unitary authorities. There are also ten organisations that have information available in other locations. There are three organisations (Marlborough District Council, Hawke's Bay Regional Council, and Gisborne City Council) that have no information available at all.

Table 12: Other Organisations that provide rural and environmental information.

Other Organisations	Has a guide online	Easy to locate online	Guide in other locations
Department of Conservation	Yes	Moderate	-
Federated Farmers	-	-	Uncertain
Dexcel	Yes	Easy	Yes
Fish and Game	Yes	Moderate	-
Forest and Bird	Yes	Moderate	-
Ministry for the Environment	Yes	Moderate	Yes
Fonterra	Yes	Difficult	-
Ngai Tahu	-	-	Yes
Totals	6		3

Table 12 displays the other sources of environmental knowledge. There is a high rate of information, with the majority, except Federated Farmers and Ngai Tahu, having information about riparian management freely available online. Federated Farmers has members only access so it was not possible to determine if there was information available or not. Three of the groups also had riparian information that could be found in other forms, including Ngai Tahu. The other two were Dexcel, which is partially responsible for the Clean Streams Accord and associated documents, and the Ministry for the Environment which has produced a comprehensive document on riparian management for New Zealand.

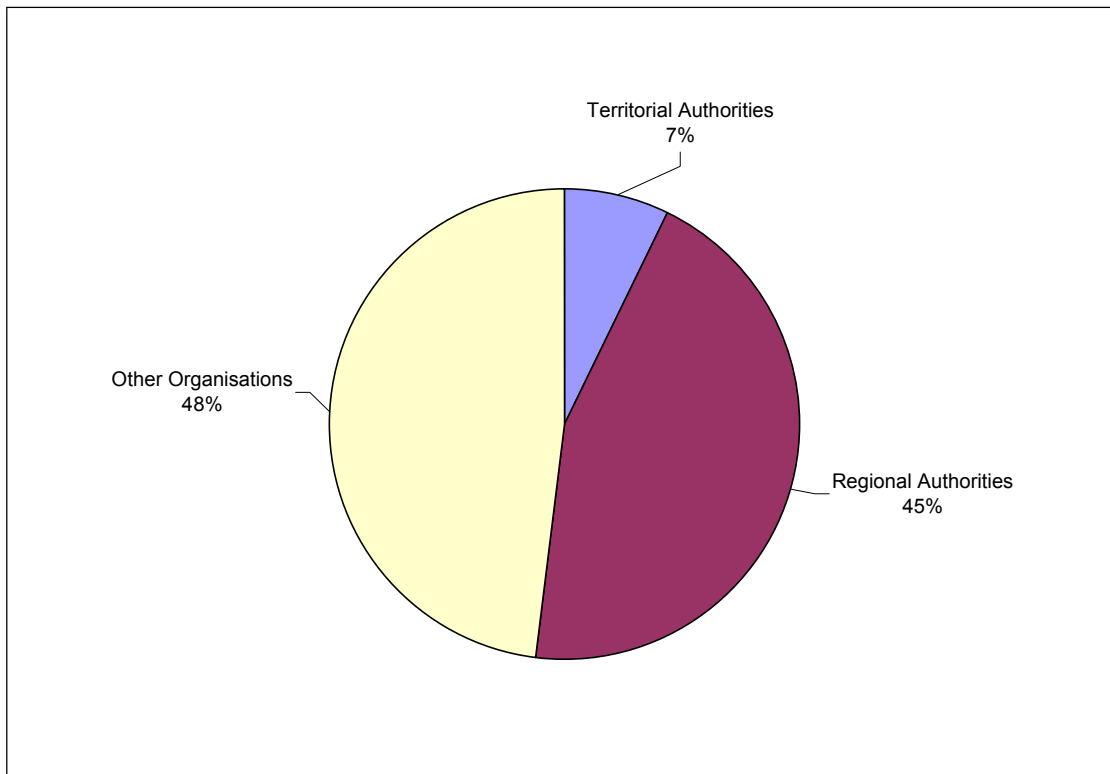


Figure 27: Comparative rates of information availability.

Figure 27 shows a comparison of where to find information on riparian management. This was determined by the percentage of organisations within their category that had information available. These figures were combined to allow for each category to be given a percentage value of the total availability of information. From this information it suggests the best source of information is Other Organisations (other sources of environmental knowledge), followed by Regional Authorities.

4.3 Prioritising the Criteria

The criteria are prioritised using the ‘most important ideas’ (Tables 3, 4, 5) at the beginning of each of the Questions in this section. These Tables show the number of times each criteria was mentioned, and then the top 11 were used to create the criteria in order of importance. This Criteria can now be used to evaluate existing publications and can be used when producing new publications.

The following criteria are listed in approximate order of importance;

- Available on/from a website
- Information has pictures
- Information has diagrams
- Information is simple and easy to understand
- Includes how-to and appropriate methods information
- Includes a list of plants
- Discusses maintenance issues
- Includes where to find further information
- Has information on how to contact experts
- Information is available in libraries
- Information is in booklets.

In addition to the overall criteria it was important to consider what was most important to each of the sub-groups

The Urban group had 23 criteria of particular importance to them. They are listed in approximate order of importance.

- Information has pictures
- Information is easy to understand
- Information is area specific
- Information has diagrams
- Information is colourful
- Information is easy to read
- Is short
- Contains information on appropriate methods
- Contains a plant list
- Discusses maintenance issues
- Lists where to locate further information
- Has a vision of what waterway could be like
- Contains a cross-sectional model planting plan
- Has maps of important ecological areas
- Deals with public interest
- Discusses public access
- Information is on a website
- Information is available in libraries
- Pamphlets
- Information is downloadable
- Information is free in at least one form
- Summary of information distributed to landowners
- Has an interactive computer programme

The Rural group had 19 criteria of particular importance to them. They are listed in approximate order of importance.

- Has a weed list
- Information is on a website
- Information is in booklets
- Information has pictures
- Information is easy to understand
- Information is colourful
- Information is easy to read
- A4 size document
- Information contains appropriate methods
- Has a plant list
- Discusses maintenance issues
- Discusses planting zones
- Suggests where to get plants
- Considers how and why to restore habitats
- Contains photos of plants
- Discusses fencing – what animals can get through
- Discusses plantings that complement and recognise the maintenance of waterways
- Information is available in libraries
- Comes as a hardcopy/book

The Interest group had 14 criteria of particular importance to them. They are listed in approximate order of importance.

- Information has diagrams
- Information suggests how to contact experts
- Information is on a website
- Information has pictures
- Guide uses bullet points
- Discusses appropriate methods
- Has a plant list
- Discusses maintenance issues
- Lists where to locate further information
- Shows a real stream success example
- Lists resources available
- Displays before and after pictures
- Has a model of a stream showing effect of runoff
- Information is in booklets

4.4 Does information available for Canterbury meet the needs of interested parties?

The criteria created above were compared to existing guides available for interested parties in Canterbury to use. Each source of information was given a mark out of 11 (the number of criterion), and the one with the highest score is the one that best meets the requirements for Canterbury. Additionally, comments were made on any other features that make the guide distinct.

The Canterbury Region encompasses nine territorial authorities (Waimakariri District, Timaru District, Selwyn District, Mackenzie District, Kaikoura District, Hurunui District, Christchurch City and Ashburton District). Christchurch City Council is the only one to produce information on riparian management.

Table 13: Christchurch City Council – Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch & lowland Canterbury. Comparison against the criteria.

Organisation: Christchurch City Council Title: Streamside planting guide	
<u>Criteria</u>	<u>Present</u>
Website	x
Pictures	x
Diagrams	x
Simple and easy to understand	x
How-to and appropriate methods	x
Plant List	x
Maintenance	x
Further Information	x
Contact experts	-
In Libraries	x
Booklet	x
Score	10

This management guide met 10 of the 11 criteria, only lacking information on how to ‘contact experts’. The guide is a three fold, A4 size document which was obtainable from the public library. It provided fairly good, short, inclusive information including a clear 10-step plan for undertaking riparian work. However it used a font size of approximately 11 Arial which is smaller than the standard (12 Times New Romans or Arial) and may not be as easy to read as if it had been done in a larger font.

The regional authority for this area operates under the trading name Environment Canterbury and under the delegation of the Central Government is responsible for water quality and quantity throughout the region.

Table 14: Environment Canterbury – A guide to managing waterways on Canterbury farms. Comparison against the criteria.

Organisation: Environment Canterbury	
Title: A guide to managing waterways on Canterbury farms	
Criteria	Present
Website	x
Pictures	x
Diagrams	x
Simple and easy to understand	x
How-to and appropriate methods	x
Plant List	x
Maintenance	x
Further Information	x
Contact experts	x
In Libraries	x
Booklet	-
Score	10

This is the main document on riparian management specific to the overall Canterbury region. It met 10 out of 11 criteria, though it is not a ‘booklet’. This guide is A4 in size with 28 pages, and has three smaller accompanying guides (hill country, lowland plains, and inland basins). It is colourful in its presentation, provides good explanations but perhaps uses too many words. This guide also uses a very small font size, approximately 10 Times New Romans.

Table 15: Environment Canterbury – Riparian zones: a guide to the protection of Canterbury’s rivers, streams and wetlands. Comparison against the criteria.

Organisation: Environment Canterbury Title: Riparian zones: a guide to the protection of Canterbury's rivers streams and wetlands	
Criteria	Present
Website	-
Pictures	x
Diagrams	x
Simple and easy to understand	x
How-to and appropriate methods	-
Plant List	x
Maintenance	-
Further Information	x
Contact experts	-
In Libraries	-
Booklet	x
Score	6

This guide from Environment Canterbury did not score well (6 out of 11) as it was not available ‘online’ (the most important requirement), it did not contain ‘information on methods’, ‘maintenance’ or how to ‘contact experts’. It was also not available from the public library and had a small font size which is likely to hinder its ability to be read easily, though it is a ‘booklet’.

Table 16: Department of Conservation – Protecting and restoring our natural heritage: a practical guide.

Comparison against the criteria.

Organisation: Department of Conservation Title: Protecting and restoring our natural heritage - a practical guide	
Criteria	Present
Website	x
Pictures	x
Diagrams	x
Simple and easy to understand	-
How-to and appropriate methods	x
Plant List	-
Maintenance	x
Further Information	x
Contact experts	-
In Libraries	x
Booklet	-
Score	7

The guide from the Department of Conservation met 7 out of 11 criteria. It is not particularly 'simple', does not contain a 'plant list', provide ways to 'contact experts' and at 94 pages it is decidedly not a 'booklet'. Though thorough and well thought out it has small font (approximately 10 Times New Roman) and is long, presenting a formidable task to any reader. Perhaps more intended for professional practitioners than the interested public.

Table 17: Ministry for the Environment – Managing waterways on farms: a guide to sustainable water and riparian management in New Zealand. Comparison against the criteria.

Organisation: Ministry for the Environment Title: Managing waterways on farms	
Criteria	Present
Website	x
Pictures	x
Diagrams	x
Simple and easy to understand	-
How-to and appropriate methods	x
Plant List	-
Maintenance	x
Further Information	x
Contact experts	-
In Libraries	-
Booklet	-
Score	6

The Ministry for the Environment has produced a comprehensive national guide, but because it is not area specific it is difficult for details to be provided. Scoring 6 of 11 against the criteria it was not ‘simple and easy to understand’ its size and detail making it a formidable read, as well as having a small font (approximately size 9 Times New Roman) it does not contain a ‘plant list’ due to its national nature, it also was not available in ‘public libraries’, detail how to ‘contact experts’ or at 216 pages meet the criteria of a ‘booklet’.

From all this information the best guide for use by interested parties in Canterbury appears to be either ‘*Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch City & lowland Canterbury*’ produced by Christchurch City Council (2005) or ‘*A guide to managing waterways on Canterbury farms*’ produced by Environment Canterbury (2005). Both guides met 10 out of 11 criteria. The Christchurch City Council does not contain information on how to ‘contact experts’ but provides a good, brief overall view of riparian management. The Environment Canterbury guide provides far more information, more suited to serious investment in riparian management, but it is not a ‘booklet’.

Chapter Five: Discussion

5.1 The importance of riparian areas and their management.

“The lasting benefits that society derives from wetlands often far exceeds the immediate advantages their owners might get from draining or filling them. Their destruction shifts the economic and environmental cost to other citizens...who have no voice in the decision to alter them”

Jimmy Carter, President of the United States of America. 1977.

(From Maltby, 1986)

There is always a danger with research output (such as this) to overlook the good work being done by many hardworking, unrecognised individuals of society and or to vilify sectors of society. This is not the intention of this thesis. The scope of this thesis is not to recognise ‘heroes’ or to create ‘villains’ but to accept that all of us, as members of society have a calling to always strive to minimise our individual environmental impacts for our own personal benefit and for the greater good.

As covered in the literature review, wetlands and riparian areas are significant for the important functions they provide to society as well as their intrinsic values. However, as Sullivan (1998) noted, these areas are not comparably valued to other environments such as forests, beaches, deep lakes and rivers.

Despite riparian management being of importance to all of society in New Zealand and worldwide, it seems to be low in people’s minds. Fourteen groups were contacted initially for this research, of whom two were willing to participate. This may suggest a certain unwillingness to participate, or a flaw in the method of locating groups to be contacted. With the exception of two teenagers who participated as part of a Rural group, there was no youth input (<18) into the research. It could be that this issue is not of importance to them. This conclusion could be supported by the fact that a youth environmental forum was contacted and chose not to participate. However, it could merely be that youth are not involved in community organisations to the same extent.

5.2 Discussion of Methodology

For this research, small discussion groups were favoured over surveys because of the underlying problems with surveys. This method ultimately proved useful because a large number of groups interpreted the questions differently to the way they had been intended and the presence of the researcher meant that a 'corrective' explanation could be given. This was a common problem, but not universal. A problem that was also noticed in most groups was that they had trouble getting started. Once groups had started they had no problems continuing. This was another advantage of the researcher being present. Perhaps these problems would have been avoided if the questions had been in a different order, or the questions were worded differently. Having the researcher present was also intended to show honesty of intention, to calm any concerns about how any of this information might be used, and to allow for any concerns to be voiced, and then addressed. For the type of results that this research was trying to achieve, small discussion groups seemed the logical choice, and in retrospect this has been confirmed as a sound choice for this thesis.

The CINCH database proved to be limited in use to this research project. The database did provide a starting point for locating appropriate groups and organisations but, as was predicted in the methodology, did focus on groups with primarily urban concerns. Fourteen groups were contacted, of which four groups responded, only two of whom were willing to participate in the research. Although it was anticipated that there would not be a high level of participation, it was still expected that the return rate would be higher than it was. Twenty four groups in total had to be contacted to produce the desired ten groups willing to participate. Eight of the remaining groups were contacted through word-of-mouth and using the researcher's existing contacts and leads. Two further groups were initially intended to be contacted due to their public advocacy for water management issues, but they were not able to participate.

A booklet (located in Appendix 4) was produced to facilitate discussion. The booklet allowed sufficient space for groups to record their ideas. This was based on the observation that only one group ever used the alternate side of the page. The initial question seemed to puzzle many groups and many expressed that they felt it overlapped with the third question. It was not uncommon for answers to be reversed between these two pages (which was corrected in the write-up). The questions were designed to be as unambiguous as possible but to not be suggestive of 'expected' answers. It could be that in order to achieve minimal suggestiveness that the clarity of the

question was diminished. However, when groups were requested to initially read all four questions before they began, there was substantially less confusion. After this was recognised, it became standard for the research. The photo on the front of the booklet showed a relevant local water body (such as Halswell Stream, or the Heathcote River). This was used to try and expedite understanding of the area that was covered by this research. It is uncertain if this actually achieved its purpose, or if it just created an attractive cover. The brief talk given by the researcher can be seen in Appendix 3. This talk was modified slightly for each group to make it more applicable in terms of location. The talk seemed to achieve its purpose of introducing the researcher, the topic and the task required. No groups raised any concerns about the anonymous nature of all information provided for the research.

