An exploration of the potential role of storytelling in development of catchment management plans (CMPs)

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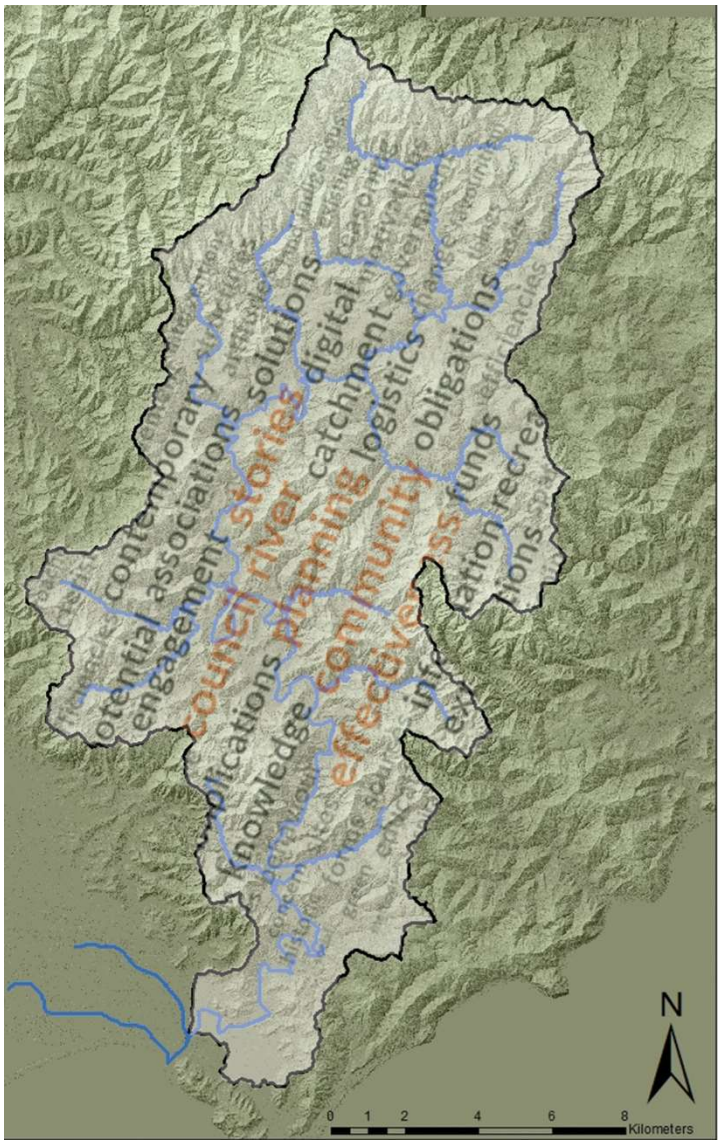

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Abstract

This thesis explores how river stories can support the development and enactment of catchment management plans (CMPs) that incorporate local values. At present, unduly prescriptive and mechanistic CMPs fail to capture and address place-based, catchment-specific issues. Semi-structured interviews with ten people from various backgrounds who live or work in the Waimatā River Catchment on the East Cape of New Zealand were used to evaluate the potential role of river stories that reflect the voices 'of' the catchment. Iterative coding highlighted three key themes and messages: 1. Values and mindsets influence perceptions of the catchment; 2. local knowledge and lived realities are vital; and 3. governance arrangements and policy instruments influence outcomes on the ground. Local issues reflected concerns for increased sedimentation, forestry debris, declining river health, and associated socio-cultural engagement with the river. Participants expressed the desire for governance structures that incorporate locally held meanings of the catchment. Stories not only express relations, but they also provide a mechanism for clear communication to support catchment-specific understandings and plans. A desire for multi-scalar catchment management plans that address short-term, medium-term, and inter-generational environmental crises was evident. An adaptive management approach provides a basis to address ongoing concerns such as biodiversity loss and reduced recreational values in ways that respect intergenerational equity. Findings indicate that river stories provide a strong platform to support and build on existing mechanistic CMP approaches. Information expressed in stories contextualises various types of knowledge, supporting plans that incorporate catchment values and aspirations. River stories weave the human and non- human perspectives to communicate learnings and approaches in compelling ways to ensure CMPs reflect the 'local'.

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Glossary & Abbreviations

ANZ	Aotearoa New Zealand
Awa	River, stream, creek
CMP	Catchment Management Plan
GIS	Geographic Information Systems
Hapū	Local subtribes that make up larger iwi groupings, at local or district geographic level
Iwi	A Māori tribe, often in a geographic area, at regional or district level
Kaitiaki	environmental guardian
Kanohi ki te Kanohi	face to face
Kaupapa	Framework, philosophy, purpose
Koha	Gift, Gratuity
Kōrero	to tell, say, speak, read, talk, address.
LGA	Local Government Act
Mahinga kai	places where customary resources are harvested
Mana	the source of rights and obligations of leadership;
Marae	Māori meeting grounds
Mātauranga Māori	Māori knowledge, Māori knowledge system
Mauri	life force
MfE	Ministry for Environment
NZ	New Zealand
P#	Participant Number
Pākehā	New Zealanders of European descent
Rangatira	Chief
RMA	Resource Management Plan
Rohe	district
Tangata whenua	people of the land
Te Ao Māori	Māori world, Māori world view
Tikanga	custom, customary procedures
Waka	canoe, vessel
Whakapapa	geneaology
Whānau	extended family
Whenua	land
Moko(puna)	a grandchild
Kōura	Crayfish

Puha	Milk Thistle
Whanaungatanga	Close connection between people; kinship.
Manaakitanga	Showing respect, generosity and care for the people who use services, their whānau and communities
Aroha	Sympathy
he kanohi kitea	‘Seen face’, which conveys the sense that being seen by the people

1 Introduction

1.1 Context

Recent media stories, such as the 2022 Newsroom article about how people have become more aware of how rivers are being managed, suggest that Aotearoa New Zealand is potentially on the cusp of a river management revolution (Brierley et al., 2021; Newsroom, 2022). The management of freshwater systems and their adjacent environs are prospectively at a turning point with an opportunity to recontextualise socio-cultural relationships with landscapes and how they are managed Accelerating degradation in recent years requires new approaches to management that understand freshwater systems from local to planetary scales (Stewart-Harawira, 2020). Understanding the complexity of environmental processes and preparing for the unpredictable and potentially irreversible impacts that human actions have on these processes presents considerable challenges for environmental managers (Craig et al., 2017).

No country or catchment is exempt from degradation of freshwater values, freshwater values are the things people think are important about the water (Stewart-Harawira, 2020). At the same time, rivers provide a source of enjoyment and connection for citizens and tourists across the world (Stow et al., 2014). Impacts on socio-economic wellbeing and ecosystem health will continue so long as existing management paradigms and perspectives on rivers remain unchanged (Brierley & Fryirs, 2022; Kennish, 2002; Reid et al., 2019). In New Zealand, environmental management is guided by sustainability principles embedded in the Resource Management Act 1991 (RMA). The longevity of this document indicates the desire for improved approaches to management of natural resources, yet limited achievements to date indicate that the focus of activities is unduly narrow and prescriptive, creating a set of outcomes that are considered in isolation without due consideration to the wider effects of said activities(Charlton & Brunette, 2011). Such outcomes have eventuated despite long-standing understandings by Indigenous people in New Zealand (and Australia) that view rivers as living ancestors, forming an integral part of their identity, heritage and conduct around rivers (Parsons et al., 2021; RiverOfLife et al., 2021). In Te Ao Māori (The Māori World) and Aboriginal worldviews, river health and the health of the community are inextricably linked (Brierley, 2020; RiverOfLife et al., 2021; Salmond, 2014). Such holistic perspectives on socio-natures and relations to rivers emphasise reciprocity and efforts to ensure the river's health is maintained to continue to support lives and lifestyles. Additionally, ancestral relations to rivers provide a tangible link to the intangible, such as passed relatives and deities, providing bases for conversations and learnings about the past to inform the future (Parsons et al., 2021; Salmond, 2014).

The objectives of a Catchment Management Plans (CMP) objective is to manage the 'real' issues in a catchment, going through a series of environmental effects assessments to dictate what management steps need to be taken (Feeney et al., 2010). ‘Real’ issues are issues that are at the forefront of people’s minds and therefore are naturally prioritized an example would be the development and implementation

of flood controls following large scale flooding or the creation of policy to mitigate the impacts of forestry following storm events. In practice CMP's:

- Are structured and overtly narrowed prior to knowledge exploration
- Are overly reliant on quantitative metrics such as water quality, water quantity and ecological metrics to determine the environmental state (Feeney et al., 2010).
- Do not address the implementation gap between applying policy on paper and generating on-the-ground action (Kirk et al., 2020).
- Are ambiguous and imprecise in trying to meet sustainable management objectives making it difficult to realise objectives on the ground (Charlton & Brunette, 2011).

Such framings make CMPs uninspiring, limiting what a CMP can encompass and achieve.

For CMPs to effectively combat issues facing individual catchments, it is important to explore alternative forms of knowledge types and ways to include them in planning processes. Such prospects are limited by narrow monitoring frameworks, siloes of knowledge and policy structures which limit current river management (Brierley et al., 2010; Joy & Canning, 2020; Kirk et al., 2020; Stewart-Harawira, 2020). These failings undermine prospects to leverage the potential for transdisciplinary and alternate knowledge to inform what needs to be done and how it can be done. Therefore, gaining a better understanding of the catchment and what objectives are needed to ensure long-term rehabilitation is integral to reconceptualising how CMPs are informed and implemented at all scales from the local to the national.

Beyond attempts to understand biophysical phenomena, CMPs also typically fail to contextualise how people interact and respond to their environment (i.e., social ecologies; Fischer-Kowalski, 2015). As environmental awareness of the state of freshwater systems has increased, the utilitarian perspective that underpins river management is increasingly being challenged, with people questioning if or how such approaches cater to ecological, social and cultural values (Knight, 2016; Randle & Barnes, 2018). Voices of criticism express concerns for the apparent decision-making tension between prioritising environmental health and economic growth (Stewart-Harawira, 2020). Unequal power relations and pressures have allowed guiding principles and management approaches to be influenced by balance sheets instead of freshwater values (Stewart-Harawira, 2020). The revival of river health discussions, discussions which are commonplace in Te Ao Māori, is important as perceptions of what constitutes a healthy freshwater system have changed over time to reflect an acceptance of the rivers' declining health (Blue, 2018). Assertions of river health are consistently reworked to fit assertions of what is known and what is possible (i.e., shifting baselines; Soga & Gaston, 2018).

Environmental storytelling is the act of sharing information about the environment in narrative forms to informally share knowledge, and as such is one of the oldest, if not the oldest way for people to share their understandings of the world around them (Parsons et al., 2021). Despite this, they are not widely used to inform management approaches. Some stories express understandings of changes and risks in immediate environments. Accordingly, river stories could support CMPs and their objectives. In the

short term, this creates discussion around expectations and aspirations. In the long term, established communication and knowledge sharing go some way to encouraging living databases that inform policy decisions rather than policy-influencing databases and their purpose meaning that policy decisions are being informed by comprehensive stores of knowledge that cover as many perspectives as practical instead of the potential for piecemeal information to unduly influence policy and ultimately catchment outcomes.

1.2 Intent of the thesis

This thesis explores the value of river stories in informing catchment planning processes in the Waimatā catchment, Gisborne, NZ. It appraises the potential use of river stories to inform alternative perspectives, values and knowledge in CMPs in efforts to promote geoethical approaches that challenge ineffective policies, path dependencies, vested interests and power structures (Krueger et al., 2016). The thesis shows how understandings inherent in the stories could be used to shape a plan that supports the ongoing adaptation of CMP objectives and projects to improve river health.

Although research projects are ongoing in the catchment and the community are engaging in a well-established restoration project (Gisborne District Council [GDC], 2022; Salmond et al., 2019), no formal research or commissioned report has addressed how the various forms of stories represent the perspectives of people, their relationship with rivers, the story of the river and how stories inform understandings for planning applications. This is especially important for the Waimatā when considering the work carried out through Waikereru Ecosanctuary and Cairns (2021) on societal relations to the river. Creating greater depth and understanding between people and the environment presents an opportunity to advance CMPs in ways that foster intergenerational equity and create blue and green spaces for everyone and everything to enjoy.

1.3 Rationale for, and approach to, this thesis

This thesis utilises a Critical Physical Geography (CPG) and socio-ecological approach to address research questions and objectives. CPG can be used to interrogate specific understandings of physical geography and their relation to society, developing an understanding of how each feeds back into the other and evolves the human-environment interactions (Lane, 2019; Lave et al., 2014; Lave et al., 2018). As an extension of the CPG approach, a socio-ecological lens explores how social values and meanings influence engagement with the landscape, supporting prospects to inter-weave different ways of knowing (Chan et al., 2016). Acknowledgement of the biases and assumptions made by scientists needs to be considered in the wider ecology of CMPs as they have a bearing on the dissemination of information and crafting of CMP objectives and aspirations (Lane, 2019).

A CPG/Socio-ecology approach appraises assumptions, underlying biases, and reasoning for decisions, seeking to weave new knowledge bases (Lane, 2017). In doing so, practitioners become acutely aware of the repercussions of decision-making frameworks, ethical obligations that develop with a systems-based understanding and the disciplinary baggage that is wilfully carried through planning

processes (Lane, 2019). By taking a CPG/Socio-ecology approach the researcher develops a greater understanding of what is known, what is not known, who the knowledge holders are and why knowledge has not to date been derived or used more efficiently, the process of identifying factors contributing to knowledge generation helps to highlight gaps in management processes and products (Blue & Brierley, 2016). By understanding the socio-ecology of the catchment, the research explores and engages with knowledge that otherwise would not be included in a CMP. To explore the human and more-than-human factors in tandem, a qualitative approach unpacks existing rationales and explore how new knowledge bases and sources can enhance approaches to catchment management.

1.4 Research Question & Objectives

1.4.1 Research Question

Explore how river stories could provide an appropriate platform to support catchment management plans (CMPs).

1.4.2 Objectives

1) Determine if river stories can support understanding of biophysical processes (fluvial geomorphology) and associated understandings of catchment pressures and management expectations.
2) Determine if river stories reflect and express the cultural and social dimensions of a catchment, and if the first two objectives are achieved, then:
3) Identify barriers to transdisciplinary and participatory practices and scope opportunities and implications for the uptake of river stories as a platform for CMPs to be better informed.

1.5 Thesis Structure

This thesis uses a case study approach to explore the relevance of river stories to CMPs for the Waimatā catchment at Gisborne. The thesis is comprised of seven chapters.

Following this brief Introduction, Chapter two summarises and critiques literature on catchment management in relation to the nexus between humans and the environment.

Chapter three documents the regional setting, overviewing the biophysical conditions of the catchment, the evolution of land use, river health trajectories, social and cultural associations to the catchment and the policy and management context.

Chapter four outlines the methodological rationale that underpins the design and conduct of this research, with a particular emphasis on ethical considerations in planning and undertaking semi-structured interviews.

Results are presented in Chapter five, highlighting participants' perspectives on CMPs, the value of river stories and how management goals and objectives need to be improved. The chapter is structured around three key themes which recurred through all interviews:

- *Values and mindsets – situating the Waimatā in its history*
- *Underlying knowledge bases and lived realities*
- *Governance arrangements and policy planning instruments.*

Chapter six weaves together the three themes to demonstrate the potential of river stories in planning processes. The findings are discussed with appropriate reference to the implications for the Waimatā in five sections:

- The Waimatā story
- The role and importance of stories
- Re-Envisioning CMPs in Aotearoa New Zealand
- Prospects for the future of CMPs
- Reflections on the conduct and execution of the thesis

The final chapter summarises the key findings and discussion points with reference to the research question. It reflects on the initial objectives for the research, providing a summary assessment of CMPs and how river stories will benefit new approaches to CMPs.

2 Literature Review

2.1 What are CMPs

CMPs are tools used to manage water resources and land at a catchment scale (Hunter & Scrafton, n.d.). CMPs are important mechanisms to manage real issues, real issues are issues which are often faced by people in the catchment on a regular basis. and their associated effects on the adjacent land and water in relation to national and regional policy and baseline values to ensure the environment is kept at an acceptable level (Feeney et al., 2008, Reed & Utting, n.d.). CMPs have made progress in managing point source issues, but substantial changes are needed if future environmental, social, and cultural effects are to be mitigated (Charlton & Brunette, 2011). The importance of CMPs is also in the administrative framework that it creates, formalising roles, responsibilities, and expectations for those using the catchment (Feeney et al., 2008; Lyver et al., 2016) whilst contextualising activities and effects within the landscape; this is integral to effective CMPs (Brierley et al., 2010; Downs & Piegay, 2019; Feeney et al., 2008). Without a plan, it is more challenging to combat effects, and decisions are rushed by the need to react to effects rather than being proactive about the potential spectrum of effects (Feeney et al., 2008).

Figure 2.1 shows the CMP process and products and the process through which CMPs are derived, Figure 2.2 highlights the narrowing of inquiry and delegation of responsibility to local government.

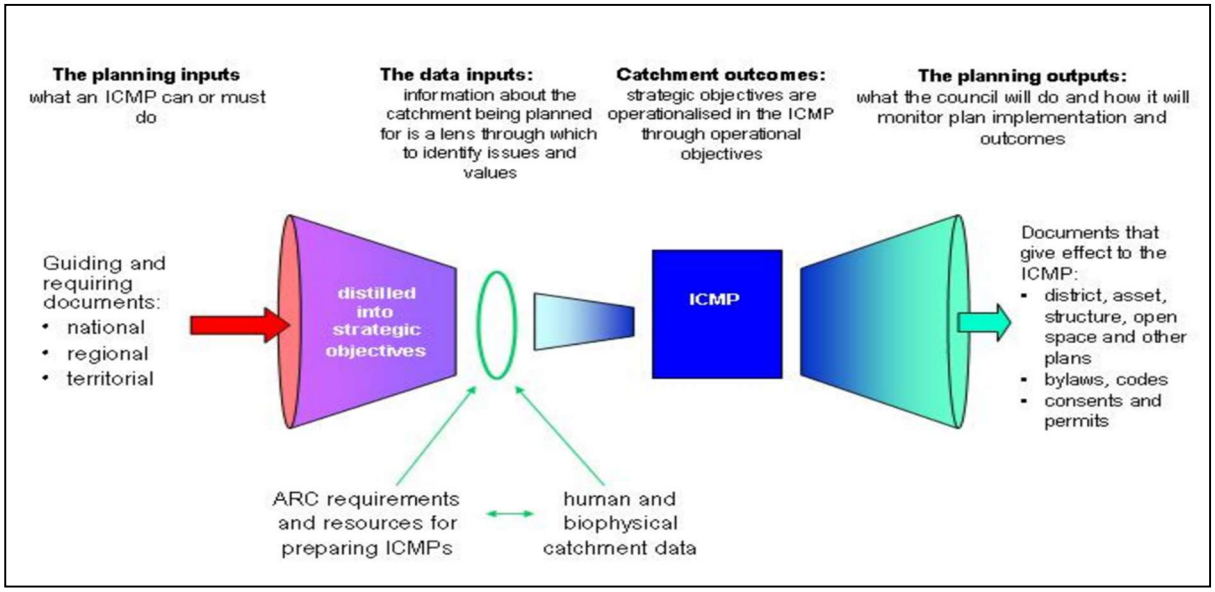


Figure 2.1. CMP processes and end products (Gustafson et al., 2009)

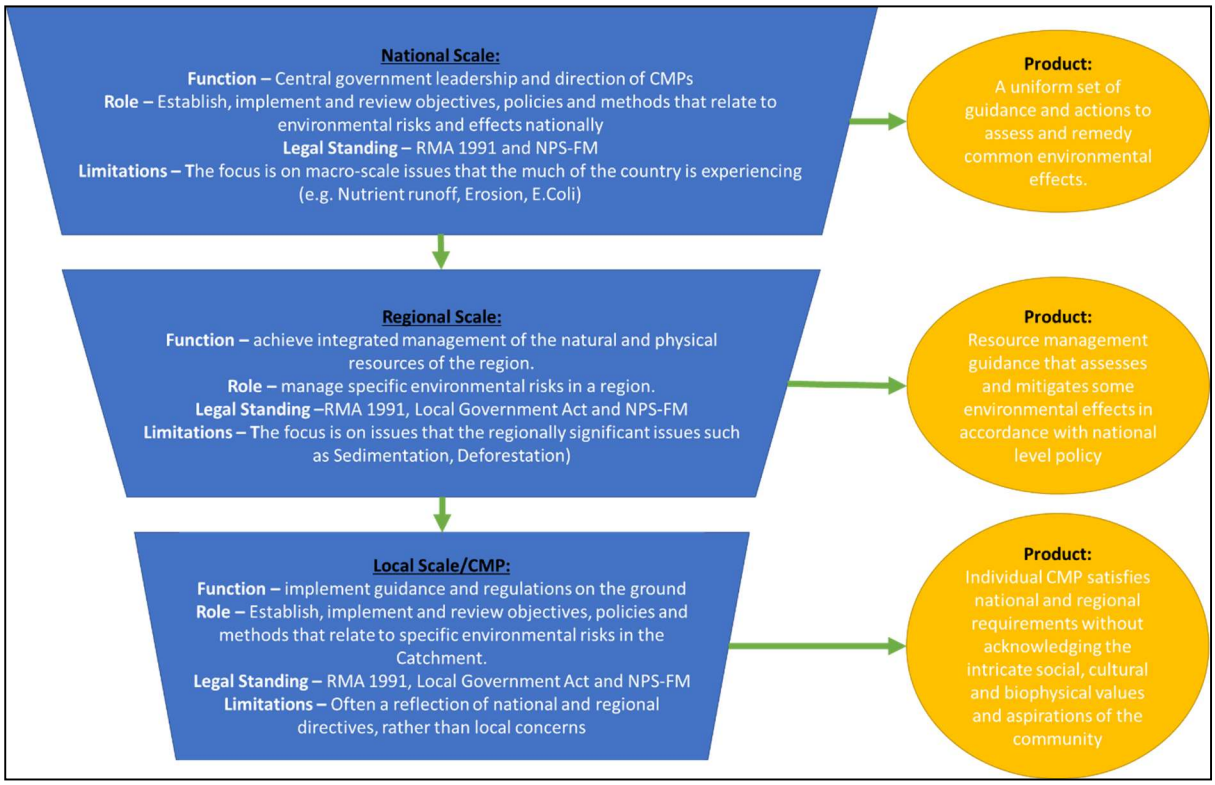


Figure 2.2. Processes of Inquiry (Bottom (Authors Own)

Existing framings outlined in Figure 2.1 do not consider social or cultural objectives. Context is everything in making a place-based management document such as a CMP (Hillman et al., 2003). Accordingly, careful consideration must be given to the geography and social ecology of any given situation. This thesis explores prospects to make CMPs far more reflective of their landscape, making the CMP more constructive, generative, and supportive of local values.

2.2 Socio-Ecologies – Underlying Influences & Values

Socio-ecology as a discipline addresses the influence of people on the environment and the influence of the environment on people (Waltner-Toews et al., 2003). A similar concept, indigeneity refers to "the state of fusion between indigenous peoples and their accustomed environments" (Durie, 2004, p. 4), the characteristics of which are identified as: a unity with the environment (holistic); a geographic relationship that reinforces belonging (place); an endurance over many generations (time); a development of a distinctive culture (identity); a system of knowledge; sustainability; and a unique language (Morgan, 2006).

Understanding the unique socio-ecologies and indigeneities in catchments means recognising, understanding and engaging with the complex reciprocal relationships between people and the environment and how they adjust through time and space (Chan et al., 2016; Waltner-Toews et al., 2003). Chan et al. (2016) sort values related to the environment into three categories:

- Instrumental values - deriving benefits for humans.
- Intrinsic values - deriving benefits for nature.
- Relational values - developed and developing relations between humans and nature.

Instrumental and Intrinsic values influence management approaches as they establish the human and natural aspects of the environment, creating a dualism of values between humans and nature without linking the two values (Chan et al., 2016). The two value systems are misleading as nature cannot be separate from humans (Chan et al., 2016; Thomas, 2015). Relational values are therefore important to understand how nature and humans interact and respond to one another, providing a fertile medium to form values bases for CMPs (Chan et al., 2016).

Similarly, Tadaki et al. (2017) show how socio-ecologies reflect individuals' priorities and how these priorities can differ through space and time. As values differ through space and time, understanding individual social ecologies involves framing the values in relation to people, places and time considering relevant ancestral and historical influences on aspirations for the future (Burnham, 2000; Hikuroa et al., 2022; Reed et al., 2018). The framing of values comes with underlying politics, values held by managers and decisionmakers have the potential to indirectly assert top-down approaches of enquiry, defining stakeholders engaged, legitimising certain ways of knowing and prioritising future trajectories over others (Lyver et al., 2016; Tadaki & Sinner, 2014). These approaches promote the isolation and measurement of certain aspects of the catchment, such as water quality or ecological indices to inform the management of the environment (Thomas, 2015).

An emerging, globally acceptable approach to considering plural world views, knowledge systems and ways of being is a geo-ethical approach (Dicks, 2021; Sharp et al., 2022). Geoethical approaches to freshwater management and rivers posit an approach of working with the river and its residents and acting in ways that support its rehabilitation (Dicks, 2021; Brierley, 2020). The now-defunct NSW Catchment Management Authorities Act 2003 is a good example of what can be achieved when the CMP process is inherently cross-disciplinary and cross-organisational (Mould et al., 2021). The establishment and support of catchment management authorities which developed and maintained social connections and communities of practice led to knowledge sharing the development and implementation of catchment objectives which fostered river rehabilitation while meeting the needs and expectations of stakeholders and management authorities (Mould et al., 2021).

