CAWTHRON

Comparing Sustainability Factors of Disposable Catering Consumables

Cawthron Report No. 1582

March 2009

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Comparing Sustainability Factors of Disposable Catering Consumables

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Reviewed by: _____ Ian Challenger

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Recommended citation:
Packer B 2009. Comparing Sustainability Factors of Disposable Catering Consumables. Prepared for Nelson City Council. Cawthron Report No. 1582. 22 p.

EXECUTIVE SUMMARY

It is now well known that the earth's climate and natural spaces are changing as a result of human activity. The general public is more aware that their choices, including purchasing choices, can influence this impact. Retailers are increasingly providing more environmentally and socially conscious products to meet this demand.

This report looks into one specific area of sustainability: waste, in particular, the impact of disposable catering consumables used at public events. It undertakes a method of product evaluation that focuses on triple bottom line accounting, *i.e.* the social, economic and environmental impact. The report compares different materials currently used to make utensils: plastic, paper, polylactic acid (PLA), fibre/bagasse, potato starch and wood. It gives some examples of companies that currently make products out of one or more types of these materials. It provides general information on each product so that stall holders, event organisers, and other people buying disposable utensils can find items to suit their requirements.

An impact analysis has been performed One of the major findings of this project is that overall environmental impact is context specific. Each product feature has different weightings of importance to different users.

Furthermore, the words 'degradable', 'biodegradable' and 'compostable' all have different meanings and should not be confused as all being "good for the environment". Depending on the average degradation time of biodegradable products, it can be determined whether a product is suitable to be disposed in a home compost (Fibre/bagasse, potato starch, some paper products) or industrial facilities that accept compost (PLA, wooden, some paper products), or in the plastic recycling line (plastic products).

Sometimes, products are lined with a chemical that prevents it from biodegrading. When considering where a product has come from, it is important to note that the distance of transportation might not have a significant impact on the carbon emissions generated by a product, because other factors, such as the material used and how it travelled (ship, plane, road transport *etc*), combine to give the total carbon footprint.

The report helps to inform people's choices, enabling them to make robust changes towards applying more sustainable practice to their events. By showing ways Councils can influence change at public events, sustainability is promoted throughout New Zealand.

This report was funded through a BAYERBoost scholarship, which provides funding for students, and the Envirolink Scheme of the Foundation for Research, Science and Technology.

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1. INTRODUCTION

Facing an increasing human population, and higher demand for natural resources[1], it is crucial that products are developed that reflect *sustainability*[2]. In contrast to just a few decades ago, the average consumer now makes conscious decisions about purchases that are promoted as *'eco-friendly'*. In order to take advantage of this new market, companies from around the world are developing new products, especially in the industries of plastics and paper. Buyers are now bombarded with 'green-washing'- a term used to describe the perception of consumers that they are being misled by a company regarding the environmental practices of the company or the environmental benefits of a product or service. So what really is a sustainable product?

This report addresses one aspect of sustainability; waste. Specifically, the waste generated at public events through consumer utensil use. Most of the rubbish thrown out in New Zealand is currently dumped in landfills, and though some is recycled, the energy required to recycle means that this also has an environmental impact[3].

Disposable products such as plates, cups and cutlery generate growing concern because of their relatively short useful life. But at places like public events, it is extremely difficult to limit the disposables given out by food vendors. One solution to this problem lies in choosing the right type of disposable product. Options made from *renewable*, *biodegradable* materials, for example, may have a lower *environmental footprint* of those fashioned in long-lasting plastic. This report focuses on a method that allows event organisers and stall-holders at public events to choose catering consumables with as little environmental impact as possible.

The Nelson City Council will be able to draw on the results of my study to adjust their practices in this area if necessary. It will help them to achieve their goals of choosing more sustainable options and reducing waste. It is important for the Council to maintain their sustainable practices, especially at public events. As Nelson is known for being quite a 'hippy, arty' town, parades and other public events are central to the citizens. This makes them a perfect opportunity to raise awareness about reducing and recycling. By taking steps to ensure top-grade environmentally friendly products are promoted at these events, Council will set a standard that considers the environment as a high priority. These ideas of waste reduction can then be adopted in homes around the region. The Nelson City Council Waste Management Plan Vision states "Waste outcomes targeted by education are to increase the amount of waste diverted from landfill. Behavioural outcomes include increasing the number of people, re-using materials and products, and increasing the number of people disposing of organic waste

[1] The following website has international data regarding gas storage, oil storage and production, forecasts, usage, reserves, and more. It shows current depletion rates of natural resources: http://www.eia.doe.gov
[2] Words that are underlined and in italics are defined in the glossary at the end of the document
[3] The website "One City- Population: Everyone" stated that "Environmentally conscious consumers have been able to pat themselves on the back and feel good about sorting their recycling and putting it on the curb. But most recycling programs have been driven as much by raw economics as by activism". This implies the idea that recycling discourages people from taking more important steps to reduce waste, such as buying less and re-using what they have (http://onecity.wordpress.com/).

in an environmentally friendly way" (Solid Waste Asset Management Plan 2005-2008). This clearly shows that the Council believes in reducing landfill waste in Nelson.

Figure 1. On-site waste receptacle (http://footprint.mit.edu/waste/food/original/walker_2.jpg)

This report seeks to raise awareness for important environmental issues through one focus: reducing waste used by stall-holders at community events. The aims outline what is intended to be gained from this project. The background information offers un-biased information that is needed when researching disposable products. The method outlines some key areas to take into consideration when choosing a product, and provides some solutions to using traditional plastic or paper catering supplies at public events. The discussion gives some suggestions and ideas for running events and food stalls with these choices.