Throughout the research there was no resolution of the issue that unorganized groups were excluded from participating due to ethical requirements. However, some professionals were willing to give their opinions, but these were not included with the results.

The list obtained on local and regional authorities was reliable about territories. There were occasional complications if councils worked under a 'trading' name (such as Environment Canterbury or ECan). The other flaw in this method is that unitary authorities were not clearly identified. For this research it was important that they were examined alongside regional councils. Reviewing each of their websites was a time-consuming task, because not all councils had 'efficient' layouts or some have information under unusual titles such as *'Investing in our Banks: the benefits of riparian management'* produced by Taranaki Regional Council (2001). The National Library of New Zealand (Te Puna) online catalogue was used to determine if printed guides had been produced by organisations.

Locating other organisations involved in waterways management or nature conservation was more challenging but eventually a list of eight was created as follows:

- Ngai Tahu (the local Runanga, Maori tribal committee)
- Forest and Bird
- Federated Farmers
- Dexcel
- Fonterra Co-operative
- Department of Conservation
- Fish and Game Council
- Ministry for the Environment

The same process was used as for local and regional authorities, and worked with comparable success.

It was a disadvantage not being able to visit each location. However, given the selected research limitations it would have been of very little benefit for the effort required. Given how ‘web-based’ our society has become, it is important for the people who are turned to for advice to be up-to-date with modern (and now common-place) technology and communication mediums. Communication methods did not seem to vary much and included a fairly standard, primarily written medium to convey the method. Notable exceptions include the Ngai Tahu information which is on a CD and contains a video-diary of a restoration project, and ‘*Ecowater – The Guardians of the Mauri*’ animated stream care DVD created by the Waitakere City Council (2007) (cover originally included as Figure 28).

The criteria created from the methodology of 2.3 were intended to be no more than 10 items long. However, in practice, it became 11 items because there was a tie for the final position on the list. As was predicted in the methodology, all criteria came from the first three questions (Q1: How will it be presented? Q2: What information will it contain? Q3: How will the information be accessed?). This was because the final question produced responses of only one mention for each criterion. This Criteria, in a published form, would be useful for any organisation thinking about publishing a riparian management guide. This led onto 2.4 where the criteria were used to assess the relative merits of guides throughout Canterbury. This process was time-consuming, and often

required subjective judgements. Attempting to visit places mentioned most commonly by landowners produced some interesting experiences as are discussed later on.

Creating the answer to 2.5 was more laborious than was expected, however it proved most interesting to try and see likely and less likely future scenarios. It was interesting to note that there is an increasing body of literature (such as Levine, 2006 and Cork, 2004) on predicting alternative futures and reviewing them proved useful for this section.

Regarding the research limitations, given the vast number of management guides available, it was sensible to limit the detailed investigation to an area, Canterbury, that the researcher was familiar with. The second research limit was that when referring to riparian planting, it meant preferentially native riparian plantings. This limit worked well except with Rural groups who were less willing to accept it. Rural groups were potentially more resistant to this due to extensive publicity that went into the planting of willows during the soil conservation era.

5.3 What interested parties want in guides prepared for their use

The information that was gathered for the purpose of the research is specific to riparian management. However, it is a reasonable assumption to believe that the basic principles such as guide format should transfer and be applicable to other environmental issues.

It seemed obvious that people who had had no experience in this type of work did tend to be more idealistic in what they wanted in their guides. Whereas, people who had worked in this or similar fields were often more attuned to the more realistic requirements of undertaking such work, particularly in the areas of maintenance and preparation required. People can lose interest in the time it takes to find out the more detailed scientific study on things such as hydrology and soil type, though these could ultimately make the riparian planting more successful.

All groups that participated in this research were open in their expression of ideas. Looking at the ideas from all the groups, there were 34 ideas on the concepts of 'presentation', 90 ideas with regards to 'desired information', there were 60 ideas regarding 'accessibility', and 25 'other' ideas. This suggests that the most important area of concern for groups was 'desired information' followed by 'accessibility' which is important when considering future management guides. However, it could be that the information is biased due to where the researcher placed constraints, groupings and definitions on where each 'criteria' fitted.

A coefficient was used to remove any bias from the differing levels of participation within the division of groups. For the concept of 'presentation' all groups were comparably represented (Urban coefficient 1.56, Rural coefficient 1.66, Interest coefficient 1.69). This suggests that presentation is roughly equally important to each of the groups. From 34 criteria in presentation, the Urban group had five ideas that were only found in the Urban group, and two criteria received consensus from all the smaller groups within the Urban group. Rural group had three ideas only from Rural groups but no criteria achieved complete agreement from all Rural groups. Interest groups had five points only found in Interest groups and one point which they all agreed upon. This suggests that, for presentation, Urban groups were more alike in their thinking than the other groups. Both Interest and Urban groups have high levels (5) of ideas that are regarded as only relevant to them.

Desired Information

For 'desired information', there is more division of opinion. The Urban group had a coefficient of 2.00, compared to a Rural coefficient of 1.44 and an Interest coefficient of 1.53. This suggests that criteria regarding information were more important to the Urban groups and then Interest groups. The 'desired information' portion contains 90 criteria of which 21 were solely from the Urban groups, 9 were from the Rural groups and 16 were from the Interest groups. This appears to emphasise how important this criteria is to Urban groups, because nearly a quarter of all the ideas came solely from one group. Although there is a low level of consensus, all groups had one criteria on which they all agreed in this area. This shows that, within the group divisions, there is some level of consensus, but it is not particularly high.

Aspects of Accessibility

The issues of 'accessibility' created the greatest diversity in opinion. Urban groups had a coefficient of 1.25, Rural groups of 0.65 and Interest groups had a coefficient of 3.20. This seems to show that this issue was very important to the Interest group, but largely unimportant to Rural groups. The issue of 'accessibility' had 60 criteria, of this seven were solely from the Urban group, one was solely from the Rural group and 32 were only raised by the Interest group. This, once again, emphasises the difference of importance regarding this issue particularly to Interest and Rural groups. However, this area did show the highest level of consensus from the Rural groups who agreed on two points while the Interest groups agreed on one. The Urban groups did not agree on any points.

Looking more specifically at the results, 'pictures' were considered important as eight of 10 groups commented on it. This is consistent with predicted division of learning styles with the greatest number of people being particularly influenced by visual media. 'Pictures' are linked to 'diagrams' at seven reiterating this point. Three of the four points that were mentioned by over half the groups are visual criteria.

Written Aspects

Looking at written aspects, being ‘easy to understand’, was considered the most important. This is probably not surprising, as topics like this can be cluttered with excess information and largely irrelevant issues. ‘Ease of reading’ was important to both Rural and Urban groups, though why this was not important to Interest groups is unclear. This was emphasised by Urban groups wanting the information written in large font. It was interesting to note that Urban and Rural groups wanted the information to be suitable for children but this was not raised by the Interest groups. Could this be an indication that Interest groups were not thinking about involving other sectors of society?

Visual Aspects

Considering visual aspects, all groups thought it was important to include ‘pictures’, ‘diagrams’ and to ‘be colourful’. ‘Diagrams’ were particularly important to Interest groups, in that all groups in the Interest category mentioned it. Interest groups seemed to be particularly vocal on visual aspects, providing seven of the nine concepts and four of them were solely points raised by Interest groups. In other words this suggests that visual aspects are very important to Interest groups.

Aspects of Content

There was little consensus with regards to ‘content. This suggests there are diverse ideas and that there is nothing of such importance that it overrides the differences between the groups. Interest groups were once more the most prolific, though this could be due to the fact that this category was made up of four smaller groups rather than three smaller groups like the other categories, though it is generally perceived that Interest groups are more vocal and willing to express their opinions than other sectors of society. The most important idea was ‘bullet points’. This view was shared by Interest and Urban groups.

Aspects of Size

There was consensus from all groups that 'A5' would be an appropriate size for a riparian management guide. However, there was also a mention by Rural and Interest groups that 'A4' size would be best. This opinion was stronger from the Rural group. All groups expressed an interest in the length of the document. The Urban and Interest groups gave the term 'short' which is unfortunately wide open to interpretation. Urban groups expressed a stronger feeling for this, perhaps due to the office-based urban dwellers not wanting to read more than is necessary. Rural groups gave the more precise '20 page maximum' which could be debated as not being particularly short, Urban groups said no longer than '2 A4 sheets' which is a wide difference of opinion. The length suggested by Rural groups could be a result of increased isolation from 'society' which requires rural people to go further to obtain information, so only wanting to have to do it once.

Other Aspects regarding Presentation

Other aspects of presentation provided an interesting observation. All groups felt that the guide should be 'glossy or water resistant'. It was also of interest to note that one group specifically named a guide they felt was good. This was the 'Travis wetland walk – a field guide' by J. Orwin (2005). However, this is not an actual riparian management guide, but it does raise awareness about wetland issues. It is a guide to help people walking through the Travis wetland (a wetland area in Christchurch which has been the focus of major conservation efforts).

Desired Information

The criterion 'desired information' did not reach the same level of consensus (compared to presentation criteria). However, it does have more ideas that achieved over 50%, suggesting that general ideas were consistent, but not inspiring. Top criteria were 'appropriate methods', 'list of plants' and 'maintenance issues'. It was interesting to see that 'appropriate methods' were not considered important, which could be problematic given their importance to the ultimate success of any management programme. The 'further information' and 'how to contact experts' criteria showed that they are considered, but still not very important to groups. This perhaps suggests

that, with regards to ‘further information’, all necessary information should already be contained. Five groups mentioned that a guide should be ‘area specific’, discuss planting zones, have a ‘real stream success example’ and give ‘reasons for cleaning up waterways’. It was interesting to note that ‘resources available’ fell at four mentions, suggesting that either the majority of people do not want assistance, or perhaps have a disillusioned feeling with regards to hoping for someone to provide assistance. With the highest criteria being at seven, it would be possible for an entire sector of society to have disagreed with points, though in practice they did not.

Information on Methods

With regards to basic methods, all three groups expressed that it was important to include ‘appropriate methods’, ‘maintenance issues’ and ‘how to get started’. However, the first two are over twice as important as ‘how to get started’. It is good to see that all groups recognised the importance of ‘appropriate methods’ and ‘maintenance issues’. However, it also recognised that sometimes the hardest thing is to ‘get started’. Interest groups did not raise the issue of safely using chemicals (the others did). This could be an idealistic view that does not consider the use of chemicals, or perhaps just disregards the issue due to familiarity. If it is lack of consideration then it would have been more expected from the Urban group, who are known to be vocal in their objections to chemical controls.

Information on Motivations for Riparian Management

All groups felt it was important to ‘have a real stream success example’ and to clearly describe the ‘benefits of riparian management’ as well as the ‘reasons for cleaning up waterways’. It might be thought that the last two criteria overlapped in at least some way. ‘Having a real stream success example’ is probably a very valid request, it provides motivation, a goal and reassurance that when things are difficult, it is still possible. The Interest group placed high importance on having ‘reasons for cleaning up waterways’ and having a ‘real stream success example’. This perhaps allows them clarity of purpose and to give them motivation. The Interest group also brought up concepts of including ‘statistical information on the benefits’, ‘models showing runoff’ and to ‘explain where waterways go’. With regards to ‘statistical information’, when referring to means such as graphs, it is likely to be of benefit. However, if this refers to higher statistical analysis, it could actually limit the usefulness of the guide. Not everyone understands

statistics and people facing a daunting chart of statistical information are likely to ignore it. With regards to ‘models showing runoff’ and ‘explaining where waterways go’, such concepts as this are generally quite widely available. Urban and Interest groups felt it was important to provide ‘a vision for waterways’, ‘what to protect’ and ‘what was originally there’. The last criteria are easy enough to provide as there are generally well documented records, though not necessarily practically available. However, the other two are far more elusive concepts. For a guide to provide ‘a vision’, it would need to be specific to a water body such as a hypothetical ‘Selwyn River management guide’ otherwise how else can it provide a vision? The criterion of ‘what to protect’ is equally elusive, what people value is always going to differ and so is what they wish to protect. The Urban group also raised the issues of ‘discussing sustainability’, thus putting riparian management into its wider perspective. However, including such a discussion could increase an already space limited document. Urban and Rural groups mentioned that it was important to express ‘how and why to rebuild habitats’ and to ‘include maps of important ecological areas’. It is uncertain as to why they have made these requests, though the information on ‘how to rebuild complete habitats’ would be useful for restoration work, the ‘maps of important ecological areas’ is very vague as to what purpose this would achieve, perhaps to give a sense of other remnants or restored areas to create ecological connectivity and corridors through the working environment.

Detailed Information

With regards to the ‘detailed information’, it was noteworthy to observe that all three groups felt it was important for the guide to be ‘area specific’. This is important because it shows that the public is aware that New Zealand has a broad variety of environments and information applicable to one type is not necessarily applicable elsewhere. It was a little unusual that this attitude was strongest from the Urban group (who it normally would be expected to be less aware of issues like this). It was strange to note that only the Urban group felt it was important to outline the ‘objectives of the guide’. Perhaps this shows that the Urban group wants to be certain of the clarity of motives of the publishers or authors of the guide, though this type of concern is normally more seen in rural populations. Both Urban and Rural groups mentioned the concept of ‘multiple uses of riparian areas’, however, it is likely they were not thinking in quite the same direction. The Urban groups suggested concepts such as ‘educational opportunities’, ‘environmental walks’ and ‘reserves’. Whereas the Rural group mentioned concepts of ‘timber production’, ‘drought-grazing’ and ‘reducing maintenance’, thus showing a diversity of opinion

of what is important. While Urban groups mentioning issues that are of an intrinsic or aesthetic nature, Rural groups mention quite practical issues. Urban and Interest groups were keen to include a glossary, though this was not raised by Rural groups perhaps suggesting that a document requiring a glossary is likely to be considered too technical. However, Rural and Interest groups felt that a 'good definition of the term 'riparian'' was required and this was also raised in the research by O'Brien & Department of Conservation (1995). This was also proved in the experience of this research, where particularly older participants in Rural groups had difficulty conceptualising the differences between riparian management issues and issues with riparian rights. Interest groups also raised the idea that the guide should clearly state the 'intended use' of the guide, as well as the 'facts' perhaps alluding to the idea of a brief summary of the key issues and options.

Information on Rural Areas

It was interesting to look at issues that are solely applicable to rural areas. Although there is a perception that the 'city-folk' are telling rural people what to do, it did not appear to be true for this study. There were no contributions by Urban groups regarding rural areas. This could also indicate a general unawareness of the realities of rural life by Urban groups. The interest group raised the valid point of how riparian management could 'add value to property' but this concept did not appear to enter the rural mindset. It could be that this is not considered by Rural groups because they consider the value of the land in terms of direct 'production'. Urban dwellers are more likely to consider the sale value of land, particularly with the increasing popularity of lifestyle blocks. The Rural and Interest groups both raised the issue of the importance of discussing livestock management. This perhaps indicates that Interest groups do not consider riparian management as being part of integrated management in the working environment, or have little realisation of the practical implications of riparian management. The remaining suggestions were all from Rural groups. Two were related, these were 'how to get plantings that complement and recognise the maintenance of waterways' and 'how to deal with areas frequently dug out for drainage reasons'. This, of course, is of importance particularly for created waterways which are maintained by the Regional Council to retain the drainage/irrigation capacities. However, it causes substantial damage to established ecosystems and aquatic life. The Rural group also raised the issue of 'fencing and which animals can get through the different types of fencing'. This is somewhat astonishing as it would be normal to assume that a farmer had at least

a passing awareness of the different types of fencing. However, it could be that this question alludes more to the issue of appropriate fencing types for near waterways given the changeable nature of waterways. A document has already been produced on this issue from the Auckland Regional Council, *'Stream bank fencing and water supply'* (1997) by D.L. Hicks. The final point raised was including information on 'the effects of stock in both a positive and negative way'. This is actually a very valid point, because though there has been substantial research into the effects of grazing, the results and practical applications can be somewhat confusing, given that light grazing is actually the best management strategy in some situations.

