

## Sky harvest – turning the tide on rainwater tanks

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Is the answer to some of our water woes above our heads, rather than under our feet?

As Auckland looks for a way out of its water crisis, towns and cities elsewhere are also wondering how to cope with a future involving more extreme weather.

Harvesting rainwater from the roof seems like an obvious answer to supply some of our growing water needs.

Yet when *Stuff* spoke to councils around the country, we found only a few actively encourage their residents to harvest rainwater.

Several weren't convinced it was a cost-effective way out of dry spells, and many said it was purely a choice for each household to make. On current progress, a rain tank revolution doesn't seem likely any time soon.

Yet, as New Zealand's rainfall gets more erratic, several commentators are calling for councils to be more proactive at prodding households to install alternative supplies.

### **VARIED ANSWERS**

We asked 66 of the nation's 67 territorial authorities (excluding the Chatham Islands) about their policies. We found that, at least for urban households, 40 councils were neutral (61%) when it came to encouraging the use of rainwater, 21 could be classed as supportive (32%), and only a few (7%) offered assistance such as discounts on tanks.

The clear leaders when it came to encouraging residents to capture rainwater were Kāpiti and Gore. Gore now requires all new residential buildings to install a rainwater tank with a minimum capacity of 3,000 litres (tiny). Kāpiti has, since 2009, required households in residential zones to capture rainwater for toilet flushing and outdoor use, and offers homeowners a targeted rate to make the installation cheaper.

In most places around the country, it comes down to the individual household. Councils say a rain tank can boost resilience to a water shortage or natural disaster, but many spokespeople told Stuff tanks were not always a simple or appropriate alternative to boosting town supplies.

Taupō District Council, home of the county's largest lake, had a lukewarm response. It said it would look at the costs and benefits of all options around rainwater tanks as part of its current District Plan review and likely engage with the community on consultation late 2020, or early 2021.

In Auckland, Healthy Waters strategy manager Andrew Chin said public consultation was under way on encouraging rainwater use in the supercity, particularly for uses that don't require water to be of drinking quality, such as garden-watering and filling swimming pools.



A 5000 litre tank barely visible on a suburban property in Auckland's Mt Albert. The installation, tank, plumbing, and pump cost the owner around \$5000. The retrofit tank collects water from only half of the roof.

The drought had made the question more urgent, he said.

The council was looking at removing barriers, such as the need for a resource consent, he said, and had already waived the application fee.



Homeowners who wanted to go a step further and plumb rainwater into the house could – provided they met Building Act requirements.

But Auckland had no plans to subsidise tanks, he said. “That’s a tall ask, post-Covid.”

Meanwhile, Chin said, the council-owned water company, Watercare, was working to alter its charging system to make it cheaper for those who reduced demand on the city’s supply by harvesting rainwater.

But, Chin said, the 45,000 to 50,000 Auckland houses that already relied solely on rainwater had their own issue: overstretched private water carriers. “Our biggest concern for the next summer is to encourage those not on reticulated supply to ensure they have enough storage capacity.”



Water carriers in some areas were overstretched in the summer providing top ups to those relying solely on rainwater. The Auckland Council is encouraging such properties in the supercity to increase their capacity.

## **DRY TIMES COMING**

While many of us treat tap water as if it was endless, council reserves are not inexhaustible, nor cheap to provide.

The 2019/20 summer saw drought declared across the entire North Island, parts of the South Island and the Chatham Islands in mid-March.

Before the government declaration, there were a series of district-wide water restrictions – towns or areas self-regulating by banning car-washing and garden-watering, or, in extreme cases, all

outdoor water use. (Outdoor use can account for 20 per cent of a household's consumption, but councils aren't legally required to supply it.)

During the summer, many of us were urged to save water by councils, as reservoirs in areas such as Dannevirke got to as low as 5 per cent of capacity. Auckland's end-of-autumn storage lake level was 43 per cent, giving former Waitakere City Mayor Sir Bob Harvey flashbacks to the summer of 1993/94, when Auckland's dams were at just 32 per cent.



Rainwater collection on a rural property, augmented by council supply.

Dry spells should no longer come as a surprise to councils.

The effects of anthropogenic climate change on a range of weather variables for New Zealand are widely accepted and relatively well-known; an increase in hot days and the frequency and severity of droughts, coupled with a probable rainfall increase in the west and south but a decrease in the north and east.

Niwa's projections show people should expect more extreme daily downpours, especially in the west.

Whatever humanity's efforts at clawing back the greenhouse gas emissions fuelling these changes, Niwa's best case scenarios involve more dry weather and more damaging rain events, sometimes in the same region.

**'NOT COST-EFFECTIVE'**

Many people living in rural New Zealand are familiar with using rainwater tanks, fed off the house or other buildings to augment a district council supply, or, in some cases, as the sole source of water.