In NZ, Recent governance arrangements have become more conducive to Māori values and knowledge, most notably through the incorporation of Te mana o te Wai in the National Policy Statement for Freshwater Management (NPSFM) (Hikuroa et al., 2021; Ministry for Environment [MfE], 2021; Ruru et al., 2017). However, balancing and prioritising all the plural values of communities is a difficult challenge (Berkes & Folke, 1998). Arguably this has not been affected in CMPs in NZ, owing to the generalised, national scale of policy, while the onus to capture the unique attributes of each catchment falls on local government, limiting the level of application of values as local and district councils have limited capacities to respond and adapt to the unique values and knowledge that are unique to each

catchment (Feeney et al., 2010; Te Aho, 2019). The product and process of policy, and by association, CMPs, therefore, dictate who, what and how values can be explored (Feeney et al., 2010).

2.3 CMPs – Product and Process

Feeney et al. (2009) discuss the linear and directive fashion under which CMPs are created, highlighting that they often focus on planning instruments to inform the data inputs (human and biophysical) which are used to determine aims and objectives for the plan. Although the premise is good, the series of narrow 'gates' through which information is forced leads to early simplifications of biophysical, social and cultural factors and considerations that make up a catchment. An example of this was the development of hydroelectric dams along the Waikato River, which focused on the damming of the river to utilise the potential energy, in turn impacting the migratory passages of eels (tuna), which are important to Māori ways of being along the river (Te Aho, 2019; Watene-Rawiri et al., 2016). Knowledge incorporated in CMPs is currently the product of specialists (Physical scientists, planners, council workers etc) and what existing data can elucidate (Gustafson et al., 2009). As a result, things that matter (aspects of the environment that individuals hold in high regard) can be missed or decisions to prioritise some knowledge types over others mean that the resultant CMP does not properly represent the values and aspirations of the majority of people using the catchment (Gustafson et al., 2009; Lyver et al., 2016; Tadaki & Sinner, 2014).

Quantitative metrics are regularly used to characterise the catchment at one point in time. However, they are often hard to contextualise in the wider landscape as they are neither representative of the landscape nor measured over a long enough time scale to appreciate the magnitude and trajectory of the changes occurring (Fryirs et al., 2021; Brooks et al., 2003). As an extension of the lack of context, catchments can be ‘pigeonholed’ into predefined management frameworks that satisfy what has been measured (Fryirs & Brierley, 2009). The outcome is a CMP product that does not address or combat the effects of the real issues that people face in the catchment on a regular basis (Fryirs & Brierley, 2009; Muller et al., 2019).

The CMP product is also hampered by the difference between the conceptual ideas of what will be achieved without adequate reference to the place-based intricacies, such as environmental, social, and cultural aspirations of the catchment, which alter how concepts materialise (Gustafson et al., 2009)
As a result, CMPs often consider only the direct effects of land development and human activity on the landscape rather than all phenomena in the catchment (Fenemor et al., 2011a). More recently, Fryirs and Brierley (2021) have discussed how management processes can move beyond reductionist consideration to consider ecological, hydrological, social and cultural requirements in riverscapes by working with the river. New approaches to working with the river require reframing perceptions of what working with the river entails and adopting approaches that consider biophysical and science understandings and incorporating broader understandings of the river (Fryirs & Brierley, 2021). The broader understandings are rooted in utilising multiple knowledges, adopting geoethical framings and bravery to adopt new ways of understanding (Fryirs & Brierley, 2021). Approaches to communication

that ensure knowledge is not altered or lost in translation are also critical in efforts to navigate the complexity of catchment values and relations (Eden & Tunstall, 2006; Krueger et al., 2016; Lave, 2016). The terminology used in CMPs can often develop without consideration for 'common language, creating the potential for communication to operate at cross purposes (Phillips et al., 2010).

2.4 CMPs in an ANZ context

ANZs founding document is The Treaty of Waitangi (Te Tiriti o Waitangi/TTOW). It was signed in 1840 by the British Crown and Māori rangatira (chiefs) to create a nation-state and build a government in NZ (Harmsworth et al., 2016). Māori understood there was little change to their sovereignty, however disparities between the Māori and English versions of the treaty led to a reduction of Māori influence over land management, and conservation goals (e.g., Ruru, 2009; Lyver et al., 2019). The contestation of resource management influence persists in contemporary terms (Parsons & Fisher, 2020). Therefore, the Waitangi Tribunal was created in 1975 to re-establish the role of tangata whenua in resource management and to create discourse for reconciling differences between the Crown and Māori (Harmsworth et al., 2016; Ruru, 2018).

The Resource Management Act 1991 (RMA) is the cornerstone of environmental legislation in NZ and similarly attempts to re-establish the role of tangata whenua (RMA, 1991). However, the RMA is primarily a sustainability document allowing for the justification of resource depletion without considering the impact on environment health (RMA, 1991). This framing of resource use is at odds with tikanga principles. Therefore, despite being amended many times, the RMA has been largely ineffective in strengthening tangata whenua's influence on decision-making and improving the environmental state (RMA, 1991; Kirk et al., 2020: Te Aho, 2019).

As a result, current CMPs in NZ rely heavily on water quality and quantity and ecology measures to monitor environments and track trajectories of change (Gustafson et al., 2009). As a result, NZ has struggled to develop a framework that creates CMPs fit for purpose that includes social, cultural and environmental values and aspirations (Reed & Utting, n.d.; Hunter & Scrafton, n.d.). Part of the difficulty is that the RMA delegates implementation of the act to regional and local councils, which have limited capacities to implement the RMA as well as meet community aspirations. Therefore, cultural and social considerations are often omitted if not required under law (Charlton & Brunette, 2014).

Recent efforts to incorporate indigenous knowledge in CMPs have culminated in a more robust policy to include Mātauranga Māori and support Treaty-based governance that leverages indigenous knowledge (Tadaki et al., 2022). Therefore, CMPs are increasingly giving effect to cultural and social approaches alongside existing eurocentric approaches. The Motueka CMP Project is an example of incorporating social and cultural expectations into a CMP effectively (Tadaki & Sinner, 2014). The project recognised that catchment managers needed 'traditional' knowledge such as water yields, sediment loads, aquatic ecology and economics, as well as an understanding of the values and aspirations of the community (Fenemor et al., 2011a). Perhaps inevitably, these evolving relations

between governance, the public and the organisations involved in implementing the Motueka CMP improved CMP effectiveness (Cook et al., 2013).

2.5 The role of Storytelling and knowledge that informs CMPs

Stories in the context of environmental management are broad, they encompass the telling of stories that capture events within the catchment in recent and historical times, they are told at both personal levels (one person to another) and at a group level (e.g., Berkes et al., 2007). As a result, stories are an asset to understanding people's worldviews and perspectives about their immediate environment (Brierley, 2020; Kellas et al., 2021; Robertson et al., 2000; Ryan, 2022). Despite the negative connotations attached to storytelling in science, stories are key mechanisms within which lived realities and learnings are communicated and stored (Dahlstrom, 2014; Sundin et al., 2018). Stories containing geomorphic information can maintain their integrity and accuracy through centuries (e.g., Swanson, 2008). Therefore, stories can represent the unique attributes of each river, catchment, and community (Te Aho, 2019). There is strength in a story's ability to deduce and communicate the driving factors, anthropogenic actors, and different community structures that rivers exist within (Dahlstrom, 2014; Wilcock et al., 2013).

Stories give a voice to the environmental phenomenon and help to explain what pressures and changes environments are experiencing, often existing between the boundaries of western science and the more than human components of the environment (Berkes et al., 2007; Brierley, 2020; Ryan, 2022). The use of stories is often how people choose to share knowledge and learning (Dahlstrom, 2014). Stories have been primary communication methods for centuries as they are widely accessible and compelling (Parsons et al., 2021; Smith, 2015). Māori often use stories or Pūrākau to share traditions, stories and understandings of the environment and compel people to engage with histories and landscapes, highlighting the value of stories to engage wider audiences in thinking about landscapes beyond what they can see, smell and feel (Dahlstrom, 2014; Parsons & Fisher, 2020; Sundin et al., 2018).

Stories also encourage people to share their experiences in a catchment, beginning discussions about recurrent themes (Shepherd et al., 2018). Stories are a segue to collaborative processes, changing the participation process from "being informed" to "being an informer" (Gregory et al., 2012; Sundin et al., 2018). The net product is a better understanding of what underlies the policy problem, aspirations for the catchment, performance indicators or observations and the socio-ecological system. The outcome informs management options (Gregory et al., 2012). Stories effectively communicate what the river experiences and are intrinsically persuasive, a clear advantage for communicating positive and negative influences on rivers to resistant audiences (Dahlstrom, 2014). The power must be tempered with a geoethical lens to avoid misconstruing messaging, an important consideration when exploring any story or narrative (Dahlstrom, 2014; Dicks, 2021).

Storylistening is equally important as the underlying and inferred value of the stories is not always immediately clear (Kellas et al., 2021; Sundin et al., 2018). Storylistening is especially important when

operating in transdisciplinary settings as the value that one "listener" may derive from a story may differ from another "listener" dependent on their existing knowledge bases (Smith, 2015). Each listener will draw unique parallels to their knowledge bases and, therefore, may help to understand the river story in different contexts, such as mapping or storylistening (Caquard & Cartwright, 2014; Kellas et al., 2021). The act of storylistening is a crucial step to tying multiple threads together and weaving them together to develop an understanding that considers multiple disciplines across multiple scales, spatial and temporal (Smith, 2015).

Stories are inherently place-based and listening to them provides a basis to expand knowledges and consider the wider natural world (Robertson et al., 2000; Fryirs & Brierley, 2021). The development of place-based understandings forms evidence bases that support understanding of specific ecosystems, the associated laws and values of the place and how these values are contextualised in social settings as opposed to policy settings (Krueger et al., 2016; Te Aho, 2019). The key to unlocking the potential of stories in the first instance is communication and engagement. Clear communication pathways allow tellers and listeners to access the information held in stories whilst engagement ensures that platforms are created for people to tell their stories and share their knowledge.

2.6 Communication & Engagement

Although communication and engagement are common actions, it can be difficult to achieve in different settings. Brandt et al. (2013) cite five challenges to achieving true transdisciplinary approaches inclusive of all disciplines and stakeholders and as such the challenges can be associated with storytelling and story listening as they are forms of sharing all types of knowledge that do not necessarily fit within one discipline or another. The lack of coherent framing was the first challenge. The subsequent four challenges speak to how research processes generate knowledge and the disparities that arise from discipline-bound communication and engagement; this limits the impact of any subsequent outputs. A solution to reversing these challenges is to have better practitioner engagement pathways that are clear and balanced in conveying information (Brandt et al., 2013; Turnhout & Purvis, 2020). Turnhout & Purvis (2020) suggest effective communication should be considered in 3 ways;

- What is happening?
- What are the consequences?
- What can be done?

Such an approach creates space for recipients of the knowledge to analyse the information, a form of peer review. Turnhout & Purvis (2020) also discuss how effective communication results from communication pathways that cater to the end user's understanding of the subject matter. Without considering the end user, efforts can be ineffective. Multidirectional communication methods between disciplines and demographics allow learnings and outputs to be simultaneously shared and serve as the impetus to reach an improved understanding for each stakeholder and specialist sector (Brierley et al., 2010; Downs & Piegay, 2019).

Beyond the existing mechanistic approaches to communication and engagement, work by Cairns (2021), Mould et al. (2020a) & Mould et al. (2020b) highlight the importance of relationality in river

management. By understanding relations to the river, efforts can be made to increase participation in projects and catchment objectives. Therefore, catchment plans that capture the relations to the river and the meanings of the catchment are likely to translate from the paper to the field in better ways (Mould et al., 2020a; Eden & Tunstall, 2006; Krueger et al., 2016).

Clear communication also involves contextualising the inherent uncertainty associated with any environmental science and engagement process, a difficult process for scientists as it can threaten their credibility (Brierley, 2020). Berkett et al. (2018) provide insight into how scientists can create or maintain credibility; they suggest that collaborative processes are more effective when scientists are known and trusted by others. Building relationships early helps create the space to discuss the inherent uncertainties without damaging approaches to addressing environmental change (Berkett et al., 2018).

2.7 Conclusion

Harris (2006) and Berkes & Folke (1998) suggest that understanding multiple viewpoints and protecting the integrity of the locally adapted systems helps to avoid management approaches that pre-empt outcomes and decisions. Only then can the values (Physical, Cultural, Social, Economic and Political) reflect the environment in question. Therefore, CMPs that embrace additional knowledge to provide a greater context of catchment and river settings, moving beyond mechanistic templates, have achieved success (e.g., Fenemor et al., 2011a). Stories provide this basis to move beyond existing paradigms and worldviews and explore what other knowledges inform environmental relationships through time.

3 Regional Setting

3.1 Introduction

This chapter reviews place-based understandings of the Waimatā river. A discussion of physical attributes is followed by an overview of social, cultural and governance considerations.

The Waimatā catchment is on the East Cape of North Island, the easternmost point of mainland New Zealand (Figure 3.1) (Chappell, 2016). The Waimatā catchment extends from the Raukūmara ranges in the north to the Tūranganui river and the township of Gisborne in the south (Figure 3.1).

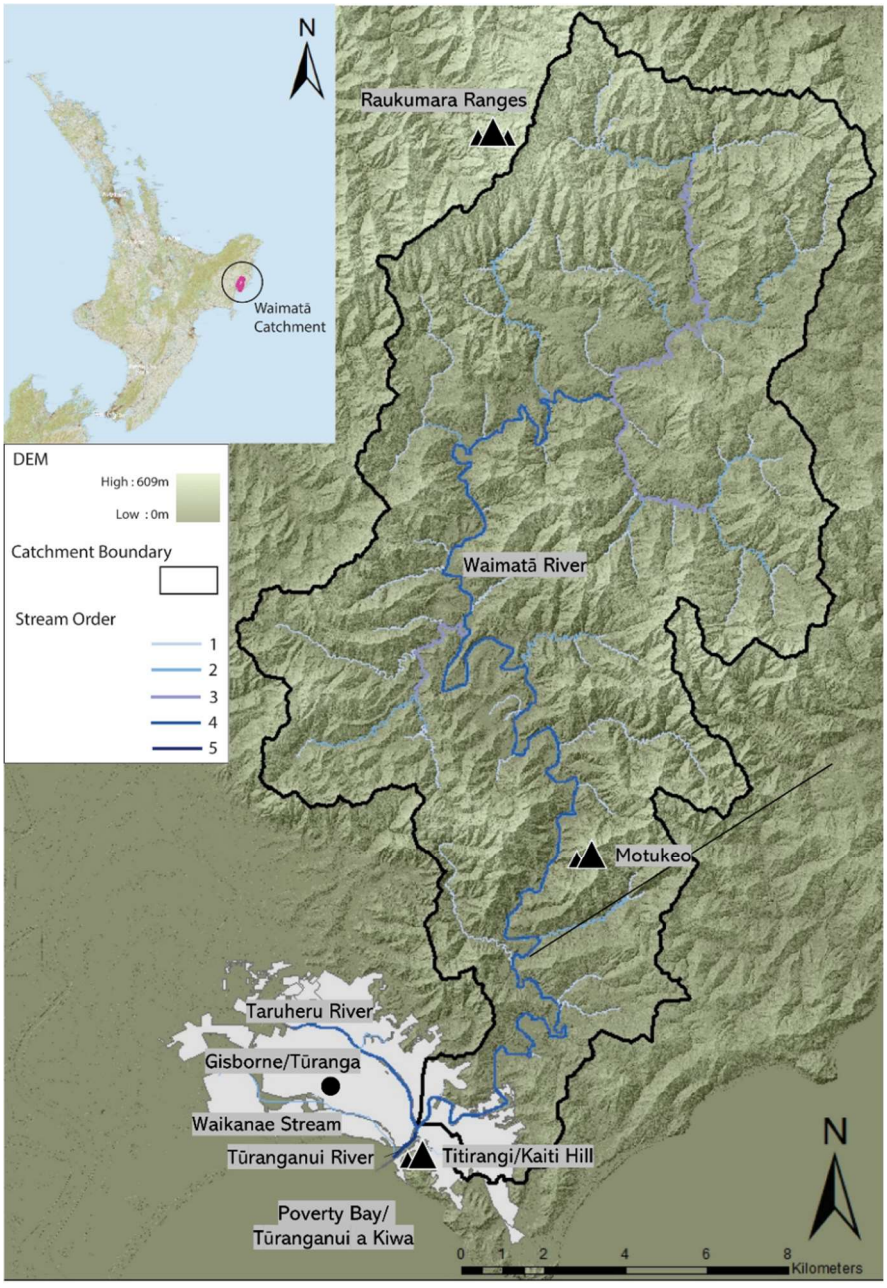


Figure 3.1. Catchment Topography. Location in North Island (inset)

The 61.4km Waimatā river drains a large hill-country catchment of approximately 228.25km^2 north of Gisborne City, flowing through farmland, forestry, and residential sections before meeting the Taruheru river to form the Tūranganui river (Harvey, 2021). The river is highly connected to the catchment. The net effect of the connectivity is that the catchment exhibits high levels of sedimentation, declining water quality and forestry debris, delivering the effects of current land uses into the sights and minds of the Gisborne population (Cairns, 2021; Cullum et al., 2017; Harvey, 2021; Salmond et al., 2019).

Compounding the exposure to these effects is that the Waimatā features prominently in the ways of being and knowing of the community, closely tied to the recreational and social values that the rivers provide to the area. The Waimatā has a rich cultural history, developed since the arrival of the Takitimu and Horouta waka and the first people to the region (Cairns, 2021; Salmond & Phillips, 2019; Reeve, 2015; Spedding, 2006). Economically, the catchment is primarily used for Pastural Farming and Forestry, contributing 55.4% of the region's GDP (BDO, 2021), creating a management situation that requires a balance of economic maintenance and freshwater health.

3.2 Climate

As New Zealand's latitude spans 35^o-47^o south, the country experiences remnant Antarctic and Tropical weather systems, each providing distinct weather characteristics (Chappell, 2016). Because of its exposed location on the eastern edge of New Zealand, Gisborne is subject to both weather systems with southeasterlies having the highest impact as the topography is unable to shield the area (Chappell, 2016). Short-duration, high-intensity rainfall events are not uncommon in the Gisborne region (Chappell, 2016); hence, flooding and landslides are recurrent and ever-present natural hazards (Cook et al., 2022). Rainfall for the catchment varies from 1800mm/yr in the headwaters near the Raukūmara ranges to 1000mm/yr in the coastal flats near Gisborne city (Chappell, 2016). Recent research highlights the potential for 250.7 mm to fall in 5 days, a quarter of the average yearly precipitation (Cook et al., 2022). Climate change predictions for the region in 2050 are stark (Mullan et al., 2018). The mean average temperatures are predicted to increase 0.7-1.1^{o}C, and the number of dry days (above 25^{o}C) increases by 56% to 37.8 dry days per year. Conversely, the potential for extreme precipitation events increases by 10-15%. This shift into the future is extreme, however highlights the potential for the region's already high-magnitude low-frequency flood events to become high-magnitude moderate-frequency events.

3.3 Geology and Tectonic Setting

The geology of the Waimatā Catchment is primarily made up of weak, highly erodible ~10-90-million-year-old sedimentary rocks (Mazengarb & Speden, 2000). Some strata have smectite clay layers that readily facilitate shallow (~0.5m deep) earth flow movements when waterlogged. These readily erodible materials provide the potential for very high sediment fluxes (Marden et al., 2012, Cullum et al., 2017). In addition to the sedimentary rocks, the catchment has tephra (volcanic ash) (Mazengarb & Speden, 2000). These weak lithologies are easily weathered and eroded, creating a highly erodible landscape (Cullum et al., 2017).

The East Cape is tectonically active with the Hikurangi Subduction fault running through the Raukūmara ranges at the headwaters of the catchment (see Figure 3.2, Mazengarb & Speden, 2000). Frequent earthquake adjustments drive the geomorphic narrative, with the quest for landscapes to maintain equilibrium resulting in profound sediment flux (Cullum et al., 2017). It is estimated that 2.6km^3 of sediment has been produced in the catchment since the Last Glacial Maximum (LGM), ~20 thousand years ago, the majority of which will have been transported by the river to the ocean (Marden et al., 2014).

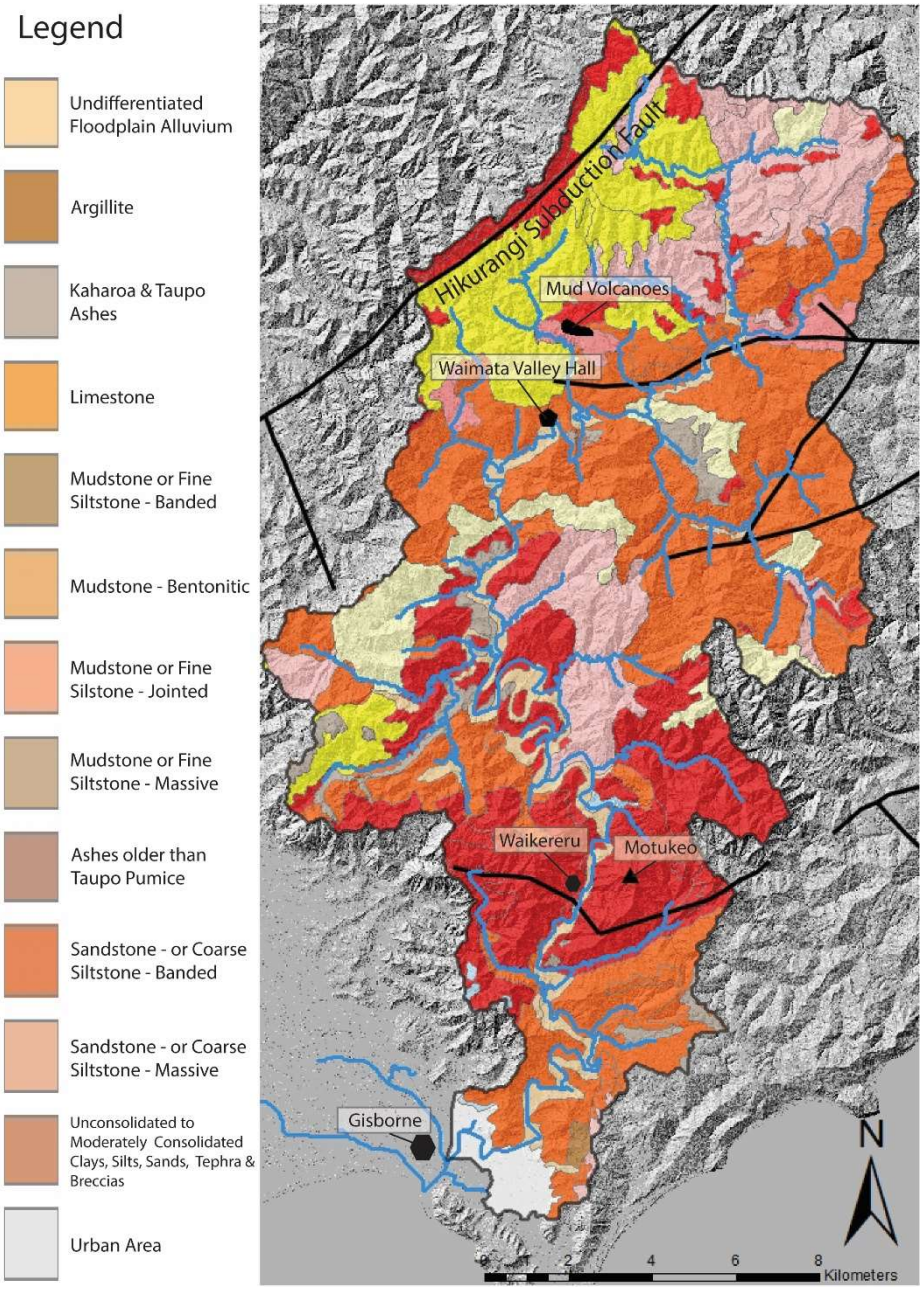


Figure 3.2. Surface Geologies and faults of the catchment

3.4 Geomorphology

The Waimatā catchment has a high level of confinement, as shown in Figure 3.3 (Cullum et al., 2017; Harvey, 2021). As a result, the landscape is highly connected and disconnected throughout its course, creating hydrologic and sedimentologic fluxes that pulse in response to accommodation space and rainfall events (Gundry, 2017; Harvey, 2021). This confinement regime is caused by a combination of relict terraces and steep topography near the active river channel resulting from periods of tectonic uplift and sea level rise, with the riverbed constantly adjusting to maintain its profile (Cullum et al., 2017).

