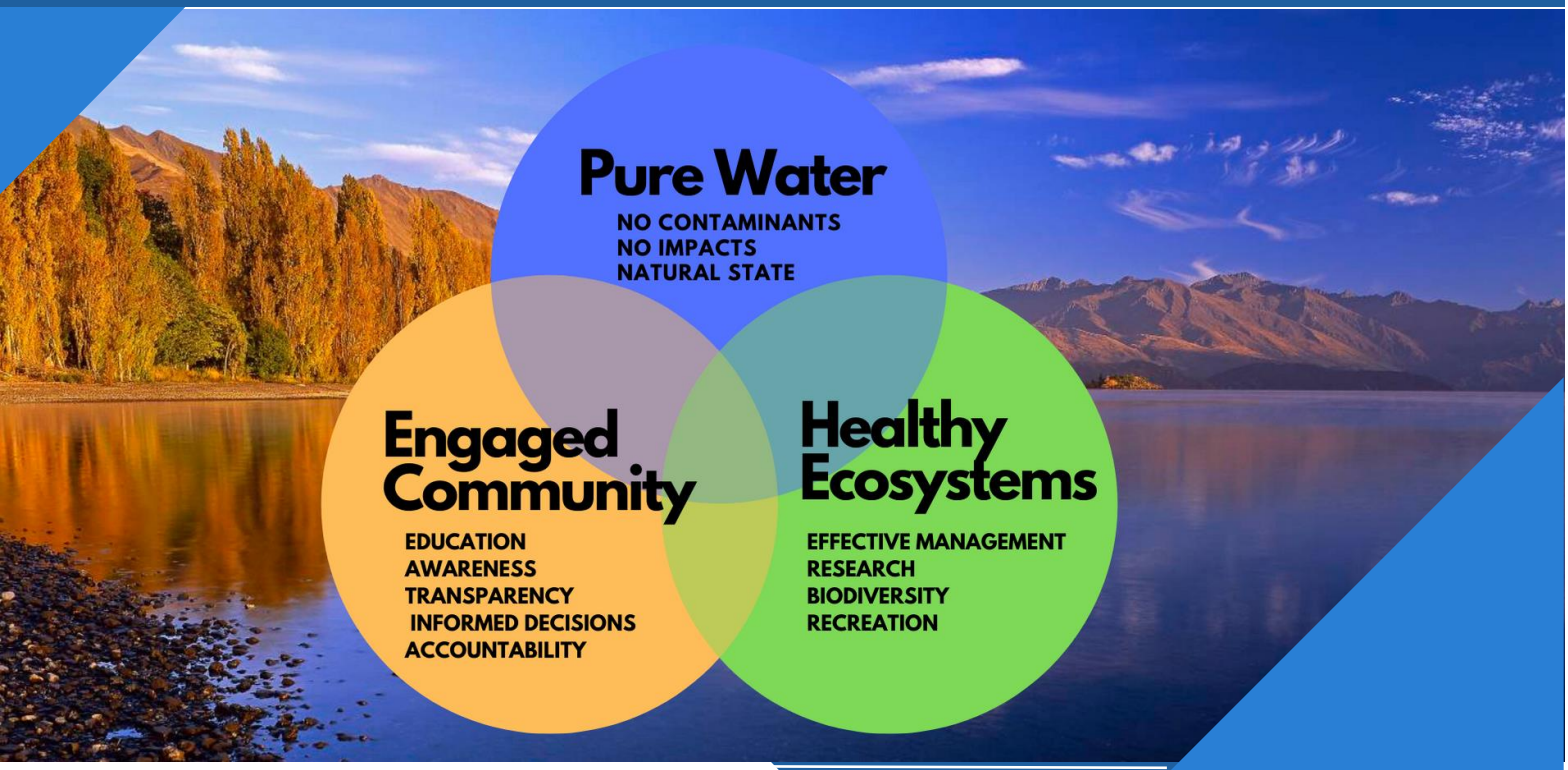
Upper Clutha Freshwater Taskforce Report 2019



Shaping Our Future

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Executive Summary

Upper Clutha Freshwater Vision 2050

Based on information gathered at forum, the taskforce developed a vision for the future of freshwater. The recommendations included within this report are steps towards achieving the vision.

The vision has three parts:

- **Pure Water**
- **Healthy Ecosystems**
- **Engaged Community**

Accountability across the community is key to achieving the vision – involving regulatory agencies (ORC, QLDC, MfE), land owners (including DOC), national and local organisations (e.g. Fish & Game, Forest & Bird), business owners, tourist operators, residents and visitors.

Freshwater Challenges in the Upper Clutha

Freshwater in the Upper Clutha faces immediate and big challenges into the future, including:

- Rapid population growth (both visitor and resident) has led to significant land use changes including urban development, rural land changes, loss of habitat and wetlands, increased demand for water to support land use changes and unknown impact of historic and current contamination of freshwater resources.
- Incursions of new invasive species and the spread of existing pest species in natural eco-systems.
- Lack of a co-ordinated, informed approach to freshwater management that prioritises the quality, quantity and health of freshwater systems.
- Lack of time series (longitudinal) research and monitoring that is specific to Upper Clutha to inform decision-making.
- Length of timeframes for implementing change, agreeing to actions and results to show within freshwater bodies.
- Climate Change – uncertain but potentially serious implications for water quality and quantity.

Summary of Key Recommendations

The taskforce recommends the following steps towards achieving the community's 2050 vision for freshwater. The current challenges of growth, community culture and funding were considered in establishing the recommendations. Minimising the impact of growth on freshwater is a key priority for the community and is a complex, multifaceted challenge with no one solution. The recommendations and vision, when implemented, will help mitigate the impact of growth.

Further detail including who is responsible for the key recommendations is included on page 11.

1. *Leadership* and *Management*

- Establish a formal process for ORC, QLDC and MfE to work closely with the community to effectively manage freshwater quality including managing the impact of development, run-off systems and monitoring. An effective, efficient process with clear accountability and management actions will result in legislation and regulation that is research based with clear accountability for all stakeholders. Figure 1 illustrates how this process might work.

Figure 1: Example of a formal process for managing the Upper Clutha catchments

Leadership and Management (continued)

- Develop and implement Water Sensitive Urban Design and Rural Land Use policies for the Upper Clutha to reduce the impacts of growth on freshwater systems. Prioritise sustainable land use and urban design.
- Strengthen legislation applying to development of residential & commercial subdivisions to ensure development activities have no adverse impact on freshwater. Legislation should promote best practice and provide for enforcement and penalties. All new development proposals evaluated for water sensitive design elements, appropriate use of land and impacts on local freshwater systems.
- Carry out a regular, independent review of National Policy Statement for Freshwater Management attributes and their application and compliance in the Upper Clutha.
- Identify and adopt science and global best practices to inform policy, planning and management decisions.

Protecting and Enhancing Eco-Systems

- Establish and implement an Upper Clutha Freshwater Management Plan that includes:
  - Wetland re-generation, protection and expansion.
  - Continuation of appropriate riparian planting.
  - Reduced contamination from urban and rural activities.
  - An understanding of Climate Change effects.
  - Establishment of a habitat renewal and re-stocking programme for native aquatic species (eels, bully, galaxiids).
  - Evaluation of hydro lake levels and their impact on eco-systems, habitats, flows, and migration patterns.

2. *Community Culture – Education and Awareness*

- Develop and implement an education and awareness programme for freshwater to give positive, strong and effective guidance to our businesses, residents and visitors in how they care for our water. It will be well co-ordinated driven by, understood and supported by the whole community.

  Key short-medium term areas for education and awareness include:
  - Water use.
  - Contaminants directly/indirectly entering freshwater systems and all their impacts including: fertilizer, herbicides, pesticides, animal sewage, human sewage, paints, detergents, metals, plastics, pathogens, development runoff (NB these contaminants come from rural, urban and industrial properties).
  - Invasive species.
  - Opportunities, education and engagement in practical ways for the community to positively impact on local freshwater systems.
  - Available, transparent and accessible information and research to inform decision making.
  - Eco-system mapping – Who is doing what? Where are the gaps? Where are the similarities? Opportunities for collaboration?
- Encourage businesses to adhere to active water management/environmental plans that include reducing water use, contaminant run-off and proactive wastewater/recycling treatment systems.

  These may include:
  - Star system or grading introduced for businesses through ORC and QLDC.
  - Water metering (to be further consulted on).
  - Education and penalties to incentivise change.
- Implement a more robust, transparent and accessible system for managing water takes.

Community Culture – Education and Awareness (continued)

- Encourage individuals, landowners and households to learn about and take responsibility for:
  - Water usage i.e. how much they use:
    - Amount of run-off from hard surfaces.
    - Contaminants in run-off e.g. paints, detergents etc.
    - Contaminant source identification.
  - Initiatives might include:
    - Installing rainwater tanks.
    - Recycling water/greywater systems.
    - Water Metering.
    - Painting fish on storm water inlets.
    - Placing nets on storm water outlets.

3. Research and Monitoring

- Establish a research and monitoring system for the lakes, rivers and catchments of the Upper Clutha that is robust, nationally comparable and with greatly expanded scope and funding.
  - Current lake / river water quality measures to establish a robust baseline and monitor over time.
  - Identify and understand all freshwater systems within the catchment area
  - Establish modelling processes to understand and manage inputs/outputs/ contaminants and the impacts these may have in the future.
  - Understand the impact of changing land use – across both rural and urban landscapes.
  - Provide an overall picture of the Upper Clutha –accessible information on quality/quantity/eco-system health.
  - Identify innovative solutions for the Upper Clutha to reduce contamination entering the waterways.
  - Understand the impacts and implications of climate change.
- Provide funding to understand the impact of invasive organisms and to establish a management plan to prevent, eradicate or control invasive organisms in the Upper Clutha.
- Identify and adopt science and global best practices to inform policy, planning and management decisions.
- Support monitoring to identify baseline information to assist in developing better urban and rural land use practices.
- Support education, research and monitoring to identify baseline information and help develop better rural land management practices in the Upper Clutha in order to reduce water use, nutrient, sediment, bacterial, protozoan and chemical run-off.
- Fund land-use research and utilisation of tools/technology to establish best use/profitability for land within the catchment areas that ensures minimal impact on freshwater in the future.

Background

In April 2018 Shaping our Future held public forums in Wanaka and Queenstown on the topic of freshwater in the Queenstown Lakes District. Over 220 responses were gathered at the forums and online, including 85 forum attendees and 41 online responses directly related to the Upper Clutha. In addition, over 800 primary and secondary school pupils shared their views on the challenges, priorities and ideal future of freshwater.

