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2 BAMBOO BICYCLES

CLEAN WATER FOR SUSTAINABLE DEVELOPMENT

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ForeWord

The Water Crisis

The global water crisis can be summed up with two facts: 2.3 billion people in the world do not have access to adequate sanitation (that's 1 in 3 of the world's population), and more than 650 million do not have access to safe drinking water.

The impact of this crisis is acute. Productivity, economic growth and people's lives falter. The United Nations estimates that Sub-Saharan Africa alone loses 40 billion hours per year collecting water and, due to mortality and morbidity from poor sanitation, US\$28.4 billion or about 5 percent of GDP is wiped from its economies (that's more than the region gets in aid per year).

The water crisis also has an impact on children's life chance. Over 500,000 children die every year from diarrhoea caused by unsafe water and poor sanitation. That's over 1,400 children a day. Girls under the age of 15 are also twice as likely as boys to be the family member responsible for fetching water. And with over half of the developing world's primary schools not having access to water and sanitation facilities, girls often drop out of school at puberty.

Investment and the SDGs

With the Sustainable Development Goals (SDGs) becoming the driving force for global development and building up prosperity, a new era for investment has been beckoned in. As opposed to billions of dollars of aid, the SDGs encourage trillions of dollars trade and investment to help the world's poor and vulnerable.

The UN has estimated that to meet SDG 6 – 'Clean Water and Sanitation' and ensure universal access to safe and affordable drinking water by 2030, US\$17.5 billion a year will need to be invested in low and middle income countries. If combined with the need for adequate sanitation, then the total annual investment need rises to US\$49 billion a year.

The impact of this investment will be vast, but it will benefit the life chances of our youth the most. By investing in clean water, young children around the world can gain more than 413 million days of health.

Investment in water management and infrastructure can also be a multiplier for the wider economy. By avoiding costs related to water pollution, contamination and disasters, the World Health Organisation estimates that for every US\$1 invested in improved water supply and sanitation, sees a return of between US\$4-US\$12.

Why Cycle for Water?

In summer 2015 Cycle for Water for the second time started its traverse of the globe. Cycling from France to New Zealand on bamboo bikes, shining a light on the water crisis and inspiring a generation of people to take action, the Cycle for Water team has raised over €10,000 to improve sanitation in schools in some of the poorest communities in Thailand in partnership with the Dutch charity the HOAT Foundation.

Water is essential for job creation, livelihood development and economic growth. KPMG supports Cycle for Water because we are committed to improving our communities hut Hent



Lord Michael Hastings KPMG Internationals Global Head of Corporate Citizenship





Water as the life-giving force



Māori believe that everything has a life force which is sustained by water, the source of life.



Water is a fundamental taonga (treasure) for Māori, which deserves great respect.

In the beginning, Ranginui (the sky father) and Papatuanuku (the earth mother) were locked in a tight embrace, forcing their children to live within a confined and dark space between them. Yearning with a desire to live in the light, the children of Ranginui and Papatuanuku forced their parents apart; pushing Ranginui into the sky and Papatuanuku to the ground.

Saddened by their separation, Ranginui cried for his wife Papatuanuku. His tears formed the rain that fell to the earth, in turn creating the arteries (waterways) of Papatuanuku. In return, Papatuanuku expressed her sorrow for her husband Ranginui, through the rising of evaporated water to the heavens. Thus creating the continuous cycle of life as we know it today.

Water is a fundamental taonga (treasure) for Māori, which deserves great respect. Water has significance far beyond just a physical form. Māori, like many other indigenous people around the world, acknowledge that a deep relationship exists between oneself and water. This is an emotional connection based on a spiritual awareness, and the ability for water to clear forces that surround us and bring clarity.

