



Interesting and thought-provoking aspects of the Auditor-General's work and public reports, presented as case studies for teachers and students.

# Meeting demand for drinking water

Are our water supplies in hot water?

## Introduction

High-quality drinking water is essential for our health. About 87 percent of New Zealanders receive drinking water from local authorities (city, district and regional councils). Given the country's generous water resources and small population, our water supplies should be secure now and in the future – right?




Concerns have arisen that some local authorities are not well equipped to manage their water supplies. In response to these concerns, the Office of the Auditor-General (OAG) audited a representative sample of eight local authorities: Tauranga City Council, Nelson City Council, Tasman District Council, Kapiti Coast District Council, Opotiki District Council, Christchurch City Council, Central Otago District Council and South Taranaki District Council.

The audit found that, in managing water supplies to meet future demand:

- three local authorities were performing effectively
- three were performing adequately but could be doing better
- two were performing poorly.

## Water-supply system

The water-supply system has three main parts:

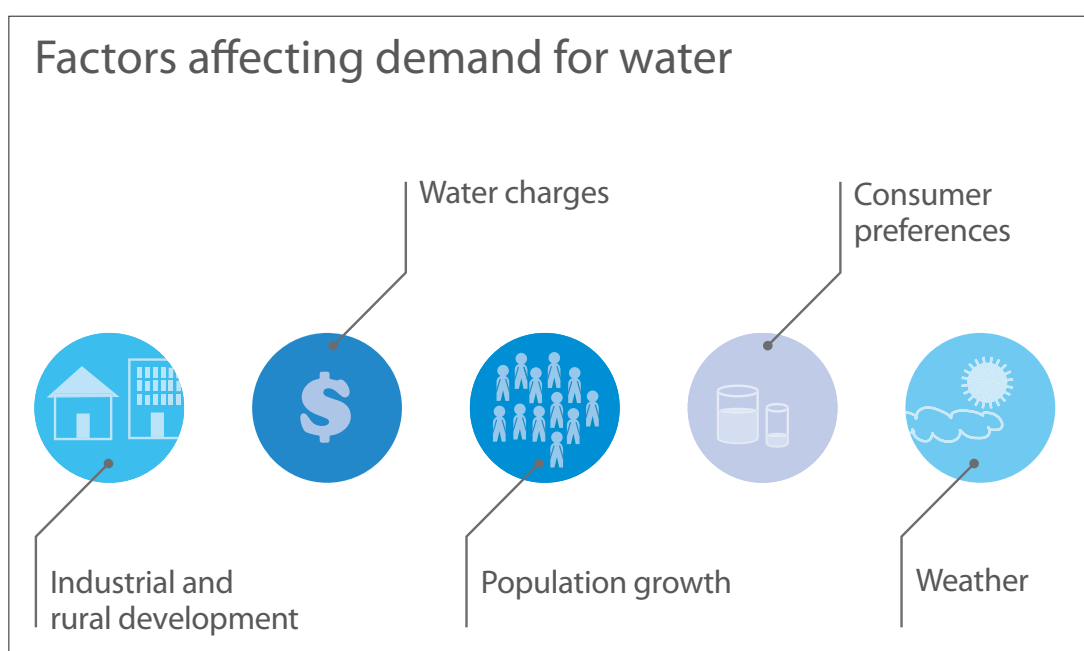
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<b>Stage</b>	 <p><b>Water source</b> Surface water (rivers and lakes), groundwater (wells and bores), rainwater</p>	 <p><b>Treatment plant</b></p>	 <p><b>Delivery</b> Reservoirs, tanks, pipes</p>
<b>Who's responsible</b>	Local authorities, Ministry for the Environment	Local authorities, Ministry of Health (drinking-water assessors)	Local authorities, Department of Building and Housing (building assessors)

Many local authorities directly manage the supply. Others contract operators and maintenance technicians.

## How demand for drinking water is forecast

To prepare for the future, local authorities need to forecast how much drinking water will be needed and where. Forecasting involves:

- identifying factors that influence demand (such as weather, population growth, industrial or rural development, water charges, consumer preferences)
- preparing projections for demand over time.



Forecasting usually takes into account data on past water consumption (ideally, average and peak use) and expected population growth. Forecasts are generally more reliable if they are prepared for various sectors (such as domestic or industrial).

Forecasting methods should be as reliable as possible. They can be quantitative (such as mathematical modelling) and qualitative (such as consultation with users and experts). Ideally, both types of method are used and compared.

Forecasting is a tricky business, so assumptions and risks should be identified.