Shaping our Future subsequently formed the Upper Clutha Freshwater taskforce and the Queenstown Freshwater taskforce. Both taskforces comprise volunteers from a range of backgrounds who are committed to a sustainable and healthy future for freshwater. The taskforces have benefitted from the input of experts in different areas.

The vision, recommendations and background information in this report reflect the views of the Upper Clutha community and their goals for the future. Freshwater plays a vital role in the economic, environmental and social well-being of the Queenstown Lakes District. The iconic alpine lakes and their catchment areas are integral to the identity of the District and highly valued by residents and visitors.

This report acknowledges the challenges associated with freshwater management and provides an overview of a range of community concerns. In particular, the Upper Clutha taskforce identified an urgent need for the development of an active, community inclusive, water management process. Such a process should be informed by research to ensure a better understanding of catchment processes and ecosystems in the Upper Clutha.

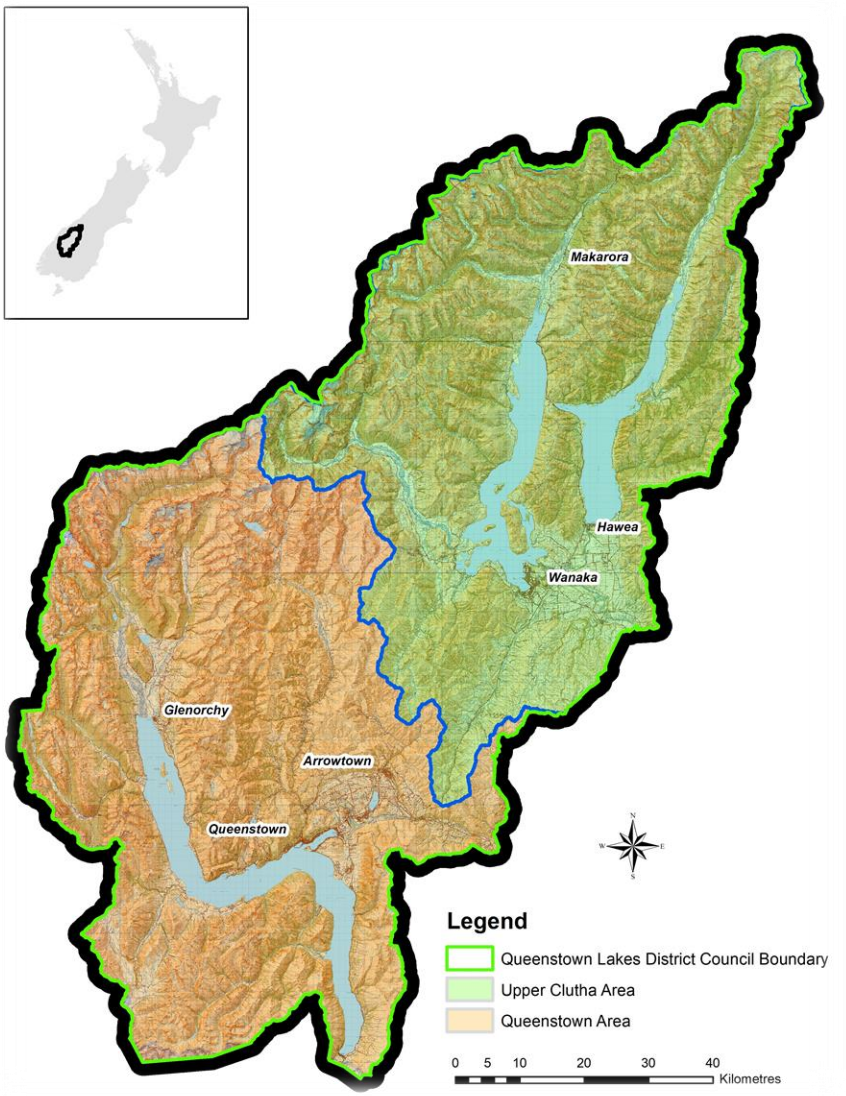
Under the Ngāi Tahu Claims Settlement Act (1998), the Clutha River/Mata-Au is listed as an area of crown land subject to Statutory Acknowledgement. This was established to ensure that the cultural, spiritual, historical and traditional association of Kāi Tahu Whānui is fairly and equally represented in all the decisions and applications for resource consents relating to this awa tīpuna (sacred river).[1] In preparing the report the taskforce was guided by the knowledge of Richie Hewitt, appointed by the Hokonui Runanga of Ngāi Tahu. The contents of this report are intended to be complementary to and supportive of the values and recommended actions contained within Kāi Tahu Ki Otago water perspective, Te Rūnanga O Ngāi Tahu Freshwater Policy and Ngāi Tahu Climate Change Strategy.

A second public water forum was held to provide an opportunity for the Upper Clutha community to reflect on the taskforce's findings and recommendations before the report was finalised and presented to the agencies, groups and individuals responsible for actioning.

[1] https://www.orc.govt.nz/media/6939/cultural-values-statement.pdf

Scope of this report

- This report relates to the Upper Clutha incorporating the catchments and tributaries of Lakes Wanaka and Hawea, as indicated in the green area on this map. In preparing the report the taskforce was conscious of the impact of activity / actions both within the Upper Clutha and on areas downstream or nearby.



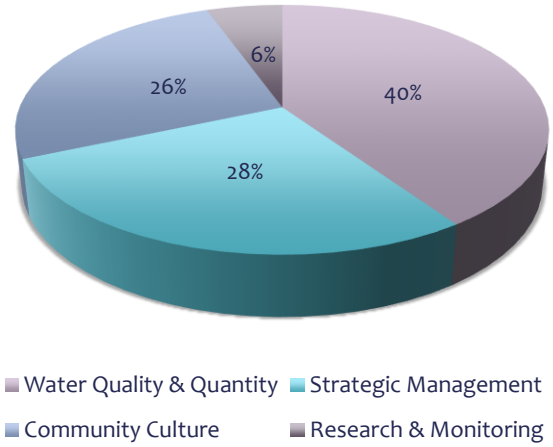
- Many aspects of this report are relevant to the entire Queenstown Lakes District.
- The Upper Clutha Water forum identified four primary themes of importance to the community
  - water quality and quantity;
  - strategic management;
  - community culture; and
  - research and monitoring.
- The original forum information was shared with WAI Wānaka (WAI stands for Water Action Initiative). WAI Wānaka is a charitable trust which received funding in 2018 from the Freshwater Improvement Fund. Working with the community and partner organisations, WAI Wānaka has developed a Community Catchment Plan to address current and future risks to freshwater across the Upper Clutha. The plan recommends a range of actions and identifies research and monitoring gaps which need to be addressed by regional and district authorities and freshwater experts.
- "Values" information was shared with Dr. Simone Langhans (SABER CULTURAL project).
- All information will be made available to agencies and community groups involved with freshwater in the Upper Clutha.

Upper Clutha Freshwater – Water Forum Results

A wide range of information was gathered during the Shaping our Future Water Forum and online. Over 200 people and 800 school children provided input on the challenges, values, priorities, future aspirations and potential actions from a community perspective. The information gathered provided the foundation for establishing the vision and recommendations included in this report. A summary of the information expressed by the community is provided below. The full Water Forum results are available in Appendix 2.

Greatest Challenge

Key Priorities



Ideal Future

Freshwater Vision 2050

Based on information gathered at the Water Forum, the taskforce developed a vision for the future of freshwater and identified a range of factors that may impact on reaching this vision. The recommendations included within this report are steps towards achieving the vision. The vision is complementary to QLDC's Vision Beyond 2050 adopted in 2019.[2]

Key to achieving the vision is the accountability of all members of our community, individuals, households, land owners, business owners, agencies, community groups and visitors. The people of the Upper Clutha want and expect exceptional water quality and quantity.

The Taskforce Vision Explained

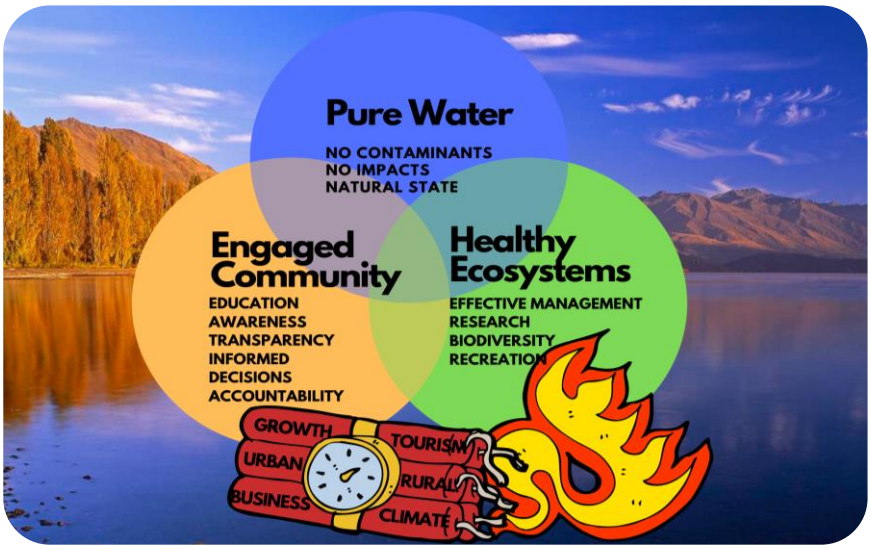
Pure Water – The water in our waterways is naturally swimmable, drinkable, renewable and healthy. We value the availability of water, its ecosystem services, and use it wisely to have little or no impact on the natural state of our waterways through urban or rural, recreational or commercial activities.

Pure water also relates to the aesthetics of our waterways, the enjoyment and economic benefits for both residents and visitors.

Healthy Eco-system – A diverse and species-rich eco-system which has good biological functionality, no species life-cycle impairment, no new invasive organisms and is one in which existing invasive species are managed or eradicated. Migratory species populations are restored and maintained (e.g. longfin eels). A healthy eco-system is safe for swimming and contact recreation, with high indigenous aquatic biodiversity. The waterways' natural flows and wetlands are restored and the waterways are resilient to natural changes and climate change.

Land use that is consistent with the local climate, soils, water resources, ecosystems and therefore enduring and sustainable over centuries/generations.

Engaged Community – Our people, community groups, landowners, business owners and agencies are educated and aware of the importance and value of our waterways. The community takes an active and collaborative approach to advocacy, leadership and strategic management of our waterways, with everyone understanding the issues and working together to secure the best possible outcomes for future generations.