Māori believe that everything has a life force which is sustained by water, the source of life. Water possesses an inherent mauri, or life essence, and this mauri must be healthy in order to sustain and support all living things (people, plants and wildlife ecosystems). Indicators of the health of a waterway - such as uncontaminated water, abundant species for food gathering, and free-flowing water from mountains to the sea - provides a tangible representation of healthy mauri. Waterways have their own identity and significant meaning. Māori recognise the critical role they play in connecting and sustaining our ecosystems, along with providing the fundamental ability to grow kai (food). The enduring nature of waterways over the centuries link generation to generation thorough whakapapa (ancestral ties). They are a platform for the exchange of knowledge and history through stories and beliefs, and give us the ability to maintain and assert the connection of people to place.









How these taonga are perceived and cared for by Māori will never change, but our approach may evolve. For instance, the Whanganui River was granted the legal status of person-hood in recent years, which gives it rights and interests under our law.

For all New Zealanders, water will have also been part of creating our memories. As social creatures, we are attracted to places of natural beauty where we can enjoy the company of others. Being on the water, in the water or beside it, is where we often find ourselves interacting and coming together.

Perhaps it was the thrill of a jet boat ride or kayaking down some rapids, swimming with your mates at the waterhole, catching your first trout, or having a picnic with loved ones for a special occasion. For some, it will be as significant as being baptised.

Water is the place that most of us will discover we are attracted to; be that the beach, the lake, the river or the stream. It is where we can relax, recharge or just be in the moment; where we can seek inspiration or motivation.

Water permeates almost all aspects of our lives – from providing sustenance and connecting our natural ecosystems; to forming part of the very fabric of our social, spiritual or religious lives.

Accordingly, the water debate is much larger than simply making decisions around how we consume water. Protecting the role that water plays in our lives, and sustaining its mauri as waterways, will continue to be equally significant.



Riria Te Kanawa Director, Advisory KPMG New Zealand



Joe Hanita Associate Director, Advisory KPMG New Zealand

From abundance to vitality







When it comes to natural water resources, New Zealand is extremely fortunate. We have one of the highest rainfalls in the world. We have enviably high levels of accessible quality water and a relatively low consumption of the total resource.

It's easy to understand why many New Zealanders continue to view water as a free and unlimited resource. Unfortunately, this view is not realistic and it ignores the significant water challenges New Zealand needs to address. More importantly, it overlooks the opportunity to move our response from 'doing the bare minimum' to 'improve and enhance'; so that Aotearoa's water can lie at the heart of our future prosperity.

This future will depend on the actions we take today.

Our dependence on water

New Zealand's prosperity is fuelled by water. This starts with our total dependence on water to sustain the natural environment, which is home to an estimated 80,000 native species. We already have too many examples of significant environment loss and at-risk species; and water quantity and quality is a real factor in that change. We do however have many examples of where this is on a positive path, such as the fencing of 20,000 km of waterways.

Our people depend on safe water supply and sanitation. Over 85 percent of this is supplied through public reticulated systems, but it is noted that 4 percent of water systems are graded as high-risk and 12 percent are ungraded. The 2015 Water NZ National

Performance Report highlights: regular restrictions on water supply; continued reliance on river wastewater disposal; 29 out of 190 wastewater treatment plant consents being out of date; and less than 40 percent of councils being confident in the accuracy of the asset data. The report also highlights that councils consistently complete less than two-thirds of planned capex.

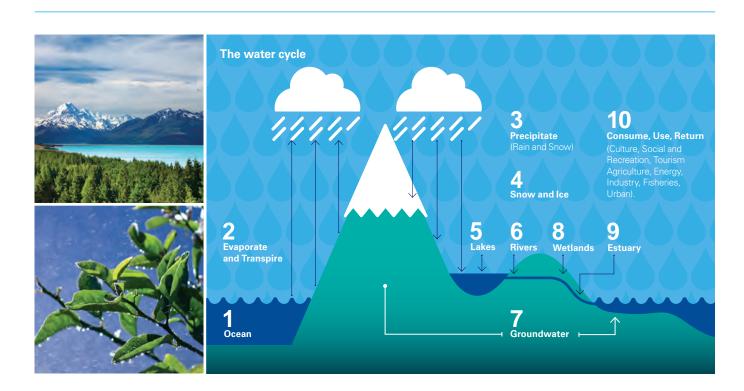
Globally, it is estimated that 78 percent of the world's workforce is either actively or moderately dependent on water to do their jobs (UN Water). New Zealand's dependence may be higher. Two-thirds of our exports are derived from agribusiness and tourism, which depend directly on water. The majority of manufacturers require water as part of the production process, including our significant food industry; while 57 percent of our electricity is supplied by hydro.