Information regarding Assistance

Information about 'assistance that is available for riparian management' proved far more exciting than was expected. This was particularly so in the rural sector where the idea was met with very obvious hostility. In the Interest groups there was a strong feeling that organisations were 'slacking off' by not providing enough assistance. However, this then creates a paradigm because Interest groups think more would happen if more assistance was available, but Rural groups will not accept assistance. This illustrates the wariness from Rural groups of accepting help because of the potential strings attached. This phenomenon is not uncommon. As noted above, the Interest groups were very vocal in this area particularly regarding how the management guide should discuss 'help from industry participants'. This could be a reflection on Interest groups being more willing (or naive) to assume that there are no strings attached, or that they are blunter (or more realistic) in dealing with any strings. With Interest groups it is important to remember that they are typically not talking about management in relation to land that they own, but rather land in public ownership which could substantially alter willingness for compromise. The Interest groups also raised the point of linking to 'internet sources'. There is a wealth of knowledge online of varying validity, and it would be most wise to be able to reach the best information quickly. After all '*Wise men learn by other men's mistakes, fools by their own*' (H.G. Botin). There is no point in everyone making the same errors when they can easily learn to watch for the pitfalls and how to avoid them by the sharing of knowledge, and the internet is one way to do this. Another point raised by the Interest groups is including information on 'where to go for help'. This is a very valid point. Sometimes challenges can seem insurmountable alone but with help can be achieved. Other than these points raised by the Interest groups, all the groups mentioned how important it was to have 'suggestions for further information' and 'how to contact experts'. This confirms

what was discussed above, that is, the importance of having somewhere to turn to when further advice and knowledge is required. Rural and Interest groups felt there should be information on the 'costs of doing riparian work'. This is a very practical question to be asked but not one that seemed to concern Urban groups. Despite the obvious difference of opinions between Rural and Interest groups discussed above and the hostility about accepting help, both groups did raise the points of 'taxes and subsidies' as well as 'resources available'. The Urban group wanted 'references' to be included, perhaps so that the validity of statements can be checked, or to provide further information.

Information on Biota

Judging by the number of comments on this topic, flora and fauna are of extreme importance to riparian management. There was a reasonable level of consensus with three issues being mentioned by all groups. These were the issues of 'pest control', having a 'plant list' and being able to 'attract 'good' fauna' to riparian areas. These were not, however, the most important points. The most important were the 'plant list' followed by having a 'weed list' and 'where to get plants from' this once again suggests a high level of practical awareness of the implication and requirements of riparian management. Both the concepts of a 'weed list' and 'where to get plants from' were raised by Rural and Interest groups. Rural groups also wanted to know 'native and common names for plants' perhaps referring to scientific and common names, or to knowing their English and Maori names. They also raised the issue of 'using riparian areas for drought or winter feed. This is a very practical use for riparian areas. However, there is the issue of whether native plants would be able to withstand the grazing pressure of domestic stock animals. Rural groups also raised the notion of information on 'how to propagate your own plants'. This is an interesting idea and one that is used by many other restoration organisations. However, it is likely to fall outside the bounds of a riparian management guide.

Urban and Interest groups felt the guide should cover the 'uses of plants'. This was possibly alluding to cultural uses given that it was not raised by Rural groups, where it would be more likely to mean diversifying farm income by using riparian areas as a different type of production environment (for things such as seeds, nuts, oils etc.).

Urban and Rural groups thought that ‘photos of the plants’ would be a good idea to assist with identification of plants. This is also linked to the having ‘pictures or photos for identifying fauna’ (as was raised by the Urban group). Urban groups also identified the ideas of having a guide to what ‘species of flora and fauna could be found in such areas’. There was also the extremely valid point of ‘how to recognize sick and dying plants’. Plants are expensive and being able to identify ones in need of attention is likely to provide noticeable cost-benefits.

Information on Planting

Information about planting is important for any restoration riparian management. All groups agreed on two points; (a) that it was necessary to know about ‘planting zones’ and (b) learning to ‘create the whole ecosystem’. This is encouraging because it recognises that there is an awareness of planning for multiple purposes of riparian areas. The Interest group was the only one to raise the issues of ‘thinning’ and having ‘before and after pictures’. With regards to ‘thinning’, unless the goals are to have timber production in the riparian zone, or maintaining a particular level of access to the water body, thinning would not normally be done as part of riparian management, except to remove dangerous objects as ecological systems are self-thinning. ‘Before and after pictures’ have great potential as was shown in the research thesis by Marchand (2006), where visual constructions of what could be achieved for particular sites were used to discuss management options. Urban and Interest groups were interested in ‘timing’. This is an important consideration when undertaking such work. They were also interested in having a ‘cross-section of the planting area as a model planting plan’. This would no doubt be useful and is normally given in a riparian management guide but often in a written form rather than a diagrammatic form. The final point raised by both Urban and Interest groups was about having assistance in ‘defining and setting targets or objectives’. This is a difficult area because, other than very broad suggestions and statements intended to encourage people to think, no one can define targets or objectives but the people who actually want to achieve them. Rural and Interest groups expressed an interest in being given ‘growing tips’ for plantings. These are normally included now, due to the high levels of plant failures at past restoration projects.

Information of Physical Aspects

Physical aspects (such as hydrology) of any site are essential to the long-term success so it is important to include information about such things in a management guide. This realm was dominated by the Urban group, which could be an indication that the Interest and Rural groups were made up of people with more understanding of the rural landscape and thus felt they did not require information on physical issues. This could be a false sense of knowledge. Urban groups raised the importance of understanding 'physiographic issues (fresh/salt/brackish water)' and 'hydrology'. They also placed an emphasis on safety in both the 'safety issues of reserves' as well as 'safety requirements for gates and fences'. The final point raised by the Urban group was about having an 'integrated management plan' though no further information was provided on what this meant to the group. The Rural group was interested in 'how to reduce drain clearing', whereas the Interest group mentioned the importance of 'soil and water testing'. The most imperative point from this section was raised by both the Urban and the Interest groups, and that was knowing about 'stream health and safety monitoring'.

Legal Information

We live in a modern society governed by laws and it is important to attend to legal issues as was raised by the groups. All groups expressed concern about the legal issues associated with 'riparian rights and ownership'. The Urban groups were concerned about 'dealing with public interest' and were perhaps concerned about vocal objectors, or wondering how to get the public involved and take pride and ownership in the area. The issue of 'public access' was also raised. Urban and Interest groups were interested in information on 'consents and permits' because any changing land use is subject to the district/city plan as well as regional water strategies. All of this can be a daunting area. Rural and Interest groups seemed interested in 'what people can do to help'. How this could be arranged might pose a number of problems, particularly with regards to what is implied by 'help'. That is 'help' could mean either financial aid or physical labour sources. Interest groups also brought up the issue of the management guide including the 'relevant legislation'. This is also important. Interest groups also wanted to know about 'getting volunteers from local community groups' and what 'support organisations' could be utilised. Finding volunteers is probably outside the scope of what a riparian management guide would do. However, a guide could include information on how to go about recruiting volunteers or

organisations that are likely to be interested (such as Scouts). Locating support organisations would be a very valid inclusion, because projects such as these are often fuelled on the passion or conviction of a few individuals, and they need all the support they can get.

Other Information topics

Other topics identified lacked any consensus between groups. Urban groups requested information on ‘choking hazards’, ‘controlling domestic animals’, ‘coping with special local needs’, ‘planning for the future’, ‘planning for path or cycle ways’, ‘coping with external things affecting your planting’, ‘dealing with conflicts in vision’ and ‘incorporating educational areas into the plantings’. Some of these are similar, for example ‘coping with special local needs’, ‘planning for the future’, ‘planning for path or cycle ways’ and ‘incorporating educational areas into the plantings’. These are all issues that require forethought and planning in the initial stages of riparian management projects and probably could be incorporated into a planning section of a management guide. Some are more difficult, such as ‘dealing with conflicts in vision’ or ‘coping with external things affecting your planting’. Interpersonal issues are an intrinsic dilemma with living in a society and deal with more complex issues than a normal management guide would be expected to cover. The issue of ‘domestic animals’ is definitely one of concern for any area which is hoping to attract wildlife. This is because cats and dogs, in particular are known for the detrimental effects they have on wildlife populations. The control of such animals, other than education of the community to use things such as belled collars, is extremely expensive and not very practical for small management areas. Interest groups wanted information on ‘bridges’, this topic is normally included in riparian management guides. There is also a specific guide on the best way to bridge waterways, ‘*Environment Waikato best practice guidelines for waterway crossings*’ by Spiers, D. & Ryan, G. (2006), produced by Environment Waikato. Interest groups also wanted guides to include a ‘warning not to try to do too much at once’. This is very sage advice, and one that is becoming increasingly evident in management guides. Rural groups raised one of the most astute requests, to have a summary of ‘common mistakes to avoid’. This would have to be one of the best suggestions; therefore it is surprising that it was only mentioned by one group.

Accessibility received the highest level agreement at nine groups of ten wanting it available on a ‘website’. But following that, much lower levels of consensus were reached, ‘available in

libraries' at six, 'booklets' at six and as a 'hardcopy/book' at five. There were lots of ideas below 50% and it was interesting to note that 'being free' only received a three. It was unexpected that this would be so unimportant in terms of concepts. This could suggest that freedom of information is not important overall, or it could indicate an assumption that the information will be free so it does not need to be mentioned. Other than having the information on a website, there was very little consensus in terms of accessibility of information.

The Visual Media

With regard to the use of printed media to convey the riparian management message, all groups required the information to be in a physical form of some description. Examples mentioned included 'hardcopy or book form' and 'booklets', this could indicate a nostalgic requirement to have a physical form, or wanting a guide that can be quickly referred to, and taken out into the field. Rural and Interest groups strongly preferred 'booklets' as the means of conveying the message. Despite not being considered by the Urban group, this came out as the most important criteria with regards to the printed media, thus suggesting that for interest and rural sectors of society this is an important way to reach them. Rural and Urban groups commented that information would be most effective as a 'one page summary sheet' and as a 'published hardcover coffee table book'. This was explained as having something you can quickly refer to and having something that you are very unlikely just to throw away. Urban and Interest groups commented on using 'pamphlets' and disseminating the information through 'magazines' and 'newspapers'. The use of these media has proved useful for conveying other public messages such as the recent road rule changes. Urban groups seemed to want more technical information, requesting a 'technical document able to be put in refereed journals' and as 'project reports' perhaps indicating an unawareness of the vast body of technical and scientific riparian management literature, or perhaps highlighting an issue that the body of literature is generally inaccessible to the public. Interest groups wanted a '3-fold pamphlet'. This was a fairly specific requirement and also thought that the 'Council newsletter' could be used to get the message out. This was a comment that drew concern, given that Environment Canterbury produces a newsletter, 'Living Here', which amongst other purposes does contain information regarding environmental issues, including waterways management. This perhaps suggests that even though this document is produced it is not widely known about, or read, and perhaps increasing awareness of these publications would be of value.

Information by way of information technology is ever increasing in importance in our society. All groups mentioned that the information should be available on a 'website' and then of lesser importance on a 'compact disc'. Urban groups indicated their interest in having an 'interactive computer slideshow programme'. Urban and Interest groups also raised the point of having the information in 'PowerPoint or pdf format that could be downloaded' or having 'E-mail updates sent out'. The 'email updates' seems to be an innovative idea, however most guides available online are in pdf format already, which was the second most important idea. Though 'email updates' are very innovative, it could be considered intrusive unless people are members of specific projects. Interest groups were the most vocal on ways to use computer technology, expressing the ideas of having 'web video clips', 'web forums', 'linking from other sites' and having 'a free disc' available. Having a 'web forum' would be a very logical contrivance to have in conjunction with a management guide as it could be used to discuss issues and raise awareness of other projects going on. Having 'web video clips' is unlikely to be of particular use at this time, unless they were very short clips such as a tip of the week. The idea of 'linking sites' is useful and is already done to some extent but it would be good if greater cooperation between organisations could lead to a general pool of knowledge. A 'free disc' would be useful but discs are not especially cheap in either materials or time to produce and so are less likely to be accepted as a useful medium. Other than the two points that all groups agreed upon, Rural groups had no suggestions for using computer technology to disperse information. This suggests a wariness to change, paper being what they are used to, or that high speed internet is still not easily accessibility and therefore they have been slower to invest in computer technologies.

The Verbal Media

The verbal medium is a very important way in which we communicate, and one that is quite important within rural communities, though the suggestions were actually dominated by the Interest group. All groups mentioned having the information in 'multimedia form' (either video or DVD), and was the most important idea in this section, and there are some in existence such as '*Ecowater – The Guardians of the Mauri*'. However, the Interest group also raised the point that the information would 'not best be served by being in a multimedia form'. This was due to the belief that informative multimedia has been created and is often not viewed by the intended audience. Although this is a very valid concern, the upcoming generations are ones that are very

used to information being handed to them on a visual 'plate' and use television (and related media) as a major source of knowledge gathering.

The Interest group suggested ideas that had some common ground such as 'workshops', 'farm discussion groups', 'community meetings', having an 'actual stream demonstration' and having a presence at 'field days'. Discussion groups are a popular way to connect with the rural community, but seem to be declining in their frequency of use. Workshops, meetings and demonstrations are all difficult because of the level of organisation they require and of the reluctance to take time off tasks to attend such events, however, the field days are an established source of rural knowledge and taking time off to attend field days is far more likely; so it is important to reach people when they are willing to listen. Other ideas from the Interest group were to produce a 'programme on waterway cleanup' or gaining a 'slot on Country Calendar (rural New Zealand programming)', both of these are very valid ideas. However, both are likely to have limited audiences, though if it is the 'right' audience this would not be a problem. The final points raised by the Interest group were to have 'speakers going to like-minded groups', though since groups often meet in the evenings this becomes difficult because it requires people to give up their personal time. Lastly, the idea to hold 'Hui presentations' was raised. This is a good idea because it is important not just for moral or legal reasons, to include Maori in the management of what is perceived to them as an important cultural resource, and because of this Hui presentations should be increasing in their frequency of use. The Urban and Interest groups suggested using 'talk-back radio' to discuss issues. Rural and Interest groups thought that having 'experts available to discuss issues with' would be the most useful. This could be achieved through a ring-up radio section, or having a presence at a field day, though it is less likely that experts would be freely available to be called or able to go visiting individuals, with perhaps the exception of landscape architects.