The impact of growth, tourism, urban and rural land use, climate change and business practices are each considered to be potential threats to achieving the vision for the Upper Clutha

[2] https://www.qldc.govt.nz/assets/Uploads/QLDC-Vision-2050-Boards-Feb19-v2.pdf

Key Recommendations

The following key recommendations are steps towards achieving this vision for freshwater and are based on the priorities and workshop information gathered at forum and subsequent discussion by the taskforce. Consideration was given to addressing the impact of growth within the Upper Clutha. Further detail on the recommendations, KPI's, baseline information and background information used to develop the recommendations is available on page 21.

The Upper Clutha continues to experience rapid growth with the resulting development of former green space, pressure on built infrastructure and increasing impact on freshwater. Minimising the impact of growth on freshwater was a key priority for the community and is a complex, multifaceted challenge with no single solution. The recommendations and vision, when implemented, will help mitigate the impacts of growth.

1. Leadership and Strategic Management

Leadership and Strategic Management Recommendation	*Why?*	*Responsibility?*
Establish a formal process for ORC, QLDC and MfE to work closely with the community to effectively manage freshwater quality including managing the impact of development, run-off systems and monitoring. An effective, efficient process with clear accountability and management actions will result in legislation and regulation that is research based with clear accountability for all stakeholders. Refer Figure 1 on page 4 an example of how this process might work.	▸ To provide transparent, accessible information and water management decision-making for the Upper Clutha. ▸ ORC and QLDC developing a culture of working with the community, listening to feedback and actioning. ▸ To engage the community, agencies and stakeholders in clear management actions and shared accountability for freshwater in the Upper Clutha.	MfE ORC, QLDC Kāi Tahu WAI Wānaka Community stakeholders[3]
Develop and implement Water Sensitive Urban Design and Rural Land Use policies for the Upper Clutha to reduce the impacts of growth on freshwater systems. Prioritise sustainable land use and urban design.	Infrastructure and development changes take time to implement and having a design policy encourages and ensures the protection of waterways. Desired outcomes include: ▸ Achieving 100% treatment of wastewater/stormwater with no contamination entering waterways.	QLDC, ORC Central Government Kāi Tahu Community stakeholders[3] (particularly property developers, landowners, builders,

[3] Community stakeholders include: DOC, Fish & Game, Forest & Bird, WAI Wānaka, Guardians of Lake Wanaka, Guardians of Lake Hawea, research institutes, NZ and overseas researchers, Contact Energy, community groups/clubs/associations, business owners, farmers, catchment groups, individuals (includes citizen scientists), property developers, Touchstone, agriculture/horticulture/viticulture industry groups, ALREC, schools, universities, existing and prospective funders

Leadership and Strategic Management Recommendation	*Why?*	*Responsibility?*
	▶ Implementation of widespread water recycling systems – both residential and commercial e.g. rainwater capture systems, greywater recycling systems. ▶ Leadership from agencies, individuals and organisations to utilise global best practice and build on learnings from local examples e.g. Camp Glenorchy, Kirimoko. ▶ Assisting in preparing for the impacts of climate change e.g. more frequent heavy rainfall events. ▶ Ensuring better urban planning to reduce urban sprawl and consequent negative impacts on waterways.	architects and new house owners)
Strengthen legislation applying to development of residential & commercial subdivisions to ensure development activities have no adverse impact on freshwater and consider the appropriate use of land. Legislation should promote best practice and provide for enforcement and penalties.	▶ Growth in the Upper Clutha has resulted in large scale residential and commercial development on previous natural landscapes. The conversion of so much porous ground to hard surfaces has adverse effects on freshwater through contaminated and concentrated run-off. ▶ Each development is considered separately, rather than considering the combined impacts of multiple developments. ▶ Tighter design rules and enforcement required to reduce the impact of urban development on water quality and the health of the lakes that eventually receive urban stormwater. ▶ Current penalties are considered a cost of doing business and fail to ensure compliance with conditions.	Central Government ORC QLDC Kāi Tahu Community stakeholders[3]
Carry out a regular, independent review of National Policy Statement for Freshwater Management attributes and their application and compliance in the Upper Clutha.	▶ The Upper Clutha has deep, cold, clear lakes and rivers, with apparently excellent water quality so the application of national standards may be inappropriately weak for this area. ▶ Assess lake quality attributes and revise standards as appropriate to improve fitness for purpose for our region.	MfE ORC, QLDC Kāi Tahu Community stakeholders[3]

Leadership and Strategic Management Recommendation	*Why?*	*Responsibility?*
Identify and adopt science and global best practices to inform policy, planning and management decisions.	▸ Allows for informed innovative decision making that best suits the region, preserving the quality of our freshwater and the health of our freshwater ecosystems and delivering pure water.	Central Government ORC, QLDC Kāi Tahu WAI Wānaka Community stakeholders[3]

Protecting and Enhancing Eco-Systems Recommendation	*Why?*	*Responsibility?*
Establish and implement an Upper Clutha Freshwater Management Plan that includes: ▸ Wetland re-generation, protection and expansion. ▸ Continuation of appropriate riparian planting. ▸ Reduced contamination from urban and rural activities. ▸ An understanding of Climate Change effects. ▸ Establishment of a habitat renewal and re-stocking programme for native aquatic species (eels, bully, galaxiids). ▸ Evaluation of hydro lake levels and their impact on eco-systems, habitats, flows, and migration patterns.	▸ A comprehensive plan for the catchments of the Upper Clutha is essential to the health of the eco-system and waterways. ▸ Re-establish and protect the Mahinga kai of the Upper Clutha. ▸ Residents and visitors place great value on the accessibility of the Upper Clutha Lakes and rivers for recreation, aesthetics. ▸ The Upper Clutha waterways provide daily community needs including electricity generation and drinking water.	WAI Wānaka ORC QLDC Kāi Tahu Community Stakeholders[3]



2. Community Culture - Education & Awareness

Community Culture - Education & Awareness Recommendation	*Why?*	*Responsibility?*
Implement a creative education and awareness programme for freshwater to provide positive, strong and effective guidance to our businesses, residents, schools and visitors as to how they care for our water. It will be well co-ordinated, driven and supported by the whole community resulting in wide spread community culture change and accountability. **Key short-medium term areas for education and awareness include:** ▸ Water use. ▸ Contaminants directly/indirectly entering freshwater systems and all their impacts including: fertilizer, herbicides, pesticides, animal sewage, human sewage, paints, detergents, metals, plastics, pathogens, development runoff (NB these contaminants come from rural, urban and industrial properties). ▸ Invasive species. ▸ Opportunities, education and engagement in practical ways for the community to positively impact on local freshwater systems. ▸ Available, transparent and accessible information and research to inform decision making. ▸ Eco-system mapping – Who is doing what? Where are the gaps? Where are the similarities? Opportunities for collaboration?	Individuals, groups and agencies working together can have a greater impact than when operating in isolation. A co-ordinated approach will assist with achieving and maintaining the vision of '*pure water and healthy eco-systems*'' by aiming to: ▸ Reduce water use. ▸ Reduce contamination of waterways through improved understanding of the impacts of different actions. ▸ Achieve an educated, aware and engaged community that actively values and protects our waterways and supports evidence-based decision making now, and for future generations. ▸ Promote high engagement and support for community projects e.g. citizens science. ▸ Ensure information is available, accurate and transparent. ▸ Create demand and economies of scale for green building / water sensitive design.	WAI Wānaka Kāi Tahu Community Stakeholders[3]

Community Culture - Education & Awareness Recommendation	*Why?*	*Responsibility?*
Educate and encourage everyone – households, farmers, developers, and businesses - to minimise water consumption, water run-off, contamination entering freshwater systems and to support and improve the health of our water and eco-systems. Actions include: ▸ Encouraging businesses to adhere to active water management plans that include reducing water use and reducing contaminant run-off, in addition to proactive wastewater/recycling treatment systems. ▸ Implement a more robust, transparent and accessible system for managing water takes. ▸ Encourage everyone living in urban settings to adapt and adopt a community culture of caring for freshwater to minimise water consumption, encourage water re-use, reduce contamination entering freshwater systems and to support and improve the health of our water and eco-systems. ▸ Adopt a variety of creative approaches to raise awareness and encourage residents and visitors to care for our water.	Ensuring responsible use of water and protecting the quality of water in our lakes and rivers.	ORC QLDC MfE WAI Wānaka Kāi Tahu Community stakeholders[3] including tourism and business representatives (Lake Wanaka Tourism, Business Roundtable, Chamber of Commerce, Holiday Park Association)
mplement a more robust, transparent and accessible system for managing water takes.	Information is currently gathered by ORC but is not in a form that is transparent or easily accessible to the public.	ORC Central Government Kāi Tahu Fish & Game
Encourage individuals, landowners and households to learn about and take responsibility for: ▸ Water usage i.e. how much they use: ○ Amount of run-off from hard surfaces. ○ Contaminants in run-off e.g. paints, detergents etc. ○ Contaminant source identification. ▸ Initiatives might include: ○ Installing rainwater tanks. ○ Recycling water/greywater systems. ○ Water Metering. ○ Painting fish on storm water inlets. ○ Placing nets on storm water outlets.	Contaminants enter our waterways from urban areas, through stormwater, wastewater, rubbish, cars, boats and everyday activities.	Individuals QLDC ORC Kāi Tahu Central Government Urban Land Owners Community stakeholders[3]

3. Research and Monitoring

Research and Monitoring Recommendation	*Why?*	*Responsibility?*
Establish a research and monitoring system for the lakes, rivers and catchments of the Upper Clutha that is robust, accessible, nationally comparable and with greatly expanded scope and funding. Outcomes to include: ▸ Current lake / river water quality measures to establish a robust baseline and monitor over time. ▸ Identify and understand all freshwater systems within the catchment area ▸ Establish modelling processes to understand and manage inputs/outputs/ contaminants and the impacts these may have in the future. ▸ Understand the impact of changing land use – across both rural and urban landscapes. ▸ Provide an overall picture of the Upper Clutha –accessible information on quality/quantity/eco-system health. ▸ Identify innovative solutions for the Upper Clutha to reduce contamination entering the waterways. ▸ Understand the impacts and implications of climate change.	▸ Currently this is the responsibility of ORC under the RMA, the current programme of research is included in ORC 10 year plan. However, additional research and monitoring are at times carried out by Fish & Game, DOC, QLDC and others. ▸ Understand eco-system health by establishing robust baseline information. ▸ Understand contaminants; where they are coming from and their impacts to inform decision making / remediation work. ▸ Improve our community's understanding of the impacts of climate change. ▸ Inform the management/eradication of invasive pest species. ▸ Create time series (longitudinal) data, to identify trends and establish processes to ensure eco-system and waterway health and quality. ▸ Provide robust information to better manage land and water use within the Upper Clutha.	Principally Central Government Supported by: ORC QLDC WAI Wānaka Kāi Tahu Community Stakeholders[3]
Provide further funding to understand the impact of invasive organisms and to establish a management plan to prevent, eradicate or control invasive organisms in the Upper Clutha.	To protect the water quality in the Upper Clutha.	Central Government ORC QLDC Kāi Tahu Community Stakeholders[3]
Identify and adopt science and global best practices to inform policy, planning and management decisions.	Allows for informed innovative decision making that best suits the region, preserving the quality of our freshwater and the health of our freshwater ecosystems and delivering pure water.	ORC, QLDC MfE WAI Wānaka Community Stakeholders[3]