A change in mindset

When it comes to the future of New Zealand's water resources, we are now moving into a new phase of reforms. Reforms that are designed to prevent a slide into decline and decay, and establish a baseline. This provides a number of initiatives to enable long-term improvements for managing fresh water in New Zealand, alongside programs for both coastal and ocean environments.

The challenge now, is to leverage current momentum. This requires a change of mindset that recognises the extraordinary and innovative work of passionate individuals and organisations. This change in mindset will pave the way forward for the entire country.

By recognising its critical roles – for both sustaining our health, and providing a hugely powerful economic advantage – we will be actively motivated to improve our water ecosystem.



A snapshot: the current situation

The various elements to New Zealand's water ecosystem are intertwined in either a positive or negative cycle.

The oceans – which are the centre of the complex water cycle – are undergoing changes in both temperature and acidity levels. New Zealand is responsible for 4 million km² of ocean; 15 times our land area. This is home to diverse fishery (we harvest over 600,000 tonnes of fish annually), marine mammals (a quarter of which are threatened), and 92 seabird species (the risk of extinction has increased for 7 of these since 2005).

New Zealand's respected fisheries management system has negated much of the historical decline in the health of fisheries. But the reality is that changes over time in water temperature, acidity levels (a drop in ph) and sediments will have a significant impact on the total marine ecosystem.

This is most evident today in our inland ocean environments, such as the Marlborough Sounds and the Firth of Thames. We're now seeing those waterways changing past the point which is healthy. In the Firth, acidity has now dropped to 7.9, compared to ocean ph of 8.1. We cannot afford this to reach the disastrous levels of 7.6 found on the West Coast of the United States.

The paradox of our abundant rainwater

New Zealand receives around 608 billion cubic metres of fresh rainwater each year. This equates to 145 litres per person annually – compared to 22 litres in Australia, and a mere two litres in China. What's more, we only use a very small portion of our rainwater, at less than two per cent.

The paradox, however, is that we have regions of extreme and increasing sensitivity around the country. This is driven by a combination of triggers that include changing weather patterns, changing farming systems and increased uptake – which is further compounded by nutrient flows back into the water system.

Due to changing weather patterns, we now have areas that are increasingly subject to drought. In Canterbury, for instance, it is forecast that by 2080 there will be a drought every five years (compared to the current rate of every 20 years).

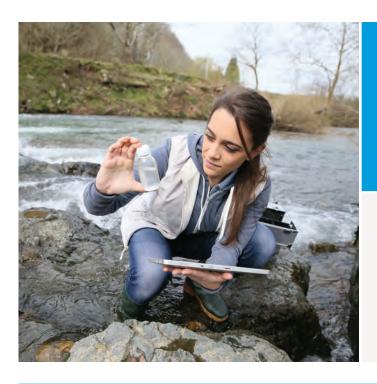
Our stores of water are under pressure

New Zealand has 110,000 hectares of snow and ice, and 700 billion cubic metres of groundwater. However, both of these critical storage resources in the water cycle are under pressure.

Glacier ice and snow feed our rivers and ground water tables: but they have shrunk by 36 percent since 1978. Our ability to exploit the groundwater has also reached a point of real sensitivity. The Canterbury region is the predominant host of New Zealand's groundwater, at around 73 percent, but increased uptake in this region means we are approaching maximum utilisation capacity. The run-off from our agribusiness systems is a further risk to the health of the groundwater resource.

Issues arising in lakes and rivers

The condition of Aotearoa's lakes and rivers is where our challenges are most visible. A combination of factors - soil sediment flows, extraction for rural and urban requirements, and rising impact from nitrogen and phosphorous run-off – continues to damage this part of the water system.