The views expressed are those of the author. This report has been produced as part of a BayerBoost scholarship, with funding from Envirolink. The project was commissioned by Nelson City Council and Cawthron Institute.

2. BACKGROUND INFORMATION

2.1. What is the difference between biodegradable and compostable?

- Compostable: Undergoes biological degradation during the composting process (up to 2-3 months) to yield carbon dioxide, water, inorganic compounds and biomass at a rate consistent with other known compostable materials and leaves no visually distinguishable or toxic residues. This is the ideal model for disposables used at events.

Figure 2. 100% pure New Zealand?
(http://www.nationalgeographic.com/adventure/0510/photos/Jpegs/NewZealand.jpg)

- Biodegradable: Degradation results from the action of naturally occurring microorganisms over a period of time. There is no specification on toxic residues or time that it takes to biodegrade. Essentially, biodegradability is just one aspect of compostable.
- Degradable: An oil-based product containing a chemical additive that undergoes significant change in its chemical structure causing it to break down into smaller particles. The degradation process is triggered only when material is exposed to specific

environmental conditions (such as ultraviolet light, heat and moisture). Residues are not biodegradable or compostable (www.plastics.co.nz 2009)

There are a number of certifications that define what the consumer can expect from a biodegradable or compostable product. Currently New Zealand does not have a standard that labels these materials. This has the potential to lead to some mislabelling, so some companies have their biodegradable products certified by international certification companies.

These certifications include:

- The Biodegradable Products Institute (BPI) that confirms that a product is compostable under a standard labelled ASTMD6400.

Figure 3. International composting standards (http://www.uscompo.com/assets/images/h_biodegradable.jpg)

- European Bioplastics has a certification for biodegradability and compostability called EN13432
- Japan certifies GreenPLA, products made from PLA are biodegradable.
- Australia is currently drafting their own certification on biodegradability which is likely to be used in New Zealand in the next few years, called DR05402 (www.plastics.co.nz and www.med.govt.nz)

2.2. Can compostable products be recycled?

Any compostable product is 'recyclable' in the fact that it can break down and restore nutrients to soil which can be used for growing crops. However, if biodegradable or compostable products are included in the recycling, it will contaminate the recycling line.

2.3. What if they take too long to compost in a home bin?

Some of the products that are labelled as 'biodegradable' or 'compostable' will take a long time to break down in a home compost bin. This is because some materials require perfect composting conditions in terms of temperature, moisture levels, and the perfect consortia of micro-organisms which is often hard to achieve in small-scale home composting bins.

It is more desirable therefore to send these products to an industrial compost facility, such as that in Christchurch (www.hotrotsystems.com). They have the perfect conditions to speed up the composting process. Please check how long it takes a biodegradable product to compost, as this will affect decisions on how to dispose of the product.

2.4. What happens if biodegradable products end up in landfill?

There is considerable scientific evidence that if biodegradable products are not composted efficiently *i.e.* if they are littered or put into landfill, they have the potential of generating methane. Methane is a potent greenhouse gas that can contribute to climate change, it is 23-fold more potent that carbon dioxide. As quoted on Cool 2012, a website to raise awareness for compostable organics in landfill, the 'green waste' sent to landfill each day, including food scraps, and products made from plants, "decompose anaerobically, without oxygen, and in the process become the number one source of human-caused methane" (www.cool2012.com).

It is therefore extremely important that if biodegradable products are chosen, they are disposed of properly, either in a home compost or industrial composting facility (as explained above).

2.5. How does the place where a product is made affect its environmental impact?

It is commonly argued that products requiring a lot of processing or travel will have a higher *carbon footprint* than locally made products with minimal processing. It should be noted that this is not always the case, and that carbon footprinting is a very complex system that takes into account all the aspects of a product's *'cradle to cradle'* impact. This idea has links to food miles, a concept which refers to the distance food is transported from the time of its production until it reaches the consumer. It is one dimension used in assessing the environmental impact of food.

Kenyan green beans provide an example of where food miles can mislead. Flown to the United Kingdom when British varieties are out of season, food mile advocates argue that air freighting the beans results in a higher carbon footprint than United Kingdom beans. However agricultural practices in Kenya are considerably more energy efficient than the United Kingdom, Kenyan farms use manual labour, no tractors, and cow muck for fertiliser, while United Kingdom farmers use oil-based fertilisers and spray and plough the field with a tractor (McKie 2008).

However, it is important to note these points in order to get a general idea of the impact of catering supplies. Because of the time limitations, this project was unable to generate full life cycle analyses for biodegradable disposable products. Instead, it provides information on some of the points that may or may not have a high impact on greenhouse gas emissions.

