Rivers, residents, and restoration: Local relations to the Waimatā River, Aotearoa New Zealand

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Key Points

- Understanding local relations to river systems is a key component of effective restoration
- Geography and history are key determinants of social relations to rivers
- River health and interactions with river systems influence residents' mental and physical wellbeing
- Concerns and aspirations of residents underpin local commitment and engagement with restoration practices

Abstract

The effectiveness of restoration efforts depends upon what you measure against. Surveys of societal relations to rivers provide critical baseline information with which to measure current engagement and facilitates future evidence-based appraisals of the effectiveness of restoration programmes. Yet collection and analysis of such data are rare. This paper assesses local relations to the Waimatā River on the East Cape of Aotearoa New Zealand. The river suffers from high sedimentation rates, declining water quality and poor biodiversity and ecosystem function. A mixed-methods approach assesses local relations to the Waimatā River using document analysis, a catchment-wide questionnaire, and semi-structured interviews with residents. Geography and history are key determinants of social relations to the river. Interactions declined as perceived condition diminished, yet emotional connections strengthened over time. Interactions with the river positively influenced mental and physical wellbeing. Strong themes of responsibility and governance emerged, with forestry companies, Gisborne District Council (GDC) and agricultural practices held responsible for the current state of the river. Incorporating knowledge of local relations to rivers in the design and implementation of restoration activities, incorporating concern for blue spaces, enhances long-term prospects for collective wellbeing.

Keywords

River restoration, local relations, river management, river health, wellbeing

Introduction

The effectiveness of restoration efforts is entirely dependent upon what you measure against. Public engagement is a key component and benefit of restoration initiatives. Hence, surveys of societal relations to rivers - perceptions, aspirations, values, uses, etc - provide critical baseline information with which to measure engagement with the river. Unless such information is in-hand, we will not have anything to measure against in future decades, limiting prospects to generate evidence-based appraisals of the effectiveness of restoration programmes. Despite this, little effort has been given, to date, to collection and analysis of such data – how to go about it, how to use such analyses? This paper documents findings of a case study that analyses local relations to the Waimatā River at Gisborne on the East Cape of Aotearoa New Zealand. A mixed-methods approach applies document analysis, a catchment-wide questionnaire (letter drop, online survey) and semi-structured interviews with residents.

River restoration is as much a social process as it is a scientific and technical one (Eden & Tunstall, 2006; Fryirs & Brierley, 2009). Solely technical applications that exclude public involvement risk the success of intervention and often further disconnect communities from the environment (Spink et al., 2010). Without general understanding of how people relate to rivers and the factors that drive public support for restoration practice, management efforts are unlikely to incorporate and facilitate long term involvement and acceptance of restoration (Eden et al., 2000). Incorporating local knowledge in the design and implementation of restoration could enhance long-term prospects for success through programmes that sustain public support for, and engagement with conservation initiatives. For river restoration to be socially desirable and considered worthy of support, it needs to work to restore relationships between people and the land, integrate social aspirations for the system, reflect cultural values and attain a sustainable balance between ecological and societal needs. To do so, social relations to river systems need to be understood and incorporated into restoration plans (Mould et al., 2020a; Petts, 2007; Smith et al., 2016). Recognizing and supporting 'river champions', effective and influential people working for better river management in a range of capacities, is also key to successful and inclusive restoration (Mould et al., 2020b).

Regional Setting

The Waimatā River begins in the steep hill country north of Gisborne City in the East Cape region of the North Island of New Zealand. It flows 20 km south through rural and residential Gisborne to the town centre where it meets the Taruheru River to form the Tūranganui River. The steep terrain of the upper catchment primarily consists of pine plantation forestry and agricultural land for sheep and cattle farming. Many farmers have resided across generations in this area (Gundry, 2017). The mid catchment is primarily lifestyle blocks transitioning to residential property closer to the city and the port (lower catchment).