Water research and innovation represents a huge opportunity for New Zealand.





Our two biggest contributors to GDP – agribusiness and tourism – are heavily dependent on water.

Of the river sites monitored by the Ministry for the Environment between 1989 and 2013, 60 percent have shown a significant increase in total nitrogen; while 51 percent had a significant increase in dissolved phosphorous.

New Zealanders are becoming increasingly concerned that our lakes and rivers will become un-swimmable. It is also having an impact on our freshwater flora and fauna. Of New Zealand's 39 species of native freshwater fish, 72 percent are now considered endangered.

On the positive side, half a billion dollars has been spent on cleaning up our lakes and rivers since 2010; and we are seeing signs of improvement. The rate of deterioration has slowed, and water clarity has improved, in both Lake Taupo and Lake Rotorua. At a community and enterprise level there are many local examples of innovation and improvement that can also be celebrated.

Estuaries and wetlands

Our wetlands and estuaries are another critical part of the water ecosystem. The sobering reality is that 90 percent of original New Zealand wetlands have been lost over the past 200 years.

The wetlands and estuaries are perhaps the points of greatest sensitivity within our watercycle.

They are probably also the points we have the least understanding of the critical issues, and a greater need for research.

To any observer, however, our estuaries are certainly not of the same standard they were even 50 years ago. Right across the country, we can see increased sediment and significantly reduced biodiversity.

How do we turn the tide?

Aotearoa's water response must not be limited to stopping the decline and protecting the resource from exploitation. Given our complete dependence on the water resource, we need to apply new thinking.

This would enable a real opportunity to build on current momentum and to turn our abundant resource, into Aotearoa's long-term source of vitality and prosperity. Our over-arching goal is to move New Zealand into a strong upcycle where we revive and revitalise the resource and capture both the societal and economic value from this. Our generation has a responsibility to future generations, and as global citizens, to grasp this opportunity.

The current process of fresh water reforms, which began in 2009, provides New Zealand with its greatest opportunity to engage in the right dialogue.

The two critical questions that emerge from this are: how do we move to a collective mindset of improving and enhancing value? And secondly, how do we speed up the pace and effectiveness of implementation?

Moving the collective mindset

The greatest constraint facing New Zealand's ability to turn abundance to vitality is our collective mindset. We know we have pockets of excellence and passion, but this must spread.

The water reforms mean we can be reasonably confident that baselines will be established and decline will be halted. This needs to be the platform to ignite a move into an upcycle. Some of the challenges evident in the current dialogue include:

- » A lack of recognition for the full cultural, social and economic value of water.
- » A focus on short-term rather than long-term intergenerational value.
- » Silos of thinking and a lack of collaboration.

Changing the dialogue is difficult but is vitally important, given how much is at stake. The first step is to ensure there is wide recognition of the importance of the water opportunity, as opposed to the water problem, and the need for urgent and significant change.

The second requirement is to better leverage the input of individuals, stakeholders and organisations. A lot of good work is being done by people who care passionately about our future. By adopting an Aotearoa Inc. mindset, this network would bring both balance and energy to the dialogue, and drive momentum. We must find new ways of informing and engaging these people.

The challenge for all stakeholders – including central government, local government, iwi, industry and agribusiness – is the way in which they will engage. Each group will, of course, have their individual agenda. Bringing these different needs to the table, and achieving a workable outcome for all, will require genuine collaboration and a deep understanding of the full intergenerational value of water.

In seeking this change in mindset, and to inspire us further, it is valuable for all New Zealanders to recognise the powerful cultural values that Māori bring to the dialogue.

We need to look at improving the outcomes from water use in our rural and urban communities.







We must recognise the critical importance of water for every New Zealander.

Pace and Effectiveness

It is clear that even with the right mind-set the ability to execute will be constrained by the current resources and operating model. If water is so critical to New Zealand's future we must challenge the status quo today

1. The right operating model

It is clear that even with the right mindset, the ability to execute will be constrained by the current resources and operating model.