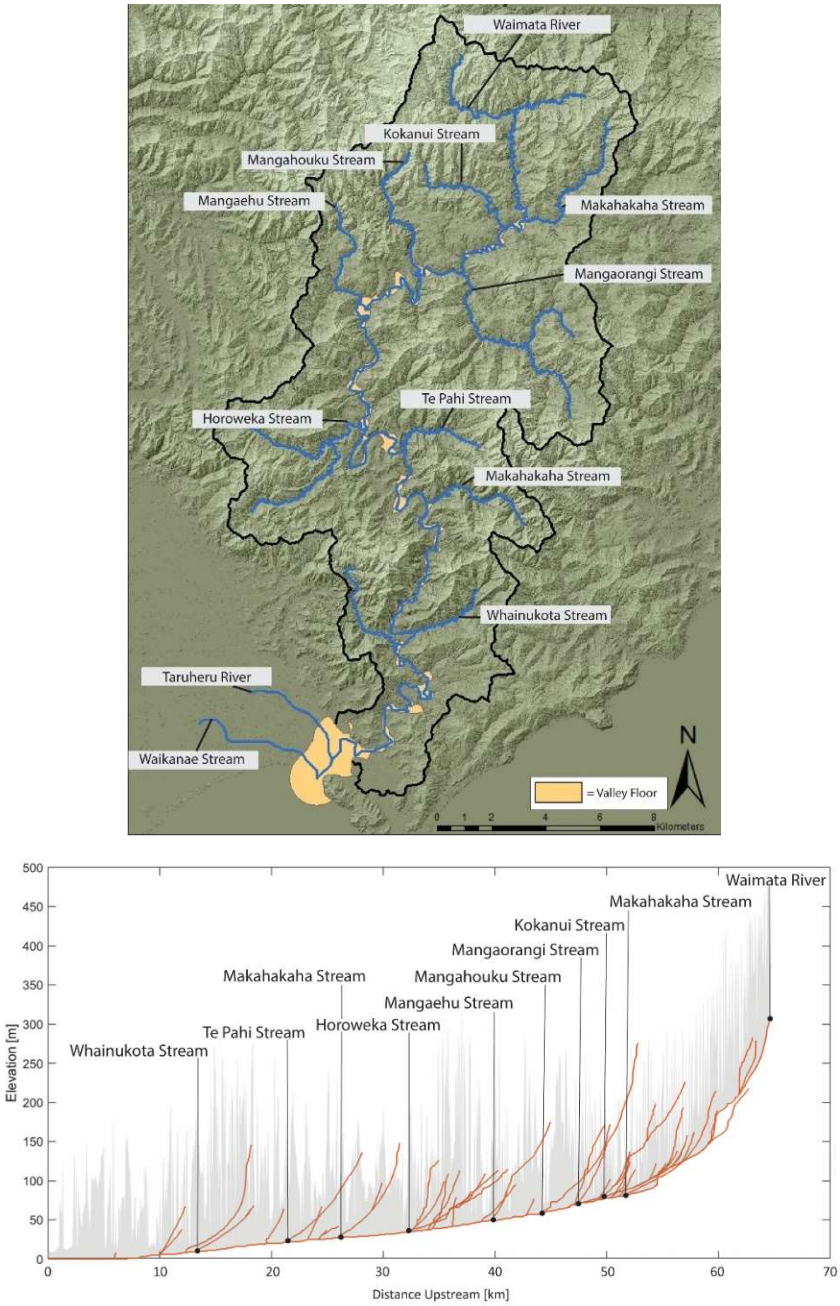


Figure 3.3. (Top) Valley Bottom Map, showing degrees of confinement and floodplain pockets. (Bottom) River Long Profile with key tributaries labelled (Orange Line) and Elevation within a 500m buffer, as a proxy for confinement (Grey Shading).

Another significant contributor to sediment fluxes is gullying caused by past land uses, forestry and insufficient mitigation to provide long-term sediment storage and stability (Marden et al., 2012; Cullum et al., 2017). Another sediment source is the mud volcanoes that form along fault lines in the upper catchment, which disperse fine sediments that are readily eroded (Harvey, 2021, Leighton et al., 2022).

The history of the geomorphology of the Waimatā and adjoining Tūranganui river is shaped by changes in sea level rise (Cullum et al., 2017). During the LGM (~20,000 years ago) sea levels were ~130m lower than they are today; therefore, the course of the Tūranganui continued into Poverty Bay (Salmond et al., 2022; Walsh, 2007). A delta formed on the Waipaoa river when sea levels began to rise, directly impacting the Taruheru and Waimatā rivers forcing them to follow the terraces at the base of the Waimatā catchment (Salmond et al., 2022).

3.5 Cultural History

Māori arrived in the 14th century on two waka (traditional Māori canoes), Horouta and Takitimu and occupied much of the lowland areas of Tairawhiti – Gisborne up to ~250m (Salmond & Phillips, 2019; Spedding, 2006). Māori settled in the coastal areas where they could easily cultivate crops and collect plentiful seafood (Reeve, 2015). Given the dense vegetation, steep topography, and extensive river networks, rivers were used as a way to travel and transport things during peace times and became escape routes during times of conflict (Reeve, 2015; Salmond & Philips, 2019). Due to these characteristics with few flat areas, the catchment did not offer much cultivatable land. Accordingly, no kin groups permanently settled in the catchment (Salmond & Phillips, 2019). Instead, the multiple hapū used it as a refuge and transport zone (Salmond & Phillips, 2019). Māori remained kaitiaki (guardians) of the catchment until the subsequent land acquisitions by the crown following the signing of TTOW in 1840, where they lost autonomy over land use and ownership (Coombes, 2000).

Until this point, the region only had a brief visit from explorer James Cook in 1769 on a scientific expedition (Reeve, 2015). The Tūranganui river was the meeting place for Cook, his crew, and the local iwi and hapū, as such formed the basis for early interactions between Māori and Europeans (Reeve, 2015). The Waimatā and Tūranganui are significant to local iwi for their role in their lifestyle before European settlement. They were also central to fostering early relationships between Māori and Europeans, forming a part of New Zealand history (Spedding, 2006).
The region was resource rich despite the British namesake, Poverty Bay, so the subsequent resource abuse by British settlers over the past 190 years has left a lasting impression on Māori ways of being (Reeve, 2015).

3.6 Land use Change

European settlement on the East Cape prompted large-scale forest clearance for pastural farming, settlement and later timber trade (Coombes, 2000). The development of primary industries has meant the catchment has experienced transformative changes to its hydrologic cycle, sediment fluxes and land cover. The landscape is undergoing a cyclical land cover change from forested to bared lands as

the radiata pines planted as part of Cyclone Bola (1986/87) erosion mitigation schemes are beginning to be harvested (Marden, 2012). The cyclic harvesting of these forests exposes the land, resulting in cyclical denudation (Marden & Seymour, 2022).

The division and distribution of land to private ownership through time are shown in Figure 3.4. Sections have steadily been downsized to cater to demands for lifestyle properties, farming and forestry (BDO, 2021; Land Air Water Aotearoa [LAWA], 2021). Comparing the land sizes shows the 19th-century land size was ~3227Ha, while the contemporary land size is ~5.2Ha. To emphasise the duality of rural and urban land types in the catchment, upper and lower catchment land sizes show that upper catchment land sizes are ~117Ha and ~0.46Ha, respectively. The delineation for these zones is shown in Figure 3.4. The implication is that the Waimatā CMP will need to cater to both rural and urban concerns.

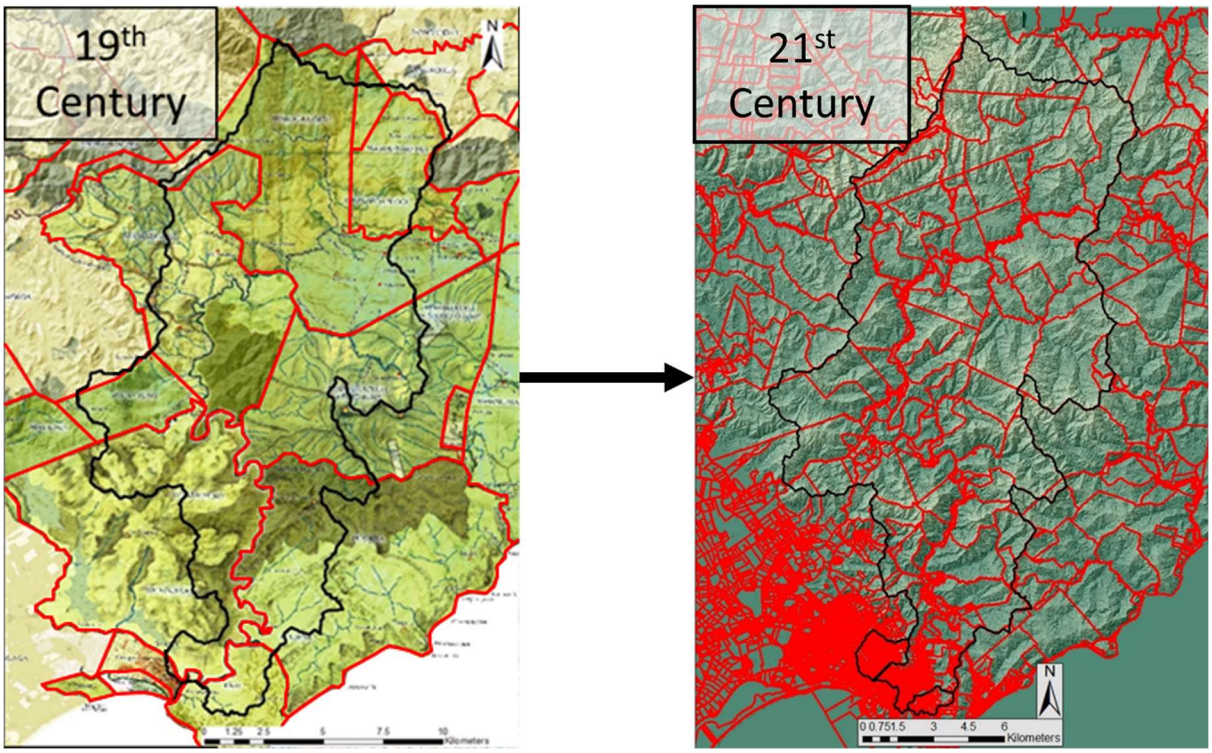


Figure 3.4. Cadastral Surveys of the Waimatā catchment comparing the size of property parcels during early settlement and present day. The red lines present the property boundaries, there is a clear reduction in property size and increase in housing density in the southwest corner of the map where Gisborne city is today. Base maps adapted from Macdonald (2019) & LINZ (2022).

Overall, the catchment has become a hub of industry for the region, with extractive forestry (26.9% of land area), pastoral farming (46.5% of land area) and smaller secondary industries such as wine and cheese making becoming established in the catchment (BDO, 2021; LAWA, 2021). These changes have cascading impacts on ecology, geomorphology, and other biophysical conditions with Gundry

(2017) suggesting that the separation of land use and land care has created a disconnect between action and ethics of care.

3.7 River Health

The contemporary health of the Waimatā River is generally poor, with large quantities of sediment choking the lower reaches and adjoining Tūranganui river. There have been accounts of the sediment stores also causing sickness for recreational users (*GDC, 2020*). This is corroborated by measures of ecology, nutrients and water quality in the Waimatā-Pakarae Background Document (GDC, 2022) that shows unhealthy levels of suspended sediment, E. Coli, Dissolved Reactive Phosphorus and Turbidity, and hence poor river health overall (Figure 3.5). These metrics help identify changes in driving factors and highlight the cumulative effects as the river gets closer to the sea. The metrics can all be attributed to the high sediment loading of the system and the river being exposed to various types of waste (e.g., Sewage & Animal effluent).

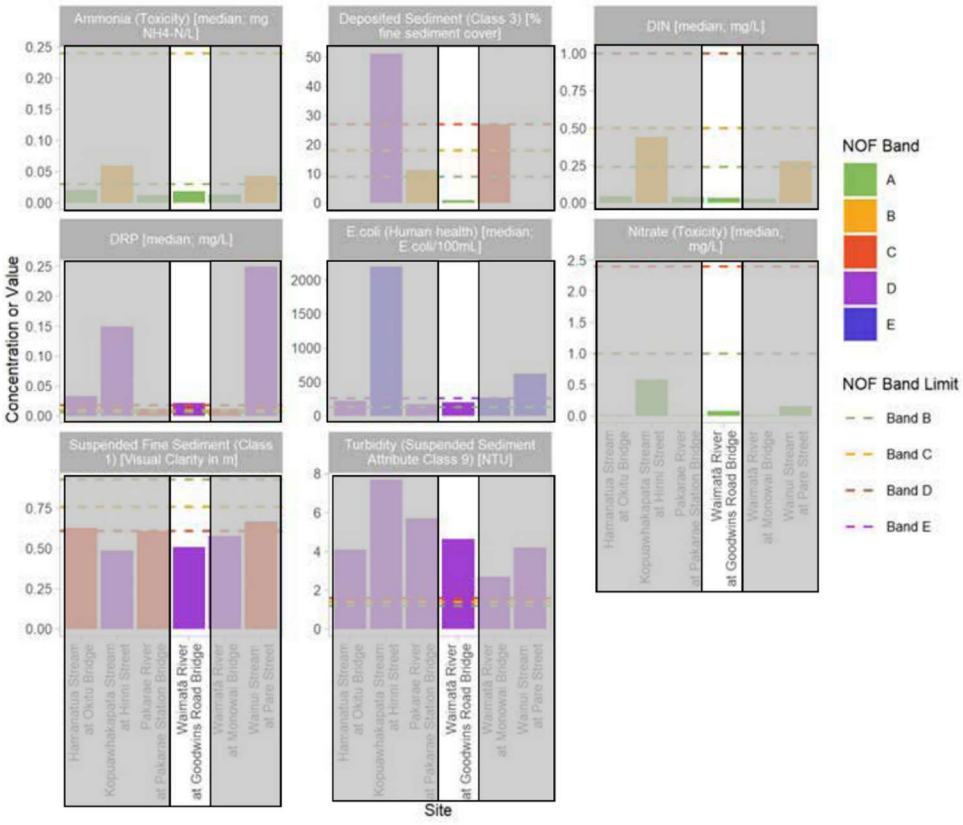


Figure 3.5. Waimatā Water Quality & Nutrient Measurements (Waimatā-Pakarae Catchment Plan, 2022)

Other measures of river health have been posited through time that offer methods to expand assessments of river health (e.g., Commission for the environment, 1978; Ruru, 2015; Tipa & Teirney, 2006; Morgan, 2006). These methods assess the wider river condition, scenic qualities, Mauri and Cultural health however data that supports making these assessments is not routinely collected, despite

their potential to inform assessments of river health from a recreational, social, and cultural perspective (Fryirs & Brierley, 2009; Knight, 2016; Mould et al., 2020a).

3.8 Social associations with the river

Social associations to the river are tied to the river as an important recreational and community space that fosters both physical and mental health through engaging with the river directly and socialising along the river (Cairns, 2021). The historical connections to the river and catchment as a refuge also endure, with many still seeing the catchment as a place to disconnect from daily pressures and reset (Cairns, 2021).

Contemporary associations with the river are constantly evolving, particularly for those who have lived in the catchment for longer periods and seen how the river has changed (Cairns, 2021). These associations are primarily evolving in response to different connections people have with the river, how they value the river and what interactions they can now have with the river with its degraded health. Counter-intuitively, connections with the river have strengthened because of the river's health degrading as residents feel responsible for advocating for change. Most residents that Cairns (2021) interviewed were unsatisfied with the river's health and how management approaches have yet to address the communities' concerns.

Concerns for the catchment differ between the upper and lower catchments (Cairns, 2021). In the upper catchment, erosion, forestry operations, invasive species, and water quality were key concerns (Cairns, 2021). In the lower catchment, the importance of recreational activities and landscape aesthetics were key concerns with consideration for water quality, swimmability, aesthetic potential and public awareness (Cairns, 2021).

The most active community group involved with the Waimatā catchment is the *Waimatā Catchment Restoration Project (WCRG)*. The group is a collaborative project to achieve conservation, recreation and community education outcomes. Participants in the project come from various backgrounds. They are currently organising and gaining funding for pest trapping, riparian planting and fencing off water courses.

As a result of the connections outlined in this section, the level of engagement amongst the community is high and therefore the community are motivated to rehabilitate the river.

3.9 Policy and Management Context

A combination of Treaty breaches, complications and finance structures in the early 1900s meant that select groups participated in decision-making in the wider Gisborne region and Poverty Bay (Coombes, 2000). In 1940, The Soil Conservation and Rivers Control Act was established, and catchment boards were set up to manage local water bodies and manage based on unique regional attributes (Roche, 1994). Post-1980, the catchment boards and other specialist boards were amalgamated into local

councils, creating a disconnect with issues facing catchments as tasks and observations were centralised (Kirk et al., 2020).

The centralisation of policy and regulation persists today with several policies placed in a decision-making hierarchy to guide management implementation at a district scale. The purpose of each policy document is summarised in Figure 3.6 and is guided mainly by the Resource Management Act (RMA) 1991 from the top down.

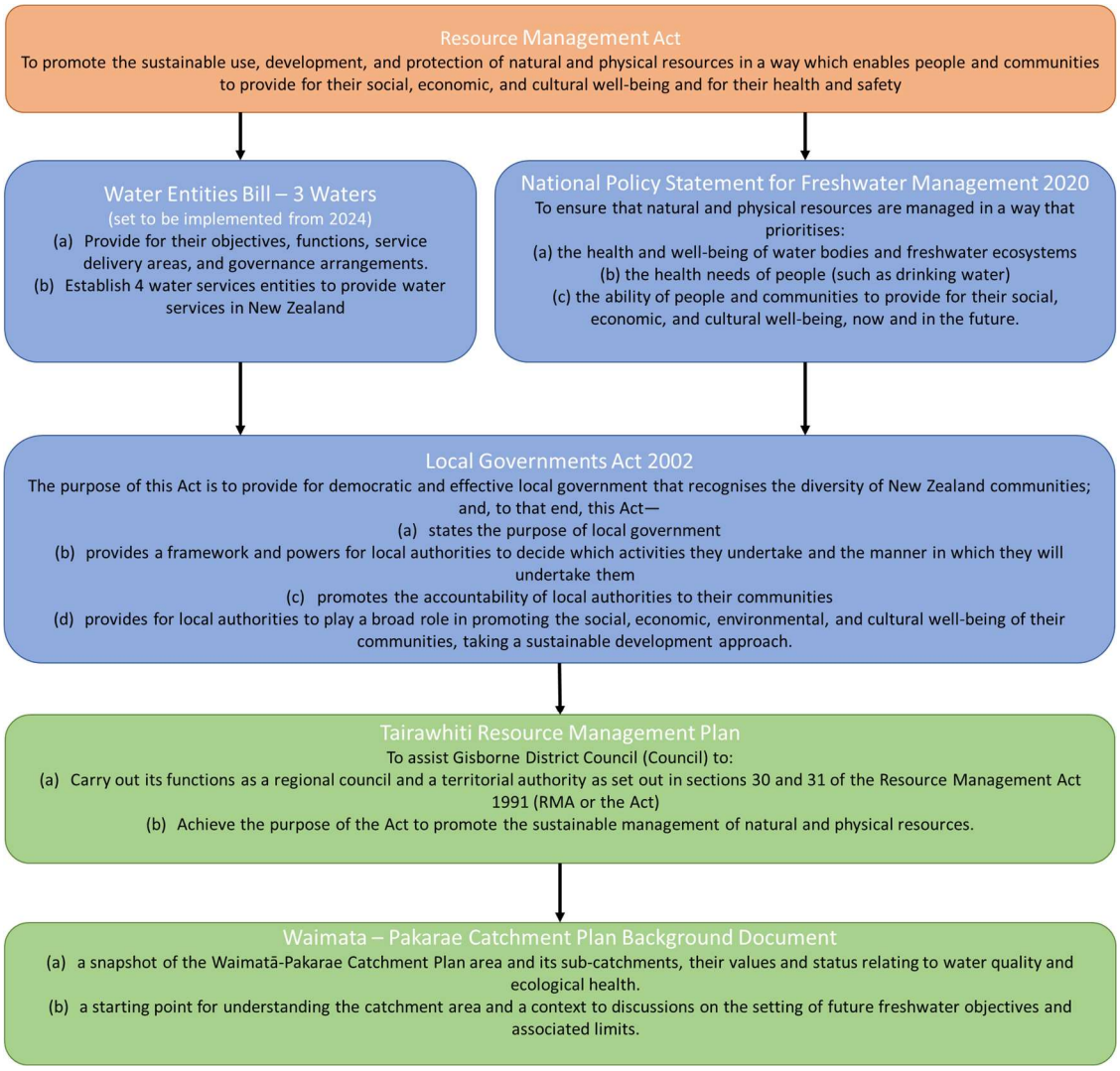


Figure 3.6. Hierarchy of relevant policy, guidance and management documents for Waimatā CMPs

This policy and regulation structure primarily focuses on resource management. It places the onus on the local governments to administer and decide on the best course of action.

In the last decade, iterations of the NPSFM have helped to provide freshwater context to RMA deliberations and advised water quality and quantity limits for all water bodies (MfE, 2020). In addition to quantitative parameters, the NPSFM gives effect to Te Tiriti o Waitangi through Te Mana o Te Wai,

with the intent of upholding tikanga principles (Stewart-Harawira, 2020) and considering the mauri of the water (Salmond et al., 2019).

Despite this developing policy landscape, the incorporation of local knowledge and knowledge systems is limited (Feeney et al., 2010). It is therefore promising to see the GDC currently creating a catchment plan for the Waimatā river representing the objectives of Te Mana o Te Wai and the NPSFM in an East Cape context and considering community-based initiatives in CMP objectives (*Waimatā-Pakarae Catchment Plan, 2022*). As a result of the policy structures outlined and the GDCs intent to provide more localised approaches, the GDC and the community could effect change beyond tick box exercises.

To establish the capacity of the GDC, Table 3.1 summarises how the characteristics and compliance statistics of the GDC compared with other councils in New Zealand. Figure 3.7 summarises the key facts in a spatial and visual format.

Table 3.1. GDC Characteristics and Compliance stats ranked from highest (1st) to lowest (16th). (Compliance and Enforcement Special Interest Group [CESIG], 2021).

Area (km^2)/staff	Rank (Overall)	Rank (Unitary)		Fines (Individual)	Rank		Fines (Corporate)	Rank
931	4/16	1/16		$ 96,800.00	3/16		$ 408,300.00	4/16

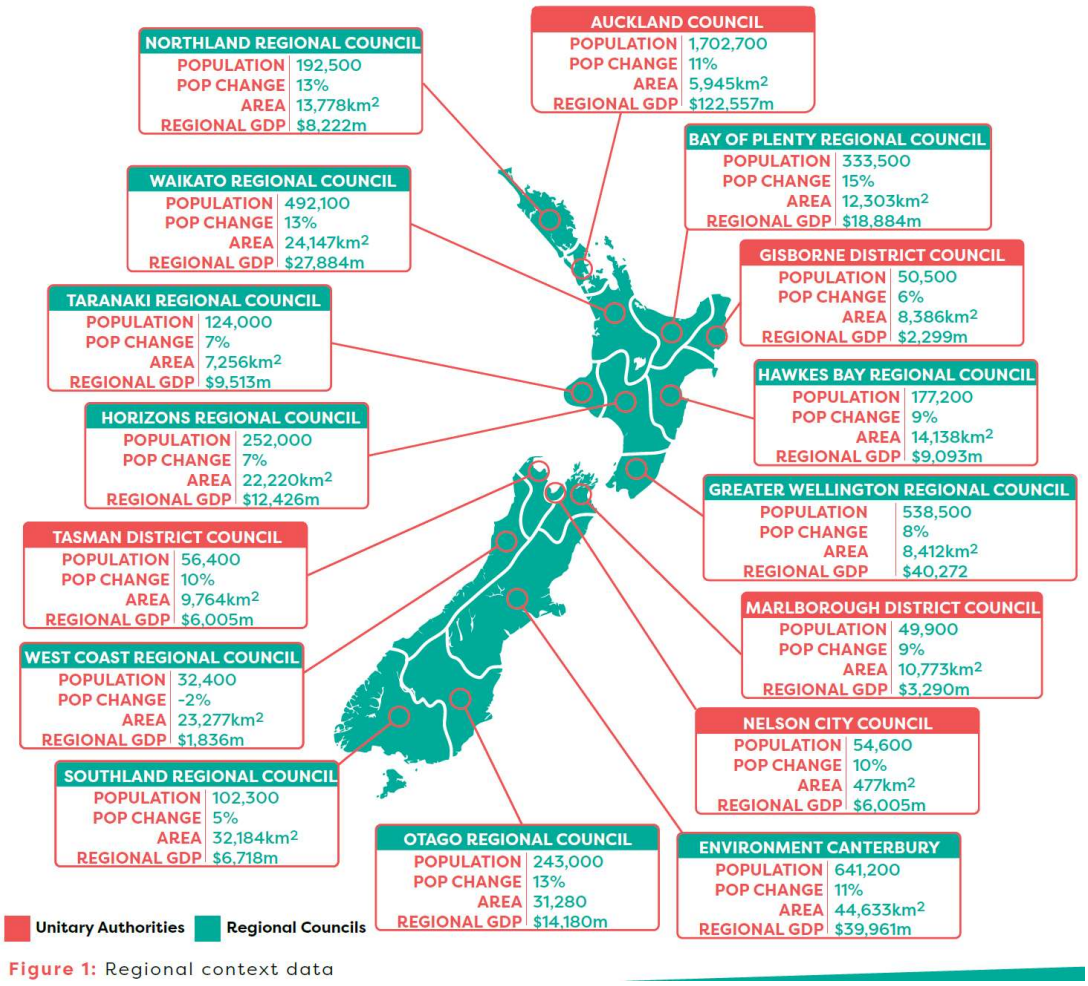


Figure 3.7. Council Summary for New Zealand, highlighting the vast area of jurisdiction for the GDC and the comparably low regional GDP to fund effective management compared with other areas of ANZ (CESIG, 2021)

Table 3.1 and Figure 3.7 highlight that the GDC is sparsely populated and has low staff capacity and a low regional GDP. In general terms, this highlights the limited capacity that the GDC has to act on new and emerging concerns. A positive reality highlighted in Table 3.1 is that GDC is doing a good job (in monetary terms) of fining people for non-compliance. How beneficial this is for advancing CMP objectives is dubious as it simply applies the current system rather than re-envisioning approaches to environmental management.