Research and Monitoring Recommendation	*Why?*	*Responsibility?*
Support education, research and monitoring to identify baseline information and help develop better rural land management practices in the Upper Clutha in order to reduce water use, nutrient, sediment, bacterial, protozoan and chemical run-off.	▸ Assist rural land owners to understand the benefits/trade offs and impacts of their activities to ensure they are able to make a living while also supporting long term ecosystem health. ▸ Provides incentives for change, facts and information to inform decision making.	MfE/ORC WAI Wānaka Community Stakeholders[3]
Fund land-use research and utilisation of tools/technology to establish best use/profitability for land within the catchment areas that ensures minimal impact on freshwater in the future.	▸ Climate change, commodity market changes and potential changes to the availability of water will lead to changes in land use – this process takes time and needs to be planned/managed.	MfE ORC Kāi Tahu WAI Wānaka Community Stakeholders[3]

Overall Baseline Analysis (Current Situation)

In developing this report, the Upper Clutha Freshwater taskforce had access to information provided by local, regional and central government, Land Air Water Aotearoa (LAWA), Fish & Game, Kāi Tahu, WAI Wānaka and other interested parties. More detailed information relating to each of the sections examined is included in Appendix 1.

Freshwater has become a major focus nationally and locally. In 2018 the Upper Clutha community clearly expressed a desire to start work on achieving a vision for the future of a precious resource. Current legislation is complex and research or monitoring information is often absent or the responsibility of different agencies or private research projects. Examination of this information was, out of necessity, undertaken at a high level.[4]

Water Quality

The quality of water in much of the Upper Clutha is among the highest in New Zealand. The available water quality monitoring data indicates that rivers flowing into and out of the large lakes in Central Otago usually have high water quality, based on the limited measures currently in place.

Current monitoring work is carried out by the Otago Regional Council which adopted an extended monitoring programme in their 10 year plan (pg 78) in 2018. Monitoring includes localised annual monitoring for swimmability and five-year monitoring of groundwater, weeds, periphyton, macroinvertebrates, fish and wetland extent/hydrology and vegetation. Monthly samples are taken from 8 river sites and 4 Lake sites in the Upper Clutha as part of the ORC's State of the Environment monitoring. Monitoring within the rivers includes ammoniacal nitrogen, total nitrogen dissolved reactive phosphorus (DRP) and turbidity, depending on the site.

Water Quantity and 3 Waters

Work is also underway for urban stormwater management, the updating of mining rights/deemed permits (due 2021) and the introduction by ORC of freshwater management units (FMU) to meet National Freshwater Policy requirements. The Upper Clutha is included in the Clutha / Mat-au FMU.

QLDC has responsibility for 3 waters in the Upper Clutha – drinking water, stormwater and wastewater.

Stormwater in the Upper Clutha is currently managed in a variety of ways. Some new developments have measures in place to reduce direct run off. However, large rain events lead to stormwater discharging straight into the lakes and rivers or large amounts of sediment running off developments into waterways.

Wastewater is managed by a variety of methods including septic tanks, Project Pure and schemes like the Hawea treatment plant. Overflows, contamination events and non-compliance with consents do occur.

Drinking water is supplied to urban areas by QLDC. All drinking water provided by QLDC is currently chlorinated following the outbreak of gastroenteritis in Havelock North in August 2016. Private water bores and schemes are managed by the individual or organisation and depending on amount of take may require resource consent from ORC.

[4] https://crux.org.nz/community/weve-not-done-enough-things-need-to-change/

Working together

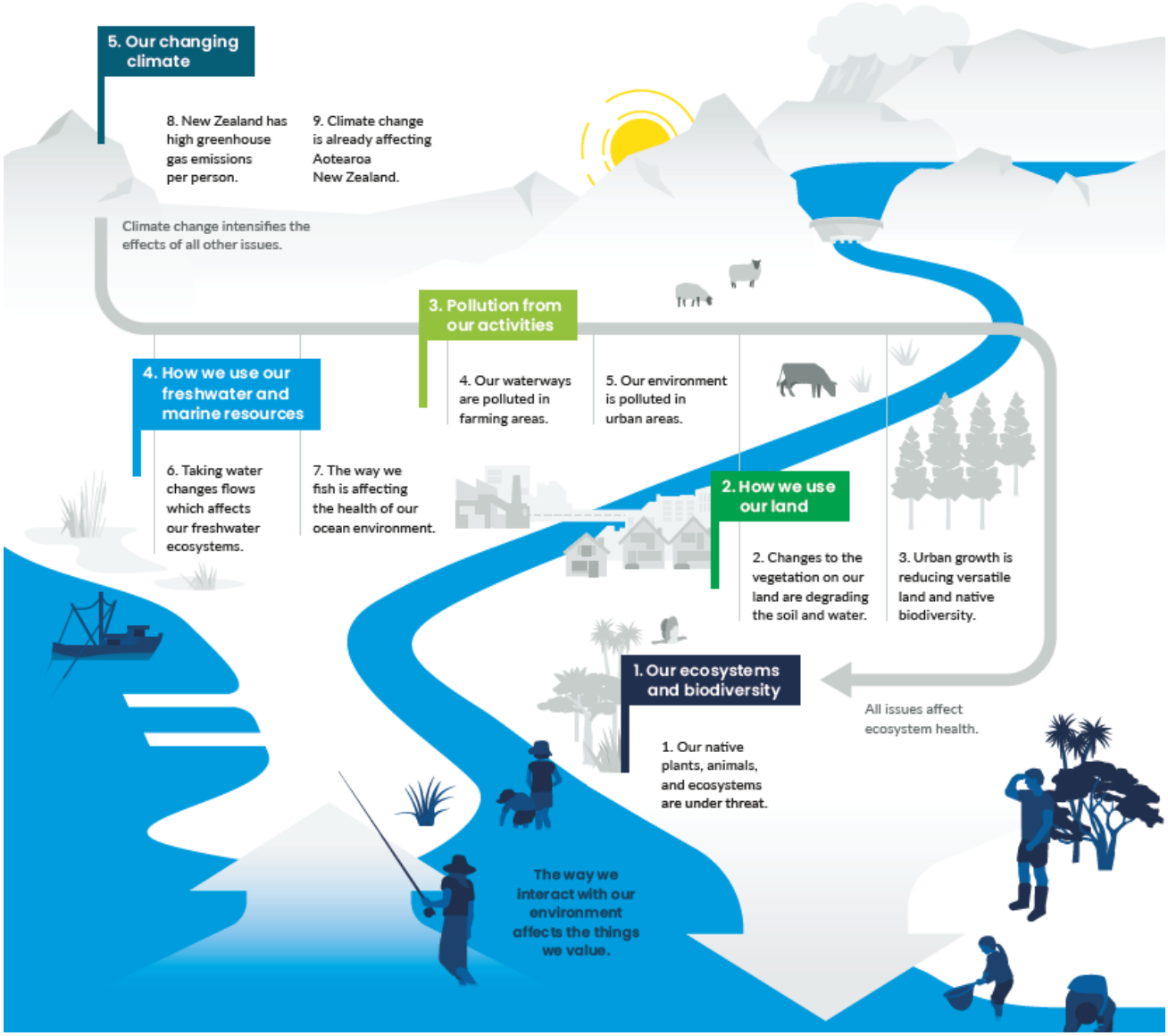
In 2019 ORC and QLDC agreed to work more closely together to monitor and manage development and its impacts on our waterways following a number of land development events affecting Wanaka's Bullock Creek, Stoney Creek, Bremner Bay, Roys Bay and the Clutha River. Currently, management of consent infringements is poor. Penalties do not appear to offer a deterrent to ensuring proper run-off management.

The Upper Clutha has a strong community focus on freshwater with a number of community groups including the Upper Clutha Lakes Trust, Touchstone, Friends of Bullock Creek and Guardians of Lakes Wanaka and Hawea collaborating to contribute to the wellbeing of the area.

The human impact on waterways

Growth within the Upper Clutha, changing land use, power generation, increased water takes and urban sprawl all impact on freshwater in the area.

In 2019 the Ministry for the Environment and Stats NZ released Environment Aotearoa.[5] The following diagram summarises the impact of the way we choose to live on our environment.