Management of water is complex and challenging. It requires the right capability and expertise across cultural, scientific, infrastructure, economic and regulatory spheres. It also requires high levels of expertise to manage communication and collaboration.

Given this, it seems obvious that having hundreds of separate organisations engaged in planning, managing, regulating and delivering water in silos is going drive inconsistency and suboptimal results. If we continue to use organisations, with varying levels of expertise and resources, we cannot have confidence that change will be executed successfully. We can have even less confidence they will have the resources and incentives to focus on the upcycle.

The answer is to centralise. leverage scale, and access the level of capability that can solve the hard problems. This approach should be applied to both the management of resources, and improving the outcomes from water use in our urban and rural communities. Effective water delivery is currently hampered by the lack of scale and resource among the individual and fragmented organisations, as has been seen recently in Hawkes Bay. This also limits the ability to invest in game-changing technology, and to proactively work with water consumers on their efficient use of water.

Alongside this, there could be greater opportunity for effective co-management of resources at a local level. This is the point where people feel the ultimate responsibility for intergenerational sustainability. This requires operating models that celebrate, share and transfer local success so our overall rate of change increases.

2. Invest in data, insights and innovation

Tracking on the upcycle will require new fuel to drive new ideas and solutions. This involves two specific levers: extracting more value from research and data, and growing our innovation resources being applied to water solutions.

New Zealand has invested in water resource data; but it is incomplete and in some areas, inconsistent. Critically, the data has not been consolidated and is not fully open to public use. Over the next 10 years, the combination of open-source quality data and emerging data analytics capability has the potential to stimulate radical change.

There are already a number of innovation programs targeting water use (such as the Land and Water Science Challenge run by the Ministry for Business and Innovation); and New Zealand also has a wide range of leading commercial and public institutions actively involved water research and innovation.

Yet there is opportunity to magnify the impact of these programs; via a combination of increased funding, improved allocation and focus, and connecting the various activities.

The global potential

Growing and optimising the innovation resources being applied to developing water solutions could have other major benefits. With our abundant water resources, New Zealand is in a unique position to become a global centre for water innovation.

Establishing New Zealand as world-leader in water research and innovation would have three important repercussions:

- 1. It opens up new export possibilities for our water-related technologies, IP and products.
- 2. It enhances our environmental reputation and creates a new product attribute that can support the premium value of our exports.
- 3. It delivers on our responsibility as global citizens to support the rest of the world, as it tackles serious problems around water scarcity and environmental decay.



Simon Hunter Partner, Advisory KPMG New Zealand

The primary sector perspective



Every farmer relies on every other farmer doing everything right every single day.





Ask a farmer and they will generally tell you that farmers are the true environmentalists.

That photo has found its way on to the front page of the newspaper again. A farmer has allowed cows to graze into a river and they are standing there in the water on the cover, yet again.

Once again all farmers are called out for degrading the environment, polluting waterways and ignoring the wishes of the wider community as they pursue profit and personal gain. That is the reality for farmers in 2016. They farm in a fishbowl with their actions being monitored and failings highlighted in the most public of ways.

Every farmer relies on every other farmer doing everything right, every single day. The industry's license to operate relies on the industry collectively doing the right things by their employees, their animals, the environment and their waterways. Each individual story of failure contributes to a broader narrative for the majority of New Zealanders on the value (or lack thereof) that the primary industries places on our natural environment. They increase uncertainty over whether farmers can be trusted to manage environmental and water resources. As these perceptions grow, they shape the policy responses from national and local Government. Ultimately, they will constrain the ability of the primary sector to grow the wealth that supports our standard of living.

Having been left to develop over the last century with a laissezfaire system of environmental regulation, many farmers are now struggling to come to terms with the focus being directed on how they treat their environment or protect their waterways. Ask a farmer, however, and they will generally tell you that farmers are the true environmentalists. They have no choice but to maintain the productive capacity of their land and water resources. The problem is: some communities are sceptical.