So, in regions where rainfall is predicted to be less or, at best, unpredictable, should more urban properties be collecting and using rainwater?

Unfortunately, the answer is not simple.

“If landowners have both town supply and rainwater tanks, then in an extended dry spell it is likely the tanks will run dry anyway,” said Whāngārei District Council Water services manager Andrew Venmore. “Councils need to be able to supply this extra water, so the engineering solution required is the same size regardless of whether tanks are in place or not.”

“Rainwater tanks usually require pumps. The power used by the thousands of pumps is greater than that required by a well-engineered water supply,” he said.

“So, environmentally, rainwater tanks are not a good idea, and that is before consideration is given to the power, materials and water used to make the plastic or concrete tanks initially.”

In 2011, Greater Wellington Regional Council commissioned research into whether installation of rainwater tanks for toilet flushing and outdoor water use would help defer building a new storage lake or dam.

The results showed tanks could provide for a high percentage of a household’s water needs for these uses. However, widespread installation would not be cost-effective as an alternative to developing the metropolitan Wellington water supply system.

However, the research noted, tanks would be good for households’ emergency resilience.

Whāngārei’s Venmore felt there was room for individuals to contribute to making their own supplies more secure.





Water harvesting on a large residential property.

“I believe that where people are motivated to do it themselves, it should be allowed, but as a solution to wider community issues it is rarely a sustainable solution.”

He cited a discussion paper, which found an average house in the upper North Island could expect upfront costs of around \$7,500 to install a 5000 litre tank – and that was for non-potable use (toilet flushing and outdoors).

Even after paying for a tank, the owner of a house with a 160 square metre roof might still run out of rainwater between 42 and 47 days a year, with the longest empty duration up to 19 days. (The rainfall figures came from Warkworth.)

The annualised cost over a period of 25 years, taking into account money saved on water charges and adding in tanker refills, was \$324 a year – pushed up partly by councils, looking to recoup income lost from water charges by upping the water rate per cubic metre.

“If sufficient proportions of the area supplied by a water provider were to move to rainwater tanks the effective demand might be cut significantly (by up to 40 per cent),” the report said. “Given that 80 per cent of the water provider’s costs are fixed (listed as salaries, overheads, depreciation, etc) and must be covered by the water charges, the only option is to increase costs to cover the fixed costs.”

## **SHIFTING COSTS**

Financially, buying a water tank would seem hard to justify for a homeowner if the goalposts keep shifting.

But from a council's perspective the price increase might be necessary – councils need to cover provision in dry weather, as well as things like wastewater infrastructure.

The report itself admits it is largely coming at the issue from a council's point of view “...if the cost per household for [a] new water source is less than the cost of retrofitting rainwater tanks to existing properties and installing rainwater tanks in all new properties, then the correct economic answer is to build the new water source. It is recognised in this that there may be additional environmental or social issues associated with a new dam or aquifer that may override the economic balance.”

A familiar-sounding trade off: economics vs the environment.



The Department of Conservation offices in Taupō were designed with rainwater harvest in mind from the outset with water for gardens and car washing piped to a tank concealed under a deck.

Several proposed new dams and water plants have been controversial, because of their costs to nature.

In 2018, after years of debate, Hawke's Bay Regional Council finally gave up on the proposed \$330 million Ruataniwha Dam after spending \$20m pursuing it.

A contributing cause was Forest & Bird's successful challenge to the acquisition of land on the conservation estate. More water meant more intensive farming, and more pollution in rivers, said Forest & Bird's Lower North Island regional manager, Tom Kay, following the council's decision in 2019 to put \$250,000 towards investigations into a scaled-down version of the dam.



Ruataniwha was touted originally as a solution to the depletion of the over-allocated Tukituki River, prey to algal blooms in summer due to low water flow, high water temperature and nutrient load.

In West Auckland, plans to build a new water treatment plant stoked fervent opposition because it required clearing native bush.



It makes sense for water used in the outdoors to be harvested on the property itself, says senior lecturer in Architecture and Planning at the University of Auckland Bill McKay. The Kāpiti Coast District Council agrees.

Meanwhile, councils are under pressure to ensure their residents have a reliable – and healthy – supply.

### **HEALTH RISK?**

While it may not make much sense to insist on domestic water collection in dry areas such as Hawke's Bay or Central Otago, some councils are encouraging homeowners to harvest the rain.

Kāpiti Coast District Council offers targeted rates that provide an interest-free payback on up to \$5000 worth of assistance on a retrofitted water tank.

The KCDC believes encouraging rainwater harvesting and the use of grey water for outdoor irrigation mean its current supplies will “meet the needs of our growing communities for years to come”.

For more than 10 years, it has required new households in urban areas to capture rainwater for toilet flushing and outdoor use, as a minimum.



Water services co-ordinator Ben Thompson says some households that do not want town-supplied water have been permitted to remove their water supply connection to become completely reliant on rainwater. "If they do, we remind them that the water is variable in quality, and they will need to manage their own treatment."