3.10 Approaches to empowering the voice of the catchment in CMPs

These sections have outlined the catchment's biophysical, social, cultural & political status. As such, there is a want from the community to empower alternate knowledge bases and perspectives to develop better threads of understanding around the catchment, river and its dynamism.

Chapter 4 will outline approaches to interviewing participants and analysis techniques employed to derive themes and meanings of the river and catchment from stories to inform existing and emergent CMP processes and subsequent products

4 Methodology & Methods

4.1 Methodology

Methods for this study were developed and enacted through a Critical Physical Geography (CPG) lens acknowledging socio-ecological perspectives. This approach considers positionality, reflexivity, geoethics, interview style, participant environments and insider-outsider deliberations (Holmes, 2020). Each of these considerations is discussed further in this chapter.

These considerations mean that contributions from interviews can extend beyond the initial interactions and conversations, helping to understand the social ecologies of the catchment, people, and landscape. Human agents and contributions are central to contextualising place-based understandings to understand what we know, where it is known in the catchment (i.e., the upper catchment may have a unique understanding of sediment fluxes from the hill slipes to the river corridor) and how this information feeds into and shapes management deliberations (Blue & Brierley, 2016; Lane, 2019). Furthermore, work by Blue and Brierley (2016) reinforces the benefits of CPG in understanding the role of theory, framing and language to empower alternate perspectives to answer questions that often go unanswered, such as how river stories could provide an appropriate platform to support CMPs.

CPG and Socio-ecological approaches are inherently qualitative, requiring knowledge to be consumed and reconfigured to align common themes from multiple sources. It is important to consider why a qualitative approach has been selected as opposed to the quantitative approaches regularly used in CMP processes.

Quantitative assessments of a catchment such as, water quality metrics, ecological indices and nutrient loading, although precise, are not necessarily accurate and focus on top-down approaches of deriving meaning and applying a set of assumptions or accepting the inherent bias of organisations (Charlton & Brunette, 2014). Additionally, given the policy structure and guidance documents, quantitative methods often confirm relationships or the presence of something (e.g., a contaminant or a discharge quantity) rather than create a better understanding of the occurrences in the broader context with links to social and cultural connections to riverscapes (Brierley, 2020; Johnson & Onwuegbuzie, 2004).

Given the inherently quantitative nature of CMPs, Qualitative methods will be used to explore how these quantitative measures and approaches to CMPs co-exist with human interactions with the environment, an important consideration for environmental governance (Davenport, 2003).

Merriam (2009) suggests four key attributes that aid in understanding human influence in studies. The attributes are summarised in Figure 4.1.

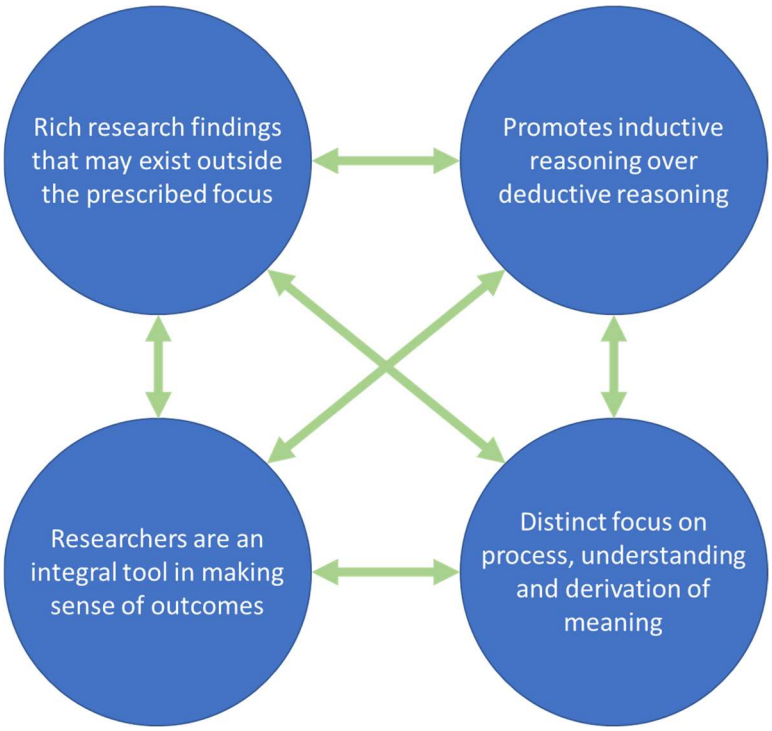


Figure 4.1. Qualitative Methods Strengths over Quantitative Methods adapted from Merriam (2009).

Figure 4.1 highlights the potential for qualitative approaches to obtain more profound answers to complex questions, which otherwise would not have been answered by quantitative approaches or approaches forced through overly prescriptive lenses (Pace et al., 2011). The qualitative approaches also give rise to inductive assessments of findings because the researcher unpacks what information has materialised and what it means. As the researcher has been an integral part of the process, they can provide context to the research findings and focus on the process they went through to derive meanings from the research, which helps explain subsequent questions about research learnings.

Such learnings and processes are beneficial to deciding whether new forms of knowledge and how they are derived are suitable for CMP processes. The inherently inductive approaches of qualitative research (see 4.1 above and Merriam 2009) make them ideal methods of inquiry for environmental governance (Lawson, 1995). The focus on processes, understandings and knowledge derivation enables qualitative research to best support the research question. Stories are different from person to person and are communicated differently depending on the storytellers' values, expectations, motivations, and the situatedness of knowledge and the reality that it appears in different forms, in different spaces and is interpreted differently (Bulkeley et al., 2007).

Considering the benefits of qualitative research set out above, this methodological approach is best suited to addressing the research question as stories are inevitably different from person to person and are communicated differently depending on the storytellers' values, expectations, motivations and residence in a landscape. In the interest of empowering each participant's perspective, an approach

that utilises the benefits of qualitative research mentioned by Merriam (2009), Lawson (1995) and Bulkeley et al. (2007) was used and informed the decision to use semi-structured interviews.

4.2 Methods for interviews

The decision-making process to decide to use semi-structured interviews is outlined in Figure 4.2.

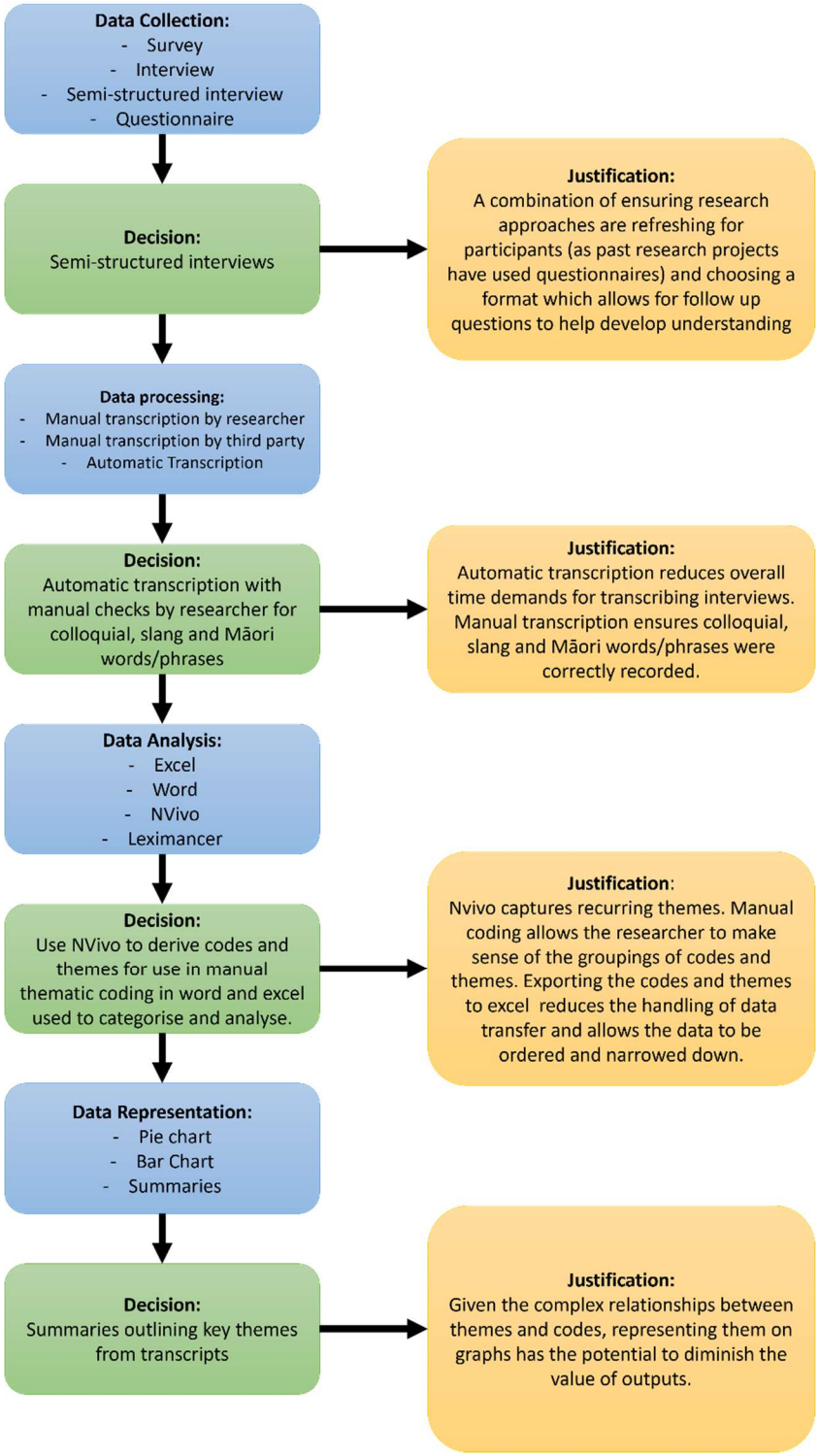


Figure 4.2. Decision-making process for methods used, the decisions panel highlights the method used for this research with justification for why that method was chosen.

Semi-structured interviews were selected to allow interviews to cover multiple topics beyond the scope of the questions provided (Dowling et al., 2016). Semi-structured interviews were chosen to build a rapport and a rhythm to interviewing, making participants more comfortable with research questions and intentions (Adams-Hutcheson & Longhurst, 2016). This is particularly important for this research, where responses relate to the immediate environment around participants and their ability to gesture towards specific spaces to enrich responses and highlight the physical cues for the information they are sharing (Dowling et al., 2016).

The criteria for interviewees were that they had to be people that lived in the catchment or had perspectives on how the catchment has been managed in the past. Initial interview participants were identified through the WCRG and then selected through a snowballing process (Crang, 2002). The snowballing process is where early participants suggest potential participants from their network that fit the research criteria, thereby increasing participants (Parker et al., 2020). This process is outlined in Figure 4.3.

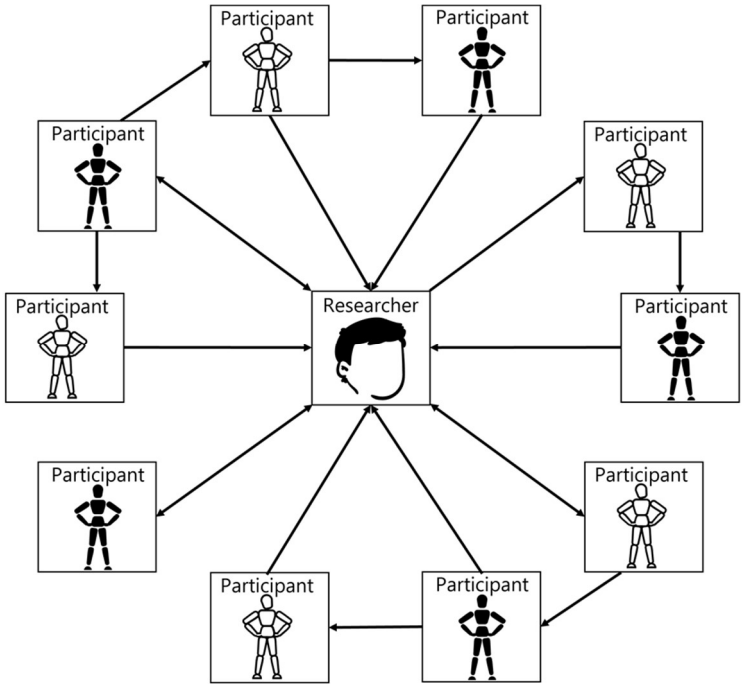


Figure 4.3. Snowballing process, the black arrows show who was engaged by whom and how the information got back to the researcher (Authors own).

Most participants were approached via email contact to gauge their interest in participation. The range of participants provided a broad overview of perspectives on the catchment. Each participant's time engaged with the catchment varied from years to decades. All participants were asked where their preferred location for interviewing would be to ensure they were in a comfortable setting and confidently discuss their stories. Initial intentions were for interviews to be conducted Kanohi ki te kanohi or face-to-face. The benefits of interviewing in person and in spaces that suit the participants adding further depth to their responses as they can draw on their surroundings are documented by Sand et al. (2022)

and Hutcheson & Longhurst (2016). This approach also aligns with tikanga principles of whanaungatanga, manaakitanga, aroha and he kanohi kitea (Smith, 1999) and makes the interview process more personable (Britt et al., 2014). For the convenience of two participants, their interviews were carried out over the video conferencing platform Zoom due to scheduling clashes.
The questions covered in the interview are:

1. In what ways is the Waimatā important to you?
2. Do you think catchment management plans are a good idea?
3. How do we ensure that catchment management plans incorporate things that are important to you?
4. Could river stories be a good mechanism to incorporate things that matter?

A copy of the questions was provided to the participant for their reference throughout the interview. These questions were intended to provide a segue into catchment management and river stories and build a base knowledge of the participants' relations to the catchment.

Question 1 aligns with research objective 1, whereby participants express what social, cultural and biophysical aspects of the catchment they hold in high regard. Questions 2 and 3 similarly allow participants to address their perspectives on the catchment's social, cultural and biophysical attributes and how they could be included in CMPs beyond acknowledging whether they are a good idea or not. They also identify why their priorities have or have not been included in CMPs, helping reveal barriers to applying multiple knowledges and values in CMPs. Question 4 builds on the previous three questions to identify how and why stories could support CMPs. By asking this question last, participants can utilise previous answers to frame their perspectives on stories and their utility for CMP.

By asking the four questions together, a better sense of how river stories can contribute to CMPs can be gleaned, especially when considering how people have knowledge that helps to identify past failures and knowledge which helps to support existing approaches. It is particularly important that these questions were open-ended to allow participants to elaborate on their perspectives of the Waimatā and its management, which informs their aspirations for future management approaches, in turn also highlighting the diverse socio-ecologies of the catchment which are important to incorporate when creating a CMP to ensure multiple perspectives and are represented.
Participants had the opportunity at any point in the interview to ask me any questions about the research, which gave rise to more organic discussions around the questions provided.

4.3 Methods for recording and transcribing semi-structured interviews

Irrespective of the interview location, each interview was recorded using the video conferencing software Zoom and the Zoom cloud transcription service was used to transcribe each interview. Notes were also taken when key themes or thoughts were raised. Following the interview, personal voice memos were recorded to summarise the interview (Longhurst, 2009).

Although automatic transcription helps digitise the interviews, the service struggled with New Zealand accents and NZ and te reo Māori turns of phrase. The automatic transcriptions were a loose representation of the interviews, and manual adjustment of the transcripts was needed.

4.4 Methods for analysis

Participants were sent their interview transcript to review the content and given two weeks to make any amendments or withdraw, in accordance with the UoA ethics guidelines. This step added an additional dimension of trust between myself and the participants as they could verify their contribution.

Following the 2-week verification period, analysis of transcriptions began. Analysis was a 7-step process. The use of NVivo helped to summarise keywords from each interview, providing the initial code words for thematic coding (Figure 4.4).

Figure 4.4. Summary of Initial NVivo keywords, common words such as “council”, “management” & “catchment” haven’t been excluded at this stage as the codes lead to important comments that improve understandings of how CMPs can be enhanced by stories.

1. Read the transcripts and create comments in Microsoft word to code and theme passages of the transcript. The format. "Code: , Theme: ", was used to make further analysis steps easier.
2. Install a macro package in excel and export comments to excel for analysis and summarising (*ExtendOffice,* 2014)
3. Initially, all the information in each comment was in one column. Using the text to columns function and setting the Delimiters as ":" and "," separated all comments into individual columns.
4. Sort codeword results alphabetically to group like results together.
5. Adapt code words to be more general, narrowing the number of categories for analysis.
6. Summarise the themes in a table and then further group them to develop twelve themes (See Appendix 1).

Steps 5-7 were iterated, ensuring the final themes captured all key findings; this is consistent with work by Ward and Jones (1999). Recurrent reading and coding of transcript themes ensured that patterns, key themes, and outlying information of interest were captured (e.g., Braun & Clarke, 2006; Cope, 2009; Coffey & Atkinson, 1996). This iteration allowed reflection of what each portion of the transcript means, both in isolation and as part of all interviews.

4.5 Ethical Considerations

In accordance with the ethics approval of this research, the research considered how and who could give consent for participation. Consent for participation was given by the participants themselves as no children (under the age of 16) or people who could not consciously consent were considered for the study. Consent was based on the information in the Participation Information Sheet (PIS) and consent form. Both forms are attached (Appendices 2 and 3). Also in the Appendix are the Group PIS and Group Consent forms (Appendices 4 and 5).

Participants had the opportunity to stop the recording or the interview at any point, and no further correspondence relating to the research was entered into. It was made clear to participants that they could remove participation or alter responses until the end of the two-week transcription review period.

Following tikanga principles and consistent with the approved ethics, a small koha was offered to thank participants for their time. Participants were reminded that this was not seen as payment but as a gratuity.

An impact analysis was also completed before commencing semi-structured interviews to determine who could be impacted by the research and in what ways, being informed about the potential impact allowed for approaches to be altered. It is important to consider the impacts as all research findings and processes can impact people or places whether they intended to have an impact or not (Lave et al., 2018). Consideration was given to how research is conducted and how this would relate to how people would engage with the information (Lave et al., 2018). The potential impact on social empowerment correlated to key terms or themes and the management solutions they align with. The potential to make

this correlation had positive and negative connotations for ensuring respondents see an influence. The main positive repercussion was the potential to make CMPs more democratic, empowering people to consider how best to improve their river or awa. The main negative repercussion was decision-making bodies misusing the findings to prioritise management outcomes without addressing the pressing issues.

The rationale for such an approach is to represent people's perspectives and knowledge bases in the catchment without compromising the integrity and authenticity of their contributions. This follows a geoethical ethos set out by Sharp et al. (2022) and Dicks (2022). As a result, the findings within best represent perspectives and knowledge in the catchment.

4.6 Knowledge distribution

Following the completion of the thesis, the findings and implications of the research will be communicated to participants and the wider community in the form of a thesis summary and a community meeting. Pathways of communication will also be kept open so that any subsequent conference or published article material is available to participants and their wider network, ensuring that the information can be used in meaningful ways. This is also a key consideration when taking a geoethical approach to research.

4.7 Positionality Statement

With personal motivations in mind, the only conscious impression I aimed to make was of a positive outlook for the catchment and progression of CMP practices. This was an effort to reinforce participants' perspectives and promote alternate knowledge that draws on all types of knowledge that challenge prevailing paradigms. I also maintained a transparent and authentic interviewing approach to ensure participants knew what their responses meant for the research and the broader discussion of environmental management in the catchment (Thomas & Harden, 2008).

As Rose (1997) suggested, I kept a reflexive stance to minimise my influence on the outcomes and instead empower the participant's responses. This stance is informed by my position as an 'outsider' to the catchment that was researching 'insiders', who understand and observe catchment changes constantly (Herod, 1999). As such quotes were intentionally left as long as possible for them to speak for themselves, this approach was also used by Thomas (2015) when navigating similar spaces. I remained reflexive to social, political and cultural cues while writing up the results and how this may shape my discussion.

4.8 Processes to approaching CMPs in new ways

This chapter has outlined the methodology informing approaches to this thesis and highlighted the methods employed to progress from a concept to a vast body of information to inform CMPs.

This methodological approach combines critical physical geography approaches set out by Lane (2019) and Lave (2018) with the socio-ecological perspectives and approaches taken in previous research endeavours (e.g., Robertson et al., 2000; Mould et al., 2020a; Maynard, 2015) which express the links between ecological rehabilitation and the social implementation and engagement.

Overall, this approach provides a foundation to explore stories' value to CMP processes. The prospect of approaching CMPs in this way, from a fresh and generative perspective, provides an approach to fill the gaps in knowledge in recent approaches to integrated catchment management (e.g., Feeney et al., 2010, Kilvington et al., 2011).

5 Results

5.1 Introduction

This results chapter summarises and connects the key themes from the semi-structured interviews. The responses show how proactive concerns for environmental management in the Waimatā community underpin the development of community initiatives. Participants' individual opinions offer nuanced perspectives that reflect and express diverse relations to the river, and associated knowledge and understanding. Often drawing on historical and contemporary knowledge, responses offer a rich insight into the generational and decadal change observed by participants, and reflections upon the things that matter, such as recreational spaces, thriving biodiversity and reduced impacts form poor land management. Although some responses are critical of institutional actions, the quest for community engagement in collaborative approaches to catchment planning is clear.

Figure 5.1 presents a word map synthesising catchment and river information from the discussions held as part of the research. From this infographic, it is clear to see the duality of governance and society and aspirations for greater community engagement that could lead to planning objectives that are more effective. Responses by participants are identified using the interviewee's assigned participant number in the format P#.

Figure 5.1. Word Map of Interview General Themes with common words such as "council", "management" & "catchment" haven't been excluded at this stage to highlight new themes and codes that emerged from the interviews.

5.2 Values and mindsets – situating the Waimatā in its history

5.2.1 Connections to and meanings of the river

For participants, connections to the river were related to daily observations, professional relationships, catchment groups, family and land ownership. As a result, the connections are stronger in some areas than others. Connections to the river also reflected specific experiences and personal motivations to enact change. Examples of historical undertones that reinforce personal connections include:

> *There's nothing more important to me, other than my family than the land that I live on and, yea, I suppose that's why the Waimatā is important to me* – P906

> *I grew up on the river. We had a house in [location redacted}, which is right on the river…from my teens onwards, we were on the river all the time, swimming, fishing, paddling rafts, rowing down the river, picnicking on the island, all that sort of thing. Water-skiing in the Cut.* – P156

> *Mainly important to me as it's the main river that flows through Gisborne, so I see it every day. My connection is largely visual as I cross the river many times. I ended up having a connection with the Waimatā as I could see that it had a lot of potential for restoration. I became very aware of how degraded it was* – P206

> *Yea, so I suppose it's that concept of sharing ideas and actually working for the greater good of the river, you know, it's not about me... I do it because I care about the river disappearing. Which in its first part is because I don't want to lose my farm but in its second part it's because I want to swim in it or I'd like to drink the water, you know, or I'd like my dog not to die if it drinks the water, you know, that kind of thing.* – P20

These quotes highlight participants' perspectives of the river's health as well as how the river is used. For example, waka ama paddlers use the Waimatā and Tūranganui rivers for training, well-being and competition. The paddlers recognise the importance of the river in providing the sport and the ways it has provided for the community. These values and understandings are summarised by P596 as follows:

> *We started off as a club for young people and our very young people, and that was the focus... but it has also grown from that to include many old people and a lot who do it recreationally … more so for their health, because as they age, of course, you know the body ages with you and the need to keep it active and mobile requires probably some activity and waka ama is one of those activities, which is quite neutral, for many, because it's not overly demanding because you're sitting. But you can get a good upper body workout* – P596

In addition to the waka ama culture, the river supports recreational activities such as kayaking, swimming, paddle-boarding, horse riding and walking. This connection is due to its accessibility, ease of use and prominence in the landscape. Numerous participants were particularly vocal about the changes they had observed and the broader implications of an unhealthy river, P22 directly addressed this sentiment.

> *I think its state reflects the life and the quality of the community that surrounds it or the communities that surround it, the quality of the urban landscape as well, so there's a connection or relationship between the state of the water body and the state of the city* – P22

Other negative connections revolve around land use impacts including sedimentation, forestry debris, and health implications of using the rivers as waste conduits. The following quote from P596 summarises the opinion of many people they have associated with regarding river quality.

> *Every one of the paddlers, I can assure you rues about the condition of the river, and when it's in bad condition, certainly that's when you'll hear a lot of mumbling and a lot of expletives being said because you know because they're passionate. The sport is one thing, but we need the river to enable that to happen, and so they will get passionate about the condition and the need to maintain it in as pristine condition as can be done so* – P596

As conversations progressed, it became clearer that the connection to the river is a complex relationship with the meaning of the river. The meanings of the Waimatā river have always been central to the Gisborne identity. Participants mentioned that their meaning ranges from sharing experiences with family to the historical role the river played in the region's development. The quotes below from P493 and P143 highlight people's motivations for engaging with the river and its restoration.

> *I'm concerned about it, I bring, I take my mokopuna on it, it's still a place to engage with, but I think it's got something else too, both in itself, but also in the potential that it has to unite us as a community around its restoration.* – P493

> *… I've got grandchildren. I want them to be able to not only swim in this river but understand what makes a river have a life and be healthy because then they are going to have the responsibility of continuing that.* – P143

These quotes highlight the multifaceted meanings of the river. It fulfils a purpose as a space and place to engage with family and nature. It also poses a reminder of the way the community needs to collaborate to restore it to a better state.