[5] Ministry for the Environment & Stats NZ (2019). New Zealand's Environmental Reporting Series: Environment Aotearoa 2019 Summary. Available from www.mfe.govt.nz

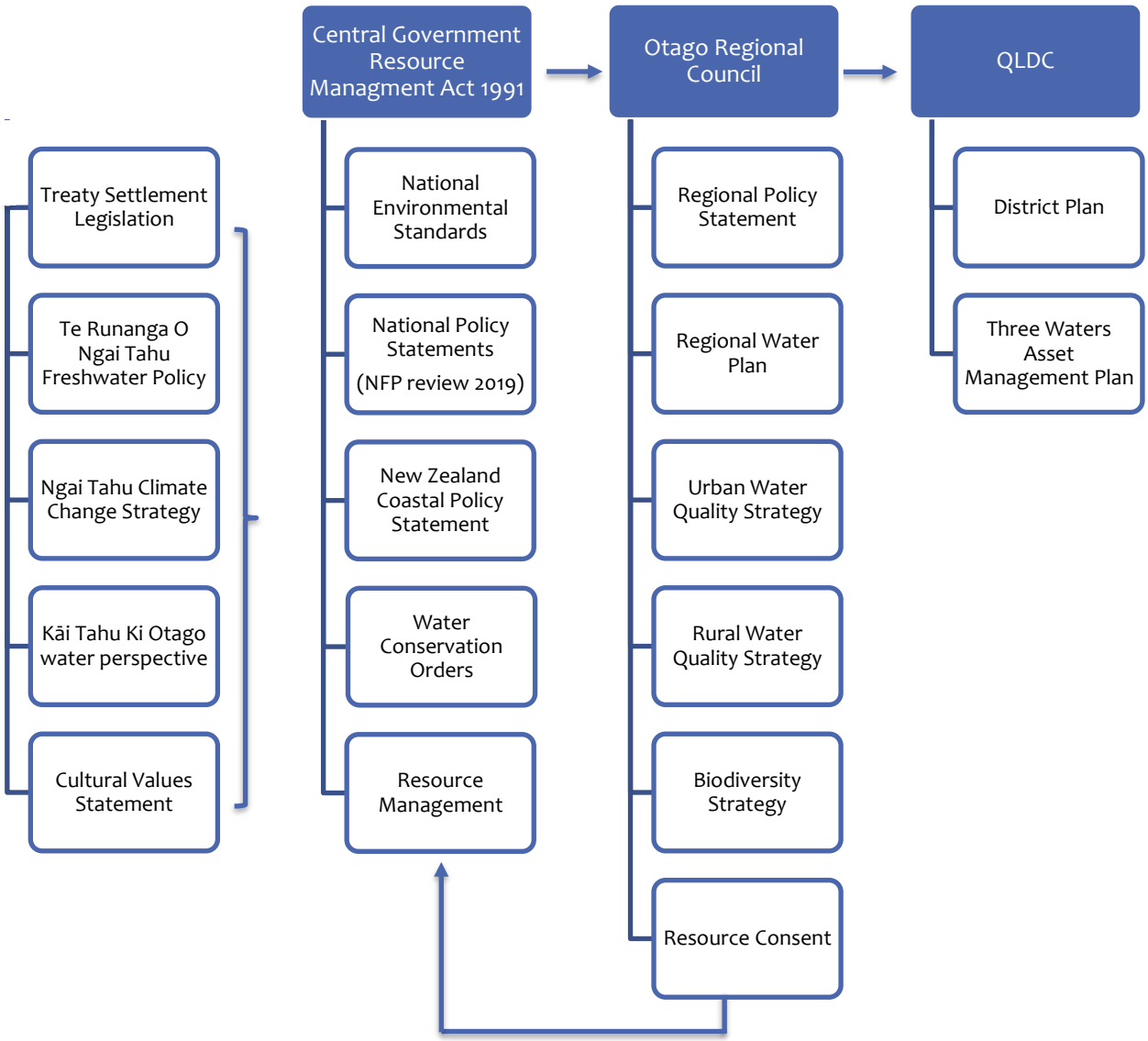
Legislation and Regulation

Legislation and regulation around freshwater is complex. Central Government set the direction through statements and policies e.g. National Environment Standards, National Freshwater Policy Statement (review 2019) and the Resource Management Act. Regional Council are responsible for regional plans and often research and monitoring. The local council are responsible for local infrastructure and activities affecting water that take place on the land.

In preparing the report the taskforce was guided by the knowledge of Richie Hewitt, appointed by the Hokonui Runanga, Kāi Tahu. The taskforce reviewed Kāi Tahu Ki Otago water perspective, Te Runanga O Ngai Tahu Freshwater Policy and Ngai Tahu Climate Change Strategy and consider the contents of this report to be complementary and supportive of the values and actions contained within the reports.

Under the Ngāi Tahu Claims Settlement Act (1998), the Clutha River/Mata-Au is listed as an area of crown land subject to Statutory Acknowledgement. This was established to ensure the cultural, spiritual, historical and traditional association of Kāi Tahu Whānui is fairly and equally represented in all the decisions and applications for resource consents relating to this awa tīpuna (sacred river)[6]. The following diagram is not exhaustive but indicative of the different legislation and regulation in New Zealand.

Summary of Legislation/ Regulation in New Zealand (note this is a summary list and not exhaustive)



[6] https://www.orc.govt.nz/media/6939/cultural-values-statement.pdf

Supporting Background Information

In order to establish the vision and key recommendations included in this report more detailed work was undertaken for each of the key elements of the vision – Pure Water, Healthy Eco-systems and Engaged Community.

At each stage and during the forum, a lack of easily accessible information and co-ordinated research and monitoring was identified. Information is often held by different agencies or is part of different research. Each section therefore also looked at the need for research and monitoring specific to the Upper Clutha. In many instances the limited information that does exist is not used for effective freshwater management and/or is not fit for purpose.

The following sections set out the key discussion points, ideal future state, possible impediments and more detailed baseline analysis that informed the establishment of the key recommendations.

Engaged Community

"Our people, community groups and agencies are educated and aware of the importance and value of our waterways. The community takes an active and collaborative approach to advocacy, leadership and strategic management of our waterways, with everyone understanding the issues and working together to secure the best possible outcomes for future generations."

Responsibility for our freshwater sits not only with national, regional and local agencies but also with the people and community groups within the Upper Clutha. Individuals, community groups and businesses are undertaking positive work towards enhancing water quality and biodiversity within the Upper Clutha already. Consideration was given to how to engage the community within each of the Pure Water and Healthy Eco-system parts of the report.

Māori have long emphasised the need to consider the environment in its entirety through the ki uta ki tai concept (from the mountains to the sea)[7]. Māori use this concept to describe their holistic understanding of freshwater ecosystems and how the health and well-being of the people are intrinsically linked to the natural environment.

Ki uta ki tai recognises the movement of water through the landscape and the numerous interactions it may have on its journey. Ki uta ki tai acknowledges the connections between the atmosphere, surface water, groundwater, land use, water quality, water quantity, and the coast. It also acknowledges the connections between people and communities, people and the land, and people and water.[8]

Key to a successful future for freshwater includes communities that:

- Embrace a collaborative multi-agency approach to protecting and improving freshwater quality in the Queenstown Lakes District.
- Have strong, strategic leadership with water as a priority in decision making.
- Are educated, aware and actively engaged in valuing and protecting our waterways.
- Are informed and have access to transparent information, research, monitoring and to examples of global best practice to support evidence-based decision making.
- Are actively involved in community projects e.g. citizen science.
- Value water - its availability, quality, economic and aesthetic attributes.
- Have robust legislation that is co-ordinated, relevant to the district, adhered to, monitored and carried out.
- Support and advocate for a comprehensive catchment plan to be established and carried out.

[7] Tipa et al, 2016

[8] https://www.mfe.govt.nz/publications/fresh-water/fresh-water-report-2017-introductionto-our-fresh-water/ki-uta-ki-tai-%E2%80%93

- Actively find ways to protect our freshwater through reducing contamination, reducing water use, and using recycling systems.

Pure Water and Healthy Eco-systems

"Pure Water" is one of the key elements identified by the community for the future of freshwater in the Upper Clutha. For the purpose of this report the term ''pure water" has been defined as:

"The water in our waterways is naturally swimmable, drinkable, renewable and healthy. We value the availability of water, its ecosystem services, and use it wisely to have little or no impact on the natural state of our waterways through urban or rural, recreational or commercial activities."

The term "pure water" also includes the aesthetic beauty of our waterways and the enjoyment and economic value to both residents and visitors, acknowledging tourism as a major contributor to the district's economy.

In the vision, "Healthy Ecosystems" is closely related to "Pure Water"

"A diverse and species-rich eco-system has good biological functionality, no species life-cycle impairment, no new invasive organisms and is one in which existing invasive species are managed or eradicated. Migratory species populations are restored and maintained (e.g. longfin eels). A healthy eco-system is safe for swimming and contact recreation, with high indigenous aquatic biodiversity. The waterways' natural flows and wetlands are restored and the waterways are resilient to natural changes.

Land use that is consistent with the local climate, soils, water resources, ecosystems and therefore enduring and sustainable over centuries/generations."

Healthy Eco-systems are closely related and interlinked with the concept of "Pure Water" and have been combined in the following section that looks at:

1. Eco-systems
2. Recreation
3. Infrastructure – 3 Waters
4. Land Use – rural, urban, wetlands, tussock land
5. Our commercial environment - urban, businesses, tourism

Each section looks at requirements for, and threats to, our waterways, key success factors for the future, potential impediments and recommendations for the future to help us to achieve our vision of ''Pure Water and Healthy Eco-systems" for the community.

1. Eco-Systems – Invasive species, Organisms, Hydro, Wetlands, Catchments

This section looks at eco-systems in terms of organisms living in or around the waterways. Hydro dams are included as they seriously disrupt freshwater eco-systems.

Current situation:

- Introduced species and native species being adversely affected by hydro schemes, disappearing habitats/excessive water takes and declining water quality. Contaminants from rural and urban intensification are likely to be having a negative impact on the health of most freshwater aquatic life.
- Lake Wanaka is home to three New Zealand native fish species (Koaro, Common Bully and Long Fin Eel) and three self-sustaining introduced fish species (land-locked Chinook Salmon, Rainbow Trout and Brown Trout).[9]
- Lindavia (Lake snow) is present in Lakes Wanaka, Hawea, Wakatipu and Dunstan; Lagarosiphon is present in Lake Wanaka, Lake Dunstan and some rivers; Didymo is present in the clear and low nutrient rivers flowing out of lakes of the Upper Clutha.
- There is limited scientific research to establish robust baselines for water quality and the health of the freshwater eco-systems.
- Unknown impact of water takes/irrigation on eco-system health.
- Wetlands within the catchments of the Upper Clutha have been reduced over time.
- Aquifer ecosystems and water quality are inadequately managed.
- Large scale hydro development over 6 decades has resulted in the disappearance of the Upper Clutha's top aquatic predator, the longfin eel, and caused major disruption to the lamprey population. Other migratory species (galaxiids) are also affected. An eel fishery has contributed to this situation. Long-term consents and lack of communication from hydro operators with local communities make it difficult to work towards change and improvement.

Eco-Systems success is….	*Impediments*	*KPI's*	*Actions / Recommendations*
Native aquatic species stocks re-established. Our lakes and rivers are accessible and support healthy ecosystems.	Competing interests – e.g. commercial vs. environmental; introduced vs. native species. Some barriers exist e.g. hydro levels / fish nursery areas that need to be re-established / remediated.	The Upper Clutha lakes and rivers are accessible and healthy for food gathering, with sustainable stocks of a wide variety of native freshwater species.	Lake levels e.g. Hawea are re-evaluated, eel re-stocking and habitat and food chain reconstruction given priority e.g., bully's, galaxiids. Fund and establish comprehensive baseline information to be able to evaluate trends. Ensure any future hydro schemes are on a smaller scale and utilise new technology to maintain stream flows.