3. AIMS

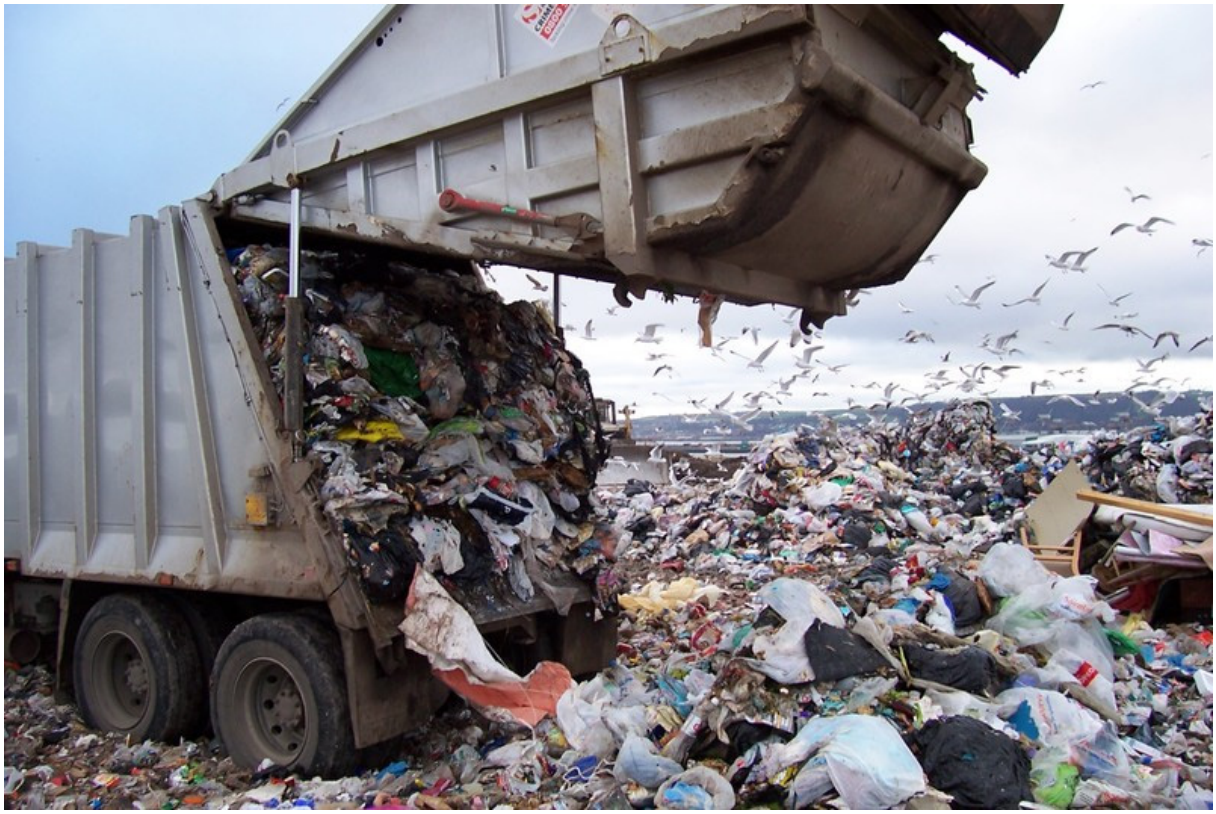

Figure 4. Traditional landfill management (http://noimpactman.typepad.com/photos/uncategorized/2008/04/07/trash.jpg)

The most obvious aim of this project is to achieve waste reduction in New Zealand, by replacing long-lasting products with materials that are *renewable*, that will *biodegrade* quickly, and that are free from toxins that could damage our surroundings. It is a shame that a utensil which may only be used for a few minutes has the potential to last hundreds of years on Earth.

The report is created to be flexible. It is composed so that the user can adapt ideas to suit the situation. If any subject is not examined in the report, readers can make their own judgments on how it should be rated based on the method. This method will allow Council to choose outcomes and easily specify contractual conditions that can be followed by vendors. For example, if Council runs an event that aims to be plastic-free, event organisers can require that

all beverage cups are made from compostable products and stall holders can use this report to find a product that fits the criteria.

There are, however, decisions other than disposal to consider when purchasing a product. Sometimes, decisions are made that are thought to be "green", only to find out that they have an unfavourable feature that wasn't seen at the start. For example, extra money may be spent choosing a cup made from paper with the expectation that it can be composted, only to realise that it is coated in a toxic lining that cannot be composted in a home bin. In an effort to reduce these undesirable effects, this report has adopted a method of evaluation called life cycle analysis (LCA). It also considers triple bottom line accounting to play an important role in purchasing decisions. Below are descriptions of life cycle analysis and triple bottom line accounting, and how they feature in this report.

3.1. Life cycle analysis

One aim of the report is to consider *life cycle analysis (LCA)* as an effective channel for describing the environmental effect of a product. The goal of LCA is to compare the full range of environmental damages assignable to products and services, to be able to choose the least burdensome one. A typical LCA investigation involves measuring the *greenhouse gas* emissions of a product in raw material, production, transportation, retailing and disposal[4]. This can involve many complicated calculations and a very close look at the company that produces these products. It is unlikely that event organisers and stall holders will be able to evaluate products this way because of the time and money that will be required finding the necessary information. Instead, this report looks to supplying information on the biggest impacts that a product will have. They are assessed simply by the judgment of the person using the method.

3.2. Triple bottom line accounting

Another aim of this project is to increase awareness for *triple bottom line accounting*. The concept originated from the 20th century and is used to succinctly describe a goal of sustainability in a business or product. Triple Bottom Line refers to "Social, Economic, and Environmental" impact of products and services. Some businesses disagree with this method because valuation techniques to estimate and quantify social and environmental liabilities effectively are yet to be developed. However, others believe that this notion should be used in order to clarify corporate responsibility. Amid growing concerns over environmental degradation and sustainable development, stakeholders are demanding greater transparency and accountability from business. Looking beyond monetary terms, triple bottom line accounting is a useful tool to evaluate companies. This report simply outlines the key points that are crucial to sustainability, and whilst there is no set scale for comparing social or

[4] Typically, a life cycle assessment will examine: acidification; eutrophication; ozone depletion; photochemical ozone creation; human toxicity; and eco-toxicity. For some examples of life cycle analysis tools, go to http://www.level.org.nz/material-use/life cycle-assessment-tools/

environmental impacts, it can often be seen where a company is doing well and where it is failing through company values and actions they have taken.