The reality for the primary sector is that attention on key issues – such as the quality of water flowing through the rivers and streams around their land – is not going away. Life will only get more challenging if farmers fail to meet the expectations of the wider community. The challenge is that there are major

gaps in expectations over what a sustainable water supply looks like. The views of farmers differ from those of tourism operators, hunters and fisherman, energy companies, iwi, urban communities and even rural communities.

The Land and Water Forum ('LAWF') has worked for some years to explore these differing expectations, looking for common ground and developing recommendations on how we manage, allocate and utilise water in both an economically and environmentally sustainable manner. The portfolio of recommendations that LAWF has made are the result of difficult negotiations, with concessions having been made by all parties to generate a workable outcome. To date, however, the Government has not adopted the total package, preferring to cherry



The time is now for the industry to step up and simply do what is right for our waterways...







pick recommendations. This has left some participants disadvantaged, as they do not receive the concessions they negotiated in return for what they were prepared to give up.

Now is the time for the primary sector to take the lead and initiative to step up and simply do what is right for our waterways, for the environment and for all New Zealanders.

This requires farmers and growers to acknowledge that the community expects waterways to meet standards that enable them to sustain native biodiversity, as well as remain available for their leisure activities. They need to stand up and take a lead in working with their community to define water standards for their catchments that all parties are comfortable with. This is possible - and it is being demonstrated by many of the Zone Committees working

on nutrient allocations and water quality standards for catchments in Canterbury.

Once the standards are established, investment is required to ensure that they are not just met but, where possible, exceeded, Many farmers will need to make significant investments into farm infrastructure and technology, rather than just relying on fencing streams and planting riparian strips. Precision agricultural technologies are becoming available to enable farmers and growers to manage the nutrients flowing through their farming system with greater accuracy; enabling them to apply lower levels of inputs, increase outputs and enhance water quality. Other farmers are looking to invest in more advanced effluent management systems, smart irrigators, and water storage infrastructure.

They are enhancing pasture quality, setting aside wetlands, and replanting native copse; all of which clearly demonstrates their desire to farm sustainably to a world-class level. In the most extreme circumstances, some farmers and growers may have no choice but to change the land use on their farm to deliver the environmental outcomes the community expects.

The question for many farmers is whether there will ever be a return on the investments they make to meet the water quality standards. The real question they should be asking, however, is whether they can afford not to make these investments. To be the supplier of choice to premium customers around the world, the reality is that all aspects of the production system are relevant when these customers choose who to deal with. If your competitor

has defined its standards, and has verified it is operating in compliance with those standards, they will have an advantage when it comes to negotiating deals and securing premium prices.

When you operate in a fishbowl, everybody will see when you do the right thing. Returns ultimately come to those that are prepared to do what is right.



lan Proudfoot Global Head of Agribusiness KPMG New Zealand



THE WAY FORWARD

Five executive messages on the water cycle.



Move the collective mindset so we recognise true value, take responsibility and stretch for the opportunities in upcycle.

2



Do the right thing today.



Embrace Māori values as a foundation and source of real understanding for the journey ahead.



Change the game (mindset, collaboration, operating models, innovation) today so we move the dial with real pace and effectiveness.



Turn our abundance into a source of vitality and prosperity for every generation that follows.

Contact

Ross Buckley

Executive Chairman

T: +64 9 367 5344 **E**: rjbuckley@kpmg.co.nz

Simon Hunter

Performance Consulting Partner

T: +64 9 367 5811 **E**: simonhunter@kpmg.co.nz

Ian Proudfoot

Global Head of Agribusiness Partner

T: +64 9 367 5882 **E**: iproudfoot@kpmg.co.nz

Riria Te Kanawa

Performance Consulting Director

T: +64 3 371 4840 **E**: rtekanawa@kpmg.co.nz

Joe Hanita

Performance Consulting Associate Director

T: +64 9 363 3565 **E**: jhanita@kpmg.co.nz

kpmg.com/nz