Sources of Information

Groups also felt it was important to note where physical information could be obtained from. The most important locations were mentioned by all groups as being 'libraries' and to a lesser extent from 'local authorities', which is why these were the location that the researcher sought information from. Urban and Interest groups thought it would be useful having information available 'from schools' and this was the third most important point. This does not seem to be a

very practical location for adults to be able to gain information. Urban groups wanted the information to be available from 'local interest groups' though unless the groups have a permanent facility this does not seem to be a very practical suggestion. Rural groups said that the 'education office of the regional council' was a good location to receive information, which is no doubt a compliment to the education office, and is also likely to be a practical location. Interest groups supplied the most answers suggesting 'waiting rooms', given that people flick through information left out and it could be a way to reach people who might otherwise never seek the information, and likewise to be 'used in community centres'. Interest groups also wanted the information to be available in 'plant nurseries' and from 'landscape architects', both of which are practical suggestions if the management plan includes plantings.

Innovative Ideas

Our future depends on innovative ideas because these are the ideas that change the world. However, interesting as these ideas were, it is likely that the issue of cost was not factored into their creation. Some of these ideas have more conventional feasibility than others. The ones that are targeted to individuals (such as the 'dancing telegram') would normally be considered unlikely, money spent on raising environmental awareness is extremely limited, and thus organisations tend to focus on a few general projects, with high levels of cost-benefits. It is for this reason that 'aeroplane banners' are also unlikely, particularly since the level of detail that can be contained on a banner is very limited. However, ideas such as having an 'animated mudfish educational video' are not so far-fetched because a similar project was created by Waitakere District Council. It is however outside the scope of this study to see if this proved to be an effective educational method. 'Murals and other types of artworks' have been shown to be very effective overseas. Lovett (2004) described it as stories that shape the way we manage our rivers and adjoining lands, stories that we tell through art, poetry and drama, which have proved very effective in Canada. In Christchurch City through parts of the city, bridges have been decorated with metal sculptures to celebrate the life of the river; examples can be found on both the Avon and Styx rivers. 'Display panels in appropriate locations' were raised as a way to convey the message. Christchurch City has some examples, such as at Travis wetland or the Department of Conservation nursery at Motukarara. However, these are generally locations where people who already have an interest in wetland areas would go, so the ability of this method to reach the wider public may be limited. However, as was noted in communication theory, it is not possible

to communicate to people who do not want to ‘listen’, only to those who are willing to receive the message. Perhaps it is not of concern that their audience may be limited. Then again, in places such as Travis wetland where there are display boards, it is an area that is frequented by local schools so it is reaching a wider audience. A lot of potential for change lies not with adults but with the next generation. It is somewhat uncertain what the costs of ‘speaking rocks’ would be, but it is likely that their usefulness would be limited to established environmental trails, such as Travis wetland. Niels Bohr was well-known for saying ‘*do not give up too soon on an idea just because it is wrong*’ and it would be an appropriate motto for a section such as this.

It was interesting to note that no Interest group thought that cost was an important issue to be considered for management guides. The suggestion that a ‘summary’ could be widely distributed did seem interesting, and it was raised by several groups, however it is likely that if this was a letterbox drop that it would just get thrown out with the ‘junk mail’ without being read. It is possible that a local newspaper insert might receive a better reception. It was something of a surprise that the Urban group were the only ones to raise issues regarding the ease of obtaining information, suggesting that Interest and Rural groups expect that if they should so desire the information it will be readily available to them. Using the education system was raised by Urban and Interest groups and it was also mentioned in Cuff & South Canterbury Catchment Board and Regional Water Board (1988). These groups also mentioned ‘monitoring projects’ and ‘posters’. Both of these are available in Canterbury. There is the Waterwatch project (www.inet.net.nz/~stevensh/waterwatch/) for schools, but it is uncertain how aware teachers are that this resource is available, and posters can be obtained, though this is said to be at some difficulty (R. Langdon, per comm., August 2007). Interest groups suggested that it was ‘sent to relevant owners and people purchasing relevant properties’. This is likely to be difficult, how relevant properties and owners are determined for starters, and also there is no guarantee that the information will be read if sent out, and such a method could be perceived to be quite intrusive. This is the same for both ‘mass mailing’ and ‘delivering the information door-to-door’ not to mention the high labour costs. Interest groups also suggested that the ‘information was given out’ though this is somewhat vague in terms of when and where, perhaps having a stall or information at a stall at rural events (such as AMP shows) would be an appropriate place to try and create greater awareness. The final suggestion was that the ‘basic text is bi-lingual’, this suggestion is probably more applicable in some places than in others. It is unlikely that it would actually be

‘necessary’ for Canterbury, however it could be seen as culturally sensitive to do so, which would be a positive action.

Urban Groups

Urban groups had two similar suggestions in ‘other suggestions’; (a) the concept that the guide was created as a ‘living book’ with either a built in redundancy or having regular updates, and (b) the other that it would be useful if ‘updates could be added to an existing book’. Of all riparian management guides in New Zealand, only ‘*Managing Waterways on Farms*’ (2001) produced by the Ministry for the Environment would fit this description in terms of its physical design, being contained in a ring binder. However, this guide does not have regular partial updates, but was most recently revised in 2005. Urban groups were very vocal (though only within one smaller group) in their belief that ‘implementation was the key’, and that this was often the major stumbling block, suggesting that there is a level of disillusionment about what can be accomplished. It was fascinating to see that Urban groups specifically mentioned the Landcare Trust and wished management guides to be linked to this organisation. New Zealand Landcare Trust could be an organisation that could assist in meeting the need ‘to ensure that a range of reserve types exist within an area’, though this really falls outside the scope of this research, it does suggest a desire for greater community cooperation and communication. ‘Games for children’ links back into the issue of educating the next generation in the environmental management issues they are likely to face. It also links to making riparian areas and their management a source of pride and of pleasure. This is something that, according to Lovett (2004), Canadian authorities work hard at encouraging the people on the ground to celebrate and ‘connect’ with their waterway. With regards to the suggestion that the guide should be available in ‘both soft and hard cover’, a soft cover is generally cheaper to produce. This is a positive feature; however a hard cover is likely to last longer.

Rural and Interest Groups

Rural groups provided the least ‘other suggestions’ perhaps suggesting that the groups felt the three previous topics covered most of the important issues. All the suggestions from Rural groups were on who was recognised as providing information, and organisations that were described as doing good work, which is encouraging because it suggests that those who have sought

information have had overall positive experiences. The Interest groups are almost diametrically opposed to the Rural groups. Not only did they produce the most 'other suggestions' but had several occurrences where specific organisations were targeted by Interest groups who felt that they should be doing more. This could be a sign that there is a prevalent idealistic view within Interest groups, a lack of contact with the reality of the situation, or the recognition of a real need. But, after this, Interest groups also specified that the guide should be 'non-confrontational' which would normally imply not trying to apportion the blame for any given situation. It was interesting to note that this section is the only area where the concept of different guides for urban and rural areas was raised. This suggests perhaps in the minds of the groups, the principles at least will not differ between urban and rural areas. Interest groups also raised the issue of riparian management being backed by 'appropriate legislation and fines' but also raised the concern that it would become 'another compliance issue'. It was interesting that both of these came from the same sector of society. However, it also shows a lack of awareness in the public mind that the Resource Management Act (1991) and Regional Plans are already intended to cover such issues. Interest groups also raised the concern of reliable information being used. The fact that this was raised is a cause for concern. Do the groups feel that the legitimacy of the information is an issue; perhaps feeling organisations may bend or make up the information? If this is true, then this is a substantial barrier to conveying the riparian management message. Another issue raised was that the guide needed to be able to 'be produced quickly' perhaps requiring the guide to have recent information contained within, rather than being delayed in the publication process. This issue was also raised with relation to having a 'webmaster to keep information up-to-date'. This is a well-founded point. However, given that most organisations just keep a scanned version of their physical management guide online it would be difficult to update. However, if such information was accompanied by a discussion forum or a blog, a webmaster could be a high priority.

One of the more interesting suggestions, was that a portion of the guide had landowners outline the benefits to them of their riparian plantings, including anecdotes about things that went wrong and things that went well. This could include positive changes they have noticed because of their planting e.g. birdlife, mental health improvement because of increased enjoyment from their property. This was contributed by a Rural group and really emphasised that there is so much more to riparian areas than might be seen at first glance.

5.4 Communication theory and barriers to communication.

Even though it is possible to determine what the interested public would like to see their guides being like, it still relies on effective communication to make this reality. According to New Zealand Audit Office (2004) no communication should be undertaken without being able to justify or give sufficient regard to costs, including establishing an identifiable need for the information (as well as identifying the audience), ensuring that the method of communication is the most effective choice to reach the identified audience, and that it is then conducted in the most cost-efficient manner.

A widespread change of attitude to our water resources is needed. However, as was observed by Simpson (1995), it is not easy to change attitudes, if only because change cost money. Another issue that is important for all communication regarding natural resources within New Zealand is that there is a deep history of superiority and general distrust, on both sides between people of Maori descent, and those of European descent, as was raised particularly by Douglas (1984). According to Clover & PCE (2002) open dialogue and debate are needed to appropriately meet the challenges currently facing our natural resources and native biodiversity.

The specific barriers to this particular research and topic can by and large be divided into two types; (a) barriers from the public and (b) barriers from professionals (including but not limited to the government and its broad spectrum of employees).

Public barriers will be covered initially where there is a greater basis of examination, and then professional barriers will be covered.

Potter, Douglas & Selby-Neal (2004) commented that though the environment in which society operates is inseparable from our culture, with increasing urbanisation people no longer see the direct effects of their choices, and how if people cannot see any problems, how can they be expected to be concerned about finding solutions.

It is distressing that there are some parts of our society who use conservation as a platform for NIMBY (not-in-my-back-yard) politics (as is noted by Penny, 1988), which damage the credibility for people who are striving to improve and protect our country with no ulterior

motives. Penny (1988) made a particularly strong argument against the misinterpretation that often exists between the public, and the people in power – ‘economic consideration alone cannot address all issues of justice, equity, cultural sensitiveness, the need to secure the well-being of future generations, and the morals of resource use in a general sense’. The basic motivation of conservation is this urge to ensure the survival of the species. Of necessity this finds expression as concern for the ecosystems that support life in a general sense and thus a strong empathy for all life; often erroneously interpreted as sentimentality. Professionals are of course trained (particularly in areas such as science or law), to be emotionally detached from whatever they are working on, no doubt with the intention of trying to ensure the highest level of impartiality in judgements. However, this can mean that they are less able to, and give value to, emotive reasoning, which are increasingly required in resource management issues, particularly when there is a crossing of cultural barriers. In a research thesis by Sullivan (1998), it was observed that wetland areas would have a more efficient management in New Zealand, if the personnel within governments, and their management agencies, had an improved appreciation of the economic and social values of wetlands. Surprisingly this kind of remark is not uncommon.

5.5 Does the information nationwide meet their needs?

Christchurch City Council produces its own guide which can be obtained online. This council may have decided to invest in promoting this environmental issue due to the high level of waterways throughout the city. Invercargill City Council also produces a guide, which is not available online. Given that the location of Invercargill is similar to that of Christchurch, it is likely that it shares similar reasons for promoting waterway management. Queenstown-Lakes District and Selwyn District both link to their regional authority. This is a positive step that negates the need for the councils to expend finances on producing their own guides. Five territorial authorities have information online (Hamilton City, Rodney District, Papakura District, North Shore City and Manukau City Council). Four are part of greater Auckland, suggesting that the greater Auckland area places high value on its riparian landscape. Three councils have information available in locations other than online (Waitakere City, Hamilton City, and Wellington City Council). It is interesting to see that these are all city councils, which would not normally be expected because of their primarily urban nature. Whakatane District is linked through to the regional council, but it is the only one in the Bay of Plenty to do so. This is interesting given that the Bay of Plenty has such a high level of rainfall and in recent times, extreme weather events have created chaos, the impacts of which could have potentially have been reduced with suitable plantings. In total this represents 13 local authorities that have made an effort in advocating appropriate riparian management techniques out of 69 local authorities in New Zealand, a rate of 19%. This seems lower than would have been expected. This rate is higher in the South Island than in the North Island, suggesting either that councils in the South Island are more concerned about riparian management, or that the results are skewed because there is a greater number of councils in the North Island. However, given that the second highest location where people would go to find information is their local authority, this will only prove useful for a very limited portion of New Zealand's population outside of Auckland, which is not particularly useful.

The regional councils and unitary authorities have a much higher rate of riparian management guide availability. Of the 16 regional council and unitary authorities, 13 have information available. Seven organisations have information both online and in other forms. Three organisations have information online, a different three have information in other forms. There are only three regional council and unitary authorities that had no information (Marlborough District Council, Gisborne City Council and Hawke's Bay Regional Council).

In addition to councils, there are other organisations that supply environmental knowledge and information. Of the eight organisations that were considered, only Federated Farmers did not have information freely available. Federated Farmers website is restricted to members only and it was not possible to determine if the information was there or not. Anecdotal information has been obtained that Federated Farmers are active supporters of riparian management. Ngai Tahu did not have information available online, but information could be found. When considering who is the best source of locating information about riparian management, it was the other organisations who had the highest rate of information availability, followed by regional authorities. The implications of this are that other organisations and regional authorities might be required to make it more apparent that they are most appropriate sources to try and locate information on riparian management from.

5.6 Does the information available for Canterbury meet their needs?

The information from the groups created the following criteria, in the approximate order of importance.

- Available on/from a website
- Information has pictures
- Information has diagrams
- Information is simple and easy to understand
- Includes how-to and appropriate methods information
- Includes a list of plants
- Maintenance issues
- Includes where to find further information
- Has information on how to contact experts
- Information is available in libraries
- Information is in booklets.

There were 11 criteria that were deemed the most important overall to the ‘interested’ public. Overall, the greatest number of criteria were related to desired information at five (45%), then presentation aspects which has four (36%), then accessibility at two (18%). This shows that the information contained within the document is of paramount importance, following by how it is presented. A prototype guide was created and is included in Appendix 6.

The Urban group had 23 criteria of particular importance to them. They are listed in approximate order of importance.

- Information has pictures
- Information is easy to understand
- Information is area specific
- Information has diagrams
- Information is colourful
- Information is easy to read
- Is short
- Contains information on appropriate methods
- Contains a plant list
- Maintenance issues
- Lists where to locate further information
- Has a vision of what waterway could be like
- Contains a cross-sectional model planting plan
- Has maps of important ecological areas
- Deals with public interest
- Discusses public access
- Information is on a website
- Information is available in libraries
- Pamphlets
- Information is downloadable
- Information is free in at least one form
- Summary of information distributed to landowners
- Has an interactive computer programme

It was interesting to note that there were so many criteria of equal importance to Urban groups. Of the 23 ideas, six of them are relating to presentation (26%), ten relate to information contained (43%) and seven ideas relate to accessing the information (30%). This suggests that Urban groups found ideas regarding information contained within riparian management guides to be the most important, while presentation was least important.

The Rural group had 19 criteria of particular importance to them. They are listed in approximate order of importance.

- Has a weed list
- Information is on a website
- Information is in booklets
- Information has pictures
- Information is easy to understand
- Information is colourful
- Information is easy to read
- A4 size document
- Information contains appropriate methods
- Has a plant list
- Maintenance issues
- Discusses planting zones
- Suggests where to get plants
- Considers how and why to restore habitats
- Contains photos of plants
- Discusses fencing – what animals can get through
- Discusses plantings that complement and recognise the maintenance of waterways
- Information is available in libraries
- Comes as a hardcopy/book

Rural groups had less ideas of what was of importance, however, they had some specific criteria relating to issues that really only affect rural areas, and would be important to note if a guide was being prepared for specific use in these areas. Of the 19 ideas, five of them are relating to presentation (26%), ten relate to information contained (53%) and four ideas relate to accessing the information (21%). This suggests that Rural groups found ideas regarding information contained within riparian management guides to be the most important. How to access information was least important. This confirms the fact that this was the only group not to express particular concern about the ease of access, perhaps working on a belief that if they want the information, it will be available to them. The request for information contained is very high at over 50%. It is also interesting to see, that despite the difference in number of ideas, the percentage importance for presentation is the same as for Urban groups.

