Callum Lo

2,000 words

New Zealand's freshwater governance must be designed to cope with increasing pressures on water availability and quality, otherwise the nation's natural and physical capital risk being squandered. Introducing a pricing system, if done robustly, manages scarcity, ensures best use, preserves water quality and provides more equitable outcomes. This essay argues that a permit auction mechanism is the best pricing system for improving the living standards of all New Zealanders.

1 Challenges

1.1 Scarcity

Despite having one of the highest amounts of water per capita in the world,[1] placement and timing strain New Zealand's ability to satisfy all requirements. Demand for freshwater peaks during summer when rain is least frequent, and eastern New Zealand has higher demand, while western areas see more rainfall.[2] Estimated use is only 65% of New Zealand's consented volume,[3] meaning that over a third of allocated water is being left unutilised. In response, many regional authorities have been forced to fully or over-allocate catchments, with around 30 percent of areas in Otago and around 20 percent of areas in Canterbury having over 100% of MALF[4] allocated.[5]

Furthermore, evidence strongly indicates a worsening trend. Of all consumptive[6] water use in New Zealand, irrigation is estimated to comprise 78%,[7] and technological advancement is making irrigation of ever larger expanses of land possible, while the long run upward trend of demand for dairy makes more intensive farming viable.[8] Municipal consumption will also rise as the population grows, while the effects of climate change will make water scarcity even more severe, particularly in eastern New

[1] "Freshwater demand (allocation)," *Ministry for the Environment*, accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/reporting-act/fresh-water/freshwater-demand-indicator/freshwater-demand

[2] Ibid.

[3] New Zealand Treasury, "Long-Term Challenges and Opportunities in the Natural Resource Sector: Three Case Studies," (New Zealand Treasury, Wellington, 2013), 19.

[4] Mean Annual Low Flow.

[5] "Allocation compared with renewable freshwater resource," *Ministry for the Environment*, accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/reporting-act/fresh-water/freshwater-demand-indicator/freshwater-dema-0

[6] Hydroelectric generation uses more than irrigation, but is considered nonconsumptive because the water reenters the catchment.

[7] "Update of water allocation data and estimate of actual water use of consented takes 2009-10," *Ministry for the Environment*, accessed July 13, 2016, http://www.mfe.govt.nz/publications/rma-fresh-water/update-water-allocation-data-and-estimate-actual-water-use-consented-3

[8] "Fonterra Revises 2015/16 Forecast Milk Price," *Fonterra*, accessed July 13, 2016, https://www2.fonterra.com/files/2016-03/160308milk-price-media-release-final.pdf

Zealand.[9] Droughts will become more frequent and intense, while rainfall will become less so. The effect of evapotranspiration[10] will become more pronounced as temperatures rise. In short, demand will rise and supply will fall.

1.2 Water Quality

Freshwater quality, the environmental issue that surveyed New Zealanders are most worried about,[11] is also declining. While New Zealand has made steady headway in combating point-source discharges,[12] it has found considerably less success in dealing with the more intractable problem of intensive farming, which removes water and leaches nutrients, increasing the concentration of pollution. Catchments require baseline water flows to mitigate the effects of nitrate leaching and sedimentation, and many rivers and lakes have insufficient water levels. 26% of all rivers have deteriorating trends in nitrate levels,[13] and pollution could be even more severe due to significant time lags.

2 Current Governance

Water permits are currently allocated by regional Councils[14] on a first-come, first-served basis, with applications decided without regard to any competing applications.[15] Councils charge for administration and monitoring costs, but not environmental externalities or scarcity, despite freshwater being a common-pool resource. Users then only face the costs of pumping or reticulation - sometimes even subsidised by the government under irrigation schemes.[16]

The RMA does provide for permit transfers, but requires consent from the issuing authority.[17] Since most such transfers would be for short term uses, users generally do not bother to attempt trading, and trading markets such as *HydroTrader* have found limited turnover, with *HydroTrader* having