[9] www.catchmentsotago.org

Eco-Systems success is….	*Impediments*	*KPI's*	*Actions / Recommendations*
Prevent, eradicate or manage invasive organisms.	Lack of understanding of current invasive organisms and their impact or ability to be managed. Cost of understanding/eradicating or effectively managing lake snot is not understood or researched.	Develop research-based management plans for all invasive species.	Provide funding for understanding the impact, management or eradication of invasive organisms. Promote education and awareness to prevent further invasives from entering the waterways.
Hydro electric generators adopt global best practice for ensuring passage for migratory fish species.	Failure to acknowledge the role of hydro-electric dams in disrupting migratory fish in Upper Clutha rivers, lakes and wetlands has significantly affected the health of the area's freshwater eco-systems	Hydroelectric generating companies annually review and maintain ways or routes of safe passage for longfin eels, lampreys and galaxiids past dams.	Review the Contact Energy resource consent conditions relating to migratory fish in Upper Clutha rivers, lakes and wetlands. Fish ladders fitted
Re-establishment of wetlands throughout the Upper Clutha	Wetland areas have been modified or removed by development / agriculture. Difficult to re-establish.	Wetlands and catchments are healthy, protected and enhanced, aiding in the health of the waterways and eco-systems.	Wetlands are re-generated, protected and expanded. Riparian planting continues, greatly reducing or eliminating impact on waterways from agriculture. Develop an active, informed Upper Clutha Freshwater Management Plan. Encourage and support re-establishment of wetlands / riparian planting.

2. Recreation

This section examines how we use our water for recreational purposes – swimming, fishing, boating etc. Access to the lakes and rivers in the Upper Clutha is part of the attraction of the area, both in its aesthetic appeal and for recreational opportunities. Pure water and a healthy eco-system are essential for residents and visitors to continue using and enjoying our waterways.

Current situation:

- Otago Regional Council set new swimmability targets for Otago in December 2018. These standards are higher than the current national standards of 90% of lakes and rivers to be swimmable by 2040. Presently swimmability is measured by two main types of testing – E.Coli and toxic algae. Monitoring occurs at limited sites at Lake Wanaka and Lake Hawea weekly Dec – March. Information is made available to the public via www.lawa.org.nz.

- Southern Lake Wanaka (e.g. Roys Bay) is under intense pressure from boating with 90% of boats using 10% of the lake. With over 1,000 boats on the lake at peak times, and increasing each year, pollution in localised areas becomes of concern, as does the aesthetic value and enjoyment for all recreational users.
- Main boat launch sites are under pressure.
- There is pressure on infrastructure and parking and expansion of commercial and recreational groups onto the foreshore.
- It is increasingly difficult to balance the needs of recreational and commercial users.

Recreation success is….	Impediments	KPI's	Actions / Recommendations
On-water recreation - fishing / boating are accessible and appreciated	Activities on the water like boating can conflict with those in the water like swimming. Finding a balance is hard e.g. close to Wanaka foreshore. Increasing numbers of recreational users, visitors and commercial users accessing the lake	Comprehensive water management plans in place for access / infrastructure / protection of the waterways Reduction in carbon footprint of recreational vessels	Education and awareness for all recreational users with citizen science bringing greater understanding of actions on our waterways Graded costing for boat launching i.e. the closer to town, the more you pay Boat parking / traffic limited close to Wanaka foreshore Prohibition of washing of commercial / recreational boats and of putting contaminants into waterways. (e.g. Waterfall Creek) National registration for boats, limits on decibel allowances Increased access to recreational infrastructure e.g. toilets, more and improved boat launching and wash-down facilities that eliminate waterway contamination

3. Urban Land Use – 3 waters and private households

QLDC is responsible for providing 3 waters infrastructure to urban areas in the Upper Clutha.

Current situation:

- Project Pure was established in 2011 with outputs now going into underground seepage near Wanaka Airport. Luggate wastewater treatment is part of Project Pure.
- Hawea Wastewater Treatment Plant has been in breach of consent conditions since at least 2012.[10]. A detailed business case is due to be undertaken by QLDC in 2019 to identify solutions, including connecting to Project Pure.
- Smaller townships in outlying areas (e.g. Makarora) and some tourism operators (e.g. Hawea Motor Camp) are on septic tank systems. Some (those with resource consent) are monitored, however there are many private systems/tanks that are not actively monitored or managed.
- Stormwater is currently not treated within the Upper Clutha, resulting in a range of contaminants entering the waterways. Increased growth and development have increased the amount of stormwater run-off from urban areas (see commercial development section).
- Greywater is not currently separated from wastewater, resulting in higher amounts of wastewater needing to be managed and treated.
- Since 2018 drinking water has been chlorinated in all QLDC townships with a reticulated water supply, following the Havelock North incident. There is currently discussion underway at national level to remove responsibility for 3 waters from local councils.
- Water is currently 'free' for urban users across the district. Water meters were installed in a number of Wanaka households in 2017 to understand use per household. There is a large amount of inefficient use of treated water e.g. irrigation for urban gardens.
- Aquifers and drinking water sources in the Upper Clutha are shown in the QLDC 30-year infrastructure plan and work is being undertaken by Otago Regional Council.
- Consultation occurred in 2017 and 2018 for the Otago Regional Council Urban stormwater policy.

Urban land use success is….	Impediments	KPI's	Actions / Recommendations
No contamination entering our waterways from:- • ***Stormwater*** • ***Wastewater*** • ***Development*** ***100% treatment to global best practice***	Rapid and unconstrained population growth Failure of maintaining and monitoring wastewater treatment compliance with resource consent conditions Cost of treatment/separation of wastewater and stormwater	100% of wastewater treatment plants operating within consents and compliant with global best practice Septic tanks are regularly monitored and maintained.	Water sensitive Urban Design policy implemented by QLDC / ORC e.g. Wellington Water Sensitive Urban Design All development is closely monitored with heavy penalties for contamination.

[10] Hawea WWTP Annual Report 2017 - 2018

Urban land use success is….	Impediments	KPI's	Actions / Recommendations
	Current design and regulations allowing for new development / upgrades to follow the status quo Difficult to plan for increasing variability of weather events due to Climate Change. Trade-offs between development and finding the right balance to protect the waterways Recycling of greywater is possible but not widely implemented and often needs high population density to be effective.	Change of land use (e.g. development or subdivision) does not result in contaminated run-off to waterways. Innovative technological solutions implemented in all new developments reducing their impact on our waterways. Community awareness and behavior change achieved to reduce water use / stormwater contamination and wastewater generation.	Review of compliance with National Policy Standards for Freshwater Management for suitability to UC deep, cold, clear lakes and rivers (research needed on lake quality attributes and processes). Education and awareness, citizens science campaigns for the community on what is suitable to go 'down the drains'. Science and global best practice inform policy, planning and management decisions.
Drinking water that is free from chemicals	Chlorination is currently viewed as the safest / most cost-effective way of treating water. Inadequate water management standards.	All people have access to safe drinking water using UN convention / SBN Measures. More use made of UV treatment of drinking water.	Alternatives to chlorination are examined and where possible implemented.

4. Urban Land Use – Commercial

This section considers urban land use and in particular commercial operations (excluding agriculture) e.g. cafes, transport businesses, development (e.g. dwellings and subdivisions), and tourism operations (e.g. ski fields), recreation (e.g. golf courses).

- Due to rapid growth in the Upper Clutha, the demand for water and the impact on water quality and quantity is intensifying Water is considered to be a ''free'' resource, resulting in little incentive to minimise, conserve and actively manage water use and waste outputs.
- Recent large-scale urban development e.g. Three Parks, Alpha Series and Northlake have resulted in contaminants and sediment entering the local waterways including Bullock Creek. There has been a perceived lack of action / co-ordination or accountability over the breaches. Some developments e.g. Kirimoko are experimenting with new systems, though their long-term effectiveness is currently undetermined.

- Impacts from multiple pollutants continue to run off into waterways e.g. fat poured into drains, air and ground pollution from dust or washing commercial vehicles or commercial premises, wind-blown and water-borne plastics. Some urban operators are beginning to understand and address such pollutants, but again there is a lack of research to measure and manage the impacts.
- Climate Change impacts are unknown e.g. extreme weather events, less rainfall in catchments.
- Current monitoring/penalties for impacting upon local eco-systems are not conducive to ensuring compliance, as exemplified by the contamination of the Clutha Mata-Au river by Northlake subdivision.

Urban land use success is….	Impediments	KPI's	Actions / Recommendations
Commercial operators have active water management plans focused on reducing use, on recycling and ensuring no contaminants enter the waterways.	Belief that water is an infinite resource and that it is there to be used without constraint. Belief by firms that their commercial operations have minimal impact on the quality and eco-system functioning of freshwaters. Business owners' perception that "meeting the standards" e.g. for design of developments is enough to ensure no water quality impacts.	100% active water environmental management plans for all commercial operators Current and past chemical application rates known Commercial operator nutrient run-off rates known Bacterial, viral and protozoan pathogens monitored All of the above points are used to assess impacts and inform water management actions.	Funding of research / establishment of systems and resources to ensure instigation of active water management plans for commercial operators. This may take the form of a grading system with people and staff to actively conserve, protect and enhance the health of waterways – "Water warriors". Further work to understand the benefits / drawbacks of water payments – for the supply of water to urban areas and the use of water in rural areas.
Development has no impact on local aquatic eco-systems.	The challenge of balancing the needs of people (for housing/infrastructure / income) with the needs of healthy aquatic eco-systems	Aquatic eco-systems are given priority - developers need to successfully mitigate the impacts of their development on water quality/the water eco-system. Run- off or adverse affects from commercial operations are heavily penalised.	Review legislation including penalties and best practice in subdivision and/or development that changes land use. All new commercial operations need to have an active water / impact management plan in place based on global best practice.