The river plays a significant role in the history and identity of Gisborne (Table 1). Today the Waimatā suffers from elevated nutrient and Escherichia coli concentrations, high sedimentation, and poor biodiversity. This reflects intensive forestry and farming practices in a catchment characterized by tectonic activity, steep slopes, and weak lithology (Cullum et al., 2017; Marden, 2011). Overall, water quality is worse in the lower catchment than in the upper reaches (GDC, 2020). Flooding and debris accumulation from forestry slash is pronounced following heavy rainfall events. Overflow releases of sewage occur urban areas during flood events. To mitigate damage and improve river condition, a catchment restoration programme focuses on the upper and mid catchments.

Table 1. Timeline of significant events in the history of the Waimatā River

1300s	Arrival of Horouta and Tākitimu waka (voyaging canoe) from Polynesia and subsequent settling of Māori in Tairāwhiti (Gisborne).
1769	Arrival of Captain James Cook and first greeting between pākehā (non-indigenous person) and Māori at Tūranganui River mouth.
1831	Establishment of trading station and subsequent arrival of other traders and missionaries.
1868	Establishment of Gisborne town.
1877	Destruction of Te Toka-ā-Taiau (sacred rock) in the Tūranganui River for port development.
1880s	Large-scale clearance of native forest for agriculture.
1960 – 1970s	Fragile soils and erosion issues. Government-subsidised soil conservation initiative planting exotic pine plantations.
1988	Cyclone Bola causes widespread erosion and flooding. Further planting of pine forest for stability.
1989	Gisborne District Council (GDC) created as part of major national reform of local government.
1990s	Sale of pine plantations to (inter)national companies. Intensive logging operations begin
1991	Introduction of the Resource Management Act (1991) supports sustainable management of natural and physical resources. Requires councils to create plans that help with environmental management. GDC given responsibility for monitoring and managing the region's rivers.
2020	Creation of the Waimatā Catchment Restoration Project. Designed to improve the ecological, geomorphological, and biogeochemical functions of the river and its catchment, while restoring local and cultural connections to the river.

Methodology

A mixed-methods approach was used to assess relations to the Waimatā River. Online questionnaires and semi-structured interviews with a range of residents from across the catchment provided a comprehensive picture of relationality that included experiences, attitudes, behaviours, and perceptions. The catchment was divided into three areas: Area 1/upper catchment, Area 2/mid catchment and Area 3/lower catchment, based on geographical boundaries and patterns of population density and land use (Fig. 1). Respondents outside of this area were classed as Area 4/outside of the catchment.

The questionnaire consisted of 22 questions, predominantly closed, covering five main categories: demographics, river interaction, river health, values and emotional connection and river restoration and aspirations. Questionnaires were distributed online to groups that interacted with the river (e.g., rowing, waka ama, kayaking clubs), the restoration group mailing list, and dropped in letterboxes within the catchment. In total, 102 responses were received, the majority completed online. Of respondents that expressed interest in participating in an interview, six participants were selected from across the different catchment areas. Four additional participants were also selected based on their involvement in river-related organisations (waka ama, Māori relations, the catchment restoration project, farming, and restoration work). Due to the COVID-19 pandemic, interviews were mainly held over Zoom or by phone and lasted between 30 to 90 minutes dependent on the participant. Semi-structured interviews allowed for flexibility in questions and responses. Themes addressed in questionnaires were explored in depth, including experiences and responsibility. Questionnaire responses were analysed using Qualtrics and Microsoft Excel. Interviews were analysed using qualitative data analysis software NVivo to code responses and identify similarities and differences.