- *"Social"* (human capital) pertains to fair and beneficial business practices toward labour and the community. This includes labourers getting paid living wages, and usually a triple bottom line business would seek to "give back" to community, perhaps by providing health care or education. The report aims to include any policies or procedures the specified companies have on human capital.
- *"Environmental"* (natural capital) refers to sustainable environmental practices. In terms of this project, this is where the LCA of a product is generally considered. Therefore, the aim is to include any details about how far each product has had to travel, how renewable each product is, how degradable each product is, and how sustainable the company that retails/manufactures the product is.
- *"Economic"* is the bottom line shared by all commerce, the economic impact. Included are some approximate prices for all products. Other points that may be noted are whether or not the supply can be printed with a logo, or in a range of colours (www.wikipedia.com).

4. HOW TO CHOOSE THE RIGHT PRODUCT

4.1. Assumptions

- The raw materials below are not limited to the companies provided in the report. These are simply examples of New Zealand companies that produce these products.
- All figures used for degradation are averages only. The time it takes a product to break down depends not only on its material, but its density as well.
- The costs of a product can vary greatly depending on factors such as the size of the order and the product type. For more specific costs, the company itself should be contacted directly.
- For the purposes of this report, it is challenging to maintain an un-biased stance on social issues such as whether food crops should be used for producing utensils rather than feeding humans. It is suggested that users make their own decision on this controversial issue, based on their own research. Some companies may be able to provide more information on their products *e.g.* what type of corn was used, which will help with decision-making.

4.1.1. Option A- Plastic

The most common disposable utensils seen today are made of plastic. Almost all types of catering consumables; plates, cups, cutlery, bowls and trays, can be made out of plastic. About

40 billion plastic utensils are used in the United States of America alone, together with billions of Styrofoam cups (www.bioware.com.au). Styrofoam is a material that is created out of one specific type of plastic. Plastic is created from oil, a non-renewable resource that needs to be extracted from below geological reservoirs. Depending on the type and density of the plastic used, these products take hundreds of years to break down in a landfill. Also, there is considerable scientific evidence that plastic can have negative health and environmental impacts. One study indicated that drinking from plastic drink bottles could be harmful to health because of the high intensity of chemicals (Science Daily 2008). There are too many variations in plastic products, as well as numerous different companies producing them, to list here. An internet search will provide some retailers of plastic utensils to New Zealand, and these companies can provide more specific details. One way to dispose of plastic is to recycle it, local Councils can advise which types of plastics (they are all numbered from one to seven) are collected for recycling in their region.

4.1.2. Option B- Paper

Paper is a popular choice for many stall holders for hot beverage cups. Paper is made from trees, a *renewable resource*[5]. Cups made only of paper are *biodegradable*, but the linings used on common paper cups (in order to prevent liquid leakage and maintain heat resistance) are often toxic and not decomposable. Most are lined with polyethylene on the inside, which is a type of plastic (Infolink). Therefore, it is important to consider the linings on paper catering supplies. Another point to think about is if the paper used in the manufacture is recycled, as *post-consumer* paper will have less carbon impact that paper produced from virgin wood[6].

Huhtamaki (www.huhtamaki.com) is an international company that sources Chinet, a brand that produces 100% post-consumer waste-recycled disposables that are free from any bleaches or chemicals (Green Baby Guide). They will biodegrade in a *home compost unit* in an estimated 60 days. It was not possible to determine where the products were manufactured, but there plates cost an average of $0.14 each.

Huhtamaki (www.huhtamaki.com) also makes cups under the brand name Bioware (www.bioware.com.au). In order to hold hot beverages, these cups have been lined with a biodegradable PLA (see Option C for description of PLA) lining. They will biodegrade in a home compost in 45-60 days. It was not possible to determine where the paper was sourced or where it was manufactured.

[5] Please note that while the trees are renewable, it takes them approximately 25 years to grow to maturity, meaning it takes a long time to be renewable. While true of all plants it is less noticeable of plants that take only a year to reach maturity.
[6] It is claimed that not using recycled instead of virgin material saves almost three million trees, one billion gallons of water, and 65 million gallons of oil each year (www.greenbabyguide.com).

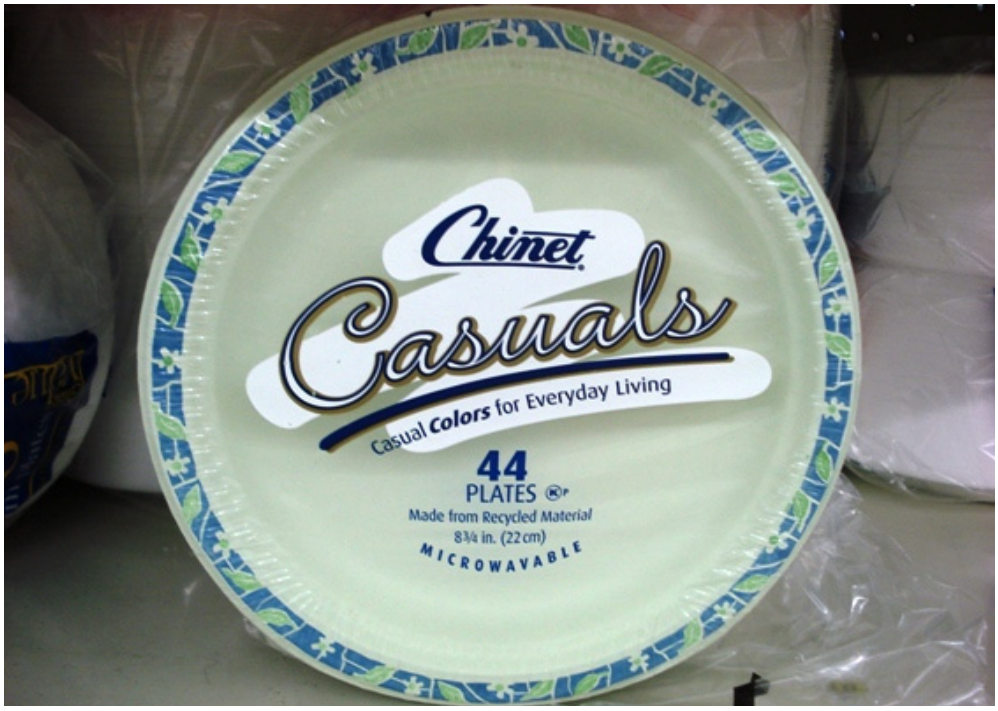

Figure 5. Huhtamaki Plastic (http://dannyseo.typepad.com/my_weblog/2007/05/ecodisposable.html)