From a historical perspective, participants acknowledged that the meaning and connection to the river and catchment varied between early settlers and Māori. Early settlers' connection to the catchment was primarily centred on the desire to farm sheep and make the land more productive to meet these desires. Whilst Māori had established river communities, and as such had an established relationship with the river that formed the basis for spiritual and societal connections to the river. The disparity in associations to the catchment centres on the focus of environmental management with early settlers clear on the capacity for the catchment be transformed to provide goods and services whilst Māori were content in the capacity for the catchment to meet their needs. As time went on it became more apparent that the entire population that settled near the river wanted the amenity value of the river but the trade-offs to achieve that value differed.

From a regulatory point of view, the meaning of the river is dictated by requirements set by the central government. The following quote highlights this scenario.

> *I mean it comes back for us to what [the council] are required to follow and respond to from the national policies statement for fresh water, so the specific requirements on their policy statement that [the council] respond to but probably at its simplest, It all starts with identifying freshwater values, so they are the things that matter the most, what are the things that matter to people and to everybody and that's not just the Council thing [the council] have to respond to the things that matter to our communities. And I guess to that end, in terms of ensuring that catchment management plans incorporate the things that are important requires a conversation with the community* - P22

Participants reiterated the need to properly engage and understand people's connections and meanings of the river to have a CMP that reflects the unique understandings and provides insight into the bigger picture of their associations to the river.

So, the key finding from this section is that values and meanings differ between people due to recreational, familial, historical, and cultural connections to the catchment. The common denominator is that they all want to see the river regain its health for current and future generations to enjoy and engage with the river.

5.2.2 Forms of Stories and their importance

All participants discussed different types of stories. The responses varied greatly in what they considered a story and what those stories meant in terms of the river's health or the expressions of its state. Key themes that emerged emphasised differing sources, forms and representations of stories, including maps, publications, oral stories, artwork, performances, images and physical artefacts. Participants commented on these different types of river stories and how they have manifested through time:

> *… even those publications…are stories in themselves of people recognising what was wrong. You know, way back from the 70s and 80s.* – P9

…everybody just stops hops out of their vehicles and has a bit of a yarn… you get to see what's happening on other people's land with erosion and things like the slash coming down the river and what happens when it really, really rains and the river turns to mud – P156

Art is also really terrific. It's not just the stories, but things like video installations and various kinds of artwork or festivals on the river…There's a young woman who lives over the back here, who is now the costume maker… She's done an amazing Stinky the Stoat costume - we have these characters that actually tell the kids stories about their lives – P156

…we have the Tairawhiti arts festival, I mean there's a place to start building those stories as well, the drama, the theatre...stories in different shapes and forms – P143

These quotes highlight how participants view the varied types of stories, from academic literature to informal stories to art forms, as important mechanisms of knowledge sharing. Participants also highlight the value stories bring to capture personal values and the power of stories to provide recent information. The role stories play in maintaining knowledge bases around key phenomena or features in the landscape was addressed by participants. Participants drew parallels between changes in the landscape, historical anecdotes, and the potential for incorporating historic and contemporary stories in regulatory frameworks, educational objectives and expand the understanding of the catchment. The quote below highlights how the catchment was used prior to the arrival of Europeans.

When you listen to some of these ancient stories, where Te Maro's summer gardens were … there's a whole lot of those early stories too, how it was a highway, how it was a water highway and what did mana whenua do in terms of getting their goods to market or how is the river a part of their lives and its uncovering some of that stuff too – P493

We know quite a bit about the Māori history of the river, and this area here was a refuge when people were getting beaten up on the coast. They'd come up here and plant gardens…And that high hill, there is Motukeo, the leaping off place of spirits, which is linked with Titirangi, the hill right beside the mouth of the river. Poho-O-Rawiri marae is oriented towards Motukeo so that when you die, your wairua flies up the river to Motukeo and then goes out to sea and then off to Hawaiki. It's that kind of landscape, you know, which a lot of people don't know about and don't appreciate how important it is to the locals – P156

These quotes reinforce what we know and the rich history associated with the catchment. Stories that emerged emphasise the hive of activities and interactions that have occurred since Māori arrival in the region. The sentiment of losing or removing a lot of the meaning of stories that would be valuable today was reiterated by P9.

> *…they'd be hugely beneficial if they were able to somehow quantify observations that they've been told about in the past and correlate that with current observations measurements to see whether things are improving or going backwards. I mean, that's really worthwhile knowing. There are many of those stories…whether it's the stream biota, what it was like in the days when they were collecting puha or koura in the upper catchments whereas now there aren't any, then that gives you an indication, if we want to try and restore that balance, how would we do it, and where would we do it.* – P9

Participants acknowledged the challenge of situating stories within policy, history and existing quantitative data but see the benefits of having a synthesised story to 'introduce' policymakers and other governing body employees alike to the status quo of the catchment. The following quotes from various participants highlight the benefits that the community see in river stories to inform management decisions.

> *The way that those stories are woven creates a singular narrative that can be associated with a water body that then forms the basis for understanding it in the first instance and then moving towards a place in the future in order to achieve some of the aspirations that are embedded within those stories themselves, so it's a way for us to navigate into the future… in a meaningful way* – P22

> *…that the opportunity for bringing stories out that are from first peoples who were here, from tangata whenua, mana whenua, is really important, and I think it's going to be important for us all and the Waimatā has got the opportunity to gift that back if we, we engage with it well enough.* - P493

> *I think river stories also reflect that the river has had a life and has had a journey as well, and that helps build [a narrative]. I'm just thinking of my moko and their moko. Three of them [moko] live up [location redacted], and they've been out as part of their school, testing the water quality and stuff, but that's only one bit. I want them to understand the stories... behind their river* – P143

All participants shared a story, and each had varying levels of meaning to the catchment and themselves. What did not waiver was the value these stories bring to understanding the catchment, the relationships born out of the stories and connections to the river and catchment.

So, the key finding from this section is that stories vary from person to person and medium to medium, dependent on what information they have absorbed and therefore what information has influenced their narratives, Stories are powerful as mechanisms to convey knowledge that has not been considered in creating CMPs in the past as well as a mechanism to situate multiple knowledges and values within one medium to be used to inform next steps for CMPs.

Across all participants, the recognition of the potential for change in the Waimatā catchment was high and all participants were clear in their expectation that CMPs need to facilitate having the right people around the table to make decisions.

The recognition of the potential for change is supported by aspirations of restoring ecosystem health and recreational value to the lower reaches. The following quote from P156 highlights this.

> *When I was a kid, on the river, mullet, kahawai were coming up the river, inanga, whitebait, a lot of life, the eels would swim up and down and out to sea and go off on their migrations. The birds in the bush and the bush itself, that's all part of the river community, and then the people. You want them all to have a fair go at being healthy and prosperous.* – P156

There was an expectation from all participants that governing bodies need to incorporate stories and on-the-ground knowledge to inform management and planning frameworks. The long-term aspiration for such collaboration is to align decision-making with on-the-ground outcomes and knowledge. Despite noting this aspiration, participants also realise that although a co-governance and co-management would work, a clean slate is needed to build expectations that aren't biased by current methods. Instead, the cogoverning should be a net effect of conversations and understandings of what has happened in the catchment in the past.

So, the key finding from this section is that there is a need to increase the influence of lived and situated knowledges in CMPs and weave together the multiple knowledges that exist in the catchment to create new and improved knowledge bases to inform CMPs The expectation is that taking these steps will help to improve river health and reshape policy approaches to resource management to ensure that CMPs formalise the expectations of all people interacting with the catchment.

5.2.3 Summary

Connections to the river are varied and are influenced by many factors such as family, culture and recreation. Similarly, meanings of the catchment are informed by these connections and histories, amplified by individual experiences in the catchment. Stories shared ranged from recent individual experiences to stories that have been passed down or communicated to participants. Throughout the chapter, aspirations and expectations for the future centre on a healthier river and catchment. As a result, participants want to see greater use of underlying knowledge in governance arrangements.

5.3 Underlying knowledge bases and lived realities

5.3.1 Cascading Effects of landscape management

There were two key themes from interviews about the effects of catchment management. The themes were the influence of forestry and land-use change on catchment processes and the sedimentation

increase. Participants raised concern over the capacity for the sediment to harbour harmful "things", which result in skin sores. The following excerpt from P596 highlights the concerns around sedimentation.

> *I don't know about the quality of mud or the sediment down below because … it's terrible to walkthrough ... it's more like SLIME rather than dirt or silt, and the mud just sticks to your legs and all that ... we know it harbours a few things, besides mud itself, and we have had occasions where some paddlers have gotten infections because of what's in the mud … but it's not a great thing just generally it's always there, that mud is always there.* – P596

P20 shared similar experiences associated with sedimentation and how it had progressively got worse reducing the recreational value of the river for residents.

> *It has really changed in the 15 years that we have lived here, in that we've swum in it all the time … probably [in the last] ten years, when the harvesting started… it [the river] might look clear, but as soon as you swim in it and stir up the bottom, it just silts up. The kids used to get ear infections and stuff, you know, sort of once a year from swimming down there…we used to ride the horses down there, we did it for 2 or 3 years, but by the third year, we were getting bogged because of the sediment, so we stopped doing that*. – P20

P20 followed this up by reiterating how they would like to see management change to try and mitigate these effects going forward. Issues materialise in different ways throughout the catchment, for example P206 was clear that in their mind the effects in the lower catchment were associated with sewerage discharge, vegetation removal, spraying things that should not be sprayed and not doing anything at all. The participants acknowledge that the impacts in the lower reaches are a product of catchment-wide actions. They would like to see steps taken to mitigate or avoid effects whether that is achieved through council approaches or catchment group approaches. Whilst in the upper catchment P906, P20 and P156 highlighted that key areas of concern are centred around forestry slash, pest eradication (flora and fauna) and sedimentation, a reflection of the impacts they see in their day-to-day life.

So, the key message from this section is that the cascading effects of land management revolved around forestry, sedimentation and the decisions made by regulators and landowners that have spill over effects for others. The impact for catchment users is an effect on the useability of the river (physically and health worries). Participants would like to see management approaches that address land use change and mitigate its effects catchment-wide.

5.3.2 Attitudes and Behaviours

Attitudes and behaviours underpin the generation, telling, meaning and implications of river stories. As such, they are a key consideration for participants when assessing how river stories and multiple knowledges could aid existing and emergent management frameworks. The considerations for

participants were varied and acknowledged shifts in societal associations and levels of disconnection in their lives.

> *…we don't just disconnect from our environments; we also disconnect from our bodies and our physical and our own mental state because it's all out there, we always sort of going outside of ourselves, for work and being someone who we potentially we wouldn't if we had time to be placed in an environment* – P20

Participants also acknowledged people's behaviours around the river had been altered because of this disconnection from the effects of their actions. Participants discussed how establishing a connection with the river and encouraging a change in attitudes and behaviours around how people use the river would help support existing initiatives to rehabilitate the river. Participants spoke of the differing attitudes held by catchment residents. The quotes below indicate how people's behaviours do not necessarily consider the downstream or legacy impacts.

> *I found a battery down there one year, you know, like a big truck battery and stuff like that, and that was interesting. When I first started planting, the neighbour came along and said, "oh, no bloody point planting in there, you know it'll just get washed out, rah rah rah, it will fail, what you need to do is stick some old vehicles in there"….* – P20

> *When you've got mates on the farms, and a horse dies, and they cut it up with a chainsaw and stick it in the river, I understand that that's likely to float past a kid on a waka ama, but they don't necessarily think about that* – P156

> …I *saw old pipes, old tires, a dead goat, a dead sheep, just a whole bunch of stuff* – P493

P143 shares a parallel experience whereby education and community engagement has shown a change in these behaviours

> *…it's been really interesting watching the development of awareness, it's predominately a farming community … watching the awareness grow in terms of, not only having clean water, but actually understanding, beginning to understand that the river has a life of its own, I think now, all but one farmer up there is actually engaged in regeneration & restoration plans, and that is amazing in this pretty conservative [setting]…* – P143

This quote highlights the positive repercussions of exposing landowners to positive and generative behaviours through collaboration between landowners and the catchment group. In turn, the net benefits to the landowners when they engage with new ways of approaching their land management become apparent. P596 discussed similar challenges in the river's lower reaches, highlighting that

people either are unaware of their impact on the river and its amenity or are wilfully complicit in degrading its health.

> *…you would see clumps of weeds or lawn clippings occasionally floating down the river and whilst we can't say where they've come from … we can assume that it's come from someone's back yard…this is a convenient way of disposing of it, saving a trip to the recycling or to the dump or whatever, to take them, otherwise.* – P596

So, the key message from this section is that the attitudes and behaviours of people in the catchment lead to unnecessary pollution of the river. This section highlights how attitudes and behaviours have an influence on river relations and how people view the river. It is clear from experiences that participants have had that, active and prolonged engagement with residents has a positive impact on changing these underlying attitudes towards the river, and hence behaviours are able to be shifted.

5.3.3 Reflections upon knowledge and practice

Participants discussed the concept of rivers as a vehicle, especially as an initial vehicle to understanding river processes and what the river means to the community. It became apparent that the actions of a few people within the catchment have created a ripple effect for other residents in the catchment to become more engaged. Those actions have led to an improved knowledge base about catchment sediment conservation and carbon sequestration using native plants, as shown in the quotes below.

> *…we have three streams that run into the river on our place as well, and so we restored the riverside bush and spent a lot of time doing that. We planted up the gaps in the bush and got money to trap it, and then [name redacted] said: "oh, what about some bush corridors up into the hills", so we thought that's really interesting. We raised some money to do that and planted up the streams, and that's been transformative… Since we've revegetated the streams, they run all year round, they're fantastic, and they're clean, even in a big rain, they run clean.* – P156

> *we're working with [a] research team to figure out if we create light wells, use successional planting including forest trees that attract the birds, because the birds poop the seed, whether we can speed up that process in order to get biodiverse native forest. The idea is to get proper returns for landowners from the Emissions Trading Scheme. We're trying to make native afforestation a financially viable option.*- P156

> *So those are original kowhai or the last of the originals. So, I go up and take seed and try to get that germinated and try to get them growing around the place here and at Nick's Head because it is pure strain. So, on the cliffs out on Nick's Head, I've started planting as many as I can cope with … I would quite like to do a couple of hundred this year along with Kaka Beak.*- P20

Although these participants' learnings are about plants, the same can be said for migratory species such as sea birds, as evidenced by the experiences of P156, who has been a part of creating sea bird refugia on their property to compensate for habitat loss elsewhere in the region.

> *So that was the next stage, and then we started bringing back endangered birds. First of all, we tried to do a restoration project with Oi, Grey Faced Petrels, they are sea birds, but they used to roost inland. That didn't quite work. It was an experiment. We had fledglings from Young Nicks Head and fed them in artificial burrows up there. They all fledged and flew off into the Pacific… and they haven't come back yet. That was about seven years ago, so they might still return, but they haven't yet.* – P156

Despite the positive outlook and potential for reformative change through these actions and learnings, participants were also aware of the fact that some parts of the catchment have a disproportionate influence on outcomes due to their size and the fact that only one owner is needed to buy into the concepts to turn the larger areas into riparian planting or ecological corridors. This is the case in the upper catchment where with help and guidance, a small group of farmers (<10 farmers) can realistically fence, trap and plant kilometres of riparian margins.

So, the key message from this section is that the willingness of people within the catchment to begin processes of engagement results in catchment and region-wide benefits, therefore the influence of knowledge held locally is valuable for taking the next steps in shaping how a CMP approaches knowledge generation and utilisation.

5.3.4 Summary

The various land uses and management frameworks have left a recurring and high-impact effect on the health of the catchment. Participants want to see steps taken to mitigate these effects catchment wide. As part of this, the attitudes and behaviours need to change to avoid ongoing effects. Responses from participants highlight how engagement with residents positively impacts changing these underlying behaviours and attitudes towards the catchment. This engagement is the result of efforts of a few people within the catchment to negotiate social, cultural and legislative requirements to create bases for achieving catchment and region benefits. Overall, this chapter highlights the need to challenge past governance arrangements and utilise the story-form knowledge to inform CMP approaches.

5.4 Governance arrangements & policy planning instruments

5.4.1 Planning Histories & considerations

Participants drew attention to the legacy of institutional arrangements; this is reflected in the below quote.

> *We've had the opportunities; there's no doubt about it. We've had funding through the East coast forestry project, for example. … there's this conflict between the operating of these*

funds between government and Councils, and there's also a conflict between Councils and landowners as to where, or how to invest the money, where best to invest it, what you'd need to incorporate into catchment management plans to deal with the issues. And this has led to underspending and poor decisions around where the money has been spent…none of these programs or projects that are essentially being designed to fix catchment management problems have ever been completed. – P9

Some participants have watched effective management initiatives come and go for various reasons. Recurring themes are the inability to properly utilise or enforce good initiatives and the persistence of governing bodies to centralise decision-making to save costs whilst increasing social, cultural and environmental costs. This sentiment is again reflected in the quotes below about catchment plans and whether they are a good idea.

*Hell yes, they're a hell of a good idea. They've lost traction over the years and, you know, I put it down to, to a large degree, to a lot of the restructuring of the science organisations. Now we're going back to 1987, where they got rid of DSIR [*Department of Scientific and Industrial Research] *and Ministry of Works and a lot of other research organisations, but the ones that suffered the most, that had the biggest impact on loss of control of catchment management was the loss of the DSIR and the Ministry of Works.* – P9

I'll give you another example…East coast forestry project … to begin with… was run locally, out of the Gisborne office … they had people on the ground to go out and talk to landowners and they had maps and photographs and all the information they needed to have a chat to the individual landowners and say look there's funding here, for this would you be interested. Where should we do it or come to some sort of consensus and basically either run with it or not run with it. Things ticked along quite easily… then in their wisdom, they decided to take the control of the program to Wellington and run it out of there and still retained the Gisborne office GIS capability but reduce the number of on the ground staff if you like, and things didn't start to work so well, mainly because they'd lost contact with the local landowners. – P9

I think they're a good idea; I do think they need to be expanded, and that's where I think there is going to be, have to be some pushback from … the wider Waimatā catchment group – P143

If they're done in the right manner...the worst possible outcome is that something is provided to a catchment … it needs to be from the community upwards that the catchment management plan is designed. It has to represent the values and objectives of those that are living within the catchment otherwise it's never going to be achieved … you're not going

to bring people along the journey, so you're not going to be successful or contribute in a meaningful way – P47

The downsizing of planning authorities through time to a more centralised model, neglecting place-based knowledge, has meant the catchment management plans have lost traction, which has been difficult to regain. Participants highlighted that throughout their connection with the river, rules and regulations don't change environments, but people and where they spend their money and time do. Although these considerations from participants hold CMPs in high regard for the potential to enact change, they are also aware that plans can do more harm than good if they do not include key stakeholders. The following quotes highlight participant perspectives around including things that matter and the benefits of aligning everyone's actions in the same direction.

"I think you need to know your critical source areas, which is what most catchment management plans identify. Everybody wants to do what they can to improve their contribution to whatever the critical source areas are, but I think like what we were discussing before, it doesn't include enough information about what the landowners and the iwi and everybody else who are affiliated with the area, they, the catchment plans don't include that…and that's what makes it difficult for landowners, in particular, is when the catchment management plans are solely focused on scientific data and research, and normally there's a lot more going on in the catchment than, than what the science is telling them, for example, for us, we have a Council water monitoring site on our property it's directly below an active mud volcano, so the water quality, sediment results are rubbish, and that's not an accurate reflection of the water quality coming up the rest of our land." – P906

Understanding the things that matter helps to distil what the CMP objectives should be. Having such conversations is contingent to the development of a catchment plan that revolves around a community, iwi and council relationship that formalises and necessitates thinking about the wellbeing of the landscape in a regulatory setting and invites approaches that potentially exist outside current paradigms. P493 summarises these sentiments below.

It is about just going and listening to Ngati Oneone … listening to Rongowhakaata, listening to Ngati Wai … Ngai Tawhiri, it's just actually spending time doing that, and without any output in the first instance so it is about having [and] forming relationships that the river can offer us and we need, we owe it to the river that are not transactional relationships … relationships cause we want to get something, that are relationships because we know as a community we can't survive without them, and the awa can't survive without them… what we are able to do is to support the council meet what it needs to meet, but at the same time, listen to the whole, listen to them, listen to all of these stories around the awa, listen

to all of what the awa means to people, and listen to all of what it requires of us, so I think that we've got that relationship is important – P493

For participants, this was equally as important as distributing and maintaining the plan. The following quotes contextualise this thinking.

There's always going to be upkeep, you can't now implement a plan [and] walk away, there are always things to do, weed control & pest control that will be ongoing – P9

We need to put as much effort into hearing and putting energy into other people's perspectives and viewpoints and wishes and desires, and that's not an easy process… particularly in Tairawhiti where the encounter between Māori, tangata whenua and pākehā was pretty fraught, there are stories that have been hidden or too scared to tell on both Māori and non-Māori...sides, I think we have to unpack some of that before we can even start thinking about what a plan might look like. – P493

Developing a functional relationship between stakeholders may not be linear in process and require ongoing attention, which is a key influence on past efforts being ineffective. P156 succinctly sums up the idea of landscape communities.

In Māori studies, so we don't really think about catchments so much. We think about river communities. From that vantage point, the river community includes the land, the water, the plants, the animals, the people. They're all equal members if you like….What we've been trying to think about …all the different voices of the river - the human voices, the birds, the plants, the animals, the whitebait, the eels and the ancient history of the land...the very ancient stories before people turned up, which was most of its history. 80 million years or whatever. The river has been here for a very long time, and humans have been here for two seconds, and we think we own the place – P156

The quote reinforces that the catchment processes and understanding these processes are not quick but when time is taken to unearth and understand the many aspects of the catchment it becomes a lot clearer what a CMP could capture and in doing so the CMP better reflects the catchment it has been made for. Stories as a method highlight many of these aspects as they are fine scale observations which may not be captured by scientific enquiry but instead is clearly communicated by those that experience the many 'voices' first hand.

In this section, participants highlighted the missed opportunities that planning bodies have had to rectify persistent issues through altering policy approaches and improving operational structures at local scales, both of which would help to realign CMPs with the catchment they are made for. Participants were clear on how they would like to see planning going forward. They would like to see greater

collaboration with residents and Iwi of the catchment and considerations for ongoing upkeep rather than applying solutions that aren't designed for the long term. These insights are central to providing a CMP that best represents the individual catchment and go some way to identifying how river stories can help to understand the factors at play that may have thwarted past attempts at management.

5.4.2 Alignment of knowledge and actions

As participants have previously mentioned, governance decisions have cascading effects on those that use the river. The common assumption from participants was that these effects resulted from poor management frameworks and foresight for how effects could accumulate through time. One such example is the acknowledgement that the measured metrics do not indicate overall catchment health.

> *They need to understand what's really going on in the catchment, rather than just the water quality; there are huge geological issues, especially within our catchment, and a whole lot of things at play and, than just what the water quality's saying down the bottom kind of thing.* – P906

P906 was also critical of the council's hesitance to resolve their contribution to the weed burden within the catchment. The lack of action from the council has resulted in the weed burden crossing property boundaries and developing on neighbouring private landholdings. The following quote sums up the feeling of landowners or community advocates dealing with management authorities.

> *I think it's arrogance. I think a lot of the agencies have a lot of arrogance that they are the council, or they are the Department, and so, therefore, what would anybody else know. There is almost like a threat, you know they feel threatened* – P20

The frustration with governance continues through many interviews as people within the region provide opportunities or highlight opportunities to effect change. However, the opportunities are not taken. This inability to provide foresight has materialised in legacy effects from post-Bola forest harvesting.

The key message from participants in this section was the need to utilise all available knowledge and find ways to best use the best available understandings of the things that matter. Additionally, they would like better knowledge-sharing avenues or openness to address ongoing concerns. Such approaches and embracing different knowledge benefit CMPs as they frame information in new ways and provide insights into how people interact with the landscape.

5.4.3 Distributing knowledge in new and established ways

The participants made it clear that the recent community engagement successes resulted from clear communication and well-documented events to discuss and learn about their river. The following quotes highlight this dynamic.

They need to have a really good communication plan with the community that lives there and also the community that are affiliated with it, like all the different iwi groups and stuff… so meeting and having good communication with people that are affiliated with the catchment would definitely help … we just need to make sure that there's a good sort of communications planning and Community feedback process – P906

Communication, I suppose, is always where it's at ae. – P20

Poor communication has a negative impact on community trust as things happen behind the scenes without being transparent about what was happening, this sentiment was summarised by P596.

You could say the three waters kaupapa is one of those plans, but you know people are distrusting of that, people may feel they'll lose some autonomy over their own resources, their own backyard and entrust it into the hands of a group that don't live here etc. The principle sounds Okay, but you know others would err to the side of caution and say "no, you can't trust them – P596

Often knowledge bases are legitimised by certain associations or qualifications. Participants were adamant that this should not be the case, given the wealth of knowledge unearthed in the previous sections. The gatekeeping of knowledge was also mentioned and was directly associated with the forestry processes in the catchment, whereby harvest plans and operational knowledge could be shared to ease the lifestyle implications of the industry. As an avenue to reform the distribution and transparency of knowledge, participants suggested co-governance arrangements whereby approaches need to be inclusive of multiple knowledges as a lot of valuable knowledge is woven into kōrero. It is clear from the interviews that it is lost and not accessible without engaging in kōrero.

Participants were also asked about the potential benefits of using emerging technologies such as simulations, digital mapping and time-lapses to increase understanding of planning goals and issues. Initial responses were reserved, with apparent reference to the potential for emerging technologies being able to create both positive and negative outcomes dependent on the motives behind the use of the technology. The following quotes however highlight the benefits of these solutions to communicate complex phenomena.