The Interest group had 14 criteria of particular importance to them. They are listed in approximate order of importance.

- Information has diagrams
- Information suggests how to contact experts
- Information is on a website
- Information has pictures
- Guide uses bullet points
- Discusses appropriate methods
- Has a plant list
- Maintenance issues
- Lists where to locate further information
- Shows a real stream success example
- Lists resources available
- Displays before and after pictures
- Has a model of stream showing effect of runoff
- Information is in booklets

Interest groups produced a list of interesting top criteria, very focussed on the information contained and with little concern about other aspects. Of the 14 ideas, three of them relate to presentation (21%), nine relate to information contained (64%) and two ideas relate to accessing the information (14%). This suggests that Interest groups found ideas regarding information contained within riparian management guides to be the most important, while accessing the information was least important. This is the same as it was for Rural groups, but even more extreme in its difference.

The Christchurch City Council management guide '*Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch & lowland Canterbury*' met 10 of 11 criteria in the comparison. It is an abridged version of an earlier, substantially larger management guide, but does well to be lacking only in one key criterion, which is how to 'contact experts'. This could suggest that the authors felt that sufficient information was contained within the guide to give a sense of the situation, without requiring the continued input of experts. The current management guide has used a smaller font size than the accepted standards (either 12 Arial or 12 Times New Romans) but this proved not to be uncommon.

Environment Canterbury has produced a guide to cover all of Canterbury which also met 10 out of 11, '*A guide to managing waterways on Canterbury farms*'. This guide has three smaller accompanying guides to tailor the information to more specific water body types. This approach has both advantages and disadvantages. It does allow you to only have to deal with the applicable information; however, it is four pieces of paper rather than just one. This guide has clear explanations of what is happening, but uses many words to do this, and far exceeds any description of a booklet, which is what was wanted. A second guide '*Riparian zones: a guide to the protection of Canterbury's rivers, streams and wetlands*' has also been produced by Environment Canterbury, which is a booklet, but it did not score well at six of 11, particularly lacking what was deemed as the most important requirement, having the information 'online'. However, it was produced earlier than the '*A guide to Managing Waterways on Canterbury Farms*' so it is possible that the information was intended to be supplanted by the more recent management guide, though the information was not the same, but this would explain why this guide was not available in public libraries. The Department of Conservation guide, '*Protecting and restoring our natural heritage: a practical guide*' is thorough and well thought out, but is not particularly 'simple' in its execution and explanations, coupled with small font and length. This guide is likely to deter all but the most serious of practitioners, unless this is the audience it was aimed at. However, it does not fulfil the mandate of this research. If this guide is intended for environmental practitioners then it would be beneficial if a more 'appropriate' management guide could be produced for the public, or if this guide was intended for the public, that it is simplified and abbreviated. The Ministry for the Environment guide '*Managing waterways on farms*' has similar issues. It is far more complex than the 'average' person would be willing to deal with, even to environmental practitioners it is a daunting read. The guide is not area specific, but does contain a nationally well represented range of case studies, which do conceivably provide the information with regional applicability.

In fulfilling the mandate of this research, the two management guides that best meet the requirements, as were created by the groups, were the guides by Christchurch City Council '*Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch City & lowland Canterbury*' and the guide by Environment Canterbury '*A guide to managing waterways on Canterbury farms*'. Looking first at Christchurch City, the guide, though primarily intended for the urban environment was also created with lowland Canterbury in mind, as it was produced in conjunction with Waimakariri District Council. It is

visually appealing and has a ten-step plan to lead you through the process of active riparian management, emphasising heavily on replanting. The Environment Canterbury guide is more strongly focused on broader riparian and wetland management, not necessarily on restoration or replanting. This guide covers a greater range of geographic and ecological areas, and as such would have more scope to be of potential use to people outside of the Canterbury region.

Locating management guides in the top two locations as listed by the participating groups proved to be an interesting experience. Initially a local council service centre was visited and did not provide a very good overall impression, leaving aside customer service issues, which are outside the scope of this research, the attendant did not listen to what was asked, and provided only marginally relevant information in response to this, all at a cost. The second location was the Central public library in Christchurch which provided a far more pleasant experience. There was a clear, obvious display in a prime location upon entering the premises, including decent levels of supplies, information on issues affecting Christchurch and Canterbury such as riparian management, green corridors in the city and enhancing native biodiversity.

5.7 General discussion

“No single raindrop believes it is responsible for the flood” – Unknown

The objectives of this study were to:

- Determine what interested parties would like to see in guides prepared for their use.
- Compare how well existing guides available to interested parties are meeting these needs.
- Compare the contents of specific guides based on criteria determined by interested parties themselves to meet the needs of the interested parties.
- Produce criteria which could be used by authorities when considering future publications.
- Speculate as to the future validity of documents and how their use and usefulness may change over time.

Determining what interested parties would like to see in guides prepared for their use was reviewed in the results sections 4.1 and 4.3, it was then discussed in section 5.3. The comparison of guides was covered in sections 4.2 and 4.4, then discussed in sections 5.5 and 5.6. The specific guides were examined in sections 4.4 and 5.6. The criteria was created in section 4.3 and then discussed in detail in 5.6, with the prototype in Appendix 6.

It could be that there is an error of mindset prevalent in New Zealand, particularly with regards to the issue of riparian management and protection of waterways. If this is true, there are many ways that this could be manifested. Some major ones include:

- This issue is not my fault
- This issue is not my problem
- Why should I make an effort on this issue when (my neighbour/the government/industry etc.) isn't?
- Sure I'm not perfect, but at least I am not as bad as (my neighbour/the government/industry etc.)
- What does this one matter? There are plenty of others.
- Yeah sure it's important, but what I am doing is more important (the me first logic).

The first mindset is that 'the issue is not my fault' and for many of the environmental issues currently facing New Zealand this may be a true statement. Our society is reaping the benefits and consequences of the choices made by previous generations, and even previous governments

and political agendas. However, in consequential logic, though this issue may not be of our own causing, the choices made now regarding it will affect all future generations and so it is a dangerous response to choose to do nothing because we did not cause the problem. This leads onto the second issue of ‘this is not my problem’ which once again leads to dangerous assumptions. If everyone assumes that someone else will be solving the problem, chances are that it will not be solved until the situation is critical or it is already too late. We all have a moral responsibility to make conscientious choices regarding all issues, including looking to those outside our immediate sphere of concern, such as the issue of commercial harvesting of whales.

The shifting of blame is something humans are very good at and it is the basis of the next two mindsets. ‘Why should I make an effort when others aren’t?’ It takes courage to stand up against the flow of general behaviour, however New Zealanders are internationally renowned for being leaders, particularly in revolutionary areas such as the Resource Management Act (1991) or women’s votes. It has, however, been shown in research such as O’Brien & Department of Conservation (1995) who noted that one of the primary forces of rural education and new knowledge is viewing what ‘the neighbours’ are doing, therefore if one farmer starts the trend, they could change the world. It is amazing what a single voice can achieve. The second error of this type is the ‘I’m not perfect, but I’m not as bad as them’, in circumstances this is no doubt a true assessment of the situation. However, it is not a valid excuse. No one is expected to be perfect, however, it is reasonable to expect people to comply with legal requirements where applicable, and to make the wisest decisions they can in any given situation as the recent prosecutions in Otago and Canterbury have shown. Wallace (2007) discussed that when Otago regional authorities visited 40 dairy farms they found 14 breaches of consent, up to ten of whom could face fines of \$60,000. This was mirrored in an article by Ross (2007) who reported that 3/5 of Canterbury dairy farms are failing to comply with Environment Canterbury regulations and that though there had been improvement, particularly on a national scale, the results in Canterbury are disappointing, recording a decline in the number of farms that are complying with regulations. This shows that actions are not free from the consequences that are attached. Though the previous errors of mindsets can have serious consequences, it is the last two which have the greatest potential to cause damage. The first of these is ‘what does this one matter? There are plenty of others.’ All natural systems, particularly water are interlinked and cyclical. If a small waterway is seriously polluted, it will feed into a larger water body which is also accepting other sources of pollution, which then feeds through any number of water bodies, ever

increasing in the sources of contributing pollution, until it reaches critical status, such as the lakes Rotorua and Rotoiti. Each of the individual contributions were not necessarily significant in themselves, however, combined they have killed entire lake ecosystems. With increasing water bodies there is always the potential of dilution and but this is a tenuous hope to cling to when trying to justify destroying a waterway. Also every water body is in its own way unique, with biodiversity and cultural importance that without decent enquiry could go unknown, it would a terrible shame if the cure for a disease was lost because its habitat was destroyed unwittingly. The last issue with this mindset is that if everyone considers 'their' waterway separate from the greater picture and believes that there are still plenty of other waterways available. It will come as a shocking reality when it is realised that everyone thought someone else was protecting their water body when in reality no one was.

The final mindset is one that is becoming increasingly prevalent through our society, 'it might be important but what I want is more important'. This could be termed the 'me first' mindset. Our society is one of evermore self-centeredness, where there are increasingly few limits, and full of instant gratification. There are now several generations, who have been impressed with the belief that if they want it they should have it, with little regard for consequences. The outcome of this could be the ever increasing disregard for what would normally be considered the moral choices with regard to behaviour towards others, such as not destroying the life-supporting capacities of the planet.

This research has shown that there is certainly a vast quantity of information, which can be obtained on the management of riparian and wetland areas, and though a substantial portion of this is likely to be available to environmental practitioners, it appears that there is still a knowledge gap to 'lay' people, who are undertaking riparian management work. It was noticed in the readings that the information and push seems to be mainly directed at dairy farmers. Little attention is paid to the benefits which might be experienced by sheep and beef farmers, particularly South Island pastoral farmers who do not have the problem of liver fluke (*Fasciola hepatica*) (Worner, 2002) which is a potential health hazard to livestock drinking water from natural water bodies.

5.8 Changes to future publications

One formidable challenge to the riparian management message, is that the farmers in the study immediately became very guarded when discussing anything to do with the word riparian, linking it automatically to ‘riparian rights’ and ‘The Queen’s Chain’. Once farmers have got their guard up in such a manner, it proved quite difficult to convey the message that riparian plantings and management, as defined by this study, is in no way linked to either. A study by O’Brien & Department of Conservation (1995) showed a similar trend, with a general community bewilderment over the term riparian, which was also true through out this study. There was also a feeling of having private landownership threatened. This is partly due to the original Resource Management Act (1991) in which public access could be required without compensation, an issue which was resolved with a subsequent amendment. Research by Marchand (2006) also noted that there was a generally fearful atmosphere over the belief that their land could be taken away from them.

Recommendations that have appeared in other research (such as Sullivan, 1998), included that riparian management information focused primarily on streams, and that the information needed to be extended to other types of water bodies (such as lakes or estuaries), and also suggested increased promotion of the ‘World Wetland Day’ (2nd February).

5.9 Future validity

The aim of this section is to put my research into a broader context of global and future environmental issues. The purpose of this is because what seems appropriate now, may not be the case in the future. This section is based on pure speculation on major issues that would seriously impact on the importance of riparian management and the long-term usefulness of riparian management guides.

Climate change

One of the main environmental issues facing our current society and receiving a lot of attention is the anthropomorphic climate change/acceleration. These alterations in climate will cause changes globally, but this will look specifically at New Zealand. Environment Canterbury has only recently released their report on the specific effects likely to affect Canterbury. O'Donnell (2007) notes that it is internationally accepted that human activities have in the very least accelerated climate change (potentially as much as 2/3 due to fossil fuels and the rest to deforestation and changes in land use) and further climate change is inevitable in the future. Though this is a global issue and thus the province of the Central Government, the RMA (1991) has been amended to delegate responsibility to Regional Councils. Climate change is naturally stochastic and the nature and magnitude of impacts are difficult to predict. It is because of this, Environment Canterbury required that all impacts be investigated, including their likelihood.

Worldwide sea-level is rising, and in many parts of the world, ice/snow cover is declining. According to O'Donnell (2007) particular issues for Canterbury include, a likely increase in temperature (including long dry periods), and thus an increase in drought (predicted at four times current levels), with an increase in severe wind and a greater proportion of rain coming in heavy storms. As New Zealand is surrounded by oceans, the average temperature change is predicted to be less than the global average. Major rivers that reach back into the 'Main Divide' mountain range are likely to experience an increase in flow because of increased rainfall in western New Zealand. For groundwater or foothill-fed rivers there is likely to be a decline in flow. O'Donnell (2007) noted that this will be of particular concern to North Canterbury, which does not have a major river to provide an alternate water supply.

Based on global change and models of the New Zealand climate, there is a high probability that lowland Canterbury will become drier, that water will become increasingly scarce and this is likely to lead to an increase in irrigation if current farming practices are to be continued. A drier climate will mean that all waterways, regardless of source, are likely to have base water quantity issues. For spring-fed streams, this problem would be made worse if there is any water abstraction. As well as the drawing down of aquifers, streams may become increasingly dry, particularly in the upper reaches. This is a problem already evident in some spring-fed waterways such as the Styx River, Christchurch. Once the water quantity is reduced, the water quality also declines, causing increasing problems for wildlife. There may be increases in riparian plantings because riparian plantings are known to help sustain low-flows of waterways due to having some functions of wetlands. However, riparian plantings also need water to survive, so riparian plantings may decline to try and prevent anything that is not providing commercial gains from accessing valuable water. Riparian plantings may increase due to rising concerns over the water quality of what is a very precious resource. If riparian plantings increase in public importance, then riparian management guides will also increase importance and it will become vital that the information is conveyed in the best manner.

O'Donnell (2007) notes that a further potential issue is that with climate change, sea levels will rise. Aquifers across the Canterbury plains are already being heavily used. Most are likely being utilised far beyond the recharge capacity of the aquifers, though with current levels of knowledge it is difficult to predict. As aquifers are drained, the space that was once filled with water becomes filled with air and aside from the subsidence issues, with sea-water higher on land there is the problem of salt water intrusion into aquifers. If this happens, it could make aquifers unusable. This, of course, is far more of a problem for coastal aquifers. Some of the Canterbury aquifers do extend from the Southern Alps to the coast and very little is known about what would happen if salt water did intrude. It would completely change the Canterbury aquatic environment if spring-fed rivers and streams (such as the Avon River) suddenly started flowing saltwater, from saltwater intrusion (freshwater has a greater density than salt water, allowing salt water to rise to the top of an aquifer). Christchurch has already experienced similar problems to this in the 1980s when the Woolston cut was put in allowing saltwater intrusion into the Heathcote River. This allowed mud crabs further up the river, which undermined the bank stability to the point that the situation had to be rectified with the flood control gates.

Land use changes

New Zealand's landscape has had a notable rate of land use changes for such a young country. The Canterbury plains were once a montage of forest types, from the swamp forests (such as Christchurch), dry land forests of the foothills, to the coastal forests. Large tracts of this had been converted into tussock grasslands before European arrival and Europeans accelerated its conversion to scrub/pasture land for European farming techniques (sheep farming primarily). In the past 10 years there has been a new conversion from sheep farming to the more intensive land use of dairying.