Eden Enterprises (www.edengreennz.com) also makes paper cups with a PLA (see Option C) lining in three different sizes. The paper mainly comes from, and is manufactured in China. The approximate price for a cup is between $0.06 and $0.22 each. The PLA lining slows the composting process and so the product won't biodegrade in a compost bin as fast as normal paper would (could be between four and 14 months). This product would be better suited to industrial composting.

Figure 6. Eden Enterprises paper cups (http://www.edengreennz.com/cups.html)

4.1.3. Option C- PLA

Polylactic acid, or polylactide (PLA), is a biodegradable polyester made from renewable resources, mainly cornstarch. Bacterial fermentation is used to convert the agricultural by-products into lactic acid that can then be processed to form a type of 'bioplastic', clear material which is melted into the form of cups and bowls. Because of this process, the material does not withstand high temperatures and so is not appropriate for hot beverage use or very hot foods (over 120 degrees Fahrenheit) (Bioware.com.au). It is refrigerator safe. Polylactide is biodegradable under ideal composting circumstances, but due to the high amount of processing, can take around 18 months to biodegrade in a home compost bin, therefore contaminating compost for use as garden mulch for about a year and a half.

Huhtamaki (www.huhtamaki.com) is one company which produces a range of PLA products, in addition to their paper cups, where the raw material is grown in the United States of America however it was not possible to ascertain where they were manufactured. The average price for a medium sized cup is around $0.16 each. They also source some bowls and trays.

Figure 7. Huhtamaki plastic cups (http://www.centralcatering.co.uk/productgroup_images/fullsize/102_120_160.jpg)

KiwiGreenPak (www.kiwigreenpak.co.nz) grows their cornstarch material in the United States of America and it is manufactured in Taiwan. Their company headquarters is located in Otaki, New Zealand. An average box of 100 medium sized cups is approximately $15.50. They also source some bowls and trays.

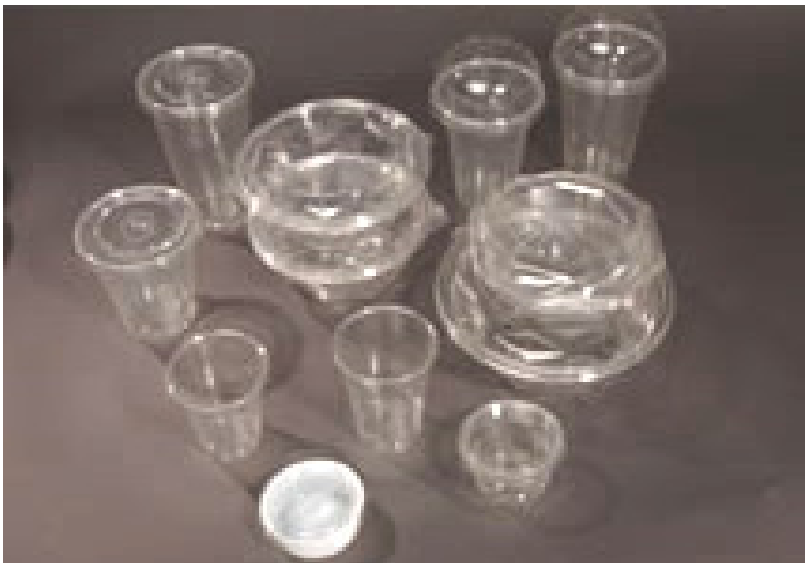

Figure 8. Kiwigreenpak plastic containers (http://www.packagingproducts.co.nz/)

Eden Enterprises (www.edengreennz.com) cornstarch products are manufactured in Taiwan and the raw material comes from either Italy or the United States of America. The average price for a medium sized cup is around $0.15 each. They also source some bowls and trays.