It definitely would have its place, yeah, like digitally if you could map someone's property looking at critical source areas, erosion control problems and things like that. It would be helpful… it also would help identify areas of like wetland restoration, so that those areas could be identified more easily and the catchments that those would help to filter, that would be cool, yeah…I'm not a fan of doing a whole lot of work when it's not going to be used practically on the ground. it's all very well, doing a whole lot of research and having a whole

lot of information, but if you can't actually turn it into something that people can use, then I think it's a waste of time. – P906

Sometimes it helps… test scenarios as well, so, for example, modelling can be really useful because we can say, "well, if we do this, if we pull this lever, then what happens as a consequence?", so it's a good way to explore different treatment pathways and different options for waterway management and land use management. – P22

Hugely, even just watching some videos of, yeah the one that we did when you were last here and when soil was visible and how that changes over time, like it really quickly helps to paint a picture, of what's happening, and I think there's a lot of data already out there, but if you're to put something in a visual representation, it's an easy to digest form of information that a lot of people can digest and yeah help influence, It can help to influence them because they understand a visual representation, so no, I think it's really important. – P47

Despite the benefits there were concerns raised over providing solutions not fit for purpose as P906 mentioned, P9 also had hesitancy over the reliance we have on these solutions.

that's a big flaw of the modellers these days. They become geeks behind computers but have very little understanding of how the environment actually works and how things have changed over time. They implicitly believe their models. They are rarely field checked to see if they're real or not… Even though they believe them implicitly, the rest of us who have worked out in the field do not believe them. We just do not, and we could probably back up or identify some of the bloody falsehoods that they may come up with – P9

Other participants also discussed the benefits of place-based learning using virtual reality and digital-based learning to build upon the landscape experiences and provide alternatives for activities that are not possible in person such as exploring landscapes that are too dangerous to safely show youth around or provide a like for like experience to people which they would have had if it were not for impediments such as severe weather. Overall creating a package that is all-encompassing and leaves no stone unturned.

Interviews highlighted the need to use a plural lens when approaching knowledge dissemination into CMP processes. How the knowledges are interwoven or included in planning processes is just as important as what is included, this will result from the engagement processes followed. Without acknowledging how knowledge disseminates, it is challenging to ascertain barriers that were overcome to distribute the knowledge. Participants were also open to using different methods of distributing knowledge if done transparently, helping to reshape how social, cultural and biophysical observations from within the catchment feed into the CMP knowledge base.

5.4.4 Engagement frameworks

The potential for external parties to bring greater value to the management frameworks was widely addressed by participants. The quote below highlights the benefits of the external catchment projects carried out by the catchment group.

> *a lot of the time, catchment projects come out of a catchment plan. But we've sort of jumped the gun and done it the opposite way around, so we already had our catchment group. We've already got all our landowners (bar one) onside. Everybody wants to do something to contribute, and so when we first meet with our landowners, we said to them, what do you think the problem is ... there are key questions that you can get out of the community if you do it the right way and they [Catchment Planners] will realise that they will get a lot further ahead and a lot more people onside if they are including the community and the iwi and everybody onside, right from the start and it will give them the biggest head start, rather than just coming in off a blank canvas, which is what they would be doing.* – P906

Beyond the catchment projects efforts to get children into the landscape have also shown high levels of engagement, as evidenced by this quote from P156

> *…they looove building the bivouacs, going up the hill, and they really love the stories. They really like making stuff and getting hands-on and they do it together…they are really different when they are there…see them interacting with each other because the kids run the show pretty much, it's not a top-down type of process...* – P156

The key message from this section is that the initiatives from within the catchment that create engagement have the potential to drive aspects of CMP implementation as they operate in the face of the issues and engage with the issues to be proactive rather than reactive. Participants highlighted how stories that come from people engaging with the landscape help to improve engagement as people begin to feel a connection to 'their' river or environment and as engagement increases, there is greater appetite to drive change and as such provides the opportunity to iteratively adapt how management applies to different demographics as a greater sense of what resonates with different people is better understood. Such approaches help to maintain engagement long term as people are included throughout the catchment planning process in the long term.

5.4.5 Summary

Participants highlighted the missed opportunities to rectify persistent CMP issues. As a result, they would like to see greater collaboration with residents and Iwi of the catchment to create solutions that cater to the long-term needs of everyone. Part of this collaboration is the need to champion alternate knowledge and ways to disseminate social, cultural, and biophysical knowledge from within the catchment to inform CMPs. These processes of engagement and implementation also provide the

opportunity to create new stories that synthesise what is known so far, providing a valuable checkpoint in the CMP process and gauging how much progress has happened.

5.5 Chapter Recap

Insights shared by participants give an overarching understanding of their values bases and motivations for the change they would like to see and perspectives on catchment management, how it needs to change and how river stories and alternate forms of knowledge would support a more holistic CMP.

The following section will discuss these findings in 5 overarching themes: The Waimatā Story, The role and importance of storytelling, Re-Envisioning CMPs in ANZ, Prospects for the future and Reflections.

6 Discussion

6.1 The Waimatā Story

6.1.1 Values & Aspirations

Values and aspirations associated with the catchment are unsurprisingly complex, informed by familial, cultural & recreational connections. Participants were clear that current management processes and values do not sufficiently preserve the essence of the Waimatā catchment and certainly are not rehabilitating the catchment. A recurring aspiration of participants in sections 5.2.1 & 5.2.3 was the desire for the river to be a healthy common area for families to interact and for lived knowledge to inform CMPs at present and for future generations. Participants in section 5.2.1 made clear how things natural values of the river should be included in deliberations about what values underly the creation of a CMP, the same notions are supported by Fryirs & Brierley (2009). The potential for these aspirations to come to fruition is somewhat limited by council values and aspirations expressed in section 5.2.1, which are largely dictated by requirements set out in policy and guidance documents.

Results show that current CMPs only represent a portion of the catchment's values and mindsets focusing on water quality, water quantity and ecology metrics without wholly capturing the unique social and cultural importance of the catchment. The implication of this is that the aspirations and expectations of people in the catchment are at odds with what can be achieved by the council. Referring to Chan et al. (2016), all three value types (instrumental, intrinsic and relational) are evident in these responses, with the council using both intrinsic and instrumental values while residents mostly use relational values. Therefore, efforts to incorporate more values mean the CMP could better represent the catchment and its people. Stories are a promising way to bridge the gap between the council and catchment residents as they are universally used and easy to understand (Dahlstrom, 2014). What became apparent throughout the interviews was how people see stories in different ways and have perspectives on how narratives can be constructed to provide insight into differing values and relationships associated with the catchment through time (Kellas et al., 2021), these stories provided the basis for participants to assert what aspects of CMPs are effective and ineffective, with recognition of their individual values.

6.1.2 Limitations of the Existing Waimatā Catchment Management

Discussion around how previous national-level management efforts have been poorly designed and executed was also a recurrent theme. There have been opportunities to enact change, but they were either not executed, poorly executed, or short timelines meant desired outcomes did not materialise despite having a sound academic basis and promise for landscape change. Participants addressed this in section 5.4.1, noting that management processes have not evolved based on the learnings of previous decisions, which is a combination of top-down initiatives set at a national level without thought to the influences at a local to regional scale and a lack of capacity for some councils which limits what they can realistically achieve.

The lack of local-level execution of management policies and objectives by local governance, both addressing their role in the issues and enforcing the compliance of others, has meant that resident expectations are yet to be met. Participants in sections 5.3.2 and 5.4.2 discussed how the council had not taken responsibility to ensure all land in the catchment is properly managed. Participants also cited the council as unwilling to collaborate to have a greater impact, due to a perceived arrogance, which was highlighted by their hesitance to collaborate on some initiatives, such as riparian weed control.. The continued lack of collaboration and responsibility can lead to disengaged communities, so implementing new initiatives becomes difficult (Brandt et al., 2013). As a result, environmental management in the Waimatā is reacting to a number of concerns, including sedimentation, declining and at-risk ecology, forestry debris and declining water quality (GDC, 2022). Attempts to include social and cultural initiatives are only recently being navigated through the Waimatā-Pakarae CMP, therefore the opportunity to employ stories to capture social and cultural values is evident.

The use of quantitative metrics in the Waimatā until recently highlights that existing frameworks that underpin CMPs are ill-equipped to harness alternate knowledge types that exist in the catchment, and efforts to effect change can work at cross purposes, this is highlighted by both the council and residents initiating their own projects to combat common issues such as weed control, sedimentation, damage from flooding and pest trapping. As such, they fail to meaningfully address concerns for environmental management objectives in ways that incorporate social, cultural, and wider biophysical understandings as efforts are not focused (Hikuroa et al., 2021; Hunter & Scrafton, n.d.; Mould et al., 2020a). The findings from this research suggest that ways to incorporate such information should be done through greater communication and collaboration, participants understand that they can bring value to some areas of the planning whilst taking direction from council in other areas will be beneficial.

The other perspective which is important to understanding the Waimatā CMP process is the perspectives and motivations held by regulatory bodies which focus on providing equitable management to the whole nation (Charlton & Brunette, 2011). The outcome from this is a blanket approach and sets of baselines and values to adhere to (Feeney et al., 2010). In a Waimatā context, this has meant that the sets of values used have not catered to the catchment-specific concerns (Sedimentation, Forestry Debris & Health concerns). The findings therein highlight the potential to use social capital by engaging people and building relationships so new initiatives, approaches or solutions can be implemented. Prospectively, the emergence of grounded, locally driven catchment groups can address this shortcoming to fully utilise the increased capacity that could be generated by collaboration between community initiatives, governance bodies and other stakeholders (Allen et al., 2011).

Recent community engagement through the WCRG has identified projects and initiated actions that work towards a healthier river. Steps to engage with the idea of a healthy river and provide opportunities for people to be a part of the change have been provided in the form of planting days, educational field days and meetings to discuss and plan new projects. This has increased individuals' sense of what could change about the river for the better and provided the foundation for aspirations and expectations

for management processes, Fenemor et al. (2011a) found similar benefits for community participation. The Waimatā-Pakarae Catchment plan provides the potential to address these aspirations and expectations and harness the momentum that WCRG has built.

6.1.3 Summary

The Waimatā's story is one of rich socio-cultural values and motivations for change. As such, there is an aspiration for management processes to extend beyond existing paradigms of meeting regulatory obligations and instead address existing limitations of approaches and collaborate with catchment residents to co-develop a CMP representing the people and environment of the Waimatā. It remains to be seen how the Waimatā-Pakarae catchment plan process implements knowledge sharing beyond suggestions of policy and legislation.

6.2 The role and importance of storytelling

6.2.1 What is a Waimatā river story

The stories and storytelling highlighted differing issues, problems and circumstances that reflected differing contexts in space and time. A key distinction emerged between lived stories and secondary stories. Lived stories were stories that participants recited from their own experiences, and secondary stories were stories that have been told to them and potentially been passed through generations. For example, in section 5.4.1, participants talked about how landowner stories and understandings supported their understanding of the catchment, how governance decisions and structures impacted landowner relationships with the land and the negative effects of these decisions. Equally, in section 5.3.3, participants talked about how their relationship with the land has been a hybrid of memories and new learnings, leading to a rich story deeply rooted in environmental, social and cultural improvement.

The two types of narrative are different as secondary stories strengthen existing understanding by corroborating or providing additional information to existing understandings, while lived stories highlight personal experiences which help to understand the environmental processes of the catchment better and therefore provide the basis to generate new knowledges that can be used to inform actions and behaviours . However, both provide a greater sense of the past pressures on the catchment and how changes could be made for better management in the future and exemplify the broad use case of stories and the process of storytelling, creating new conversations about best approaches. Berkes et al. (2007) found similar benefits to narratives and, as such, suggest them as valuable additions to environmental management.

A range of events shape the Waimatā story, including multiple periods of settlement, increasing industrial activities and more recently the influence of climate change and the cascading effects it has triggered associated with land use (increased sedimentation & forestry slash); therefore, a vast knowledge base informed the shared stories, highlighting the diverse knowledge that can be incorporated into the creation of a CMP for the Waimatā. Participants would like to see a management

approach that reflects the Waimatā story and does a better job of representing the various connections and associations to the river, ranging from use for waka ama to being able to swim in the river with your family. Given the wide range of connections to the river it is important to consider how stories are interpreted and utilised as stories are context-dependent, one story with three themes may not tell the same story as one that includes 12 themes that this research uncovered, this understanding of the potential for stories to provide stark contrasts in information but help build a wider understanding of the environment is also noted by Shepherd et al.(2018). The interweaving of themes is similar to a braided river where themes take many paths, and at each point where themes converge, they diverge again. There is no knowing how many diverging points the stories go through; all that can be acknowledged is the end product and the themes woven into one story, therefore situating stories within a planning process may be uncomfortable but necessary as stories play an integral role to better understanding the catchment from multiple viewpoints.

Stories in the Waimatā presented are a way to deliver information that is memorable and enlighten people's understandings of what the catchment has experienced. As chapter 5 shows, a great diversity of themes highlight strong expectations for how the catchment and river should be managed to improve its state. These themes include ranging from values and mindsets, underlying knowledge and lived realities to how governance arrangements have not met expectations in the past. In many cases, feelings, connections and knowledge are expressed through these themes that are not captured in conventional monitoring and management approaches. Without the role of storytelling, much of the information captured by this research would remain abstract and unlikely to be incorporated in CMPs. As addressed in the findings, participants highlighted how they had difficulty collaborating with the council. Therefore, the potential to create approaches that benefit the catchment and the council is diminished.

The successes that participants have achieved in catchment initiatives such as pest trapping and riparian corridor rehabilitation, discussed in section 5.3.3, highlight the value of sharing stories for CMPs to better understand how the landscape responds to efforts to rehabilitate the landscape. This value is doubtless associated with the fact that stories are continuous streams of knowledge that are reworked and added to as more observations occur, an organic yet structured approach to developing knowledge bases that inform CMPs. This notion is discussed further in section 6.4.2.

The developed knowledge bases present in the stories also reinforce the comments of Te Aho (2019) when understanding that each tributary, river, catchment and community is unique in its own right; therefore, the shared stories provide further insight into specific locales. In the case of the Waimatā, the diversity of stories shared amongst participants highlights how macro-scale issues such as sedimentation have differing micro-scale impacts within the catchment. Participants spoke about how the increased sedimentation has potentially caused skin lesions for waka ama paddlers. Likewise, participants spoke about how the increased sedimentation has reduced the recreational value of the river as they can longer use the river to exercise their horses, a favourite pastime a matter of years ago.

The value of storytelling for CMPs lies in the ability to see multiple perspectives of the landscape and associate the knowledge held within the story with other stories, data and policy directives. It is also important, however, that CMPs engage in storylistening, the act of absorbing as much of the story as possible and relating it to personal knowledge and other perspectives (Kellas et al., 2021)

6.2.2 The role of story listening

Storylistening in the Waimatā is presented as learning from others and reworking that knowledge to relate it to the river. Participants in section 5.3.3 highlighted how listening to other residents of the catchment and industry specialists has helped to reduce time spent pioneering approaches and more time applying themselves to rehabilitating the Waimatā catchment because the process draws on each person's strength and time in the landscape.

The act of storylistening is, therefore, a crucial step to tying multiple threads that consider multiple disciplines over various scales (spatial and temporal) that are essential to a CMP that represents the catchment (Kellas et al., 2021. Engaging in story listening allows CMPs to move beyond the existing monitoring paradigms to leverage the knowledge that can be held in the catchment and its adjacent residential areas (Smith, 2015). The net outcome of this process is a snowball effect of outcomes. The more listening that occurs, the more informed decisions are and therefore reduce the periods of less efficiency, and more time can be spent fine-tuning existing efficiencies and adding efforts together, such a collaborative approach has been proven by the catchment group and getting landowners to buy into their initiatives, as a result the catchment group have affected behavioural change, created a cohesive community striving for a common goal and the outcomes have been clear for the community to see. The collaboration is the result of the landowners taking the time to listen to others and process the information being provided to them whilst also providing feedbacks about how and why some aspects of their approaches may or may not work for their land.

Therefore the storytelling and listening process deals with both sides of the knowledge sharing process, providing opportunities to unearth old and emerging knowledge bases whilst also providing opportunities for the development of knowledge shared in conjunction with existing and established knowledge bases that feed into CMPs (Sundin et al., 2018). By association using river stories in CMPs then necessitates reciprocal knowledge generation and inherently creates a seat at the table for all stakeholders.

6.2.3 River Story inputs to CMPs

Current approaches to CMPs involve abstractions of catchment understanding, such as a water quality metric, to satisfy guiding and requiring documents, although the metric is sufficient in regulatory terms to represent a healthy system it doesn't consider the wider environment and the potential for other factors to shape whether the river is healthy or in a good state. Such an approach is referred to as reductionism (Tadaki & Sinner, 2014). Stories do the opposite, taking the notion of a healthy river and providing context to how the metric has or has not been met, considering multiple factors that may help

to determine if the river is healthy such as people using the river not getting health issues, as was mentioned in section 5.3.1. Stories therefore create a broader understanding of what could meet the initial requirements and guidance (Shenk & Gutowski, 2022).

Section 6.2.3 highlights the potential for stories to improve CMPs, the potential goes beyond the ability to leverage past experiences to increase efficiencies. Stories can unabstract what we know, providing context, meaning and place specificity for knowledge. Often these stories are in layman's terms and associate technical and specialist knowledge with familiar phenomena in the landscape. In the Waimatā, the experiences of those using the landscape and riverscape are not well represented in management approaches, creating a set of objectives that do not marry up with resident values, aspirations and concerns.

Stories can help with implementation allowing more people to understand the issues that a catchment is facing by putting the issues in easily understood forms. Therefore, more people can make informed decisions about how they get involved. The engagement and implementation benefits of stories are discussed further in sections 6.3.5 and 6.3.6, respectively.

The next steps in the Waimatā CMP require listening to people's stories to incorporate them with the other available data. What is clear from all participants in sections 5.2.3 and 5.4.1 is that once this engagement with their knowledge occurs, a greater sense of how human rationales and interactions in the landscape have implications for current approaches to river management can be understood (Berkes et al., 2007; Makey et al., 2022; Wilcock et al., 2013).

Incorporating a river's story in a CMP means that a greater sense of what the river "was", "is", and "will be" can be built into what the CMP tries to achieve (Smith, 2015). The information uncovered in the river story journey means that decision-makers have the opportunity to consider the broader implications of their approaches (Smith, 2015).

6.2.4 Summary

Stories provide observations of the landscape and reflect the values of those telling the story. The value they bring to CMPs is that they highlight many catchment perspectives form people who live, work and use the river for recreation. By representing these perspectives it helps to highlight how management approaches are not efficient and the potential for those in decision making positions to assert their preferences or understandings of how a catchment should be managed onto the final CMP. Beyond the meanings of the story and how they can inform management, engaging with stories requires reciprocal communication between people using the catchment, regulatory bodies and decision makers providing a new frame of inquiry that will help to re-envision how CMPs communicate and use different forms of knowledge.

6.3 Re-Envisioning CMPs in ANZ

6.3.1 Conceptual process

NZ's current policy structure is centralised, so policy directives are the same for every local government. The expectation is that councils will meet the metrics set out at a national level using regional policy. New approaches that utilise the different management processes unearthed in sections 5.3.3 and 5.4.3 will create a framework for utilising alternate knowledge emergent in sections 5.3.3 and 5.4.3. Adapting Figure 2.1 shows how the existing processes can be re-envisioned to support the use of stories (Figure 6.1).

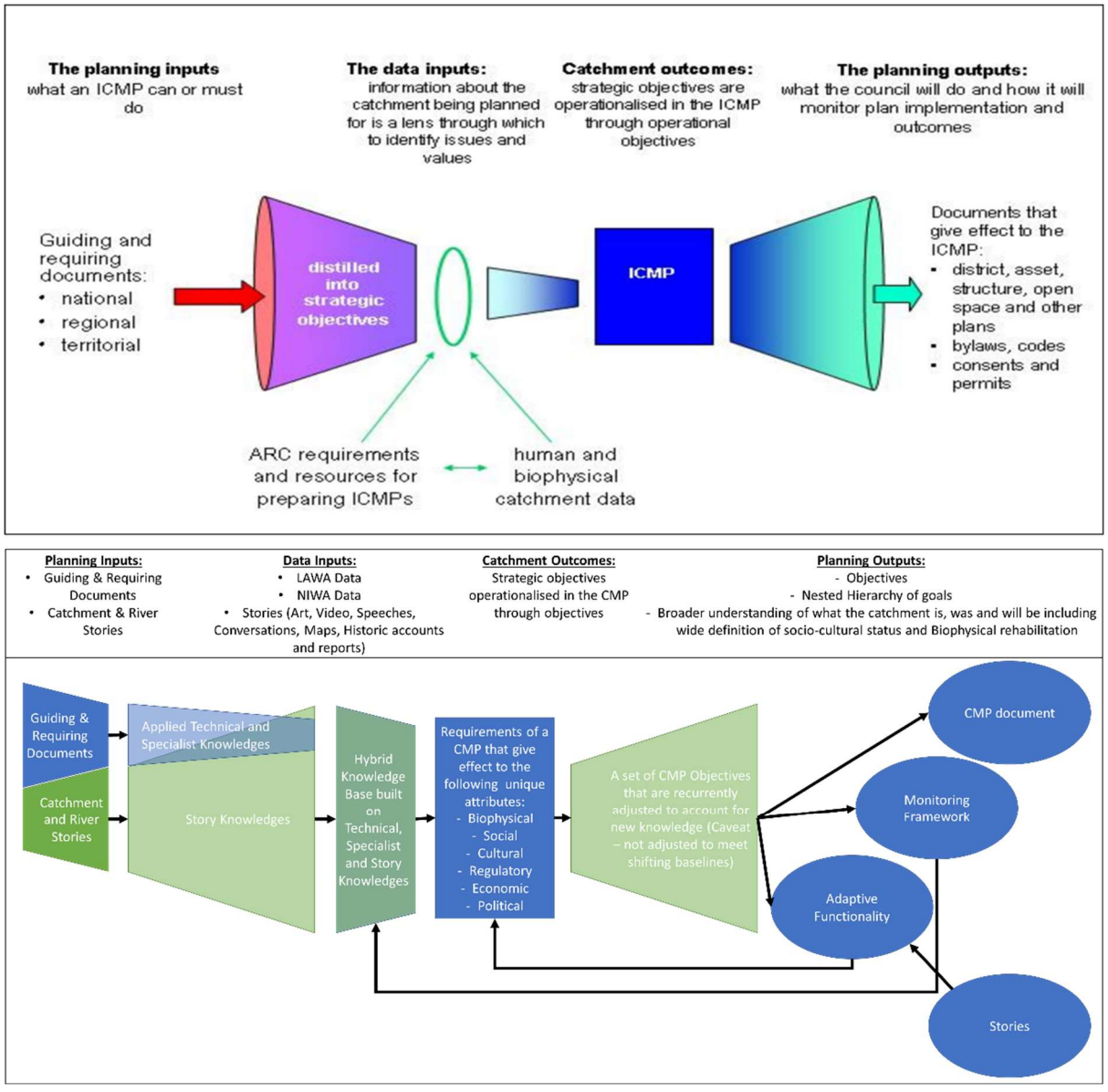


Figure 6.1. Re-conceptualised CMP process (Top: Feeney et al., 2008; Bottom: Authors own)

As shown in Figure 6.1, new approaches to CMPs can sensibly use both quantitative and qualitative information to build a catchment-specific CMP. Adding stories into the process before objectives are

established allows catchment managers to corroborate story knowledge against existing knowledge. The corroboration of knowledges ensures new knowledge is being added to the CMPs whilst challenging existing assumptions about previously used information, raising the possibility that objectives need to be adapted to better reflect all the information available.
Participants in section 5.4.1 asserted that effective CMPs centre on the plural views of; specialists, the lived knowledge of residents and local Hapū. This re-conceptualised process would work well for the Waimatā catchment as it takes a less linear (cause and effect) approach, creating space for both quantitative and qualitative knowledge. The approach also creates space for bottom-up initiatives to inform future catchment states and responses and top-down approaches which assert the regulatory expectations (Brierley & Fryirs, 2022; Robertson et al., 2000).

Part of being able to operationalise new approaches is dependent on clear communication pathways and ensuring there is sufficient capacity to acknowledge and include new information. Part of weaving multiple knowledges together relies on having multiple communication methods to suit target audiences and fit the understanding of different demographics and specialisations to ensure full participation in debating how rivers and catchments should be managed (Knight, 2019; Taiepa et al., 1997).

Communication to keep people informed about CMP progress was one of the most referred themes in the interviews. New approaches to CMPs that prioritise setting up robust communication pathways at the beginning of the process are more likely to produce positive biophysical, cultural and social outcomes (Taiepa et al., 1997). Fryirs et al. (2020) shared similar aspirations highlighting that without suitable communication and cross-database association, knowledge is gatekept or gets stuck in silos and therefore does not propagate readily.

In sections 5.2.2, 5.4.1 and 5.4.3, participants highlighted how stories for the Waimatā can be communicated in many ways, including maps/GIS outputs, in-person discussions, artworks, field trips/work, social media and past reports. The ability of these stories to capture complex and large-scale phenomena in simple ways helps people understand specialist knowledge (i.e., Brown and Pasternack, 2019; Caquard & Cartwright, 2014).

Each communication type appeals to different audiences and highlights the diverse ways information is shared, even in small communities. Therefore, communication pathways must be:

- Clear
- Established early
- Diverse

Taking these three steps ensures that communication methods meet the needs of all parties in interesting ways whilst ensuring that messages are not lost in translation and that relationships of trust can be built; these notions are supported by Feeney et al. (2010). Equally, what is not known about the research needs to be communicated (Brierley, 2020; Hillman & Brierley, 2008). This is a key consideration for CMPs and is discussed in the next section (6.3.3).