Sheep or cattle farming is a more sustainable land use practice for dry lands without irrigation (as is shown by the High Country stations) and it could be that as water becomes scarce there is a re-conversion back to sheep and beef farming. This could take place even though with current market conditions they have less profit than dairying. However, if industry (including agriculture) were to be charged for water, the profit margin for dairy farming in areas such as lowland Canterbury would be far less. If there was a conversion back to sheep (particularly) or light cattle, there would be far less demand for riparian management guides because sheep and light cattle have far less direct impact on waterways and without irrigation there would be less runoff. Though this could be a cause for concern because sheep and cattle would still have direct inputs (faeces and urine) into waterways.

Currently, New Zealand has a fairly stable deer industry after the boom starting from the late 1970s. However, if there were to be large scale conversions to deer farming it would mean a substantial re-writing of riparian management guides would be required, as currently most make only passing reference to deer farming, if it is mentioned at all. Deer farming is recorded as being almost as damaging in terms of direct inputs as dairying. Deer and heavy cattle cause the worst pugging, trampling and direct sediment inputs of any livestock currently stocked to any substantial level in New Zealand. Deer are also known for wallowing in water bodies. Conversion to deer farming would also require re-writing of information on the farming of streams.

If the land was converted back to forest to produce timber or forest products (such as herbs or truffles), even just in substantial riparian tracts, it is the researcher's belief that this would ultimately be of benefit to national riparian management. However, it would mean that current

riparian management guides would not be of much use to those doing the conversions. The issues facing timber production, forest products and livestock management are completely different. For timber production, information would be needed on basic forestry principles, as well as coping with mitigating the issues surrounding the ultimate harvest of the crop, issues such as mechanical trampling. The impacts for harvesting products would usually be deemed to far less significant as most harvesting would be done manually to the point that it is likely that other than initial set-up (preparing for issues such as changing water levels) riparian management guides would not be of much help.

Throughout the world there is increasing affluence (and equally increasing poverty). With rising affluence comes rising social demands, represented internationally by increased meat and dairy consumption. If the subsistence diet of most countries is examined, it is very obvious that meat is far less represented than it is in current western diets. The world population is also increasing exponentially. Combining increasing meat consumption and increasing world population, there is an ever rising demand for food resources and New Zealand still has the potential to rise to meet this demand, through more intensive production practices have an increased environmental cost. There is no reason currently to believe that New Zealand (as a broad social concept) will not continue down the path of ever increasing intensification of our agricultural lands. If this happens, riparian management guides will become more important because of the higher environmental demands. On the other hand, they are likely to become less popular as they advocate the fencing off of buffer areas from production.

Market demands are incredibly powerful and already internationally there is demand for environmental sustainable food products. There is a growing awareness that general production should be proven to be environmentally responsible. If this increases in importance, then appropriate riparian management will also increase in importance. This will perhaps require riparian management guides to move to areas such as environmental certification (an industry standard which can be obtained), or green audits (a review of business practices to ensure everything is conducted in the most environmentally responsible manner).

Bio-security issues in New Zealand are very important, and New Zealand has some of the most stringent bio-security laws and enforcements throughout the world. Even so, organisms arrive either naturally or through human movements. One that has received a lot of attention recently is

the invasion of didymo (*Didymosphenia geminata*). This is now widespread in the South Island and believed to be in the North Island. Didymo is a freshwater diatom alga which creates thick mats and reduces available habitats. For the invasion of a species such as this, riparian management becomes of increased importance. The biological nature of didymo is such that it has a bloom and bust nature, using favourable conditions to give them a competitive edge and allowing their dominance in an area. Favourable conditions for algae, such as this are high levels of nutrients and light, both of which appropriate riparian management can alter. Though riparian management cannot in anyway stop the invasion of didymo into a water body, appropriate management could potentially reduce the impact for a specific water body. Though current riparian guides do not cover this, many recognise that riparian management can alter shade and nutrient levels thus reducing algal blooms.

There are many organisms which have not made their way to New Zealand, and many organisms already present, that have pest potential that they have not achieved yet. In terms of organisms it is almost impossible to predict what will happen when introduced into a new environment (thus the stringent tests required on bio-controls), and there is always the possibility that a new organism could radically alter New Zealand's riparian landscape, and if that was the case riparian management guides would become immediately invalid and would require rewriting, even though some basic information would remain valid.

Technology changes

Our society is currently in a period of dramatic social and knowledge change. This has allowed for amazing revolutions in the way things are done internationally. However, this period does not appear to be over yet, and so there is always the potential for revolutionary technological changes that will alter the way things are done for the management of the environment. However, history has unfortunately recorded far more revolutionary technologies that ultimately created more problems than they solved (such as DDT), than ultimately successful technologies (such as pyrethroids). Technologies of interest could be the creation of new fertilisers that do not have the same potential for runoff or leaching, or a new or altered pasture species that prevents or reduces runoff would also be an important technology. Such a species is likely to be the product of genetic engineering, a concept with which the New Zealand public, at present, is not willing to accept in mainstream use. Finally, technology could head down the engineering path and create

physical interception methods to prevent runoff. Any of these would potentially invalidate large portions of riparian management guides leading to necessitating their re-writing.

Internationally the fact that New Zealand livestock spends most, if not all, of their lives in paddocks (open to the environment) is quickly becoming unusual. To New Zealanders, as a general statement, it is strange to think of animals not being out in paddocks. In some of our major markets (Europe, Japan, and increasingly the United States of America) livestock spend substantial portions, if not all of their lives inside. It is entirely possible that the markets could start demanding barn-raising in New Zealand (despite all its disadvantages) under the banner of animal welfare. If this occurred, then current riparian management guides would need substantial re-writes, though management will still be important, because when you have barn-raised animals' stored effluent becomes a major management issue. The preferred method of disposing of effluent is spreading on the land, but if inappropriately done, this may cause substantial runoff issues and contamination of surface and ground water sources. So major issues of riparian management guides such as fencing would decline in importance, but issues of runoff and appropriate methods for dispersing effluent would be of high importance.

Governance changes

As is happening internationally, New Zealand might eventually choose to join some equivalent of the European Union (perhaps a Pacific Union or join with Australia). As in Europe and beginning in Africa, there is the realisation that united Countries become a far more formidable force for economic equality within the countries, and have extreme bargaining power with other countries. Joining a union of any kind would be likely to create overarching environmental policies to be applied to member countries (such as are found in Europe), which could drastically alter the importance of riparian management. This may, however, meet opposition from Maori unless a suitable constitution could be drafted for New Zealand, because claims under the Waitangi Treaty are only valid between the Maori people (represented originally by Chiefs, now by Tribal Committees) and the representative of her Majesty, the Queen and because of these issues, such a change like this is less likely to happen.

There is always the possibility that the Central Government will adopt far more strict regulations for land uses and mitigation near water bodies. If riparian management became strictly legislated,

the land-based information in current riparian management guides would still be valid but anything relating to legal issues would be outdated, meaning that guides would have to be substantially altered. This scenario is more likely under a major 'Green' coalition led government.

Under current governance, New Zealand is phasing in the concept of carbon credits, which could make riparian management (in the form of planting trees), a necessity to offset the carbon emissions for viable agricultural business. If this is the case, riparian guides would still contain valid information, but the legal issues would be out of date and would require re-writing. These are national carbon credits to meet international criteria; however, there is the possibility for regional carbon requirements which would necessitate significant changes to management of all lands, particularly in highly intensive agricultural areas, such as the Waikato. In areas of carbon intensive land uses, riparian management would be very important to allow for continued land use.

Though the practice of environmental management can at times seem very daunting and gloomy, New Zealand has come a long way on the positive side, changing the way our lands are managed. There are increasingly good land management practices that are widely implemented and accepted throughout the rural community. If this was not true, then there would not be a requirement for riparian management guides, the fact that they have been created shows there is an audience of interested people that have pushed for their creation and for the legislation from which they are based.

Overall it is most likely that riparian management will increase in importance, and thus riparian management guides will also be more important. The forms they exist in, being primarily paper and internet based are unlikely to quickly become outdated (as opposed to technologies such as VHS), though of course there is a trend towards using less paper. As to the information being valid and enduring long enough to justify their creation, which would largely depend on how long the guides were intended for use. For example, Christchurch City Council updated their guide after four years. It is the Researcher's belief that the guides for lowland Canterbury are unlikely to become outdated in less than five years, perhaps as long as ten years, unless there are major political changes (i.e. replacement of the Resource Management Act).

The current riparian management guides will remain valid as long as they have a regular updating with new knowledge and take into account of changing political and environmental climates.

In summary, riparian guides in the future may need to be re-written and have a different content because of

- Climate change
 - ➔ Increased temperature and dry spells
 - ➔ Sea water intrusion into aquifers
- Land use changes
 - ➔ Returning to primarily dry land farming
 - ➔ Increase in deer farming
 - ➔ Riparian land used for forest products or forestry
 - ➔ Increased farming intensity
 - ➔ Marketing environmental demands
 - ➔ New organisms
- Technology changes
 - ➔ New biological technology
 - ➔ New engineering technology
 - ➔ Requirement to barn-raise animals
- Governance changes
 - ➔ Joining Australia or a Pacific Union
 - ➔ Stringent regulations by Central Government
 - ➔ Carbon credits.

In summary there is quote which defines why this topic is of such pressing importance:

'Without water, life itself is impossible, without abundant water for agriculture, industrial and domestic consumption, electric power and waste disposal, organised life in a modern industrial society would be impossible' M.P. Mosely (1988)

Conclusions

Riparian and wetland areas in working lands are very important. This is especially so in lowland areas of New Zealand where they are becoming increasingly rare. They have intrinsic and cultural values and provide ecological services. Riparian management is important so as to protect the benefits that they provide. Benefits include, reduced erosion, runoff and sediment inputs into waterways as well as providing ecological habitats and corridors for native flora and fauna in an otherwise inhospitable working landscape. It is for these reasons that individuals and communities invest in riparian management work. Riparian areas also provide cultural benefits to all New Zealanders, but particularly to those of Maori descent. Maori cultural identity is often closely tied to significant waterways within their tribal regions. Wetland areas are protected in New Zealand through the Resource Management Act (1991) and the Conservation Act (1987), both of which also ascribe organisations to have responsibility for their protection and management.

Riparian management issues are also communication issues. Organisations are attempting to convey information and positively influence people's behaviour in a manner that does not distort or misrepresent the intended message. This is particularly difficult as there is an underlying atmosphere of distrust. This is especially evident between rural people and 'the government' and between government organisations. The outcome is that information is often prone to distortion and misunderstanding. It is important to be as clear and concise as possible using the most appropriate mediums of communication. Above all, organisations should be as transparent as possible, with integrity of purpose and without hidden agendas. People are very willing to share their thoughts and ideas if they think someone will listen.

With regards to new publications particularly for wetland and riparian areas, (also applicable to other environmental resource management issues), is that the management guide are simple and easy to understand. Such a guide should include appropriate methods, pictures, diagrams, maintenance issues and a list of suitable plants. It is also important to include information about how to contact experts, and where to obtain further information. Although it is most common for the information to be in a booklet, it is highly important that the information is available online and in public libraries. Organisations other than local government are likely to have more information about wetland and riparian issues. The research suggest the best guides for use in

Canterbury are produced by Environment Canterbury (A guide to managing waterways on Canterbury farms) and Christchurch City Council (*Streamside planting guide: what to plant and how to maintain native plants along freshwater streams in Christchurch city and lowland Canterbury*).

Wetlands and riparian areas are like the kidneys of the planet, they are important, priceless, largely forgotten and undervalued. Wetlands and riparian areas protect and enhance our precious water resources. They reduce the impacts of society on the waterways, and yet they are also extremely vulnerable. It is important that everyone makes their own contributions towards improving the health of all our waterways. It is vital that as a society we mitigate our impacts on the environment. However, society is very unlikely to do this, and so it falls to the individuals to remember that no one else is going to look after our waterways if we do not do it ourselves.

Recommendations for future management guides

On the basis of this research, there are a number of recommendations that could be suggested:

- A guide should be;
 - ➔ Available online
 - ➔ Have pictures
 - ➔ Include diagrams
 - ➔ Be simple and easy to understand
 - ➔ Contains appropriate methods
 - ➔ Includes a plant list
 - ➔ Consider maintenance issues
 - ➔ Identify where to locate further information
 - ➔ How to contact experts
 - ➔ Be available in libraries
 - ➔ In a booklet form.
- People will not think about a problem unless they are made aware of it. All issues requiring public action require more publicity.
- Regional Councils and other Organisations have the bulk of the information but they need to promulgate this more widely.
- Local Councils need to have information on riparian and wetland management, as they are also looked to for advice.
- Regulatory methods are currently viewed as not being the best option for the management of wetland and riparian areas. The public do not want further compliance issues. Regulatory organisations may not have the resources to cope with regulating this issue in the best manner. Voluntary actions are best and should be acknowledged and encouraged.
- Information, though specific, should be applicable and useful to other similar environmental issues.
- Information needs to be easily accessible and clearly labelled.
- Further information is needed on specific benefits for pastoral farmers.

Many small people, who do many small things in many small places, can change the face of the world – Writing on the Berlin Wall.

References

- Adams, L. W., Dove, L. E., & National Institute for Urban Wildlife. (1989). *Wildlife reserves and corridors in the urban environment: a guide to ecological landscape planning and resource conservation*. National Institute for Urban Wildlife. Columbia, Md.
- Astbury, C. J., Delamore, R., Williams, J., Arbuckle, M., McMullan, C., Harris, R., Department of Conservation. (1988). *Intrinsic values*. Centre for Resource Management. Lincoln University. Lincoln.
- Booth, V. (1984). *Communicating in Science: writing and speaking*. Cambridge University Press. Cambridge.
- Broughton, W. C. (1976). Planning water resources development with multiple objectives. *New Zealand Water Conference Proceedings*, 3.
- Clover, D., & New Zealand Office of the Parliamentary Commissioner for the Environment. (2002). *Weaving resilience into our working lands: recommendations for the future roles of native plants*. Office of the Parliamentary Commissioner for the Environment. Wellington.
- Cork, S. (2004). Connecting Communities with the future [Electronic Version]. *Riprap: River and Riparian Lands Management Newsletter*, 27, 23-24. Retrieved 13th February 2007 from <http://www.rivers.gov.au/publicat/riprap/riprap27.htm>
- Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruela, J., Raskin, R.G., Paul, S., van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*. 387, pg 253-260.
- Cuff, J. R. I., & South Canterbury Catchment Board and Regional Water Board. (1988). *Soil conservation: achieving sustainable land use in New Zealand: a review of soil conservation in New Zealand*. South Canterbury Catchment Board. Timaru.

- Davies, L. J., Morland, K., Barker, R. M., & Christchurch (N.Z.). City Council. (1997). *Restoring Nottingham Stream*. Christchurch City Council. Christchurch.
- Douglas, E. M. K. (Ed.). (1984). *Waiora, waimaori, waikino, waimate, waitai: Maori perceptions of water and the environment* (Vol. 27). Centre for Maori studies and research. University of Waikato. Hamilton.
- Environment Canterbury (ECan) (2005). *A guide to managing waterways on Canterbury farms*. Environment Canterbury and Living Streams. Christchurch. [Electronic Version] <http://www.ecan.govt.nz/NR/rdonlyres/4B9BC0E7-8482-4D03-8AE6-DBB07966038A/0/Managingwaterways.pdf> Retrieved 13 October 2006.
- Finlayson, M., & Moser, M. (Eds.). (1991). *Wetlands: International Waterfowl and Wetlands Research Bureau*. Oxford. New York.
- Fonterra Co-operative Group., Local Government New Zealand., New Zealand. Ministry for the Environment., & New Zealand. Ministry of Agriculture and Forestry. (2003). *Dairying and clean streams accord: between Fonterra Co-operative Group, regional councils, Ministry for the Environment and Ministry of Agriculture and Forestry*. Fonterra Co-operative Group: Local Government New Zealand: Ministry for the Environment : Ministry of Agriculture and Forestry. Wellington.
- Forgie, V., Horsley, P., Johnston, J. E., & New Zealand. Dept. of Conservation. (2001). *Facilitating community-based conservation initiatives*. Department of Conservation. Wellington.
- Fraser, A. (2002). The effectiveness of the brochure 'Garden Escapes'. *Science for Conservation*, 205.
- Freegard, J., & Owen, J. (1988). Wetland management and conservation. *Water in Society: Policy and Practices. Proceedings of the Water Conference*.