---

[9] "Climate change impacts in New Zealand," *Ministry for the Environment*, accessed July 13, 2016, http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts
[10] Evaporation out of soil.
[11] Hughey, K, Kerr, G and Cullen, R, "Public Perceptions of New Zealand's Environment: 2013," (Lincoln University, Christchurch, 2013), iii.
[12] Ministry for the Environment, "Next steps for fresh water: Consultation document," (Ministry for the Environment, Wellington, 2016), 4.
[13] "River condition indicator: summary," *Ministry for the Environment*, accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/fresh-water/river-condition-indicator/summary
[14] Resource Management Act 1991, s 30(1)(fa).
[15] *Fleetwing Farms Ltd v Marlborough District Council* [1997] 3 NZLR 257 (CA).
[16] "About Us," *Crown Irrigation Investments*, accessed July 13, 2016, http://www.crownirrigation.co.nz/about-us/purpose/
[17] Resource Management Act 1991, s 136(2).

facilitated only 22 trades in 2015.[18] Most often, the only way to acquire existing water rights is to purchase the land underneath them.

3 Permit Auctioning

Pricing can use many different tools, such as volumetric use charges, resource rentals or transfer surcharges.[19] This essay argues for setting a desired environmental minimum flow for surface water (and minimum water level for groundwater) in each catchment based on assimilative capacity.[20] Permits for a percentage (to allow for periodic variation in water availability) of the allocable water would be auctioned off by the government. Total allocable amount would be set based on expected flow at the start of each water year[21] or each season, with adjustments during periods of extreme shortage. Auctioned permits would also be traded on water markets, and the system would only need to apply in areas of scarcity or environmental concern, to avoid unnecessary costs. This differs from a uniform charge, so may not be a *national* pricing system in that sense.

3.1 Best Use and Economic Growth

When a price is paid for each unit permitted to be used, it would no longer be economical for users to seek consents for more than they need, as they would be paying for the excess. Any consented water not put to use would be sold on the market to recoup costs, allowing natural capital not to go to waste. Producing goods with comparatively low water requirements, such as vegetables, would be preferred to water-intensive products, achieving allocative efficiency as costs are factored into production choices. In Australia's southern Murray-Darling Basin, where water is traded but not auctioned, trading has produced "significant allocative efficiency gains" and increased Australian GDP by NZD $235 million, according to the National Water Commission.[22]

Permit auctioning, unlike other pricing tools, implicitly reveals information held by bidders as prices emerge, deepening the country's intellectual capital and allowing better investment decision making. The Ruataniwha Dam project in Hawke's Bay is a germane example, where debate around the project's feasibility has often been stymied by a lack of information on its projected uptake.[23] Permit

[18] "Trade history," *HydroTrader*, accessed July 13, 2016, http://hydrotrader.co.nz/trade-history
[19] New Zealand Treasury, "Long-Term Challenges and Opportunities in the Natural Resource Sector: Three Case Studies," 23.
[20] The ability of a body of water to cleanse itself of pollution over time.
[21] In New Zealand, this is currently the same as the calendar year.
[22] National Water Commission, "Water markets in Australia: A short history," (National Water Commission, Canberra, 2011), 101-102.
[23] Fraser, P, Ridler, B and Anderson, W, "The Economics of the Ruataniwha Dam - Is it the son of Clyde?," (2014), 5-6.

auctioning also forces the government to trade off natural capital with economic growth, since setting higher environmental minimum flows results in less revenue. Authorities must make judgements about how much foregone revenue a cleaner waterway is worth, and set the allocable amount accordingly.

Many producers will be negatively affected, particularly ones that are water-intensive or reside where water is scarce, producing flow-on effects as consumption spending and demand for inputs like labour drop, and prices of some primary goods rise. However, the effect will become less pronounced over time, as firms adapt practices and invest in more efficient physical capital. According to the IMF, Australia used pricing to halve irrigation water use without decreasing output.[24] Moreover, redirecting resources generates economic activity elsewhere, improving other capital stocks and flows. For example, auction revenue spent on education deepens human capital, generating higher incomes.[25] Certainty in allocation reduces wasteful litigation in the Environment Court, freeing up resources for productive spending elsewhere. In addition, there are direct benefits to industries such as tourism and recreation from improved water quality, as demand for their services grow.