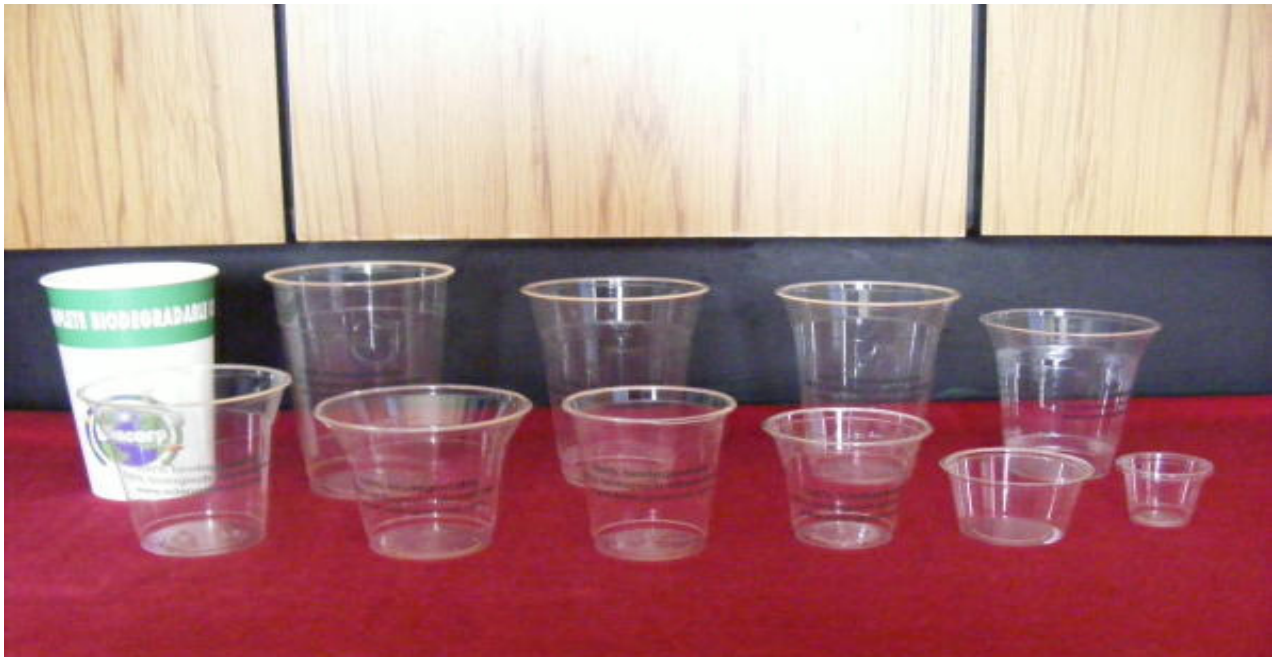

Figure 9. Eden Enterprises plastic containers (http://www.edengreennz.com/cupsPLA.html)

4.1.4. Option D- Fibre/bagasse

Bagasse is the biomass that remains after sugarcane stalks are crushed to extract their juice. It is annually renewable. Fibre comes from renewable plants such as reed and bamboo. Usually, these two raw materials are combined to produce a pulp product. It is 100 degrees water resistant and 150 degrees oil resistant, microwaveable and refrigerator safe, as well as being biodegradable in a home compost in under three months.

KiwiGreenPak (www.kiwigreenpak.co.nz) combines sugarcane, reed and bamboo in their fibre products to produce a pulp that can be moulded into plates, cups and trays. All the raw materials are grown and processed in West China before being sent to New Zealand. The factory there recycles all its waste. The average price of a box of 125 plates that are 245 mm diameter x 20 mm height is $24.61.

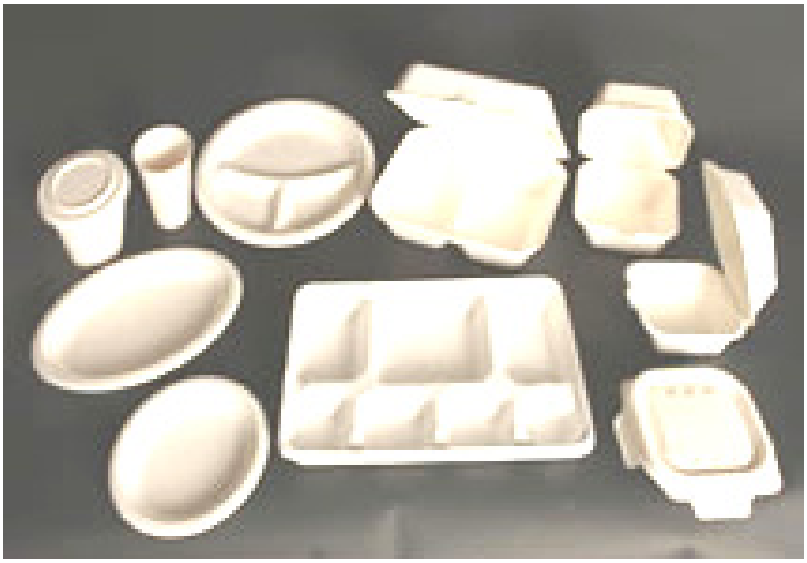

Figure 10. Kiwigreenpak bagasse containers (http://www.packagingproducts.co.nz/)

Eden Enterprises (www.edengreennz.com) supplies sugarcane (bagasse) products from China. The raw material was sourced from Southern China. The average price of a 240 mm diameter x 20 mm height plate is $0.125 each and come in cartons of 500 or more.

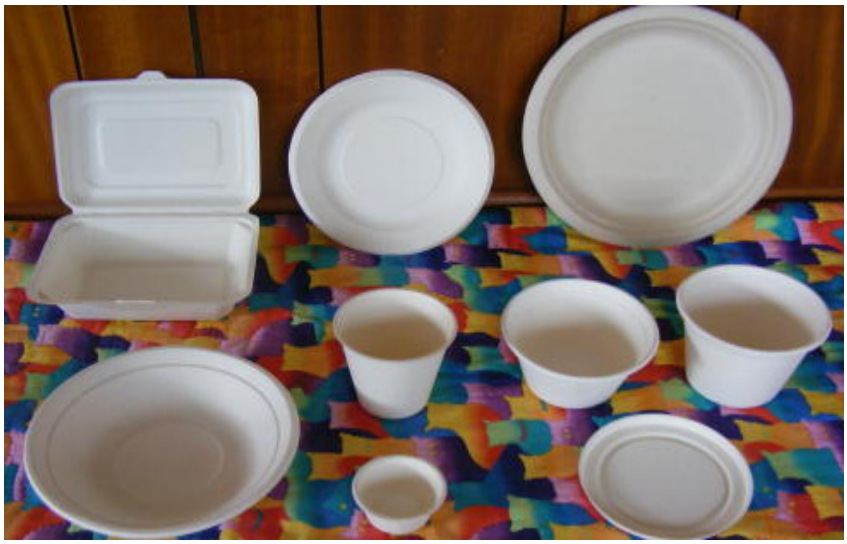

Figure 11. Eden Enterprises bagasse containers (http://www.edengreennz.com/sugarcane2.html)

4.1.5. Option E- Potato starch

Catering supplies can also be made out of the by-products of the potato food industry. When potatoes are washed in the preparation between the farm and dinner plate, starch is extracted from the waste water after the potatoes have been sliced or cut into the shapes required.