Accurate forecasts allow local authorities to:

- plan to access new water sources
- design and budget for new or upgraded supply systems
- efficiently use public funds.

## Strategies to meet demand

Strategies to meet demand generally fall into two categories:

- **Supply strategies** deal with how water is captured and delivered, usually with a focus on meeting growing demand. Examples include planning for new infrastructure, carrying out on-going maintenance and controlling inefficiencies such as leaks or high water pressure.
- **Demand strategies** deal with how consumers use water, usually with a focus on reducing use. Examples include metering or charging for water, educating people about water conservation and restricting water use.

## Effective management of water supplies

Effective management of water supplies involves:

- using high-quality data and reliable methods to forecast demand
- evaluating a range of strategies to meet demand
- implementing appropriate strategies (such as building or upgrading of infrastructure) at the right time and scale.

Effective management avoids stress on scarce water resources and results in responsible use of public funds.

The OAG considered the above criteria when assessing the performance of the local authorities.

## Summary of the OAG's findings

### Tauranga City Council

<b>Water source</b>	Surface water
<b>Ability to manage supply to meet demand</b>	Effective
<b>Forecasting future demand</b>	Forecasting is relatively detailed and likely to be accurate (for example, it includes analysis of factors influencing demand). The existing supply is insufficient to meet projected demand.
<b>Planning to meet future demand</b>	Planning and implementation are good. Supply strategies include investing in new or upgraded infrastructure, looking for new water sources, and leak- and pressure-control programmes. The council has identified a new water source and applied for resource consents. Demand strategies include universal water metering and charging, education and water restrictions when necessary.
<b>Quality of drinking water</b>	Ungraded in 2010 but graded A in 2005. Compliance with 2007 standards requires minor upgrades.

**Water-quality grades:** A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Nelson City Council

<b>Water source</b>	Surface water
<b>Ability to manage supply to meet demand</b>	Effective
<b>Forecasting future demand</b>	Forecasting is relatively detailed and likely to be accurate (for example, it includes analysis of factors influencing demand). The existing supply is sufficient to meet projected demand.
<b>Planning to meet future demand</b>	Planning and implementation are good. Supply strategies include investing in new or upgraded infrastructure, looking for new water sources and a pressure-control programme. Demand strategies include universal water metering and charging, education and water restrictions when necessary.
<b>Quality of drinking water</b>	Graded A in 2010.

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Tasman District Council

<b>Water source</b>	Surface water and groundwater
<b>Ability to manage supply to meet demand</b>	Effective
<b>Forecasting future demand</b>	Forecasting is relatively detailed and likely to be accurate (for example, it includes analysis of factors influencing demand). The existing supply is insufficient to meet projected demand.
<b>Planning to meet future demand</b>	Planning is satisfactory and improving, and commitment to implementation is at an early stage. Supply strategies include investing in new or upgraded infrastructure (although significant upgrades are still needed), looking for new water sources and leak- and pressure-control programmes. The council is investing in dams as an additional supply source. Demand strategies included universal water metering and charging in all urban supplies (90 percent of users), education and water restrictions when necessary. The council is developing other conservation measures, for example, a policy on low-flow and restricted supply connections.
<b>Quality of drinking water</b>	Ungraded in 2010. Compliance with 2007 standards requires upgraded infrastructure (new filtration and disinfection).

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Kapiti Coast District Council

<b>Water source</b>	Surface water and groundwater
<b>Ability to manage supply to meet demand</b>	Adequate
<b>Forecasting future demand</b>	Forecasting is adequate but data could be improved. (Using water-production data in place of water-use data risks overstating demand because it doesn't take account of leaks.)
	The existing supply is generally sufficient to meet projected demand, but summer demand in 2015/16 is projected to exceed the amount that can be taken under resource consents.
<b>Planning to meet future demand</b>	Planning is satisfactory, but implementation (for example, of demand strategies) is sometimes affected by policy changes.
	The council has decided to increase supply, which will require investment in new or upgraded infrastructure. It is looking for new water sources. It has only recently started to focus on making the existing supply system more efficient.
	Demand strategies include voluntary conservation, education and water restrictions when necessary. The council is investigating water metering and developing other strategies (for example, new houses will be required to have rainwater tanks and/or wastewater systems).
<b>Quality of drinking water</b>	Ungraded in 2010.
	Compliance with 2007 standards requires upgraded infrastructure (UV treatment).