- Gray, E. (1990). Wetlands: An overview of the issues. *Council of Planning Librarians Bibliography*. No. 265.
- Greenaway, R., Department of Conservation (Tongariro/Taupo Conservancy), Tongariro Natural History Society. (1998). *The restless land: stories of Tongariro National Park*. Department of Conservation (Tongariro/Taupo Conservancy) and Tongariro Natural History Society. Turangi. New Zealand.
- Hicks, B. J., & Howard-Williams, C. (1990). Development of guidelines for the management of streamside riparian strips. *New Zealand Freshwater Fisheries Miscellaneous Report*, 59.
- Hicks, D. L. (1997). *Why manage stream banks?* Auckland Regional Council. Auckland.
- Hovell Environmental Planning. (2003). *Wetlands of Southland: a guide for maintaining and enhancing the values of our wetland areas*. Invercargill City Council. Invercargill.
- James, B. & Department of Conservation. (1991). *A bicultural partnership for Te Waihora (Lake Ellesmere): a case study in management planning*. Department of Conservation. Wellington.
- Levine, S. (Ed.) (2006) *New Zealand as it might have been*. Victoria University Press. Wellington.
- Lovett, S. (2004). Connecting Communities – Learning from Canadian Approaches [Electronic Version]. *RipRap: River and Riparian Lands Management Newsletter*. *Land & Water Australia*, 27, 1-7. Retrieved 13 February 2007 from <http://www.rivers.gov.au/publicat/riprap/riprap27.htm>
- Ludlow, R., & Panton, F. (Eds.). (1992). *Essence of Effective Communication* New York: Prentice Hall.

- MacGibbon, R. & Ministry for the Environment. (2001). *Managing waterways on farms: a guide to sustainable water and riparian management in rural New Zealand*. Ministry for the Environment. Wellington.
- McKeown, R., Hopkins, C. A., Rizzi, R., & Crystalbridge, M. (2002). *Education for sustainable development toolkit – version two*. Energy, Environment and Resources Center. University of Tennessee. Knoxville. United States of America.
- McMillan, S. (1992). *Rivers, lakes and wetlands: Conserving animals and plants in a changing world*. BBC Books. London.
- Maltby, E. (1986). *Waterlogged wealth: why waste the world's wet places?* Earthscan. London: International Institute for Environment and Development. London.
- Mander, Ü., Kuusemets, V., Hayakawa, Y. (2005) *Editorial: Purification processes, ecological functions, planning and design of riparian buffer zones in agricultural watersheds*. Ecological Engineering 24. pg 421-432
- Marchand, N. (2006). *Riparian management: an exploration into connecting the biophysical and social sciences: a thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Lincoln University*. Unpublished Thesis (PhD), Lincoln University.
- Memon, P. A. (1996). Sustainable water management in New Zealand. *Environmental Policy and Management Research Centre Research Paper*. Dunedin. P6.
- Ministry for the Environment (1992). *Scoping of environmental effects: a guide to scoping and public review methods in environmental assessment*. Ministry for the Environment. Wellington.
- Mosely, M.P. (1988) Climatic change – impacts on water resources. *Water in Society: Policy and Practices. Proceedings of the Water Conference*. Institute of Professional Engineers New Zealand and the Royal Society of New Zealand.

- Naiman, R.J., Décamps, H., McClain, M.E. (2005) *Riparia: ecology, conservation and management of streamside communities*. Elsevier Academic Press. Amsterdam.
- New Zealand Audit Office. (2001). *Report of the Controller and Auditor-General, Tumuaki o te Mana Arotake: meeting international environmental obligations*. New Zealand Audit Office. Wellington.
- New Zealand. Audit Office. (2004). *Good practice for managing public communications by local authorities*. Controller and Auditor-General. Wellington.
- New Zealand Central Government (1987) *Conservation Act*. New Zealand Central Government. Wellington.
- New Zealand Central Government (1991) *Resource Management Act*. New Zealand Central Government. Wellington.
- New Zealand Inland Revenue Department (1998). *A guide for consultation with Maori*. New Zealand Inland Revenue. Wellington.
- O'Brien, M., & Department of Conservation. (1995). *Community perspectives of riparian management: a case study in Marlborough*. Department of Conservation. Wellington.
- O'Donnell, L. (2007) *Climate change: an analysis of the policy considerations for climate change for the review of the Canterbury Regional Policy Statement*. Environment Canterbury. Christchurch.
- Otago Regional Council. (2005). *Environmental considerations for clean streams: a guide to managing waterways in Otago*. Otago Regional Council. Dunedin.
- Parkyn, S., & Ministry of Agriculture and Forestry (MAF). (2004). *Review of riparian buffer zone effectiveness / prepared for MAF Policy by S. Parkyn*. Ministry of Agriculture and Forestry. Wellington.

- Parsonson, G. S. (1988). Cultural and ethnic values. *Water in Society: Policy and Practice. Proceedings of the Water Conference.5*. Institution of Professional Engineers New Zealand, the Royal Society of New Zealand. Dunedin.
- Penny, E. C. M. (1988). Water, conservation and public participation. *Water in Society: Policy and Practices. Proceedings of the Water Conference*.
- Potter, N., Douglas, L., & Selby-Neal, R. (2004). *See change: learning and education for sustainability*. Parliamentary Commissioner for the Environment. Wellington.
- Quinn, J. & McKergow, L. (2007) *Answers to frequently asked questions on riparian management*. Hawke's Bay Regional Council & National Institute of Water & Atmospheric Research Ltd. Hamilton.
- Reeves, P. N., & Champion, R. D. (2004). Effects of livestock grazing on wetlands: literature review. *Environment Waikato Technical Report*, 16.
- Roberts, M., Norman, W., Minhinnick, N., Wihongi, D., & Kirkwood, C. (1995). Kaitiakitanga: Maori perspectives on conservation. *Pacific Conservation Biology*. 2 (1). Pg 7 – 20. Surrey Beatty & Sons. Sydney.
- Ross, T. (2007, 2nd October). Cauty farms in breach: Call for crackdown on dirty dairying. *The Press*. Christchurch.
- Sakissian, W., Perlcut, D., Ballard, E. (Eds) (1986). *The community participation handbook: resources for public involvement in the planning process* (2nd ed.). Impact Press. Roseville. Australia.
- Simpson, P. (1995). Alongside the water – Parewai: a concept to restore ecological health to riverbanks and similar places. *Conservation Advisory Science Notes. Department of Conservation*. 117, 5.

Smale, S. J. (1983). *Wetlands in the agricultural landscape*. Unpublished Thesis (Dip LA), University of Canterbury, 1983.

Stephenson, G. K. (1986). *Wetlands: discovering New Zealand's shy places*. New Zealand Government Printing Office Publishing. Wellington.

Sullivan, B. J. (1998). *Public perceptions of wetlands: implications for wetland conservation and management: a thesis submitted in partial fulfillment of the requirements for the degree of Master of Applied Science at Lincoln University*. Unpublished Thesis (M.Appl.Sc.), Lincoln University.

Sutherland, F (1987). Riverside beautification - Turning theory into a thicket. *Soil and Water*, 23(1).Wellington.

Taranaki Regional Council. (2001). *Investing in our banks: the benefits of riparian management*. Taranaki Regional Council. Stratford.

Taylor, A., & Patrick, M. (1987). Look at water through different eyes - the Maori perspective. *Soil and Water*. 23 (4). Pg 22 – 24.

Te Runanga o Ngai Tahu. *Freshwater Policy*. Retrieved 5th April 2007.From http://www.ngaitahu.iwi.nz/IM_Custom/ContentStore/Assets/8/50/6bd541a77ee8cfe126a93118c9aef868/Ngai%20Tahu%20Freshwater%20Policy.pdf

The Main Report. (1998). *The effective communicator: how to communicate well in everyday situations in business and in life*. The Main Report Publications Ltd. Christchurch.

Trueman, S. (2002) *Native forest and wetlands: a guide to the care and protection of natural areas*. Auckland Regional Council. Auckland.

Waitakere City Council. *Ecowater –The guardian of the Mauri*.

<http://www.waitakere.govt.nz/abtci/ei/ecowtr/guardian.asp> Accessed 20th August 2007.

Wallace (2007 3rd October). Warning for dairy farmers: Clean up act or face fines, ORC says. *Otago Daily Times*. Dunedin.

Wells, P. K., & University of Waikato Department of Accounting. (1998). *Manapouri: catalyst or consequence?* Department of Accounting, University of Waikato. Hamilton.

Worner, S. P. (2002). *BIOS 111: Invertebrate Biology*. Subject Outline. Lincoln. Ecology and Entomology Group. Lincoln University.

List of Appendices

Appendix One: Definitions

Appendix Two: List of Acronyms and abbreviations

Appendix Three: Talk to accompany research

Appendix Four: Group discussion booklet

Appendix Five: Discussion group responses.

Appendix Six: Prototype of a riparian management guide.

Important Note:

All views expressed in this section are the views of an individual and do not necessarily represent the views of the group/organisation as a whole. As such no responsibility is taken by the groups/organisations for the opinions given.

Appendix One: Definitions

It is important for clarity that where words have been used that could have more or less specific meanings there is an interpretation of what they mean in relation to this document.

Anthropomorphic	In this context refers to climate change that can be directly attributed to man-made causes such as the burning of fossil fuels or deforestation.
Authorities	Groups which typically provide guidance and typically have higher legal status than the interested parties; such as Regional Councils, District Councils, and local Iwi.
Farm	The land used for production purposes. Similar to farmer with a broad interpretation including stock farms, wheat fields, commercial forests etc. (MacGibbon & MfE, 2001).
Farmer	This term is used with a broad interpretation to include pastoral farmer, arable croppers, foresters, market gardeners and fruit growers (MacGibbon & MfE, 2001).
Hapu	Sub-tribe.
Hui	A Maori social gathering.
Inanga	Any of the young of the <i>Galaxias</i> sp. Maori name for New Zealand whitebait. A delicacy fish, cooked and eaten whole.
Interested Parties	Groups or individuals who either are actively or potentially involved in management and/or restoration of riparian areas.
Kaitiakitanga	Preservation and guardianship responsibilities of specific appointed Iwi representatives to carry out functions, to keep and guard Iwi interests and taonga (MacGibbon & MfE, 2001).

Landowner	A group or individual who has the primary responsibility for a piece of land under some form of legal tenure.
Mahinga kai	Traditional Maori food sources and other resources and the areas that they are sourced from or propagated (Te Runanga o Ngai Tahu, 2007).
Mauri	Essential life force or principle, a metaphysical quality inherent in all things, both animate and inanimate (Te Runanga o Ngai Tahu, 2007).
Physiography	Physical geography, looking at the natural features of the Earth, particularly referring here to looking at the physical differences between fresh, salt and brackish water.
Rahui	An act of prohibition, often temporary, imposed to conserve or replenish a resource. When a rahui is applied to water bodies people are banned from using specific resources within a prohibited area (MacGibbon & MfE, 2001), these are put in place by Tangata tiaki in accordance with tikanga (Te Runanga o Ngai Tahu, 2007).
Riparian margin	The area beside a waterway that forms the interface between land and water (Otago Regional Council, 2005)
Rohe	Area (Te Runanga o Ngai Tahu, 2007).
Runanga	Tribal council.
Seep	A low point on land where water is known to pool and be absorbed into the ground.
Tangata tiaki	Specifically appointed guardians (people) that are responsible for protecting taonga resources. Their obligations include enforcement of tikanga and customary practices (Te Runanga o Ngai Tahu, 2007).

Taniwha	Supernatural or spiritual guardian of a waterway, usually perceived as a type of water monster. Sometimes perceived as a benign guardian but can be openly hostile and dangerous. Can be closely tied to a particular Iwi or hapu.
Taonga	Treasured or prized possession of Maori (MacGibbon & MfE, 2001), both tangible and intangible (Te Runanga o Ngai Tahu, 2007).
Tiaki	The people are responsible for the Kaitiakitanga (MacGibbon & MfE, 2001).
Tikanga	Maori customs (Te Runanga o Ngai Tahu, 2007).
Wahi tapu	Place of sacred and extreme importance (Te Runanga o Ngai Tahu, 2007).
Wai tapu	Water that is considered sacred due to its properties in relation to other water, sacred places or objects and its close association with the gods. Maori are likely to seek absolute protection for these waterways (MacGibbon & MfE, 2001).
Wai taonga	These are water bodies with special treasure value normally because of special uses dependent on the preservation of their purity and avoidance of unprotected contact with humans. Maori are most likely to seek to protect the quality and quantities of these water bodies (MacGibbon & MfE, 2001).
Waterway	Includes both permanent and seasonally wet rivers, streams creeks, drains and wetlands (ECan, 2005).
Wetland	Including bogs, gully bottoms, swamps and seepage areas that contain or channel water at least some of the year (ECan, 2005)

Through this thesis it was decided to use the more common ‘ng’ rather than the southern dialectic ‘k’ e.g. Ngai Tahu rather than Kai Tahu.

Appendix Two: List of Acronyms and abbreviations

<u>Term</u>	<u>Meaning</u>
RMA	Resource Management Act (1991)
DOC	Department of Conservation
MfE	Ministry for the Environment
CCC	Christchurch City Council
ECan	Environment Canterbury (trading name for Canterbury Regional Council).
Forest & Bird	The Royal Society for Preservation of Forest and Bird
CINCH	Community Information Christchurch
PCE	New Zealand Office of the Parliamentary Commissioner for the Environment
Pdf	Portable document format – a means of storing and sharing documents, often used on the internet. Also known as Adobe format.

Appendix 3: Talk to accompany research

I am very pleased to be here and most appreciative to your group for being willing to participate in my research. My research is looking at riparian management guides currently available and seeing if these guides are meeting the needs of people, and where improvement is needed. Riparian management guides are produced by many organisations but primarily by councils. They are usually intended for landowners and discuss the reasons for riparian management. Riparian management is dealing with the margins of water bodies – including streams, rivers, wetlands, estuaries, open drains and seepage areas. These areas are normally vegetated and are intermittently underwater. In pristine areas the riparian vegetation can extend several metres from the normal water level. What I would like is for you to suggest ideas for what would comprise the ultimate riparian management guide for your group if you were suddenly to take over management of a small water body. Before you get too concerned about the guides, just remember that this guide is no different than a users guide or how-to guide except that it is relating to riparian areas. This booklet contains four questions which I would like you to answer for me. If you have any questions as we're going along, please ask them now or as we go. With regards to the discussion I am very interested in your ideas – all of them, including the creative and oddball ideas, the ones that not everyone agrees on and do not worry about feasibility. Just try and focus in on what would make a riparian guide the best one for your group if you were to undertake riparian work and write it down. Any ideas you provide will not be linked to your group in any end publications other than the research thesis where they will have a disclaimer. Thank you very much for your ideas.

Appendix Four: Group Discussion Booklet

The Ultimate Hypothetical Riparian Guide for Your Group



Group Name:

Date:

1

How will it be presented? /What will it look like?