3.2 Water Quality and Sustainability

Without pricing, users consume up to where private marginal cost equals private marginal benefit, compromising environmental flows. When consents cost, intensive water users will decrease use or invest in more efficient processes and technologies, like variable-rate irrigation. In several European countries, simply switching from a flat rate to volumetric charging decreased agricultural use by 10 - 20%.[26] Commercial users large enough to achieve economies of scale may build reservoirs to avoid high future water prices. Municipal users, some of whom already face volumetric charges, would also face higher prices as suppliers pass on the costs of consents, decreasing water use for activities such as drinking and showering. Preserving water quality through sustainable use is essential for natural capital used in industries like tourism, as well as for recreational use.

Pricing mechanisms where the government sets the price can be ineffective due to low irrigation water price elasticity,[27] because governments may be politically unwilling to charge sufficiently high prices for sustainability. Moreover, uniform charging does not reflect variation in the marginal costs of scarcity and environmental externalities across thousands of different catchments. The advantage of

[24] "Water - The right price can encourage efficiency and investment," *OECD*, accessed July 13, 2016, http://www.oecd.org/env/resources/water-therightpricecanencourageefficiencyandinvestment.htm
[25] New Zealand Treasury, "Working Towards Higher Living Standards for New Zealanders," (New Zealand Treasury, Wellington, 2011), 18.
[26] European Environment Agency, "Assessment of cost recovery through water pricing," (European Environment Agency, Copenhagen, 2013), 77.
[27] OECD, "Sustainable Management of Water Resources in Agriculture," (OECD Publishing, Paris, 2010), 40.

auctioning, similar to cap and trade, is the certainty that the allocable amount is not exceeded. Unlike allocating rights by entitlements, it avoids the perverse incentive where users don't decrease consumption for fear of having their entitlement decreased in the future,[28] as well as contributing to fiscal sustainability by raising revenue.

3.3 Equity

Procedural fairness, a key component of equity,[29] suffers under a first-come, first-served system, where allocation is essentially arbitrary. The value of permits is capitalised into land prices, effectively transferring wealth from society as a whole to permit holders. Trading after allocation is also inequitable, as it creates windfalls when consents that were allocated largely for free are sold for a profit.

With pricing, user-pays principles apply; those who benefit from the resource bear the costs, and the benefits of water use are shared more widely through revenue. Upholding intergenerational fairness also relies on sustainable use of renewable resources. Conversely, willingness to pay can be considered an unjust allocation mechanism for restricting the capabilities of those on low incomes in both commercial and municipal use. However, most equity concerns can be offset fiscally, for example by using additional revenue to cut lower-end taxes or subsidise water efficient technologies.

4 Prerequisites to an Efficient Pricing System

New Zealand already has compulsory water metering,[30] but comprehensive compliance and enforcement of the regime would be needed to maintain an efficient pricing system; ECan in particular has struggled to enforce monitoring and use restrictions under the current regime, with one in five farmers in the region with consents having "serious non-compliance issues".[31] Furthermore, avoiding collusion would require a large number of buyers in each catchment or rigorous enforcement of competition laws.