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Opotiki District Council

<b>Water source</b>	Surface water
<b>Ability to manage supply to meet demand</b>	Adequate
<b>Forecasting future demand</b>	Forecasting is limited.
	The existing supply is sufficient to meet projected demand.
<b>Planning to meet future demand</b>	Planning is limited.
	Supply strategies are minimal, with little investment in new or upgraded infrastructure. The council has only recently started to focus on making the supply system more efficient.
	Demand strategies include universal water metering and charging, and education. The council is developing other conservation strategies, for example, a policy on demand management.
<b>Quality of drinking water</b>	Ungraded in 2010.
	Compliance with 2007 standards requires upgraded infrastructure (UV treatment).

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Christchurch City Council

<b>Water source</b>	Surface water and groundwater
<b>Ability to manage supply to meet demand</b>	Adequate
<b>Forecasting future demand</b>	Forecasting is limited by incomplete data, especially on water use, but the council is developing a demand-forecasting model. The existing supply is sufficient to meet projected demand until about 2051.
<b>Planning to meet future demand</b>	Planning is satisfactory and improving. Supply strategies include investment in new or upgraded infrastructure. The council has just begun a leak-detection programme. Demand strategies are limited to universal water metering (but with charges only for commercial and industrial consumers) and education. The council has adopted a new water-supply strategy for 2009–39, which includes more tools for managing demand.
<b>Quality of drinking water</b>	Grades B and D for Christchurch City in 2010, and E for Banks Peninsula. Compliance with 2007 standards in Banks Peninsula requires upgraded infrastructure.

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## Central Otago District Council

<b>Water source</b>	Surface water and groundwater
<b>Ability to manage supply to meet demand</b>	Poor
<b>Forecasting future demand</b>	Forecasting is limited by incomplete data, especially on water use. (Using water-production data in place of water-use data risks overstating demand because it doesn't take account of leaks.) The existing supply is sufficient to meet projected demand, but future restrictions are anticipated. Resource consents for taking surface water may not be renewed if consumption is very high.
<b>Planning to meet future demand</b>	Planning is improving, but commitment to implementation is at an early stage. Supply strategies include looking for new water sources. Significant investment in new or upgraded infrastructure is required. The council has only recently started to focus on making the supply system more efficient. Demand strategies included education and water restrictions when necessary. The council will progressively introduce water metering and charging. The council has adopted a new water-supply strategy (2007), which, if implemented, should improve the situation.
<b>Quality of drinking water</b>	Ungraded in 2010. Compliance with 2007 standards requires upgraded infrastructure (treatment plants).

Water-quality grades: A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## South Taranaki District Council

<b>Water source</b>	Surface water
<b>Ability to manage supply to meet demand</b>	Poor
<b>Forecasting future demand</b>	Forecasting is limited by incomplete data, especially on water use. (Using water-production data in place of water-use data risks overstating demand because it doesn't take account of leaks.)
	The existing supply is insufficient to meet projected demand. Additional sources are problematic because of drought, a shortage of groundwater and use of surface water being at its maximum in some areas.
<b>Planning to meet future demand</b>	Planning is improving, but commitment to implementation is at an early stage.
	Supply strategies include looking for new water sources. Significant investment in new or upgraded infrastructure is required. The council has only recently started to focus on making the supply system more efficient.
	Demand strategies include education and working with farmers to reduce water use and environmental impacts. The council will progressively introduce water metering.
	The council has adopted a new district water-supply strategy (2007), which, if implemented, should improve the situation.
<b>Quality of drinking water</b>	Ungraded in 2010.
	Compliance with 2007 standards requires upgraded infrastructure (treatment plants).

**Water-quality grades:** A = completely satisfactory, B = satisfactory, C = marginally satisfactory, D = unsatisfactory, E = unacceptable

## The OAG's recommendations

The OAG recommended that all local authorities look for opportunities to:

- improve the efficiency of their current supply systems, using benchmarks to measure progress
- improve the data used for forecasting, especially data on water use
- use more tools to assess how reliable their forecasts are (for example, by putting past data through the forecasting model to see whether the resulting forecast is close to actual water use)
- better evaluate the costs and benefits of possible supply and demand strategies
- prepare plans that include a range of sustainable supply and demand strategies.

## Student inquiry questions

- What challenges do local authorities face in meeting demand for drinking water? What factors are under their control? What factors are beyond their control?
- Are the challenges the same everywhere? If not, which might differ?
- What strategies can you think of to reduce demand for, or improve the supply of, drinking water? (You may have ideas beyond those in the case study.) Which strategies are most sustainable?
- What do you think your local authority should be doing to manage your water supply?