6.3.2 Communicating uncertainty

As with any research, there are uncertainties. In general terms, the more technical or complex the subject being communicated, the more uncertainty there is associated with it as researchers are forced to make assumptions about how a given process works which often leads to simplifications of the process and therefore uncertainty increases as some parts of the process are omitted which may have a discernible influence on the outcome (Oreskes et al., 1994; Schumm, 1998). A good example of the increasing uncertainty with complexity is the use of black-box simulations to model landscape evolution, the output is clear and easy to understand but only a select group of variables are able to be manipulated (Sediment size, rainfall etc.) and therefore the evolution of the landscape is simplified, and the real-world occurrence of evolution ends up very different. By not communicating uncertainties, the impact of the research is unclear and contested (Pidgeon & Fischhoff, 2011).

In the Waimatā, the impact of this hesitancy is clear when considering the ever-changing policy landscape discussed in section 5.4.1. Participants discussed how past policies have many potential learnings that could be applied to new approaches and how past policies had effectively developed landowner relationships, leading to better implementation on the ground. Because there is a feeling that we will never know enough, or seemingly better solutions come along, past approaches have been abandoned without much thought for the story that these processes inherently hold.

By highlighting the uncertainties, the subsequent CMP highlights gaps in knowledge and seek knowledge to fill these gaps, something which stories are effective at doing. The net benefit is also that landowners have a better understanding of the science behind decisions and governance have a better understanding of the on-the-ground implications of the management decisions, overall creating a circular knowledge cycle that constantly evolves in response to what is and is not known. This characteristic is significant for any new CMPs, as NZ has many different landscapes, each with its priorities for preservation. For example, the Waimatā is largely centred around the easily erodible landscape that produces large quantities of sediment when not properly vegetated, as was mentioned by participants in section 5.3.1. Conversely, a catchment in Auckland with volcanic lithologies may not have the same sedimentation issues. Therefore, building these relationships and creating dialogue about individual catchment needs and concerns is important for the effective implementation of initiatives and projects (Taiepa et al., 1997).

When considering a story's role in CMPs and the uncertainties associated with them as a knowledge type, there needs to be awareness that stories will always be filtered versions of facts that reflect the values and aspirations of the storyteller (Shepherd et al., 2018). Therefore, stories need to be used with other knowledge types to best represent the catchment. However, stories can also highlight uncertainties in other knowledge types, by comparing the learnings and identifying the areas of overlap, that contradict one another. By associating multiple knowledges, the areas of uncertainty can be mitigated by the other knowledges used (Figure 6.2).

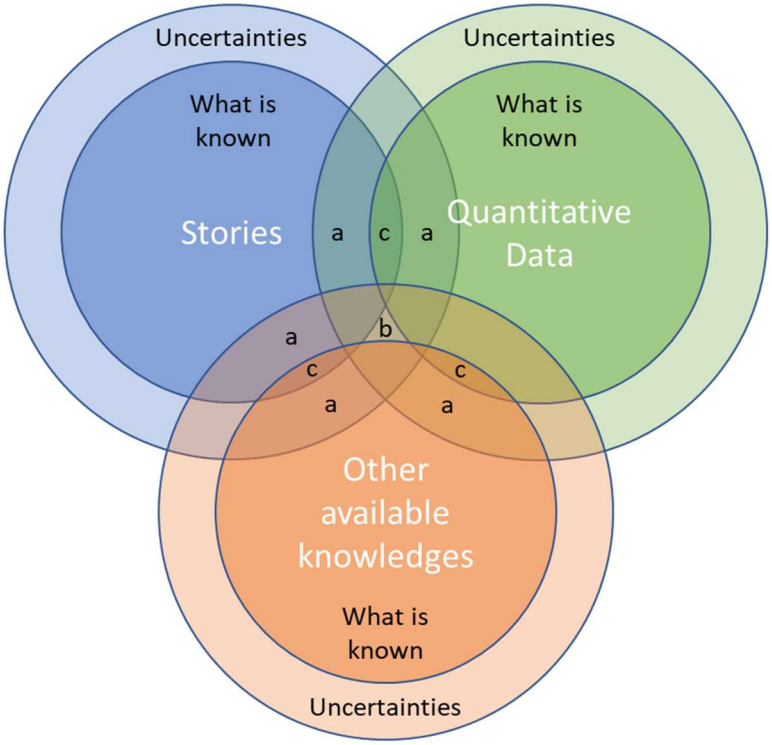


Figure 6.2. Association of knowledge systems to identify uncertainties that are mitigated by other knowledges or remain unmitigated and therefore require further attention (Authors own)

Figure 6.2 shows how each knowledge type has a circle of uncertainty. Comparing the knowledge types allows practitioners to identify three areas of uncertainty and certainty; uncertainty in one knowledge type that can be mitigated by another knowledge type. Areas of certainty that eventuate from one knowledge type corroborating the information provided in another knowledge type, and areas of uncertainty that no knowledge type has addressed, therefore requiring further attention to mitigate the impact of the uncertainty on knowledge generation. Understandings of knowledge and their uncertainties are important for framing CMPs, allowing planners and decision makers to acknowledge the gaps in knowledge and work towards providing more comprehensive knowledge bases from which to make their decisions.

The communication of uncertainty must not be discounted. Poor communication of uncertainties can also mislead people, with suggested actions and objectives not realising their theoretical benefits, undermining people's trust and engagement in scientific approaches (Reed et al., 2018).

6.3.3 Combatting distrust

Part of combatting distrust is reassuring people that current approaches are based on the best available knowledge (Fryirs & Brierley, 2021). By reducing barriers to accessing knowledge, inherent

uncertainties and decision-making processes, people can decide for themselves whether to trust the process (Feeney et al., 2010). If governance bodies are willing to collaborate with the community on initiatives and take the time for each party to understand each other's perspectives, then outcomes of engagement and trust have been seen to increase (e.g., Allen et al., 2011; Fenemor et al., 2011a). The short-term benefit is engagement, while the long-term benefit is trust in new approaches and ideas (Feeney et al., 2010; Fenemor et al., 2011a).

Participants in section 5.4.1 highlight how a lack of communication and transparency historically undermined relationships between landowners and regulatory bodies as new legislation did not involve them or cater to their needs and therefore they had a reduced sense of engagement with the policy and what it was trying to achieve. Ultimately those management approaches lost traction and did not achieve their objectives. Navigating these changes to combat distrust requires new engagement and negotiation processes that build upon existing knowledge and frameworks. Therefore, early engagement and listening to people's stories will help develop relationships that endure successive iterations of CMPs and their planning and implementation. The net effect is that policy requirements are implemented, discussions about best practices in relation to the Waimatā can be held and effective management initiatives that mitigate current effects can be designed and implemented .

6.3.4 Processes of negotiation and engagement

Like dissolving distrust, processes of negotiation and engagement will be dependent on relationships that have been built. Focusing on creating space and time for CMP objectives and values to be distilled allows stories to add greater meaning to initial findings. Tropp (2007) notes that many water sector decision-makers have not realised the full potential of inclusive decision-making processes, coordination and negotiated outcomes. This sentiment was reiterated by participants in section 5.4.1 and section 5.4.4, highlighting how they feel they have not been able to contribute to council-led management initiatives, preferring to engage with catchment group initiatives to enact change. Linton (2014) and Berkes et al. (2007) suggest that negotiation and collaboration approaches allow mutually beneficial outcomes to be executed despite numerous social, cultural and political actors. This is essential for CMP processes in the Waimatā, where the potential for social and cultural input to the process is great, evidenced by the willingness of participants to promote and engage with catchment projects and partake in this research.

During negotiation and engagement, it is also important to acknowledge that there will be 'things' that are seen as invaluable and, therefore, non-negotiable to ensure they are preserved for the future (Lyver et al., 2016). Participants in section 5.2.2 refer to Motukeo as one of these non-negotiable places which need to be considered in management approaches as it is an integral part of the spiritual passage for Māori after passing. This is an important consideration for the Waimatā CMP as it is currently privately owned and the potential for the land surrounding Motukeo to be used in ways inconsistent with tikanga principles is a very real possibility, such a land use could be pine plantations for timber production or carbon farming. Without taking a wider and more holistic perspective on the landscape and its

importance it is difficult to capture the wider implications of land management at an individual property scale.

Stories provide the wider more holistic perspectives and without them, the importance of the catchment would be less apparent, and the potential for making decisions inconsistent with social, cultural and biophysical values is greater. Stories provide a familiarity to place and through time knowing about a place also builds connection to that place, which provides positive feedback to individuals engagement with initiatives to improve the place. Given the importance of these deliberations, processes of negotiation and engagement are integral and are dependent on governance to incorporate time and money in these processes when administering the CMP, in turn creating continuity from engagement to enactment at all scales.

6.3.5 Specific roles of governance

Considering the potential for the Waimatā landscape to be further degraded if CMPs do not address the cascading effects, the influence of forestry and land-use change on catchment processes and the sedimentation increase, mentioned in section 5.3.1 and the poor track record of policy summarised in section 5.4.1, there is pressure for governing bodies to do more to manage and mitigate impacts associated with current land use. Positive environmental governance needs to better use regulatory instruments alongside societal expectations and enterprise to shape environmental futures. This is highlighted in sections 5.2.3 and 5.4.1 in which participants highlighted how they would like to see greater use of additional or alternate knowledges to combat the inefficiencies from past policy, similarly Reid et al. (2019) suggested similar approaches of using hybrid approaches to supplement existing freshwater management tools to support biodiversity and ecological hotspots.

The role of governance in the Waimatā is important as it legitimises what knowledge bases inform CMPs, creating the space within regional by-laws to use stories to help understand the catchment. They may also find that adopting stories promotes collaboration between practitioners as stories are a compelling and social form of knowledge transfer. To overcome the constraints imposed by national governance, steps by the GDC could:

- Acknowledge past errors in management processes, part of this step is understanding and mitigating decision-making tendencies that current frameworks and people have. This links to comments made in section 5.4.1 and is supported by literature (e.g., Herse et al., 2020).
- Facilitate discussion amongst stakeholders about current and emergent challenges (Cook et al., 2013). Participants discussed this in sections 5.4.1 and 5.4.2.
- Embrace on-the-ground solutions and learnings. Participants discussed this in sections 5.3.3 and 5.4.2 and are supported by literature (e.g., Fryirs & Brierley, 2021).
- Aiming for visionary approaches and championing better futures, they must also temper this with managing expectations for CMP outcomes or objectives. Participants discussed this in section 5.4.1.

In addition to facilitating changes in management approach, the council must also take responsibility for deciding what needs to be monitored, informing management approaches, and providing justification for management decisions (Feeney et al., 2010). This is not to say they must do it themselves, if they develop and maintain social connections and communities of practice (Mould et al., 2021a), then the capacity released by community buy in can be focused on driving compliance with regulations and enforcing local bylaws which ensure that catchment projects and initiatives are achieving the objectives set out.

6.3.6 How monitoring must evolve

Beyond the conventional methods of monitoring water quality and ecology metrics, monitoring that stays in touch with stories from the catchment will help understand the broader implications of these metrics. In the Waimatā this understanding has been limited to the use of mechanistic values as addressed by participants in section 5.4.2. Stories provide the scope to broaden the monitoring database, participants in section 5.2.2 highlight the use of stories and narratives in everyday life to facilitate knowledge transfer from one landowner to another, reinforcing the benefit of having stories incorporated into monitoring approaches. Despite stories being a best reflection of fond memories, in some cases, the information that underpins them is equally as valuable as recent information captured in stories as it provides information that can be contrasted against other information. Therefore, CMPs having an up-to-date, objective, and relevant information base from within the catchment is valuable to contrast against quantitative metrics and has the potential to guide management objectives. Fenemor et al. (2011) support the participants' responses, identifying that involving stakeholders in monitoring increases their sense of ownership for CMPs; as a result, more people are monitoring the landscape.

In addition to monitoring approaches that utilise the value of stories, a living database is another possible monitoring approach. Living databases for catchments are a new concept. They are living in 2 ways:

- Provide up-to-date information as they can be consistently updated whether that is a result of scraping data from websites such as LAWA or LINZ or whether people are inputting the latest observations from within the catchment
- Dealing with a living entity (the river), the river is never going to remain static and therefore is state is evolving consistently and therefore for the river to be properly represented the databases needs to be able to reflect the evolution.

Living databases inherently support place-based catchment management planning, creating a series of connections between disciplines – each adding alternative perspectives and building up the monitoring story. The Waimatā provides a good case study for living databases, given the existing and developing knowledge expressed in the results and past research outputs (e.g., Cairns, 2021; Cullum et al., 2017; Harvey, 2021; Reeves, 2015; Salmond & Phillips, 2019).

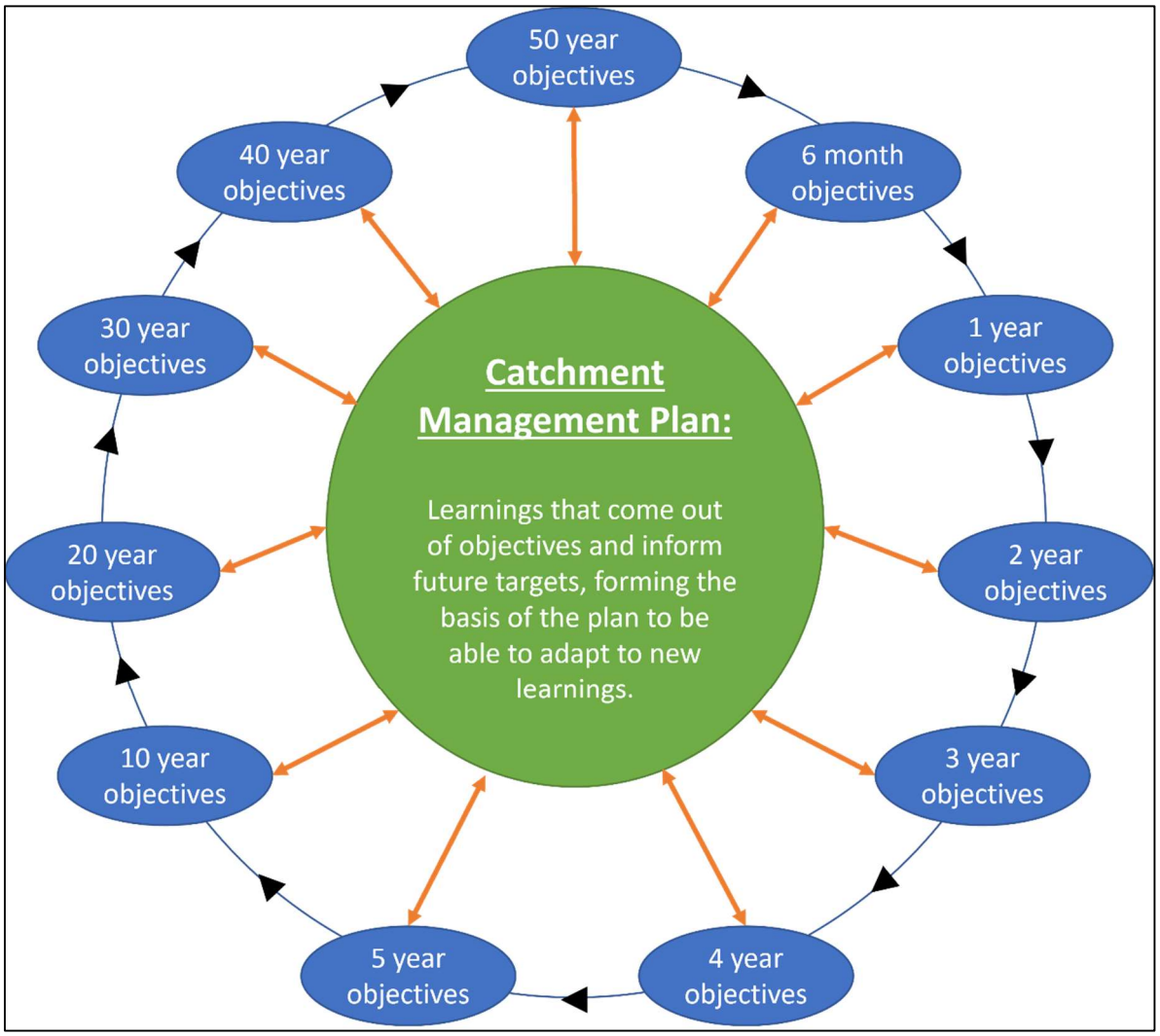
Having a living database could also provide the interactive benefits that participants in section 5.4.4 mentioned when discussing getting children involved in the landscape. Similar modes of engagement would apply to everyone when exploring the available data in one database and subsequently placing them virtually within the catchment. Living databases also support the need to integrate the outcomes fully (e.g., water quality metrics & Community observations) in a singular joint monitoring framework (Eger et al., 2022). The benefit of having a living database is removing the need to do reconnaissance for new management objectives. Instead, labour demands can be allocated to maintaining existing monitoring networks, deriving more depth of meaning from the knowledge collected and understanding the importance of lived knowledge.

Having a living database means there are no instances of 'handing over the catchment plan or data to the next manager or generation as the document and data would have been iteratively improved, laying the foundation for adaptive management. Similarly, stories can be handed over, and therefore the two approaches work well together as the database can house all available information while the story provides context and engagement with the information.

6.3.7 Requirements for adaptive management

The adaptive management approach should summarise what is known, what needs to be known and acceptable monitoring results, then establish clear, solid, and transparent expectations. At the same time, a set of responses to monitoring outcomes are pre-empted to avoid reactive decision-making (Brierley & Fryirs, 2022; Feeney et al., 2010).

An adaptive management framework needs to operate on multiple timelines simultaneously to adapt to new information and concerns; this is similar to Brierley and Fryirs (2016), who suggest using 'moving targets' in river management to account for future unknown environmental states. Figure 6.3 conceptualises how the timelines may look.



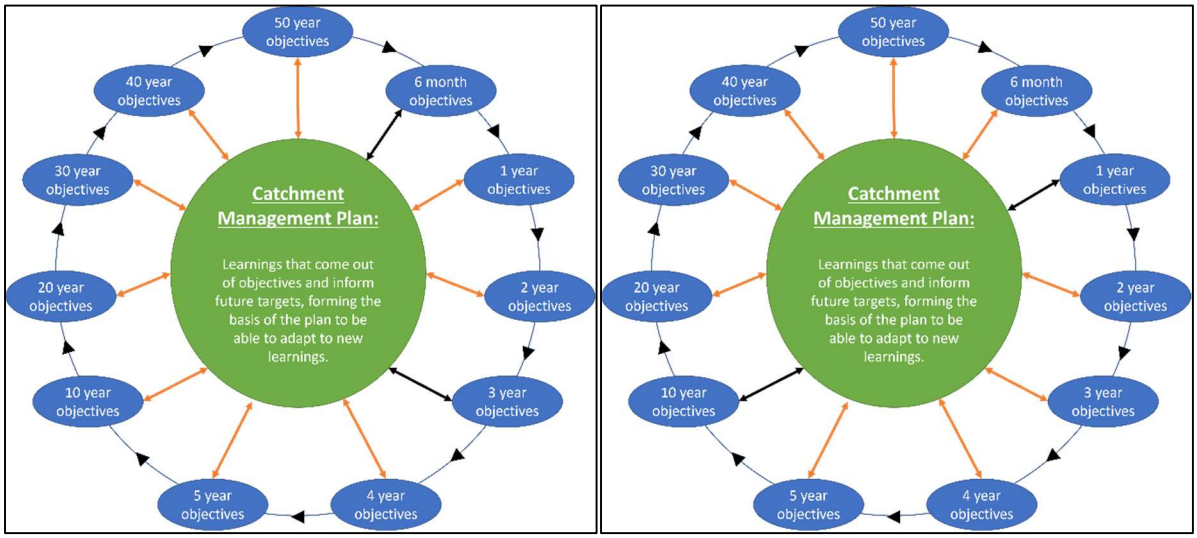


Figure 6.3. Adaptive Management conceptualisation whereby short-term objectives (6 months to 5 years) can influence later objectives depending on the learnings from earlier objectives. For example,

the outcomes from 6-month objectives could influence what the three-year objectives should represent (bottom left, black arrows), or outcomes from one-year objectives influence what the ten-year objectives should represent (bottom right, black arrows).

Organising objectives as a series of smaller targets nested within bigger targets allows for multiple benefit solutions to be developed as they are considered simultaneously (Gustafson et al., 2009). As this process iterates, it creates a hierarchy of motives to achieve change aspired by residents of the catchment (Mourad, 2016).

In the Waimatā, stories can aid the adaptive approach by providing new information through time, informing management responses and objectives. Conversely, without adaptive management, it is challenging to leverage the full potential of stories as they constantly evolve and represent new information. Stories gathered at the time of CMP generation will be different to ones shared throughout the CMP process, even if it is the same storyteller. Heraclitus was a Greek philosopher and poet in the 6th century BC and his quote summarises this sentiment in simple and clear terms.

No man ever steps in the same river twice,
for it's not the same river and he's not the same man

Although the same story at two different times may share similar learnings, the influences and perspectives may change, directly impacting how the story is told and received. Therefore, the ongoing adjustment and nesting of objectives create opportunities for information from stories to be added, such as biophysical stories (e.g., landscape evolution) and new socio-cultural meanings and stories that have been discovered. It is evident in section 5.2 and recent literature (Cairns, 2021; Fox et al., 2017; Salmond et al., 2022) that understanding of the catchment is still developing. Therefore, any new management approach needs to incorporate new understandings and knowledge as they become apparent.

6.3.8 Summary

New approaches to CMPs must reflect the plural knowledge and worldviews in management products. This research has shown that many perspectives and knowledge bases have been developed and held within the catchment. Management products that reflect these perspectives and knowledges can capture the catchment's unique traits and respond to concerns and issues with the catchment. Incorporating knowledge and worldviews is a direct product of better communication, engagement, negotiation and transparent discussions about uncertainties. The added benefit of improving communication and uncertainty understanding is the reduction in distrust as people are aware of the pitfalls, and relationships are built through these discussions reducing the barriers between science and the public. Governance has an important role in facilitating knowledge sharing and implementation, ensuring that adaptive frameworks are constantly evolving in response to monitoring results and the aspirations and expectations of the community.

6.4 Prospects for the future

6.4.1 Addressing ongoing concerns

During interviews, the three main concerns for catchment river health were sedimentation, forestry debris and human health implications. Sedimentation has a recurrent impact on the river's recreational/amenity value and ecological function. Forestry debris impacts the useability of the river and adjacent coastal zones and poses a hazard for those using the river or residing near the river. Participants highlighted how even small exposures to the river can result in skin irritation, the cause of which is still undetermined, but it is thought that it is a result of bacteria being harboured in the increase of silt. Overall, the three key concerns centre around the useability of the river and having a healthy river that resembles past environmental functions, which are seen as a time when the river was healthier and it was able to be used freely without concerns for safety or health. Each is closely tied to the ways of living on the Waimatā, with the river being used extensively for recreation and participants noting that they enjoy seeing the native ecology in the river.

The impact these concerns have is more pronounced by the sense of loss participants felt when comparing their experiences with the river to what experiences with the river would be in current settings. Such understandings and feelings can be referred to as solastalgia (Albrecht, 2007). Sections 5.3.1 & 5.3.2 highlight how participants have experienced these impacts, the increase in forestry slash, the loss of the recreational value of the river and the reduction in ecological abundance, because of decision-making. Strengthening decision-making can be enhanced by acknowledging these concerns and working backward, incorporating other knowledge to inform management steps and responses, this decision-making process is also posited by Shepherd et al. (2018).

Turnhout and Purvis (2020) discuss the need for approaches that recognise the inextricable links of science, society and policy, and therefore the 3 sections of society must work together to address ongoing concerns. Participants shared similar sentiments, recognising that catchment concerns may only appear in some places, but everyone feels the impacts. They also highlighted the need for a framework that sets:

- Clear expectations of landowners and how they use their land, which is a reflection of ingrained actions and behaviours (e.g., section 5.3.2, when talking about shifts in landowner behaviours as they gather a better understanding of the implications of their actions).
- New educational approaches to expand catchment understandings (e.g., section 5.4.4, when talking about how place-based learnings have resulted in children better understanding the catchment but also wanting to spend time in the landscape)
- Address existing concerns early in the CMP process (e.g. section 5.4.1 when talking about how planning has had opportunities to be better, but they have not been taken, this needs to be addressed into the future as concerns for the catchment remain largely unchanged)

By taking this approach, it opens a dialogue for the community and council to regularly discuss concerns for catchment conditions; this is something that participants felt is currently poorly done and would like to see changed in subsequent management steps.

Stories are an ideal mechanism to help address ongoing concerns. As previously mentioned by participants in section 5.2.2, people tell stories about what is happening on their land and therefore raise and discuss relevant and recent concerns. Broadly this helps to contextualise the individual events and their role in wider concerns. Stories are also a great way to alleviate concerns as they are a user-friendly communication method that scales to the level needed by the audience and has the diversity of mediums to help communicate the complex nature of concerns and what is being done to mitigate them. The development of clear landowner expectations and new educational approaches, as well as addressing existing CMP gaps, improves catchment residents' understanding of the issues and allows for consistent and unbiased incorporation of knowledge.

6.4.2 Knowledge incorporated in CMPs

Knowledges currently underpinning CMPs are inherently scientific, with guidelines determining the value of knowledge and its meaning (Gustafson et al., 2009). This is an inductive process that does not allow for information to tell the story. Stories are inherently deductive and therefore present an opportunity to capture catchment dynamics and state changes in a broader context.