2

What information does it contain?

3

What form/s will it be in? /How will the information be accessed?

4

Any other features or suggestions for your guide?

Appendix Five: Discussion Group Responses

Important Note:

All views expressed in this section are the views of an individual and do not necessarily represent the views of the group/organisation as a whole. As such no responsibility is taken by such groups/organisations for the opinions given.

Otakau Crib

November 2006

How will it be presented? What will it look like?

- Eye catching cover
- Clear and concise
- Diagrams
- Photos
- Flow charts
- Words – try to appeal to different learning styles
- Use only a little text in diagrams

What information does it contain?

- Legislation that applies to it
- Working examples
- How to plant riparian areas
- How to look after riparian areas
- Where to get more information
- Who to contact if they want to know more
- Good definitions
- Glossary
- Say who this is useful for – if you are in this situation this guide will be useful to you.

What form/s will it be in? How will the information be accessed?

- Email updates highlighting changes without full detail
- Poster
- Pamphlet (3-fold)
- Booklet
- Links to websites
- Bi-lingual (basic text)
- Hui presentation

Any other features or suggestions for your guide?

- Must be suitably priced for groups to purchase

- Must have a webmaster to ensure the guide is still current
- Additional reference material

Lincoln Community Committee

December 2006

How will it be presented? What will it look like?

- Coloured pamphlet
- Computer document
- Small size important so can be used as a consultation document
- Simple English, short guide for general audience
- More technical guide for those engaged in the physical management/technical manual
- Illustrative and colourful

What information does it contain?

- Where is it relevant? Description of area covered
- What is it all about?
- How does one go about it?
- When is work required?
- Why is it important
- Objectives of guide
- Description of work to be done
- Vegetation mix /selection of plants
- Wilderness area and wildlife habitat /refuge and having migration pathways
- Public access (one side only) areas
- Domestic animal control
- Spraying controls
- How to deal with the larger area including areas just outside 'controlled' area
- Ongoing maintenance
- Dealing with different uses of the area
- Safety issues for the area
- How to link the area together
- Dealing with conflicts of visions i.e. natives versus exotics
- Dealing with noxious plants
- Ensuring there is a variety of types of reserves within an area
- Planning for the future
- How to incorporate educational areas into planning
- Planning suitable and hardy pedestrian and cycle ways.

What form/s will it be in? How will the information be accessed?

- Pamphlet
- In the library
- Email by requesting secretary
- Electronic (web based)
- Summary brochure for public use
- Technical document for specialist use
- DVD – school education etc.

- DVD could be interactive.

Any other features or suggestions for your guide?

- Implementation is key
- Keep it short and simple

Christchurch Estuary Association Inc.

January 2007

How will it be presented? What will it look like?

- Large, easy to read writing (no smaller than font 12)
- Not too large (no bigger than two A4 sheets)
- In simple English – reading age 12
- Very similar to Travis wetland guide
- A5 wire bound water resistant paper
- Lots of pictures to help identify animals, birds, plants, insects and fishes
- References and glossary at higher reading age
- ‘Integrated management plan’

What information does it contain?

- Goals and objectives of riparian management
- Appropriate methods for each objective
- Outlines and maps of riparian areas.
- Specific to a geographical location with the area clearly stated
- Addressed special local needs and allows variation between locations
- Hydrology (stream, wetland etc.)
- Physiography (fresh/salt/brackish)
- Ownership issues
- Public access and interest
- Identifying and protecting special ecological values
- Species of flora and fauna

What form/s will it be in? How will the information be accessed?

- Printed available from local interest groups and local authorities, public and university libraries
- Website
- Distributed to interested landowners and appropriate resident groups
- Book
- Display panels with special points in appropriate locations
- Leaflet
- Project report
- Published articles in newspapers/magazines such as New Zealand Geographic
- Refereed technical journals

Any other features or suggestions for your guide?

- Sources for further information both already known, and researchable
- Joint to NZ Landcare Trust and make use of their resources for owning and accepting this as our problem
- Applying integrated environmental management

- Built in redundancy – when will the book need to be updated or as a ‘living document’
- Nice if updates could be ‘added’ to existing books
- Inclusion in a refereed journal
- Discussed on radio – national radio
- Book both as hardcover and soft cover
- Free handout but more detailed book available for purchase

Glenroy Farmers

February 2007

How will it be presented? What will it look like?

- Simple text
- Clearly
- Pictures / photos
- Diagrams
- Colour
- Maps
- Attractive
- A4 size, glossy pages, spiral or hardbound
- Hardcover – to encourage being kept for reference
- A good explanation of the word ‘riparian’
- Information about the importance and purpose of riparian plantings
- Multimedia including talk to farmers on why they planted
- Multimedia outlining existing plantings to give ideas
- Multimedia showing four steps
 1. why to plant – purposes
 2. talking about the plan
 3. implementing – fencing, planting, pest and weed control
 4. maturing planting

What information does it contain?

- Planting species – including suitability for conditions
- Photos of the individual plants
- Advice on safe chemical use
- Practical grazing management
- Weed/pest control advice
- The effect of stock – both positive and negative
- Multiple use of riparian areas – biodiversity, recreation, economic etc
- Use of riparian areas for drought/winter feed e.g. willows
- Sources of funding for development of riparian strips/buffer zones
- Recommended fencing
- Legal issues – in regard to riparian rights (Farmers are very concerned about these).
- Contact details for assistance i.e. suppliers/nurseries, advice on establishment of plantings
- Costing – fencing per metre, plants, weeds and pest works

What form/s will it be in? How will the information be accessed?

- Book
- Internet
- Simple paper form/Booklet
- Free
- Video/DVD

- In library with multiple copies so access is easy
- Varied forms/information for different groups such as schools, councils, farmers, business, community members
- Hardcover – A4 size book – a book that would look presentable on the bookshelf or coffee table – it would be more likely to be kept and read.

Any other features or suggestions for your guide?

- Maps of important ecological areas
- A portion of the book/multimedia where landowners outline the benefits to them of their riparian plantings including anecdotes about things that went wrong and things that went well. This could include positive changes they have noticed because of their planting e.g. birdlife, mental health improvement because of increased enjoyment from their property because of aesthetic qualities of the riparian area.

Selwyn water care group

March 2007

How will it be presented? What will it look like?

- Easy to read
- Good mix of pictures and words (about 50/50)
- Succinct writing
- ½ A4 in size
- 20 pages maximum
- Simple language
- Accessible and suitable for children
- A4

What information does it contain?

- Information on riparian zones
- Lists of suitable species for each zone (scientific names rather than common)
- Growing tips
- Planting tips
- A section describing how to propagate your own plants by collecting seed or dividing
- Most common mistakes to avoid
- Weed control especially when new plants are getting established
- How to deal with areas that are frequently dug out for drainage reasons
- Which species attract 'good' fauna (insects, fish etc.)
- How and why to rebuild habitats
- What features attract 'good' fauna (insects, fish etc.) i.e. riffles for spawning
- Plantings that complement and recognise the maintenance of streams, creeks and drains that make up drainage district
- How to reduce drain cleaning

What form/s will it be in? How will the information be accessed?

- Hard copy
- Online
- Booklet
- One page summary sheet
- CD
- Summary should be available for wide distribution as an information/guide to landowners

Any other features or suggestions for your guide?

- Department of Conservation and ECan have info on planting around riparian areas. Other regional councils are good sources as well. Landcare Research is also good for info.

Wright Stream in conjunction with Springston School

March 2007

How will it be presented? What will it look like?

- Colour pictures
- Easy to read layout
- Sharp, clear information

What information does it contain?

- Start very basic
- Good definition of riparian
- Fencing – what can be allowed in
- The different planting zones
- Weed control
- How to plant
- Plant spacing
- Ratio of different plants
- Native and common names of the plants
- Photos of the plants
- Tells you where to look for information
- Places to get large numbers of these plants

What form/s will it be in? How will the information be accessed?

- Small booklet
- Internet
- Local council
- Library
- Having specialists come and talk
- ECan education office

Any other features or suggestions for your guide?

- ECan education office was very helpful

Lincoln Environmental Organisation (Lincoln University)

March 2007

How will it be presented? What will it look like?

- Lots of pictures
- Simple information
- Aimed at general public
- Bullet points
- Attractive
- Diagrams
- Well defined headings

What information does it contain?

- Plants suitable for the area
- How to maintain this area
- Who to contact for advice
- Dos and don'ts
- Where to get plants from
- Monitoring kits for water quality
- Information about wildlife in and around the stream
- Stage pictures
- Timeline for when things will happen
- Facts
- Where waterways go
- What happens to it along the way
- How it affects the surrounding environment
- What people can do to help
- Current state and how it could be in the future
- Its history
- Help set/define targets

What form/s will it be in? How will the information be accessed?

- Forum/discussions with consultants or experts
- Website
- Book
- Landowner buys house received pamphlet
- Pamphlets/Brochure
- Local authorities – city and district council
- Schools
- Community centres
- Newspapers
- Magazines
- Door-to-door education
- Passed out

- Library
- Mailed out
- Town meeting/speaker's corner
- Dancing telegram
- Radio broadcast
- Art work i.e. mural
- Web forum
- Airplane displaying information in the air
- Rocks along rivers with a recording saying educational statement

Any other features or suggestions for your guide?

Information must be from credible sourced and cited at the end

Young Mothers

April 2007

How will it be presented? What will it look like?

- Bullet points
- Easy to understand
- Pictures
- Diagrams
- Colourful

What information does it contain?

- Reference to other sources of information
- Plants suitable for the area
- What plants are poisonous/dangerous if consumed by children
- Choking hazards
- Safety requirements for fences and gates
- Test results – is the water suitable for contact activities
- Maps
- How to care for plants
- How to recognise dying/sick plants
- Uses for plants
- What was originally there
- Sustainability
- Regulations of local and regional councils e.g. resource consents
- Contact person in the area i.e. a nursery owner
- Case studies of good existing planting
- Typical design plans

What form/s will it be in? How will the information be accessed?

- CD Rom
- Interactive computer slideshow programme
- Downloadable
- Free in at least one form
- Easily obtainable

Any other features or suggestions for your guide?

- Games for children

New Zealand Primary Industry Management

June 2007

How will it be presented? What will it look like?

- A4
- Glossy
- Photo presentation
- Photos
- Bullet points
- Checklist
- Pictures
- Diagrams

What information does it contain?

- What waterways should/could be protected
- 'Stream health' guide – how farmers can measure and monitor improvement
- Planting guides
- Demonstration of practice systems (photos)
- Time series
- Funding options for development
- Adding value to your property
- Clearly define sources of pollution and the impact on the environment
- References to internet sources
- Vision of what the stream could look like
- Guidelines
- Sources of more information
- Livestock management
- Why do it e.g. water quality, aesthetics, value
- Plants for revegetation
- Desired outcome
- Local contacts for advice
- Form for budgeting costs
- Any subsidies
- Timing
- Scale – don't be too ambitious
- Thinning

What form/s will it be in? How will the information be accessed?

- Booklet
- Website
- Not a DVD – often have good material but not viewed
- Hardcopy
- Web video clips
- PDF on web i.e. downloadable

- Workshops
- Promotion at field days
- Promotion at farm discussion groups

Any other features or suggestions for your guide?

- Non confrontational
- Not another compliance issue
- Different approaches for urban and rural

Forest and Bird (North Canterbury)

June 2007

How will it be presented? What will it look like?

- Lots of pictures
- Captions
- Graphs, pie charts
- Colourful
- Short
- Simple
- ½ A4
- Unusual
- Diagrams
- Recycled paper
- Ideal photo on cover
- Bullet points
- Check lists form

What information does it contain?

- Before and after pictures
- Models of streams showing effects of runoff
- Lists of plants
- Area specific
- What plants can be used for i.e. attracting birds
- Site preparation including fencing
- Maintenance issues
- Where it is best to plant
- Pest control
- Where to get plants/ plant nurseries
- Statistical information as to the benefits of riparian strips
- Sequence of fruiting and flowering plants for bird attraction
- Consents/permits information
- Local community groups – volunteers
- Weed list
- How to recognise weeds
- Real stream example – success stories
- Bridges
- How to guide
- Where to go
- Resource List/ list of supplies
- Reasons for cleaning up waterway
- Resources available
- Costs of doing it
- Benefits of doing it

- Attracting birds and insects
- How to get the whole ecosystem
- Successful examples
- Cross sections of planting area i.e. a model planting plan
- Soil and water testing
- How to get further information
- How to contact experts
- Reference to more information
- How to get started
- Support organisations
- Tax information and subsidies
- Help from industry participants

What form/s will it be in? How will the information be accessed?

- Community meetings
- Actual stream demonstration
- Animate mudfish educational video
- Website
- Multimedia
- Pamphlets
- PowerPoint – downloadable
- PowerPoint – free disc
- CD
- Helpline- free phone
- Used in community centres
- Libraries
- Schools
- Landscape architects
- Waiting rooms
- Plant nurseries
- Speakers for like minded groups
- Distilled via Council newsletter
- Booklets
- Link from other sites – i.e. restoration and monitoring sites or council rates
- Sent to all landowners with a stream on property
- Slot on Country Calendar
- Film successful examples and produce a programme on waterway clean up e.g. CTV
- Use schools to push clean waterways through curriculum/posters/monitoring projects
- 3-fold pamphlet

Any other features or suggestions for your guide?

- Target developers
- Keep it simple
- Have a separate plant list
- Stencil for marking local drains

- Needs to be able to be produced quickly
- Needs to be backed by legislation or fines for polluting
- Department of Conservation needs more funding
- Fonterra needs to be lobbied to do more

Appendix Six: Prototype of riparian management guide.

This section was included to give a suggestion of what important features need to be included for the criteria to be put into practice. It includes what a mock guide might look like. It is not an actual riparian or wetland management guide but is merely a demonstration of principles.

Notes

Leaving a space here with non glossy light coloured paper to allow for a convenient place for people to add their own contacts and helpful tips. This was not included as a suggested criteria but it is useful to not have to search for multiple papers

Organizational Logos: Examples
Environment Canterbury
Department of Conservation
Living Streams
Dexcel
New Zealand Landcare Trust

Wetland & Riparian Management:

Looking after Canterbury's Water



Organizational Logos: Examples
Environment Canterbury
Department of Conservation
Living Streams
Dexcel
New Zealand Landcare Trust

Date Created

Appropriate Methods:

Including appropriate methods is an extremely important inclusion, though it is often undervalued. Expert opinion rested firmly on the belief that most restoration or natural management failed because appropriate methods were not followed. Therefore it was very reassuring to see that the requirement to have appropriate methods included made the popular criteria.

Plant list:

A plant list was deemed to be an important inclusion. Though this is a common feature in current management guides, it perhaps indicates either a lack of knowledge or a sense of unfamiliarity with wetland species. Though most plant lists also include helpful information on species tolerances which is no doubt useful.

Maintenance of your site:

It is important to include maintenance of riparian management to improve the chances of success.

This was raised both by the groups that created the criteria as well as professional opinion. It is likely that this is the one of the areas where diagrams would be most useful in demonstrating points and the inclusion of diagrams was also an issue raised in the creation of the criteria and is likely to be more applicable than pictures in this circumstance.

There are further considerations, the criteria created made it quite clear that it is important that the information was in a booklet form, as well as being online and available in libraries.

Further information:

- Suggested books
- Websites
- Guides produced by other organizations
- Research papers
- Information on assistance available

Helpful Contacts:

- New Zealand Landcare Trust
- Local universities/polytechnics
- Particularly active community groups in the area
- Regional Council Educational services