Potatopak, a New Zealand-based company located in Blenheim, collects the waste waster and puts it through starch extractors to separate the starch and clean water. The starch can be heated and moulded and turned into catering supplies such as plates and bowls. Due to this process of manufacture, the product is not very heat resistant and whilst food can last for a short time in a plate, hot beverages cannot, hence the reason the company do not produce cups. They are freezer and microwave safe. These products are biodegradable within approximately four weeks in a home compost and contain no chemicals or bleaches. The average cost of a box of 25 serving trays is $6.50[7].

[7] The company has a strong environmental policy, and sends any leftover starch or plates to a local pig farm in Blenheim (Richard Williams, Potatopak, pers. comm.).

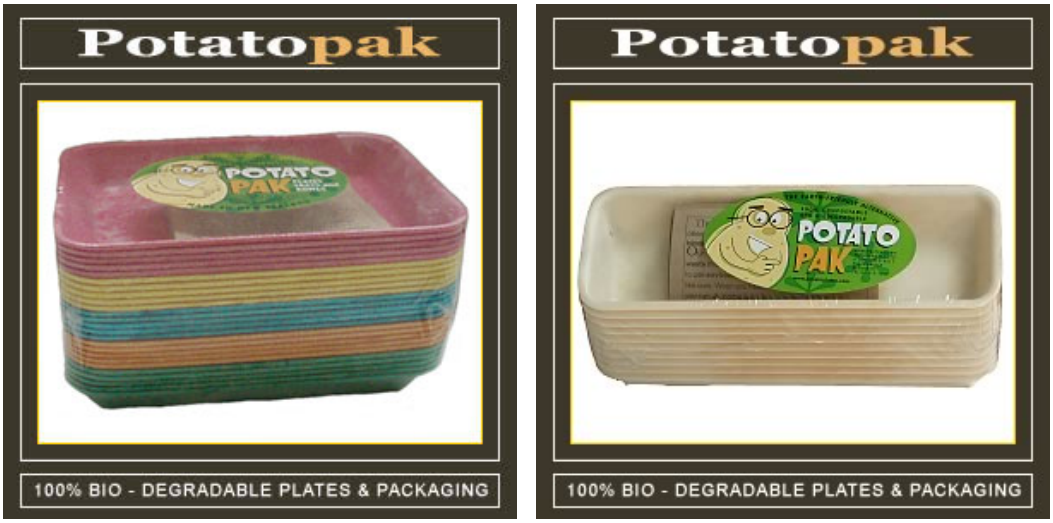

Figure 12. Potatopak, potato starch containers (http://www.potatoplates.com/product-range.htm).

4.1.6. Option F- Wood

A few disposable catering supplies are made of wood. Wood comes from trees, most often virgin trees, but they are a renewable resource, taking several years to biodegrade. Check with the company whether the products are lined with chemicals that may stop them from being biodegradable.

Potatopak company (www.potatoplates.com) produces wooden cutlery to go along with their plates and bowls. The average price for a box of 25 forks is $3.70. The wood used is white beech, sourced from Asia, with a certificate of sustainable forestry (Richard Williams, Potatopak, pers. comm.).

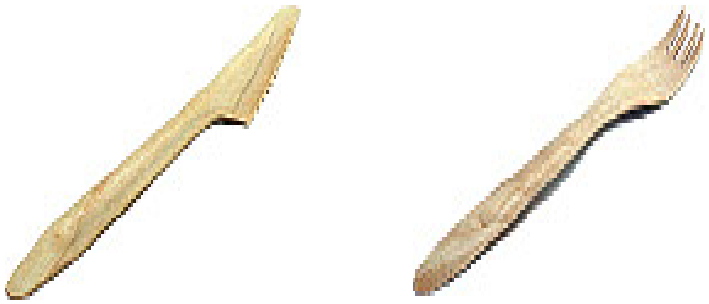

Figure 13. Wooden cutlery Potatopak (http://www.potatoplates.com/product-range.htm).

5. DISCUSSION

Due to limited time, it was impossible to carry out full life cycle analyses on all the catering consumables available. This means that this assessment is a qualitative assessment rather than quantitative.

Investigation has shown that results will vary depending on the method used. It is crucial that features are chosen that are most important to the user. Major points can be ranked, as shown in triple bottom line accounting, so that the most important features of each product can be correlated to the user's needs.

It is also worth noting that whilst the ecological footprint can be greatly minimised, none of these products are perfect. Almost every action taken will have an impact on the environment, and true "sustainability" is difficult to achieve. Instead, advantage must be taken of the information available that allows this impact to be reduced as much as possible. This ideal carries over to other aspects of environmental concern as well, as one of the aims of this project is to empower people to consider general life cycle analysis in every purchasing decision they make.

For example, in Nelson, there is no industrial compost facility to take organic matter. Polylactide is biodegradable, but inefficient in a home compost unit because of the time it takes to break down, therefore PLA in Nelson would have to be disposed of to landfill. Polylactide is a product that would be better suited to a region that has an industrial composting facility. The only way for users to avoid making mistakes is to familiarise themselves with the local policies on waste management.