Functioning water markets where transaction costs are low and information is accessible are essential. Permit transferability could be improved by easing the requirement for Councils to approve trades and allowing divisibility of consents, reducing transaction costs and enabling smaller, tailored trades to

[28] IMF, "The Fiscal Implications of Climate Change," (IMF, Washington, D.C., 2008), 25-26.
[29] New Zealand Treasury, "Living Standards: A Short Guide to 'Increasing Equity'," (New Zealand Treasury, Wellington, 2013), 1.
[30] Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, s 6.
[31] ECan, "Compliance Monitoring Annual Report: 1 July 2014 - 30 June 2015," (ECan, Christchurch, 2016), 2.

take place. Information is likely to be incomplete, as supply and demand are difficult to predict, though Australia has responded to this problem by publishing water information and research online.[32]

5 Barriers in the New Zealand Context

5.1 Existing Permits

Existing water permits make initial implementation difficult. The government could simply void all existing rights, but this would be unfair to many users who have invested considerable resources into water infrastructure. It could also lead to the creation of stranded assets, where existing physical capital becomes worthless as access to natural capital changes. Moreover, some users may have paid full price for water rights by having purchased the land attached to them with a premium built in. A possible solution is to grandfather[33] existing rights for a few years, while signalling that the government will start auctioning rights at a specific date. This would offset losses and allow the market time to make necessary changes in preparation for the pricing system. For example, a farmer might decide not to invest in an irrigation scheme, knowing that imminent water pricing would make it uneconomical.

5.2 Political Feasibility

Politically, there is firm opposition to pricing from primary sector groups such as Federated Farmers.[34] Others are concerned about the idea of a natural resource like water being commodified, arguing that access to water is a human right and as such should remain free of charge. While some environmentalists,[35] political parties,[36] and economists[37] have expressed support for market-based freshwater reform, it is clear that political antipathy remains a barrier. Furthermore, because not all catchments face scarcity issues, authorities would have to make determinations about which catchments to implement the pricing system in, which could problematically lead to permit holders lobbying for exemptions for their catchment.

5.3 Māori Claims

Taonga, guaranteed by Te Tiriti o Waitangi,[38] and customary title can be interpreted as including flowing water. The longstanding position of the Crown and common law is that there is no ownership

---

[32] "Water Market Information," *Water Market Information*, accessed July 13, 2016, http://www.nationalwatermarket.gov.au/

[33] Extend the period of existing consents.

[34] Gudsell, K, "Commercial use of water - who pays?" *Radio New Zealand*, accessed July 13, 2016, http://www.radionz.co.nz/news/national/300747/commercial-use-of-water-who-pays

[35] See for example Parliamentary Commissioner for the Environment Jan Wright.

[36] See for example Green Party of Aotearoa New Zealand, ACT New Zealand.

[37] See for example Basil Sharp.

[38] Te Tiriti o Waitangi, art 2.

over naturally flowing water,[39] but in 2012 the Waitangi Tribunal found that Māori do have traditional rights and interests in freshwater.[40]

Although Waitangi Tribunal rulings are not binding, partnership between Māori and the Crown on policy is essential for social cohesion and strengthening the economy.[41] The interests of Māori could be reconciled with a national water pricing system by using proceeds from the auctions to compensate iwi. Alternatively, water could be set aside and allocated to Māori land, a proposal which surveyed Māori have indicated support for.[42]

Conclusion

Freshwater remains New Zealand's greatest natural resource challenge, as well as one of the nation's most precious assets. Pricing freshwater use by permit auction is the best solution to maximise the value of natural and physical capital, improving the living standards of all New Zealanders.

[39] Gibbs, M and Bennett, A, "Māori claims to ownership of freshwater," (Resource Management Journal, Auckland, 2007), 2-3.
[40] Waitangi Tribunal, "The Stage 1 Report on the National Freshwater and Geothermal Resources Claim," (Waitangi Tribunal, Wellington, 2012), 75-81.
[41] New Zealand Treasury, "The Treasury Statement of Intent: July 2015 - June 2019," (New Zealand Treasury, Wellington, 2015), 14.
[42] Durette, M, Nesus, C, Nesus, G and Barcham, M, "Māori Perspectives on Freshwater Allocation," (Ministry for the Environment, Wellington, 2009), 1.

Bibliography

Crown Irrigation Investments, "About Us," accessed July 13, 2016, http://www.crownirrigation.co.nz/about-us/purpose/

Durette, M, Nesus, C, Nesus, G and Barcham, M, "Māori Perspectives on Freshwater Allocation," (Ministry for the Environment, Wellington, 2009), 1.

