**Background notes for sustainability assessments**

New Zealand is a country that has plenty of clean drinking water that is dispersed to the locals from our rivers and our lakes to drink. We sell ourselves overseas using the clean, green image for our marketing. What is the reality? We really need to look after our water because it is inevitable that in the future, it will become in greater demand. Every 7 days there are another 1 million people being born into our world needing food and water.

**Focus questions**

***How important are rivers to New Zealand? ie drinking water, economic benefits, recreational, tourism, farming etc***

New Zealand is a small country that is very reliant on its waterways, from clean drinking water to water for crops. New Zealand is home to nearly 1000 rivers and lakes so water is something that is very plentiful, but something that is also in high demand.

The waterways in New Zealand are also a vital part of our farming, for hydrating the animals, watering fields to allow the animals to live/graze in them and for watering the crops that will later be exported to foreign countries. Unfortunately it is farming that is one of the biggest contributors for the pollution in these waterways. The nitrogen in the animal’s urine soaks down through the earth and enters the waterways making them unclean and unsafe to drink.

With this growing problem in New Zealand the water needs to be significantly treated before it is clean and safe to use for drinking and various other purposes. While farming is not the only culprit, something is going to have to change with the farmers for New Zealand’s waterways to be naturally clean again.

Will our water become close to running out? Will it be a valuable scarce future commodity that other countries want? As water grows more and more scarce in other countries, it is becoming valuable as a possible export for New Zealand in the future so we need to protect it.

It is also important that we keep it clean because New Zealanders need to drink it and our clean beautiful rivers and lakes bring a lot of tourism and recreational activities to New Zealand which means good economic benefits.

***What are the factors polluting New Zealand’s water ways****?* (Lake Taupo and the Waikato river in particular)

There are many different types of chemicals that endanger our waterways, but the two main ones in NZ are chemical compounds containing nitrogen and phosphorus, most of which come from **fertiliser run off** and **animal wastes**. The main one out of these two is definitely nitrogen. While some plants contribute nitrogen such as native bush and gorse, and some wildlife as well, arguably, the main culprit for dirtying our rivers is pollution coming from farms such as cow/cattle urine. The cow urine is not so bad, but because we are farming them so close to our rivers and lakes, it is soaking through the ground and into them, increasing the nitrogen content.

When cattle urinate they excrete a chemical called ammonia (NH3), made up of nitrogen and hydrogen. In the Taupo catchment area there has been many volcanic events leading to the area containing a lot of pumice which is a lot less dense then regular soil. Nitrogen compounds that run down through the soil, hit bedrock, and flow into a waterway are called diffusive nitrogen. Point nitrogen is when the cow stands in the waterway and urinates directly, which is a lot worse than diffusive nitrogen.

Phosphorus (faecal collar forms), found in stock poo is also a very heavy contributor to the waterways being polluted. Phosphorus, unlike nitrogen, stays on the surface and enters the waterways via ‘runoff’. Unlike nitrogen, phosphorus is a problem that humans contribute to as well. Approximately 50% of all phosphorus that goes into waterways is from the overflow of sewage systems in towns and cities.

***What happens to our rivers and lakes when excess nitrogen and phosphorous are added?***

Each day, every dairy cow in the country urinates 23 litres of urine

There are 6.2 million dairy cows and 3.9 million beef cattle in NZ

Every day, over 230 million litres of bovine urine is leached into the ground (plus the 32.6 million sheep New Zealand has)

Nitrogen and phosphorus are the main culprits for polluting our waterways.

Nutrient cycles / Nitrogen cycle – how is nitrogen cycled?

Exemplars of food chains and webs around Lake Taupo and the Waikato River and the effects of water pollution on them

Eutrophication

Water quality - drinking water

***What are some solutions we can use to minimalize the pollution of waterways in New Zealand?***

Reducing nitrogen levels:

\* creating wetlands beside the rivers and lakes where the water flows directly

\* planting trees to absorb nutrients

\* using chemical products to make fertilisers and wastes nitrogen compounds stay in the soil longer

\* farming indoors to have control over the loss of nitrogen produced from the farm

\* taxing for water use

\* reducing stock levels

\* reducing fertiliser usage

\* more efficient farming

\* reducing acreage under farming

Filters have the ability to turn dirty water into clean water because after water goes past Hamilton, it’s undrinkable yet it supplies 25% of Auckland with water

The world health organisation has decided on a 4 parts/million as the maximum amount of nitrogen allowed in clean drinking water.