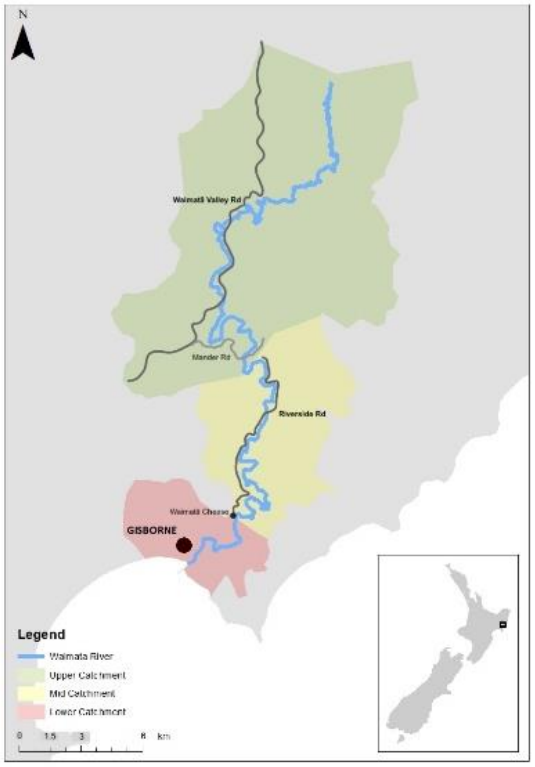

Figure 1. Delineation of the different catchment areas within the Waimatā catchment referred to in this study.

Results

Societal interactions and values

For most respondents, particularly those in the lower and mid catchments, their interactions with the Waimatā were purely recreational, including walking and paddling sports (kayaking, waka ama and rowing). Fishing was

particularly common in respondents from the mid-catchment. In the upper catchment, interactions with the river were primarily work-related associated with farming practices.

The average respondent indicated six different values of the Waimatā River (Fig. 2a). Overall, recreational opportunities were the most common value (92%), alongside scenic attributes – attractive scenery, sights, and sounds (89%). Spatial differences in values reflected respondents' interactions with the river. In addition to aesthetic value, respondents living in the upper catchment valued the river for its wilderness, whereas those in the mid and lower catchment commonly valued the river for recreational opportunities. The mid catchment also commonly valued the river for its learning and educational attributes and biodiversity.