European Environment Agency, "Assessment of cost recovery through water pricing," (European Environment Agency, Copenhagen, 2013), 77.

ECan, "Compliance Monitoring Annual Report: 1 July 2014 - 30 June 2015," (ECan, Christchurch, 2016), 2.

Fleetwing Farms Ltd v Marlborough District Council [1997] 3 NZLR 257 (CA).

Fonterra, "Fonterra Revises 2015/16 Forecast Milk Price," accessed July 13, 2016, https://www2.fonterra.com/files/2016-03/160308milk-price-media-release-final.pdf

Fraser, P, Ridler, B and Anderson, W, "The Economics of the Ruataniwha Dam - Is it the son of Clyde?," (2014), 5-6.

Gibbs, M and Bennett, A, "Māori claims to ownership of freshwater," (Resource Management Journal, Auckland, 2007), 2-3.

Gudsell, K, "Commercial use of water - who pays?" Radio New Zealand, accessed July 13, 2016, http://www.radionz.co.nz/news/national/300747/commercial-use-of-water-who-pays

Hughey, K, Kerr, G and Cullen, R, "Public Perceptions of New Zealand's Environment: 2013," (Lincoln University, Christchurch, 2013), iii.

HydroTrader, "Trade history," accessed July 13, 2016, http://hydrotrader.co.nz/trade-history

IMF, "The Fiscal Implications of Climate Change," (IMF, Washington, D.C., 2008), 25-26.

Ministry for the Environment, "Allocation compared with renewable freshwater resource," accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/reporting-act/fresh-water/freshwater-demand-indicator/freshwater-dema-0

Ministry for the Environment, "Climate change impacts in New Zealand," accessed July 13, 2016, http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts

Ministry for the Environment, "Freshwater demand (allocation)," accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/reporting-act/fresh-water/freshwater-demand-indicator/freshwater-demand

Ministry for the Environment, "Next steps for fresh water: Consultation document," (Ministry for the Environment, Wellington, 2016), 4.

Ministry for the Environment, "River condition indicator: summary," accessed July 13, 2016, http://www.mfe.govt.nz/more/environmental-reporting/fresh-water/river-condition-indicator/summary

Ministry for the Environment, "Update of water allocation data and estimate of actual water use of consented takes 2009-10," accessed July 13, 2016, http://www.mfe.govt.nz/publications/rma-fresh-water/update-water-allocation-data-and-estimate-actual-water-use-consented-3

National Water Commission, "Water markets in Australia: A short history," (National Water Commission, Canberra, 2011), 101-102.

New Zealand Treasury, "Living Standards: A Short Guide to 'Increasing Equity'," (New Zealand Treasury, Wellington, 2013), 1.

New Zealand Treasury, "Long-Term Challenges and Opportunities in the Natural Resource Sector: Three Case Studies," (New Zealand Treasury, Wellington, 2013), 19.

New Zealand Treasury, "The Treasury Statement of Intent: July 2015 - June 2019," (New Zealand Treasury, Wellington, 2015), 14.

New Zealand Treasury, "Working Towards Higher Living Standards for New Zealanders," (New Zealand Treasury, Wellington, 2011), 18.

OECD, "Sustainable Management of Water Resources in Agriculture," (OECD Publishing, Paris, 2010), 40.

OECD, "Water - The right price can encourage efficiency and investment," accessed July 13, 2016, http://www.oecd.org/env/resources/water-therightpricecanencourageefficiencyandinvestment.htm

Resource Management Act 1991, s 30(1)(fa).

Resource Management Act 1991, s 136(2).

Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, s 6.

Te Tiriti o Waitangi, art 2.

Waitangi Tribunal, "The Stage 1 Report on the National Freshwater and Geothermal Resources Claim," (Waitangi Tribunal, Wellington, 2012), 75-81.

Water Market Information, "Water Market Information," accessed July 13, 2016, http://www.nationalwatermarket.gov.au/