5. Rural Land Use

Current Situation:

- It is a national requirement that all consented water takes are measured and recorded. Currently, information provided to ORC is not readily available to the public. Current mining rights/water take/minimum flow levels are due to expire in 2021. These are currently being reviewed and renewed by ORC. Over allocation is a risk. Some historical rights or existing systems within the Upper Clutha are not measured or monitored e.g. streams.
- There is a lack of information, research and overall understanding specific to the Upper Clutha on contamination from run-off in rural areas. This is due to a lack of data e.g. changes to stocking rates over time, information on frequency and rates of application of fertilizer, herbicides/pesticides, burn-off or of removal of native vegetation. These factors all impact on receiving water bodies.
- For catchments feeding into Upper Clutha Lakes, ORC has introduced Plan Change 6A which states that nitrogen loss to waterways should not exceed 15 kg N/ha/year. There is also growing dependence for nutrient run-off limit-setting by Council on the use of the model OVERSEER which has received criticism for its use in calculating nutrient limits and calls for its independent review. The Government's 2019 budget allocated an additional $44m to improve Overseer.
- The ORC is about to embark on a review of its water plan using a Freshwater Management Unit process. It is likely that this will lead to changes in the targets and expectations currently managed under Plan Change 6A.
- Farming practices in the Upper Clutha are improving through utilizing technology, a professional approach to sustainability, a raised awareness of social licenses to farm and some participation in riparian planting restoration of wetlands. In 2018 a Beef and Lamb NZ strategy outlined a goal for carbon neutrality by 2050.
- Rotorua and Taupo are examples of long-term degradation within catchment areas that have resulted in expensive remediation work, requiring subsidies and incentives to change agricultural practices.

Rural land use success is….	Impediments	KPI's	Actions / Recommendations
Rural land use and water takes do not result in adverse effects on our waterways.	Increasing reliance on irrigation for modern farming practices Frequently held belief that water is an infinite source and there to be used Absence of programs to assess ecological impacts of water takes Potential over-allocation of water Disagreement on biologically "safe" residual flow levels	Rural water takes are measured and monitored with the information readily available to the public. Water take renewals and access are considered with the biological health of lakes, rivers and aquifers as a priority. Strict water take limits are agreed to and compliance reviewed and managed.	ORC review the way they are managing water extraction data, and make it easily accessible and understandable for the public. The health of waterways, aquifers and eco-systems are given priority when assessing applications for water extraction. Pro-active rather than re-active planning, including for the potential impact of climate change on water availability.

Rural land use success is….	Impediments	KPI's	Actions / Recommendations
			Support, education, research and funding to identify and enact changes to reduce rural water takes. Potential to charge for water to encourage more efficient use and capture some of the value that water clearly has to land users. Any funds raised to be ring-fenced for research to inform water management.
Contamination from run-off in rural areas is minimised/ negated.	Lack of funding for research and analysis to assist in understanding of the impacts of run-off and of remediation work needed in the Upper Clutha. Current and past stocking rates are not available or unknown. Lack of accurate models to estimate "safe" levels of nutrient loss from farmland.	Population sizes of non-farmed pest species assessed. Current and past fertilizer application rates known. Nutrient run-off types and rates known. Bacterial, viral and protozoan pathogen concentrations assessed. All of the above used to assess impacts and to inform water management actions.	Develop stocking rate database for all farm units. Fund research programmes to assess run-off and the fate of all "contaminants" flowing into lakes from all contributing catchments.
Science and research are utilised to ensure sustainable, profitable farming practice. ***Land use that is consistent with the local climate, soils, water resources and aquatic eco-systems***	Lack of funding to research and implement aquatic eco-system priorities specific to the Upper Clutha. "One size fits all" legislation.	Wetlands are re-generated, protected and expanded. Riparian planting continues, reducing the impact on waterways from agriculture. An active Upper Clutha Freshwater Management Plan.	A specific Upper Clutha Water Management Plan is established, well-funded and actioned, utilising science, community, national, regional and local agencies to promote action. Land-use research to establish best use / profitability for land in the catchment areas that has minimal impact on freshwater.

Rural land use success is….	Impediments	KPI's	Actions / Recommendations
An entire rural community that is actively engaged in managing, protecting and improving freshwater quality in the Upper Clutha.	Profitability, income and land use versus waterways and healthy eco-systems. Lack of science, data and funding for change and regeneration. Lack of understanding of impacts of past land use changes nor of remediation work that is needed. Complexity and the length of time it will take to remediate (related to above).	Acceptance and implementation of an Integrated Catchment Management Plan. The number of riparian planting & wetland re-establishment projects. Number of active catchment & water user groups. All people making the environment part of every decision they make.	Acceptance and implementation of an Integrated Catchment Management Plan prepared in collaboration with all stakeholders. The community needs to be educated about their impact on water health and what they can do to reduce this impact. ORC to carry out a thorough and inclusive FMU process to educate and establish a Water Management Plan that delivers positive results for our waterways and water users. Funding & support available for individuals or groups that want to make positive change e.g. water groups, planting projects etc. A greater understanding of waterway protection and community needs in the Overseas Investment Office process. Utilise this as a resource to fund positive projects. Implementation and adoption of widespread water recycling / water use by the community and developers.

Glossary of Terms/Abbreviations used within the report

ALREC – the Alpine Lakes Research and Education Centre being established in Wānaka by WAI Wānaka

Community Stakeholders (note this is not intended to be an exhaustive list): Kāi Tahu, DOC, Fish & Game, Forest & Bird, WAI Wānaka, Guardians of Lake Wanaka, Guardians of Lake Hawea, research institutes, NZ and overseas researchers, Contact Energy, community groups/clubs/associations, business owners, farmers, catchment groups, individuals (includes citizen scientists), property developers, Touchstone, agriculture/horticulture/viticulture industry groups, ALREC, schools, universities, existing and prospective funders.

DOC – Department of Conservation.

Drinkable - for the purposes of this report the term drinkable means water that people can trust, swim in and drink from the source with confidence that they will not fall ill.

Kāi Tahu – as used in this document refers to the kupenga (net) of whakapapa that embraces the three constituent indigenous iwi of Otago, being Kāi Tahu, Kāti Māmoe and Waitaha.

MfE – Ministry for the Environment.

Pure – the word pure was heavily used by the community in their aspirational future. The term pure within the report refers to naturally healthy water, free from contamination, aesthetically pleasing, with healthy aquatic life and safe to swim in.

RMA – Resource Management Act.

QLDC – Queenstown Lakes District Council.

ORC – Otago Regional Council.

WAI Wānaka – the Water Action Initiative, a charitable trust with the objective to safeguard and enhance the health and water quality of Lake Wānaka and its catchment water sources. As a registered charity (Upper Clutha Lakes Trust Board CC53728), it also acts as an umbrella organisation for community groups.

Taskforce Members

Jim Bohm (Chair), Julie Perry (Deputy Chair), Don Robertson, Barry Bruce, Richie Hewitt, Randall Aspinall, Rick Boyd, Jennie Blennerhassett, Andrew Gawith

With input from: Calum MacLeod, Chris Riley, Craig Blake, Markus Hermanns, Martin McCarron, Chris Arbuckle

Shaping our Future: Anita Golden

The taskforce thanks the many members of the community and experts who shared their knowledge.

Appendix 1: Information reviewed

During the writing of this report the taskforce reviewed a wide range of information from a number of sources including:

Ministry for the Environment

Otago Regional Council - regional and specific plans

Queenstown Lakes District – infrastructure and 3 waters

Kāi Tahu Ki Otago water perspective

Te Runanga O Ngai Tahu Freshwater Policy

Ngai Tahu Climate Change Strategy

Cultural Values Statement

Draft National Policy Statement for Freshwater Management

We also had the experience and wisdom of Richie Hewitt and taskforce members who reviewed a number of articles, wrote summaries and helped inform the wider groups. Topics reviewed included:

- Contamination sources
- Commercial and private wastewater schemes
- Water takes in the Upper Clutha – both rural and for private schemes
- Dung Beetles
- Closed urban water systems / greywater reuse
- Stormwater reviews
- Farming practices and information
- Mahinga Kai and native species

The results from Shaping our Future's first Water Forum are included in Appendix 2.

Appendix 2: Shaping our Future Water Forum

Water Forum held in Wanaka

85 attendees and 41 online responses[11] - Tuesday 10th April 2018 6pm – 9pm

Use of this information and Disclaimer

Introduction

The aim of this report is to capture the outcomes of the Wanaka Water forum in a way that can help the Taskforce shape its recommendations. It records the community's long-term aspirations and values, their views about current challenges, priority issues and identifies steps that can be taken for the future of freshwater in the Queenstown Lakes District.

Shaping our Future also held the same forum in Queenstown on 9th April 2018. A separate taskforce was established in the Queenstown with the two groups working closely together to share information and resources. The outcome of both reports will provide a high-level district wide view for freshwater.

Summary

There were four main themes identified and generally agreed by all respondents on what was important for the future and as key themes for change:

Water Quality (and Ecology) and Water Quantity

- The desire for accessible, affordable, clean, safe, drinkable and swimmable waterways
- Management of water quality and quantities in waterways and catchments
- 3 waters – drinking water, stormwater and wastewater quality and infrastructure
- Reduction and remediation of pollution e.g. run off

Strategic Management

- The need for strong, collaborative, visionary leadership in management of all freshwater
- Collaboration and clarification of policies and procedures, accountability and enforcement of freshwater standards at local, regional and national level.

Community Culture – Education and Awareness

- Residents, visitors, commercial and industrial understanding, value and respect for our freshwater
- Education around pollution, stormwater, consumption and impacts of our actions on our waterways e.g. cleaning boats, no plastics,

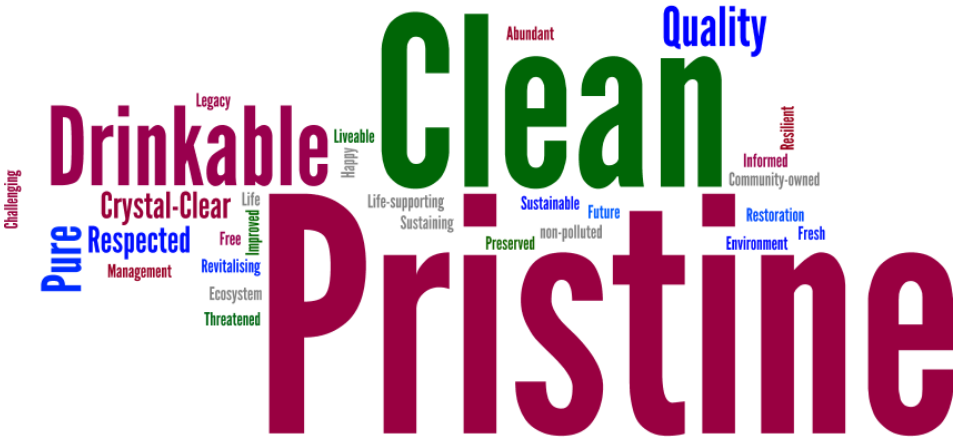
Research and Monitoring

- Need for consistent, robust monitoring of our waterways
- Increased communication of results and establishment of accurate baseline information
- Monitoring followed by evidence-based action

[11] (13 Upper Clutha specific and 28 district wide online responses)

The Future of Freshwater

Attendees were individually asked to give one word that best described their ideal future. The results were put into the wordle below:



Attendees were asked "What's the headline for Freshwater in the Upper Clutha in 2040"

- Wanaka Water Treatment Plant no longer needed
- Lakes District becomes 100% Pure
- New economic model discovered
- Wanaka announces 1st water neutral town
- Lakes District water quality best in the world
- Impact of climate change reversed
- Healthiest underwater ecosystem in the world
- All rivers drinkable
- Water use slashed by 50% in the Upper Clutha
- No attendees at the latest water meeting as there are no problems!
- Worlds 1st closed loop farm announced in Wanaka

Prior to the forums over 800 school children shared their views on freshwater in our district. Their views are expressed in wordles below.