Wetlands are effective in stopping nitrogen but only 5% of water running into the lakes goes through a wetland

These solutions are effective but only to a point and even by putting into play all of these; nitrogen will still find its way into waterways.

All these solutions also have negative effects:

Adding chemicals will create consumer disagreements because these days, customers are very concerned about what’s going into the products they consume.

People want to have lakes and rivers that look good so that rules out wetlands in places that the public commonly used for leisurely activities. Indoor farming is great for lowering nitrogen levels, but can have side effects such as global warming emitting carbon emissions into the atmosphere.

For every litre of milk farmed in New Zealand and exported to Europe, it has 8 kg’s of carbon emissions as a side-effect, compared to indoor farming in Europe, the carbon emitted from transporting maize to the cows and other factors, adds up to 17 kg’s without even leaving that country.

A likely scenario we as a nation are going to have to face is; either having nitrogen capping on farms which will affect the farming economic industry or continue polluting the water and having dirty water for the future generations.

***What does the future look like in terms of our water quality in New Zealand? What are the flow on effects of having clean water?***

We can never tell exactly what will happen in the future but all we know is that we can’t continue on the same path that we’re on now. Nitrogen capping may well be put into place after its five year trial whether farmers like it or not and this will cost.

\* renewable water? ie renewable water in shower water to flush the toilet

\* more filtering systems?

\* 96% of all NZ rainfall runs out to sea unused.

\* NZ has the most fresh water per capita in the world.

On the positive side: Lake Taupo will stay under the recommended nitrogen level and we could have fresh water for everyone in the Waikato River.

On the negative side: The possibility that the flow on effects in terms of cost will be massive; the prices of meat/ wool will go up immensely causing a percentage of consumers to face financial problems and farmers in the catchment will begin losing their jobs because their farms will be turned into forestry or their stock numbers will drop to compensate for the capping.

The public want to have clean water that is nitrogen free but they also want cheap, healthy meat. Everybody is just blaming farmers for polluting our water, but in order to lower nitrogen levels, we need to decrease the number of cattle per acre and increase the price in meat to let the farmers be able to survive the national economic inflation. What it’s going to come down to is whether the consumers will want to pay that little bit extra in order to keep farmers in business and keep their water clean, or whether they want to continue on path that we are currently on that is leading towards ruining our waterways. . On average today, a family spends 12% of their income on food compared to in the 1960’s where they used to spend 45% of their income on food. Can we go back to this?

One option is purposefully going over the nitrogen level in some New Zealand areas and destroying the lakes and rivers in that selected area in order to extensively farm and produce dairy products. This is all well and good for the country in general but not for the selected areas that have to put up with having dirty lakes and rivers.

In the future, consumer products may well be labelled with their “emissions profile”. This will tell you how many carbon emissions have been put into the atmosphere in the making of the product and how much nitrogen was leached. The products that have used lots of CO2 and nitrogen will be cheap, while the clean green products that increase emissions will be more expensive. The consumers will be able to choose whether they want to continue polluting the environment or whether they want to support the cause. It will play a role in guilt on the customer almost like the free range egg issue.

New Zealand’s water will be influential in its future population. Australia has a population of approximately 24 million and New Zealand has a population of approximately 4.5 million. In 2100, it is possible that NZ will have an equal population of 20 million because of New Zealand’s plentiful amount of food and water. Most New Zealanders view this as a negative effect because we don’t want to share our beautiful country with too many others, but it would bring a lot of wealth in terms of economic growth for New Zealand.

***Questions that might be asked of stakeholders***

Apparently the increase in nitrogen in New Zealand’s waterways is from farming stock urinating into the ground and it is soaking into our lakes and rivers. Do you believe this is true?

The filters that we have at the moment can filter our water to get it completely clean. If the nitrogen increases to the stage where it is directly undrinkable, will the filters still be able to clean the water to the drinkable standard?

We’ve heard that creating wetlands next to the rivers will filter the nitrogen naturally, is this realistic? Do you have any better solutions?

Is water a realistic export for New Zealand in the future?

Whose responsibility is it to keep the waterways clean?

How can we keep our waterways clean?

Along with nitrogen what else is threatening our water?

Do you agree with the nitrogen legislation placed on Lake Taupo? Is it fair to farmers?

***Cross Cultural Collaboration:***

Maori see water as a spiritual element and themselves as kai tiaki guardians of the water. They want our rivers cleaned up.