However, at present, there has been difficulty shaping knowledge in ways that fit within the current cookbook approach (Fryirs & Brierley, 2009; Maynard, 2015). Section 5.3 highlighted the information that is generated and held within the catchment but is difficult to incorporate with existing policy and regulatory structures, this was further evidenced by the frustrations of participants in section 5.4 highlighting the difficulties they have had collaborating with the council, the Department of Conservation and other regulatory bodies. Although this is a local scale issue in this research, literature highlights that it is also a global issue that has been widely studied (e.g., Berkes et al., 2007; Kennish, 2002; Reid et al., 2018). To overcome the challenge of knowledge incorporation, early attempts to weave multiple knowledge's together through commonalities would allow CMPs to operate from one knowledge base and avoid the pigeonholing of catchments into predefined approaches as mentioned in sections 2.3, 5.4.2 and literature (Berkes et al., 2007; Fryirs & Brierley, 2021; Tadaki et al., 2017). Participants highlighted the want to participate and drive knowledge incorporation in section 5.2, they are aware of the need for more people to be involved to ensure that they get a CMP that they can support and feel empowered by. Further, section 5.4.1 highlights the need to embrace new approaches to overcome institutional constraints and avoid making similar management mistakes into the future, such as the removal of local scale engagement by national scale regulatory bodies such as the *DSIR and the Ministry of Works.* Therefore, knowledge incorporation that provides knowledge equity allows new and emerging knowledge types to be utilised in CMPs, reducing the number of knowledge gaps in catchment understanding (Kabisch et al., 2016; Wilcock et al., 2013). In the context of the Waimatā, it is also important to increase the influence and acknowledgement of Mātauranga Māori, as it provides the opportunity to approach CMPs from a different perspective encouraging policy and management

outcomes to move beyond the existing tick-box exercises that people engage with (Clapcott et al., 2018; Parsons et al., 2021; Te Aho, 2019). Such considerations were highlighted in sections 5.2.2 & 5.4.1, with participants highlighting the need to incorporate iwi perspectives and the importance of individual landscape features such as Motukeo. Creating the considerations ensures that management products have assessed the diverse worldviews held within the catchment and the necessary levels of management to represent all knowledges held in the catchment. Key to empowering different knowledges is the use of differing approaches which inherently favour one knowledge type or another.

Approaches and tools to facilitate the weaving of knowledges are equally diverse as the knowledge bases themselves. Literature suggests that creative forms of knowledge (GIS tools, Images, Maps, Narratives and Presentations) are great for communicating and legitimising efforts as they are compelling (Dahlstrom, 2014; Caquard & Cartwright, 2014). Responses from participants in sections 5.4.3 and 5.4.4 highlight the diverse knowledge ways for people to learn and gain knowledge about the catchment. Landscape simulations, time-lapses, field experiences and catchment group projects have all helped understand catchment phenomena, highlighting the benefits of sharing knowledge in different ways. The diversity of medium also prompts considerations about how different representations of knowledge influence people differently (Caquard & Cartwright, 2014; Kellas et al., 2021; Shepherd et al., 2018).

Equally, tools to open communication pathways are needed to allow place-based knowledge to inform the new Waimatā catchment plan, as discussed by participants in sections 5.4.1 and 5.4.2. Without understanding what is known and how it could inform CMPs, it is difficult to implement the knowledge "on the ground". Therefore, knowledge sharing should be a reciprocal process whereby people or groups openly distribute and consume knowledge to best inform actions (Mould et al., 2020a).

For these reasons, utilising river stories (stories told by people about the river) and the river story (the story told by the river in the form of geomorphic change) are equally beneficial in weaving knowledge together and informing CMPs as they provide context and broad enquiry to associate multiple events with one another.

6.4.3 Role of river stories in CMPs

Despite the greater demand for time and engagement, prospects to include river stories and the river's story are good if geoethics and the values of the river are understood. River stories provide an active and engaging platform to support and relate to catchment management plans. Very rarely can an approach provide:

- The contextualisation and understanding of biophysical processes and the associated cause and effect relationships of driving factors, this was clear through discussions with all participants in sections 5.3.1 and 5.4.2
- A compelling communication method has been widely accepted and used for centuries to provide clear, comprehensive and contextual information for everyone.

The ability to create hybrid perspectives of catchment and river states that draw on quantitative and qualitative knowledge types

The implication for the Waimatā is that when stories are incorporated in the CMP, what is known about the catchment is better contextualised and grounded in multiple knowledges. River stories effectively distil the things that matter (important characteristics of the river) to people that interact with the catchment and provide insight into how the environment has changed through time, how the environment responds to changes in driving factors and importantly, highlight the values held in the catchment (Robertson et al., 2000). Section 5.2 highlights how participants can remember the landscape, section 5.3 highlights how the landscape has changed, and section 5.4 highlights how planning considerations and processes have achieved limited change despite the evidential shift in landscape and riverscape status.

The Waimatā has many stories about how the catchment has been managed in the past with limited success, there is the opportunity to leverage the knowledge held in stories to inform management approaches. Stories are an avenue to regain the meaning of the landscape that conventional approaches have progressively stripped. Including local values and knowledge provides a wealth of data to reinstitute this meaning (Parsons et al., 2021). Therefore, CMPs that engage with stories and knowledge from within the catchment will understand the different worldviews and motivations for change, creating a CMP from the common spaces between disciplines. A desire for this to happen was expressed participants in section 5.4.2 when discussing wanting to share their knowledge with governing bodies and help train up governing body staff to see the landscape from their perspective.

An important role of stories is the references through time that help challenge the accepted shifting baselines that may be developing in current environmental management plans (Cammen et al., 2019; Soga & Gaston; 2018). An extension of river stories is to look at the voice of the river. Academic discussion has developed around the globe about giving environmental entities personifications, such as personhood, providing a different lens to view nature and its characteristics (e.g., Ruru, 2018; RiverofLife et al., 2021). Legal Personhood and Understanding of the lives of rivers have been researched more frequently since 2009 (e.g., Brierley et al., 2019; Gudynas, 2009; RiverofLife et al., 2021), and this lays the foundation for understanding the stories that a river can tell using its voice and forms a vehicle to rest management rationales on (Salmond et al., 2019).

From a Waimatā CMP perspective, the voice of the river helps to frame management approaches from the point of view of the river and establish the needs are of the river for it to improve its health, prominence in the world, and respect the role it plays in the region for people and biodiversity (Brierley et al., 2019)

6.4.4 Summary

For CMPs to remain effective in the future, there is a need for new frameworks of knowledge incorporation to be adopted. Such frameworks also need to be conducive to consistent additions of knowledge to build up knowledge bases and address ongoing concerns. River stories, the voice of the river and Living databases all have a role to play in guiding CMPs and collectively helping to build a broader understanding of what is happening in the catchment. This is where the use of stories is imperative to CMPs, as stories can portray information in ways that relate to the values and aspirations of the teller as well as the listeners' values and aspirations.

6.5 Reflections

Reflecting upon personal experiences in the conduct of this thesis, participants were welcoming, supportive and open/transparent with a willingness to take all the opportunities available to tell their story and build momentum for their cause. This made engagement with participants and understanding their perspectives particularly enjoyable and listening to people's stories allowed micro and macro-scale issues to be addressed in tandem. These discussions covered issues that most participants addressed and smaller nuanced pieces of information that otherwise would not be heard or discussed as readily.

The opportunity to interview ten people directly resulted from the intent to do each interview justice. The intention was to understand how stories could inform catchment management. I was mindful of the need to understand the full depth of the stories instead of hearing too many stories and being unable to do any of them justice. I scoped perspectives from people with a broad range of backgrounds and experiences to begin to understand the prospects of river stories as methods to inform CMPs.

The reflections and feedback of participants were central to the formation of this thesis, clarifying and directing responses in their desired directions based on the time they had to reflect between participating and receiving their transcript. This is a beneficial yet easily overlooked component of the research that allowed for clearer assertions of things that matter to them and how they saw CMPs changing into the future.

The transcription process was challenging - not from the perspective of insufficient learning, but instead too much information that presented some difficulties in crafting key messages. Doing justice to the wealth of knowledge presented in the ten interviews, especially in relation to inherent personal bias, was difficult in the short space allocated in a thesis.

One aspect of the research I did not foresee was that participants were initially unclear about what river stories meant. Therefore, their engagement with the concept may have been subdued. Time was spent explaining the concept to participants, and examples from previous literature whereby stories carry significant scientific reasoning were used to provide context (e.g., Berkes et al., 2007). To alleviate this uncertainty, future research could also provide a small paragraph or sentence about what a river story is in the PIS.

Findings from this thesis highlight the potential role that river stories could play in CMP processes. Implications for strengthening subsequent research include:

- Applying different data collection methods to get a sense of people's perceptions of river stories (e.g., use of video or infographic with a written response afterwards).
- Expand the sample size and range of experiences and backgrounds of participants to strengthen the understanding of river stories as a planning tool and, more importantly, understand the values and mindsets in the catchment and on the river.
- It is heartening to see the LTRS project continuing. Seeing how perspectives and approaches change would be valuable to understanding the implications of the management suggestions in this thesis and the eventual implementation in CMPs.

7 Conclusion

The Waimatā is characterised by its community, history, and underlying cultural associations to the landscape. Building on these relations, river stories and the river's story are a vital piece of reconnaissance to be carried out before writing the CMP, as they help to understand the social ecologies of the catchment. Stories create a living history and commentary of the catchment. Such understandings should not be discounted in contemporary settings and management practices purely because the information is delivered in unconventional ways. Stories are a way to apply a broader understanding of the landscape. They help to contextualise and situate valuable specialist information. They provide a compelling method of communication that allows more people to understand the meanings, values, aspirations and needs of the catchment for the future (Shepherd et al., 2018). River stories revealed in this thesis could be used to alleviate pressures on the catchment, thereby supporting a healthier river and population. They help to relate understandings of biophysical processes to socio-cultural drivers that shape uses of, and concerns for, the catchment.

Participants expressed great care for the landscape and riverscape of the Waimatā. Findings indicate clear aspirations for CMPs that reflect local values and aspirations. The interviews showed how cultural and social values have evolved and persisted through time within the catchment. The motivation for a healthier and balanced river, catchment, and community was recurrently emphasised. These aspirations reinforce the value of river stories to understand the many threads that represent diverse values of the Waimatā River and catchment, including its role in recreation, lifestyle, and culture. Stories also help to communicate the intentions and outcomes of catchment projects to date. By extension, they can inform future CMPs that communicate aspirations and what is not working.

Findings from this thesis highlight how CMPs have lost traction over time in New Zealand because of engagement frameworks that have excluded key stakeholders and the inability to capture and incorporate new knowledges. The rich knowledge held within the catchment has been reflected in the success of community initiatives to improve the state of the river and catchment. Activating and utilising new knowledge bases is also dependent on respectful processes of negotiation and engagement. The WCRG have shown how underlying knowledge can be incorporated into approaches. Thus far, emphasis has been given to small-scale projects that reflect associations between disciplines. The next step to mitigating transdisciplinary boundaries is regulatory support from the GDC and national level policy to ensure that collaboration results in more aspirational and meaningful management objectives and approaches. This exploration of the generative potential of river stories that bring together many knowledges and actors in the landscape highlights the potential for hybrid approaches.

River stories provide an excellent platform to support catchment management plans. It is important to acknowledge that the research focused on the supporting element of the research as there is not one approach or the other (quantitative or qualitative) that provides a complete solution. River stories allow practitioners to draw on the best bottom-up or top-down approaches to inform CMPs. Therefore, CMPs

need to be restructured to allow for the ongoing incorporation of stories and the information they hold. The process is long and cannot be rushed. Expectations need to be set early, so people do not lose interest in the progress of the management approaches.

Globally, river stories are just as powerful. The methodology used in this research to enhance the understanding of the Waimatā catchment can be translated to any other catchment, with equal anticipation that the benefits shown in this thesis can be expected for any other catchments in which the methodology is applied Stories provide the opportunity to empower perspectives (social, cultural and biophysical) and the essence of the individual catchments. They can be used to reassert values, perspectives (e.g., Indigenous, European) and information that inform and shape management approaches to represent the people of the catchment. River stories provide a way to understand and regain meanings of the environment that have either been lost through time or excluded. The importance of capturing the value of these meanings and stories is evident in recent literature that addressed new ways to manage nature, its rights and reinvigorate the importance of nature in people's lives (e.g., Berkes et al., 2017; Gudynas et al., 2009; RiverOfLife et al., 2021). Therefore, stories are valuable to influence how environments are managed, how people relate to environments and ensuring all perspectives on landscapes are upheld.

The Waimatā case study, alongside national and international examples, highlights the use case of stories and the potential to access the meanings of the landscape that are lost, emerging, or excluded. River stories are the past, present and future, yet they are underappreciated and utilised. This research highlights how stories support new approaches to CMPs and wider environmental management deliberations.

River Stories & Voice	Community Involvement & Engagement	CMP considerations	Council and Wider Governance influence	Catchment Character & Associations	Digital Solutions
• Essence of stories • Challenges of story incorporation • Informing potential of stories • Juxtapositions in the landscape • Chains of stories • Education potential • Forms of story • Geomorphic stories • Historic anecdotes • Importance of river stories • Trajectories • Forms of voice	• Landowner engagement • Accountability • Concern • Community engagement • Community involvement • Community priorities • Importance of inclusion and engagement • Uncertainties about the realities of co-governance	• Connectivity problems • Frame of reference • Implications of irregular management practices • Planning (in)effectiveness • Planning (in)efficiencies • Plan Development • Planning information sources • Planning logistics • Planning needs • Planning obligations • Things that matter • Virtue Signalling	• Council accountability • Council (in)efficiencies • Council Limitations • Council regulatory requirements • Council structures • Funding change • Government (in)efficiencies • Regulatory expectations • Implications of poor governance	• Social association • Spatial association • Negative associations • Catchment associations • Catchment characteristics • Temporal associations • Importance of the river • Māori associations and knowledge • Migrations to and from the river • Pilgrimages within the catchment • Recreation • Sites of Significance	• Advancing use case • Application • Communication • Council • Education • Evidential • Planning
Aspirations and Expectations	**Attitudes and Behaviours**	**Championing Change**	**Implications of Poor River Health**	**Construction and Distribution of Knowledge**	**Communication**
• Community • River • Expectations from the community for the Council • Expectations of the council for CMPs • Motivations for change	• Engrained attitudes • Awareness of attitudes • Many hands make light work (negative & positive) • Landowners	• Regeneration • Restoration • Existing • Future • Riparian • Scientific baselines • Scientific interventions • River meaning • Landscape connectivity • Magnitudes of influence	• Health implications • Land ownership implications • River and its contemporary implications • Disconnection • Minority influencers • Potentials for change • River industries	• Education/Experiences • Elitism and Knowledge Favouritism • Fluvial Understandings • Funds of Knowledge • River Values • Potential for change • Funds of Knowledge	• Methods • Outcomes • Pathways • Stakeholder to community communication • Potential to use stories

Appendix 2 – Individual PIS

Elliot Stevens
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PARTICIPANT INFORMATION SHEET
(Individual)

Project Title: Integrating River Stories in catchment management plans

Principal Investigator: Prof. Gary Brierley

Co-investigator: Dr. Daniel Hikuroa

Student Researcher: Elliot Stevens

My name is Elliot Stevens, and I am a Master's student in the School of Environment at the University of Auckland.

I would like to invite you to participate in my research. This study is focused on the Waimatā River (and the surrounding catchment) and the potential benefits of using river stories to influence catchment management policy. The study aims to ascertain the roles that can be played by fluvial geomorphology, social and cultural participation, and digital representations of rivers in advancing catchment management beyond what it is today. As part of the process of incorporating social and cultural perceptions in my thesis, you have been identified as someone that interacts with the river frequently and would like to volunteer your time and knowledge to the project.

Your participation will take the form of a semi-structured interview and your identity will be confidential. The Interview should take approximately 30-45 minutes to complete. Interviews are proposed to be carried out in person however may be forced to be done over Zoom or Phone. The time frame for the interviews is early 2022 (January/February). Interviews will be audio-recorded, with your permission. Recordings will be used to produce interview transcripts for analysis. You have the right to have the recording device turned off at any point of the interview. You also have the opportunity to review interview transcripts before analysis begins.

Participating in this study gives you the opportunity to share your understanding of river stories broadly or in relation to the Waimatā River. Knowledge collected from the research on river stories and aspirations for the future state of the Waimatā River may be used by the Waimatā Catchment Restoration Project Group to support and guide the restoration work.

Data from the interviews will be analysed and results published within the thesis. Research may be included in subsequent publications or at conferences in future. If the information you provide is reported/published, this will be done in a way that does not identify you as its source. Interview recordings, transcripts and consent forms will only be available to the researcher and investigators. Transcripts and recordings will only be stored on a University of Auckland hard drive, protected by passwords, for a period of six years following transcription. After the six-year period, information will be destroyed. You will be given an identification number at the conclusion of the interview, please remember or note this number as it will be needed to alter or destroy your submission.

Participation is voluntary and you have the right to withdraw from the research at any stage, without giving a reason. You can also adjust any responses in the transcript up to two weeks after receiving the transcript. In either case your identification number will need to be given as reference.

If you would like to receive a summary of the thesis' findings please provide your email address on the consent form, as with all other information collected this will be stored securely by the principal investigator until it is no longer of use and will be destroyed.

Thank you very much for your consideration of being involved in this project and helping to make it possible. Please contact me on the details provided below if you have any further questions.

As recognition of the time you have volunteered, we would like to offer you a small koha ($20 Supermarket Voucher) to say thank you! This is not a payment or inducement to partake, nor should it compel you to partake.

You are entitled to the koha regardless of whether you choose to withdraw participation or your data at any point.

Postal address: C/- School of Environment,
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand
Email address: este748@aucklanduni.ac.nz

You may also contact my academic supervisor, Prof. Gary Brierley:
Postal address: C/- School of Environment
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand
Email address: g.brierley@auckland.ac.nz
Phone: +64 9 923 8956

Alternatively, the Head of School, Dr Robin Kearns:
Postal address: C/- School of Environment
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand
Email address: r.kearns@auckland.ac.nz
Phone: +64 9 923 7412

For any concerns regarding issues, you may contact the Chair, The University of Auckland Human Participants Ethics Committee, at the University of Auckland Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on 16/11/2021 for three years.
Reference Number: UAHPEC23561

Appendix 3 – Individual Consent Form

Elliot Stevens
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Private Bag 92019
Auckland 1142
este748@aucklanduni.ac.nz

CONSENT FORM

(Individual)

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project Title: Integrating River Stories in catchment management plans

Principal Investigator: Prof. Gary Brierley

Co-Investigator: Daniel Hikuroa

Student Researcher: Elliot Stevens

I have read the 'Participant Information Sheet' provided and I understand the nature of the research and why I have been selected. I have had the opportunity to ask questions and have had them answered to my satisfaction. I understand my participation is entirely voluntary and can withdraw at any stage, without giving reason.

- I agree to take part in this research.
- I understand that this research involves a semi-structured interview that may take 30-45 minutes.
- I **agree / do not agree** (please circle) to be audio recorded. I may choose to have the recording device turned off at any stage of the interview. I acknowledge any recordings will be transcribed by a third party under strict confidentiality.
- I **would / would not** (please circle) like an electronic copy of the transcript of this interview.
- I understand that the digital recordings and transcripts of my interview will be stored on a password-protected University of Auckland hard drive for a period of six years, after which they will be destroyed. I may withdraw my data until two weeks following the reception of the transcript.
- I understand that this consent form will be stored in a secure file at the University of Auckland for a period of six years, after which it will be destroyed.
- I **agree / do not agree** (please circle) to direct quotes from my interview transcript being used in the final thesis and related academic publications. If quotes are used, they will be identified using my identification number.
- I **would / would not** (please circle) like a summary of the findings of this study, which can be mailed or emailed to me at the address below.
- I have had the opportunity to accept or decline a koha as recognition of the time I have volunteered to the project. I understand this **is not a payment or inducement** nor has it compelled me to participate.

Email or Postal address: _____

Signed: _____

Name (Please print clearly): _____

Approved by the University of Auckland Human Participants Ethics Committee on 16/11/2021 for three years. Reference Number: UAHPEC23561

Appendix 4 – Group PIS

Elliot Stevens
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The University of Auckland
Private Bag 92019
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este748@aucklanduni.ac.nz

PARTICIPANT INFORMATION SHEET
(Group Leader)

Project Title: Integrating River Stories in catchment management plans

Principal Investigator: Prof. Gary Brierley

Co-investigator: Dr. Daniel Hikuroa

Student Researcher: Elliot Stevens

My name is Elliot Stevens, and I am a Master's student in the School of Environment at the University of Auckland.

I would like to seek permission for members of your group to participate in my research. I would appreciate your assistance in suggesting potential participants for the research also. Please also note, you cannot give permission on behalf of the group member to participate, withdraw their data or be recorded.

This study is focused on the Waimatā River (and the surrounding catchment) and the potential benefits of using river stories to influence catchment management policy. The study aims to ascertain the roles that can be played by fluvial geomorphology, social and cultural participation, and digital representations of rivers in advancing catchment management beyond what it is today. As part of the process of incorporating social and cultural perceptions in my thesis, I would like to interview members that interact with the river frequently and would like to volunteer your time and knowledge to the project.

Their participation will take the form of a semi-structured interview and their identity will be confidential and only known to the researchers. The Interview should take approximately 30-45 minutes to complete. Interviews are proposed to be carried out in person however may be forced to be done over Zoom. The time frame for the interviews is early 2022 (January/February). Interviews will be audio-recorded, with the participants permission. Recordings will be used to produce interview transcripts for analysis. Participants will have the right to have the recording device turned off at any point of the interview. They will also have the opportunity to review interview transcripts before analysis begins.

Participating in this study gives participants the opportunity to share their understanding of river stories broadly or in relation to the Waimatā River. Knowledge collected from the research on river stories and aspirations for the future state of the Waimatā River will be provided back to you (the group) to support and guide future restoration work.

Data from the interviews will be analysed and results published within the thesis. Research may be included in subsequent publications or at conferences in future. If the information provided is reported/published, this will be done in a way that does not identify participants as its source. Interview recordings, transcripts and consent forms will only be available to the researcher and investigators. Transcripts and recordings will only be stored on a University of Auckland hard drive, protected by passwords, for a period of six years following transcription. After the six-year period, information will be destroyed.

Participation is voluntary and participants have the right to withdraw from the research at any stage, without giving a reason. Participants can also adjust any responses in the transcript up to two weeks after receiving the transcript. In either case the identification number will need to be given as reference.

Please ensure that participation or non-participation will not affect the participant's relationship with your group or access to its services.

Thank you very much for your consideration of being involved in this project and helping to make it possible. Please contact me on the details provided below if you have any further questions.

As recognition of the time participants have volunteered, we would like to offer them a small koha ($20 Supermarket Voucher) to say thank you! This is not a payment or inducement to partake, nor should it compel you to partake.

Postal address: C/- School of Environment,
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Email address: este748@aucklanduni.ac.nz

You may also contact my academic supervisor, Prof. Gary Brierley:
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Alternatively, the Head of School, Dr Robin Kearns:
Postal address: C/- School of Environment
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand
Email address: r.kearns@auckland.ac.nz
Phone: +64 9 923 7412

For any concerns regarding issues, you may contact the Chair, The University of Auckland Human Participants Ethics Committee, at the University of Auckland Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on 16/11/2021 for three years.
Reference Number: UAHPEC23561

Appendix 5 – Group Consent Form

Elliot Stevens
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Private Bag 92019
Auckland 1142
este748@aucklanduni.ac.nz

CONSENT FORM

(Group Leader)

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project Title: Integrating River Stories in catchment management plans

Principal Investigator: Prof. Gary Brierley

Co-Investigator: Daniel Hikuroa

Student Researcher: Elliot Stevens

I have read the 'Participant Information Sheet' provided and I understand the nature of the research and why I have been selected. I have had the opportunity to ask questions and have had them answered to my satisfaction. I understand my participation is entirely voluntary and can withdraw at any stage, without giving reason.

- I grant permission for members of the group to take part in this research.
- I understand that this research involves a semi-structured interview that may take 30-45 minutes.
- I understand that I cannot give permission on behalf of the group member to participate, withdraw their data or be recorded.
- I understand that this research is participant confidential and therefore I will not have any further involvement with participation following my organisational support for members to volunteer to participate.
- I understand that the digital recordings and transcripts of the interviews will be stored on a password-protected University of Auckland hard drive for a period of six years, after which they will be destroyed.
- I understand I will not have any access to data collected, aside from the summary provided at the conclusion of the research, if I provide my email or postal address.

- I assure the research team and prospective participants that participation or non-participation will not affect the participant's relationship with the organisation or access to its services.

Email or Postal Address: _____

Signed: _____

Name (Please print clearly): _____

Approved by the University of Auckland Human Participants Ethics Committee on 16/11/2021 for three years. Reference Number: UAHPEC23561

Appendix 6 - Transcriber Confidentiality Agreement

SCIENCE
SCHOOL OF ENVIRONMENT

Elliot Stevens
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TRANSCRIBER CONFIDENTIALITY AGREEMENT

Project Title: Integrating River Stories in catchment management plans

Researcher: Elliot Stevens

Supervisor: Prof. Gary Brierley

Co-Supervisor: Dr. Daniel Hikuroa

Transcriber:

I agree to transcribe the audiotapes/videotapes for the above research project. I understand that the information contained within them is confidential and must not be disclosed to, or discussed with, anyone other than the researcher and his/her supervisor(s).

Name: _____

Signature: _____

Date: _____

Approved by the University of Auckland Human Participants Ethics Committee on 16/11/2021 for three years. Reference Number: UAHPEC23561

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