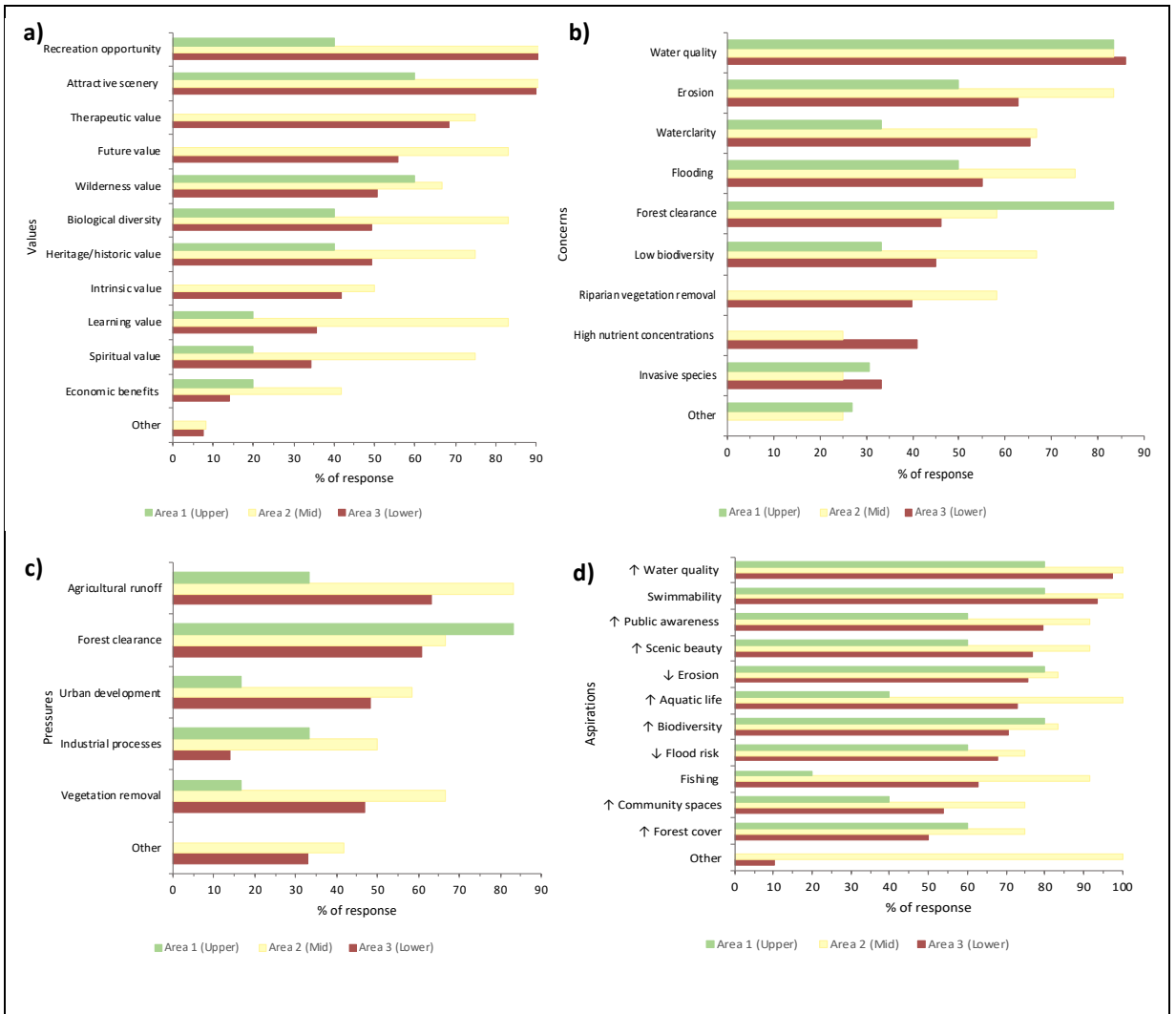

Figure 2. Residents and river users': a) values of the Waimatā River; b) key concerns for the Waimatā River; c) perceived pressures on the Waimatā River; d) aspirations for the Waimatā River across the catchment.

While 29% of respondents felt no emotional connection to the river, others did, using expressions such as 'home', 'calming', 'part of the family', 'deep appreciation', 'part of my life', 'therapeutic' and 'heritage'. Profound cultural connections were expressed in some instances, with one respondent referring to the river as their 'tūrangawaewae' (foundation, place to stand). Others described themselves as 'kaitiaki', reflecting their role in protecting the awa (river) from further degradation and considered it to be their responsibility (building on

ancestral connections). Recurrent use of the Māori proverb '*Ko au te awa, ko te awa ko au*', meaning 'I am the river, the river is me', reflects the deep connection and responsibility many feel towards the river.

Of those that felt they had an emotional connection to the river, 72% felt the connection had strengthened over time, 6% thought the connection had weakened and 22% felt there had been no change. Those that had lived in the catchment for the longest periods (>10 years) showed higher emotional connections with the river than those with shorter residency lengths (1-5 years). Most respondents (81%) reported a connection between river health and societal wellbeing (81%). Interview comments on connections between people and nature include:

> 'We are all connected. Healthy water, healthy people.'
>
> 'It makes me happy to see fish in the river, birds nesting nearby, swimming in it on days when the water is clear and warm is amazing and paddling to town is the best adventure one can have.'
>
> 'Without a doubt, it has to have a huge emotional part, if it's in good condition. Because you want to be there. Even on a dirty day [locals] want to be there.'

River health and restoration prospects

When asked how satisfied respondents were with the current state of the Waimatā on a scale from 1 to 10 (one being unsatisfied, ten being very satisfied), the median response was 5 – neither satisfied nor unsatisfied. The most common response was 3 out of 10 (26%) and least common 9 and 10 (1% each).

When asked how healthy they considered the river to be on a scale of 1 to 10 (one being very unhealthy, ten being in perfect health), the mean and median response was 4. The most frequent response was 3, indicating lower perceptions of health. Only 3% of respondents responded with 8 or above. The perceived level of health was slightly higher in the upper catchment than in the mid and lower catchment.