However, this raises potential health issues.

The Building Code requires drinking water supplies be adequate in quantity and potable, so collected rainwater needs to have some form of treatment.

But Venmore says the difficulty of ensuring compliance is another barrier to widespread rainwater tank use. Councils are keen to ensure untreated rainwater is not unwittingly, or deliberately, used as a potable source.

The rub is, in some rural communities, it already is.

The Building Code and Health Act says water collected from a roof must comply with drinking water standards and any dual system (where households get grey water off the roof and potable water from their council) must be designed to prevent mixing.

Untreated rainwater must not be able to backflow from a tank and potentially contaminate a council's supply.

This is a real issue, says Water New Zealand's technical manager Noel Roberts, but it can be guarded against.

But where houses rely on rainwater for domestic use, any ongoing maintenance to ensure the water is drinkable is left in the hands of the homeowner.

Many farming families will be able to relate stories of dad scooping a dead possum out of the tank after the water got smelly.

Although there is an increasing range of innovations, like first flush diverters, leaf and debris diverters and protozoa-rated filters, to ensure roof water is clean, there remains a risk.



Rainwater harvesting has been the norm in rural areas for years, why not urban?

The Ministry of Health does not have statistics on the number of people who get sick each year from using roof water, nor does it know what waterborne pathogen was to blame.

“Unfortunately, we don’t have data on that,” replied Emily Barrett, a senior media advisor at the ministry.

“Generally speaking, those types of conditions wouldn’t have any coded data that identified the mechanism by which they contracted the pathogen.”

### **WHO USED ALL THE WATER?**

Data is a problem in other areas, too.

We know that the average consumption per person in New Zealand is around 200 litres per day – a nation profligate in personal water use. (Though Aucklanders, who pay by the litre, have got theirs down to 150 or so.)

Household water meters (increasingly, smart meters) are not required by many councils – yet they are instrumental in finding leaks, and every council is supposed to be acting to monitor or reduce water waste.

According to Justin Bell of Leak Detection Limited, of about 400 callouts in Auckland a month, 75 per cent show no sign above ground that water is being lost.

If they weren’t metered, with a leak appearing as a spike in the bill, he said, this water would likely continue to be wasted.



Water meters should be mandatory as an aid to finding leaks and enabling properties to monitor water use, says leak finder Justin Bell.

Going through one \$45,000 post-Covid-19 bill for a business in Auckland revealed it was losing 56 litres a minute, and probably had been all lockdown.

“All councils should know what percentage of loss they have in their reticulation, because they should know what volumes are going out and that each property that’s running off that network has as an average take that’s acceptable,” said Bell.

Conversely, some argue that water meters do nothing to encourage water conservation, as some homeowners believe: “I’m paying, so I can use as much as I like.”

Education on saving water may not hit home for some until taps run dry -- and places like Taupō are bedevilled by the perception that, with a huge lake on the town's front door, there is plenty of water to go around.





Chlorinated, fluoridated, evaporated. Water use in some districts is well above the average for the country and New Zealand is a country with high average water use per capita.

According to a submission by Lakes and Waterways Action Group Trust to the Taupō District Council Draft Water Supply Strategy in June 2019, locals have an unenviable record.

Quoting the council's own figures, the group noted: "Taupō District ... has a high use of water per capita, with approximate consumptive use of 400 litres per person per day. This is significantly higher than the national average and indicates inefficiencies in the supply chain and the community's current views on water conservation that may need to be better managed over time."

Of the medium-sized districts, Taupō's consumption was the highest (2016/17 NZ Water National Performance Review Data: Water Daily Use).

That prompted the group to call for the council to make water tanks mandatory for all new buildings in the District Plan, and consider subsidising water tanks.

## **CALLS TO ACT**

It's a call several others have backed.

Bill McKay, senior lecturer in Architecture and Planning at the University of Auckland, believes central and local government should be offering incentives to make individual houses less reliant on council infrastructure.

Down pipes heading straight to stormwater drains or soakage could, in some urban properties, be hooked up to a tank.

In a Radio New Zealand interview in July, McKay said: “When you have got a house in town you’re not allowed to catch water off the roof and drink it or cook with it... but that use is minor, so why don’t we catch rainwater ourselves for the major uses: flushing toilets, washing, watering the garden...”

Environmental Defence Society chief executive Gary Taylor was of the same mind in January, in Coromandel. “The combination of an expanding population, plus climate change impacts means a lot of smaller centres will need to be reviewing their potable water schemes and building in more resilience.

“Demand management is fine as a tool but where I’m sitting right now in Whitianga, the grass is brown, fruit trees are dying and there’s a total outside use ban, not likely to end any time soon. Supplementary rain or wastewater tanks are useful when there’s space for them.

“So the question really is whether local government, especially smaller entities, are onto this or not.

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