What we love about Freshwater

What will it look like if we don't act?

What can we do?

Our Values

Attendees were asked to tell us what they value about freshwater. The full list of values is available.

Water Quality

- Swimmable, drinkable, accessible, sustainable and safe lakes, rivers and aquifers (highest value with over 65% of respondents having this as a value)
- Transparency of Lakes and Rivers
- All water is clean, low in nutrients, low in toxins, pathogens, low in protozoa, high in diversity
- Reduced agricultural water demand and better methods to reduce run off effects
- Recycling and cleaning of all water
- Water quality is better in the future than it is now
- Stormwater is clean and doesn't pollute waterways

Water Quantity

- Water takes managed and priced with the environment as the priority
- Decrease in water use and sufficient quality water to meet demand environmentally and commercially.

Ecology

- Resilient, healthy waterways that support biodiversity – some measures:
    - No algae blooms
    - Return of birdsong, habitat restoration (Riparian), sustains a healthy and diverse ecosystem.
    - Wetland extent returned to 80% of original
    - Rivers kept close to natural hydrology % MALF and variability
    - Solve biosecurity issues e.g. Lake Snow, Didymo
    - All lakes to have a trophic level 2 or less & to exceed MFE National Objective Framework

Strategic Management

- Collaboration to manage water supply – our rivers, reservoirs, biodiversity.

Community Culture

- Community values and respects our freshwater
- All users contribute to the cost of improving our freshwater
- A balance between recreational, commercial and residential users
- Community engages in behaviour change e.g. consumption, recycling of water, use, pollution

Research and Monitoring

- Continuous and effective monitoring of freshwater quality and quantity including:
    - Minimum flows

- Contamination – chemicals, run off
- Scientifically measurable
- Identify trends and warning signs
- Continuous research – biological markers and indicators
- Action from monitoring – communication, remediation, research

The Priorities and Challenges facing freshwater today

Each attendee was asked to provide one word describing the greatest challenge in freshwater today – the results are in the wordle below (note the word pollution includes contamination and chemicals):

Attendees workshopped the priority issues for today and into the future. An individual rating system was used to show the highest priority (higher number shows higher priority for respondents).

Big Issues – top priorities

Theme:	Issue:	Priority rating	Notes
Water Quality and Quantity	Pollution from Land Use	**97**	• Deforestation, farming and urban input (pesticides, chemicals, effluence) • Proximity of land use to water sources e.g. no development near headwater system catchments • The proximity of our people to our waterways impacts on our water quality – run off, stormwater etc.
	Population Growth and its impacts on our water quality and quantity	**32**	• Rapid growth in both resident and tourism numbers • Increased recreational and commercial use • User pays, allocations of finances to assist with pressures from tourism.
	Supply of water and availability and quantity for Hydro	**6**	• Increasing demand for our water e.g. electric vehicles, risks to supply and climate change all impact on the amount of water available
	Invasive species	**9**	• Plants and algae, animals, degradation of our waterways. Lake snow, didymo and introduced species impacting on our natural eco-system
	Ecosystem resilience – e.g. after a shock	**8**	• Biodiversity and protecting it – recreation vs ecosystem conflict • Protection of wetlands
	Balancing diverse objectives and commitment to them	**11**	
Strategic Management	Lack of informed strategic leadership	**25**	• The need for an integrated shared vision, goals and objectives for everyone to work towards. • Courageous leadership and active management of lakes, rivers and catchments • The need for transparency in communication • Collaboration and consistency – councils, individuals, communities • Economics and economical use • Public accountability for water rights • Need for partnerships and collaboration – scientific, policy community. • Investigation of alternative methods – embrace innovation, look at overseas models, communication, action. Funding

Theme:	Issue:	Priority rating	Notes
			• Water use rights allocated for the greater good
	Lack of a value for water resource – societal and fiscal	**32**	• This applies to the community culture section as well
	Governance – need for change to regulation Government Policy E.g. National Government policy.	**21**	• The need for governance and regulation to change to protect and enhance our waterways e.g. National Government Policy • Collaboration and consistency between regulations at local, regional and national level.
	Governance held captive by lobby and economic interest groups	**18**	
	User pays / polluter pays for all impacts	**17**	
Community Culture – education and awareness	Education, Awareness and behaviour change	**51**	• Disconnect of people in understanding the impact of their actions, the reality of our situation and the value of water not imbedded into the community. • Social apathy and understanding that we are part of the problem
	Stories and identification with the environment	**24**	• Imbedding a love of and appreciation for our freshwater through the stories we tell
	Reconciliation and alignment of people for our natural surroundings.	**10**	• Reconnection of people to nature through culture change • Reconciliation and alignment of people with their natural environment – above and below the water.
	Economic system – make a living with less impact.	**16**	• Education and awareness for all members of the community about their actions and how they can assist e.g. • Riparian planting, consistent story telling (tourism), education and new methodologies
	Willingness to pay to fix the problems	**4**	• Education and awareness can assist with people's willingness to apply rates, taxes, other contributions to be able fix problems and stop new ones occurring
Research and Monitoring	Lack of data / relevant data to make informed decisions.	**22**	• Research and monitoring – the establishment of good baseline information, future triggers, indicators and remedial actions were identified as themes throughout the workshop.

Workshop Information

Attendees then workshopped the top priorities in small groups, identifying critical driving influences, ideal future outcomes and potential next steps/solutions. Note despite the majority of attendees agreeing that the key biggest issue was pollution of our waterways there was insufficient interest to establish a group. This may be due to a number of factors including the depth and breadth of the subject, differing views and reluctance to enter into what might become heated discussions.

Theme: Water Quality and Quantity

Key Issue: Impact of land use on water quality and quantity

Critical Driving Influences	2060 – Ideal future outcomes	Solutions/ Next Steps
1. Economic models systems 2. Tradition and heritage 3. Government policy and regulatory frameworks 4. Incentives for intensification 5. Lack of payment for resource and accountability 6. Gap between research and application in land use.	1. Land use is within limits/is limited 2. Match land use with capability/sustainability 3. Understanding how natural systems work back to first principles	1. Question whether effects based or more prescriptive governance/regulation 2. More monitoring 3. Need a lot of date – find the limits, indication and investment in research 4. Economic Incentives – internal/external 5. Shared vision with a strong commitment by all stakeholders 6. Strong leadership – effective planning and shared values 7. Public awareness and education – its everyone's problem.
	Measures of Success 1. Reduced ecological footprint 2. Water supply is not an issue 3. Natural hydrological regimes supply indigenous or 'novel' ecosystems. 4. Few cars, public transport resulting in better stormwater quality	

Theme: Strategic Management

Key Issue: Changing Government Policy

Critical Driving Influences	2060 – Ideal future outcomes	Solutions/ Next Steps
1. Lack of ecological priorities 2. Lack of diversity in decision makers – central and local 3. Lack of balance between urban and rural communities 4. Lack of courageous leadership	1. Strong sustainable a. Vision b. Society 2. Policy and Planning focused on eco-system-based paradigms 3. Sustainable urban drainage	1. Ongoing political consensus across parties 2. Constitution including environmental rights 3. Consequences for non-compliant (fiscal – carrot and stick, taxes and rebates) 4. Democracy 5. Use of other political mechanisms (referendum) 6. Use of example to mode e.g. water framework directive 7. Apply sound eco-system service methodologies.

Key Issue: Reaching agreement, commitment and balance on differing objectives

Critical Driving Influences	2060 – Ideal future outcomes	Solutions/ Next Steps
1. Drawing out interest groups and their differing objectives 2. Communication 3. Disseminating information about issues 4. Existing policies and regulation and their ability to influence change 5. Data Collection – definition of what is required to assign responsibility	1. Best use and quality of water – balancing needs and wishes and those that the community is prepared to pay for	1. Identifying interest groups and communicating 2. Develop commitment from relevant agencies – particularly government – central, local and regional 3. Clearly define and publicise process and objective.
	Measuring success: 1. An agreed management regime with measures in place to assess progress/achievement	

Theme: Community Culture

Key Issue – Lack of stories and our connection to water

Critical Driving Influences	2060 – Ideal future outcomes	Solutions/ Next Steps
1. Lack of awareness 2. Lack of language 3. Operators/Group – common conversation about use of lake 4. Lack of information	1. Sense of ownership/pride in personal stories 2. Museum / sense of history 3. Documentaries and strong stories 4. Clarity as a community and embedded as part of the culture	1. Long term scientific research in story format/documentary/factual/science based. 2. More scientific programs in schools 3. Space where we promote sharing of stories about water and lake – using different changes – physical space, radio, you tube, new invented technologies e.g. 3D or Holograms, VR
Who: Operators, locals, tourists, holiday makers, Iwi	Measuring Success: 1. Stories are an accurate reflection of the value we put on water 2. Quantifiable change based on story-based projects.	4. Use Whanau – learning our local Maori history – words and stories that invite others to tell their story to create a generic, shared identify and love for Wanaka and a connection to the water. 5. Examples include Love our Coast campaign and Iceland Tourism

Key Priority: Driving Behaviour Change

Critical Driving Influences	2060 – Ideal future outcomes	Solutions/ Next Steps
1. Ignorance and apathy 2. Lack of connection to our water 3. Lack of understanding of consequences in the short and long term 4. Knowledge of alternatives 5. Growth tourism and housing development	1. People default to positive impact choices on the environment and consistently loo for better options 2. Measurable data outcomes	1. Education for personal accountability 2. Education about consequences of actions e.g. car washing 3. Legislation changes 4. Charging for water use 5. Taxing, citations for incorrect use 6. Incentives and subsidies (carrot and stick) 7. Zero waste / zero pollution