Water quality was the greatest concern across the entire catchment (Fig. 2b; 86% of all respondents). In the upper catchment the effect of forest clearance was a primary concern, while in the mid catchment erosion was a greater concern. Water clarity was a main concern in the lower catchment. Of 'other' concerns selected, 30% of respondents listed the release of sewage into the river via stormwater overflow. Forestry slash, pollution (particularly from the port) and the lack of a clear role of mana whenua (indigenous people with rights over land) were also listed. Only one respondent felt they had no concerns for the health of the Waimatā. Of note was that water quality was perceived to be better and less of an issue by farmers than by urban and non-farming respondents. As noted elsewhere (e.g., Church et al., 2020), farmers in the Waimatā feel that they are stewards of the land yet are given a disproportionate percentage of the blame for poor water quality relative to impacts of forestry practices or sewage releases by GDC in the lower catchment.

Overall agricultural runoff and forest clearance were perceived to be the greatest pressures on the river (Fig. 2c). Over 70% of respondents stated that river health had declined over time, while only 11% observed an improvement. Some interviewees highlighted increased awareness about the environmental state and impacts, especially associated with the emergence of the restoration project and an enhanced incentive of funding.

Most residents and river users felt that restoration of the Waimatā is necessary, yet views of what restoration means varied markedly, reflecting personal and local concerns and aspirations. When asked how necessary restoration of the river is on a scale of 1 to 10 (one being very unnecessary, ten being very necessary), the median response was 9. The most common response was 10 (36%) and 96% of respondents selected 5 or above. The perceived need for restoration was highest in the mid catchment (median: 10), compared to upper and lower catchment areas (median: 7 and 8 respectively). This corresponds with higher perceptions of greater pressures on the Waimatā by residents in the mid catchment and potential higher environmental concern.

All respondents selected nearly all options in a list of aspirations for future restoration work on the Waimatā River (Fig. 2d). Aspirations were mainly biophysical, particularly water quality (97% overall) or linked relational attributes such as swimmability (94% overall). These concerns reflect common issues of sedimentation and high nutrient levels along the river. In addition to concerns for water quality and swimmability, decreased erosion was a common aspiration in the upper catchment, linked to concerns for loss of productive farmland, whereas increased aquatic life and fishing were common in the mid catchment. While concerns for water quality were expressed across the catchment, they were especially pronounced in lower reaches where recreational activities are negatively impacted. Fishing was a priority issue in responses noted from mid catchment residents. Public awareness was a common aspiration in the lower catchment. As one interviewee commented, 'Everybody profits from a healthy river. Everyone suffers if it is not useable.'

Responsibility emerged as a key theme in interviews, with explicit, recurrent mention of the role of GDC, forestry companies and landowners in managing concerns for the health and wellbeing of the Waimatā. In particular, GDC were held responsible for their role in releasing sewage and wastewater into the river. GDC have a legal requirement to protect the interests of local iwi Ngāti Porou and Rongowhakaata in resource consent decision making, including them in relevant regional plans and policy statements (GDC, 2013). While most respondents placed responsibility for the state of the Waimatā on local government and contributing industries (forestry and agriculture), when asked explicitly asked how to address concerns, an emphasis upon public responsibility emerged (i.e., a collective responsibility or duty of care approach to river systems; Salmond et al., 2014). When queried, several residents emphasized the importance of collective and respectful concerns for healthy rivers, noting this was the responsibility and right of everybody in the country.

Discussion

As restoration is as much, if not more, a socio-cultural imperative than a scientific and technical practice, understandings of complex social relations are required to support restoration programmes. Findings from this study form a baseline summary of contemporary societal relations to the Waimatā River. This provides a platform against which the effectiveness of restoration programmes can be assessed into the future, as at least we now have something that we can measure against (i.e., we can now do things that we could not do before).

Understanding relational values and incorporating them into practice is critical in ensuring long-term public involvement in restorative work (e.g., Tadaki et al., 2017). Findings from this study indicate that geography and history – where residents live in the Waimatā catchment, their length of residence/connection, and their interactions with the river - shape their perspectives and aspirations for restoration. The presence and strength of emotional connections to the river reflected length of residence, especially over ten years, as noted elsewhere (cf., Kleit & Manzo, 2006; Lewicka, 2011). Generational ties between residents and the Waimatā, particularly those in the upper catchment produced strong place attachment. Sometimes, newcomers to an area, or those with shorter residence lengths, may not have developed an authentic attachment to a place or share the values of the resident community as they have not contributed to the space's creation (Stedman, 2006). However, these are far from universal relations, as strong connections to the Waimatā River were also reported by residents that had lived in the catchment for less than a year.

Cultural factors also influenced relations and emotional connections to the Waimatā River. Local iwi (tribes) trace strong cultural ties to the environment to their arrival in Tairāwhiti (Gisborne) in the 1300s (Salmond et al., 2019). Several respondents refer to the saying '*Ko au te awa, ko te awa ko au*. I am the river, the river is me', which originates from the people of the Whanganui River in New Zealand and depicts the relationship between Māori and their awa (river). In this interconnected, indivisible view of the world and river systems (Te Aho, 2010), the metaphysical and material characteristics of blue spaces are interwoven and connected to the wellbeing of tāngata whenua (people of the land) (Harmsworth & Awatere, 2013). Respondents emphasized the importance of incorporating this perspective into restoration and management strategies.

Relations to water bodies have long been associated with concerns for human health, whether associated with use of water for treatment and recovery, health maintenance, mental health and wellbeing or within spiritual and religious practices (Foley et al., 2019). Despite its apparent degraded state, residents in the Waimatā catchment spoke of the benefits and solace provided by the river as a place of refuge for residents and river users. Residents referred to the river as 'therapeutic', with one respondent relating their meditative practice of watching the river and its flow as 'restorative'. In this light, blue spaces can support broader conceptualizations of restoration practice, incorporating concerns for collective wellbeing – for individuals, society, and the river itself (e.g., Brierley, 2020; cf., Parsons et al., 2021; Völker & Kistemann, 2011).

River health may influence such psychological interactions (de Bell et al., 2017). This incorporates what Albrecht (2006) labels as solstalgia – psychological distress resulting from environmental loss. The perceived quality of freshwater systems can impact how spaces are used, with poor environmental quality acting as a deterrent for users (McCracken et al., 2016; McDougall et al., 2020). Paralleling findings by Doi et al. (2013), residents on the Waimatā noted that their interactions had changed over time, stating that degraded water quality and the risk of waterborne diseases compromised the swimmability of the river, and other uses. Indeed, several studies show how water bodies of a poor quality are less frequently used for swimming, boating, and fishing and therefore are less likely to positively impact upon mental and physical health (Curtis et al., 2017; Lankia et al., 2019). As one questionnaire respondent stated, 'How can my soul feel good when the river is often filthy with lots of debris!!' Contamination, erosion, and flooding events in the Waimatā restrict its uses, disconnecting the river from prospective users. The social importance of blue space and its condition indicates the strong need for the protection and restoration of such environments.

Conclusions

Residents of the Waimatā catchment are not satisfied with the current state of their river. A need for restoration, in its many forms, is evident. Residents have multiple aspirations for their river and opinions on how these are to be achieved. This includes improved water quality, swimmability, increased public awareness around river protection and environmental knowledge, and increased scenic beauty. As noted elsewhere, such aspirations reflect values that satisfy human needs (Junker & Buchecker, 2008; Tunstall et al., 2000). In this instance, however, and across the whole of Aotearoa New Zealand, such perspectives are conceived through a broader lens that reflects Treaty obligations and relationships with Māori as rightsholders, including the rights of the river itself (Brierley et al., 2019; Salmond et al., 2019). This prompts greater regard for public awareness around river protection and environmental knowledge.

Understanding local relations to rivers and the roles rivers play in the lives of residents can help in the design and implementation of restoration projects and catchment management plans by highlighting different aspects of the river and river values that locals consider important. These may differ or be broader than purely ecological values and result in greater buy-in by the public for restoration. Consequently, by engaging residents in the deliberation, design**,** and implementation of projects through workshops, surveys, education**,** and restoration work**,** long-term (ongoing) prospects for success are likely to be enhanced. Failure to do so may result in a lack of support in which positive impacts on both the natural and social environment are not sustained. A collaborative approach to management seeks a common vision to guide such deliberations (Gregory & Brierley, 2010).

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