6. CONCLUSION

The results showed that:

- The words degradable, biodegradable and compostable all have different meanings and should not be confused as all being "good for the environment".
- Compostable and/or biodegradable products have less negative effect on the environment than long-lasting disposable products. These are PLA, fibre/bagasse, potato starch, some wooden and some paper products.
- Depending on the average degradation time of biodegradable products, it can be determined whether a product is suitable to be disposed of in a home compost (fibre/bagasse, potato starch, and some paper products) or industrial facilities that accept compost (PLA, wooden products), or in the plastic recycling line (plastic products).
- Sometimes, utensils can be lined with a chemical that stops them from biodegrading.

- The distance of transportation might not significantly increase the carbon emissions released by a product, because other factors, such as the size of the factory and how it travelled (ship, plane, truck *etc*.) combine to give the carbon footprint.
- Some biodegradable products do not withstand heat, and some cannot be refrigerated.
- Users may find it important to check with a company regarding its sustainability programmes and policy.

Nelson City Council plans to make this information available in a smaller, summary booklet which will be available from the council's website (www.nelsoncitycouncil.co.nz) or from the Civic Centre building, Trafalgar Street, Nelson.

7. SUMMARY TABLE

Table 1. Guide to sustainability of catering consumables.

Product	Company	Compostable at home	Compostable Industrial facility	Renewable Material	Made in NZ	No Lining	Biodegradable lining	Freezer Safe	Microwave Safe	For hot Beverages	Plates	Bowls	Trays	Cutlery	Cups	Cup Lids Available
Potato Starch	Potato Pak	✓	✓	✓	✓	✓	NA	✓	✓		✓	✓	✓			NA
Fibre/ Bagasse	Eden Enterprises	✓	✓	✓		✓	NA	✓	✓	✓	✓	✓	✓		✓	✓
	Kiwi Green Pak	✓	✓	✓		✓	NA	✓	✓	✓	✓	✓	✓		✓	?
Paper	Eden Enterprises	✓	✓	✓		✓	NA	✓	✓	✓	✓				✓	✓
	Hutamaki Bioware Cups	✓	✓	✓			✓	✓	✓	✓					✓	✓
	Hutamaki Chinet	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			NA
PLA	Eden Enterprises		✓	✓		✓	NA	✓			✓	✓	✓	✓	✓	NA
	Hutamaki Bioware PLA range		✓	✓		✓	NA	?	?		✓	✓	✓	?	✓	
	Kiwi Green Pak		✓	✓		✓	NA	?	?		✓	✓	✓	?	✓	
Wood	Potato Pak		✓	✓	✓	✓	NA	✓	✓	NA				✓		NA

Please note that products listed above are only a selection of all products available as at February 2009.

NA = Not applicable
? = insufficient data available at the time this report was written

8. GLOSSARY

Biodegradable: Biodegradable will degrade from naturally occurring microorganisms, such as bacteria, fungi *etc*. (World Centric 2009).

Carbon Footprint: A carbon footprint is "the total set of GHG (greenhouse gas) emissions caused directly and indirectly by an individual, organisation, event or product" (UK Carbon Trust 2008 as cited on Wikipedia 2009).

Compostable: Is biodegradable, plus breaks down into carbon dioxide, water, and biomass, at a rate consistent with known compostable materials (at the same speed as paper would), and leaves no toxic residue (World Centric 2009).

Cradle to cradle: This framework seeks to create production techniques that are not just efficient but are essentially waste free. In cradle to cradle production all material inputs and outputs are seen either as technical or biological nutrients. Technical nutrients can be recycled or reused with no loss of quality and biological nutrients composted or consumed (The Dictionary of Sustainable Management 2009).

Degradable: It will break down into very small, indistinguishable pieces.

Eco-friendly: not harmful to the environment (www.dictionary.com 2009).

Environmental Footprint:

1. The area taken up by the impact of a product or service
2. A trace suggesting that something was once present or felt or otherwise important; "the footprints of an earlier civilization" (www.dictionary.com 2009).

Greenhouse gas: Any of the atmospheric gases that contribute to enhanced greenhouse effect and human-induced climate change. The greenhouse effect is the phenomenon whereby the earth's atmosphere traps solar radiation, caused by the presence in the atmosphere of gases such as carbon dioxide, water vapour, and methane (http://www.answers.com/topic/greenhouse-effect 2009).

Home compost: This refers to a backyard compost bin or worm farm as found in a lot of New Zealand homes. The mulch, or compost, that is left over can be used as fertiliser for the garden.

Life Cycle Analysis (LCA): A life cycle analysis is the investigation and valuation of the environmental impacts of a given product or service caused or necessitated by its existence (Wikipedia, Life Cycle Assessment 2009).

Post-consumer: Of or relating to products that have been used and recycled by consumers (http://www.answers.com/topic/greenhouse-effect 2009).

Renewable: Relating to or being a commodity or resource, such as solar energy or firewood that is inexhaustible or replaceable by new growth (www.dictionary.com 2009).

Sustainable: Capable of being continued with zero long-term effect on the environment or society.

Triple Bottom Line (TBL): Reporting all aspects of an organisation's performance, not merely the meeting of financial targets. At the heart of the TBL philosophy is an acknowledgment that an organisation has impacts on society and the environment as well as financially on its stakeholders. Such impacts may be positive or negative (Christchurch City Council 2009).

9. ACKNOWLEDGEMENTS

A huge thank you to the following:

1) The Royal Society of New Zealand, for presenting me with a BAYERBoost scholarship.
2) Karen Lee at the Nelson City Council, for providing me with a project, information, and a desk for two weeks.
3) Ian Challenger at the Cawthron Institute, for hosting me and helping me throughout the project.
4) Envirolink funding, for allowing Ian to be available for help throughout the project.
5) Eden Enterprises, Huhtamaki, KiwiGreenPak, and Richard Williams of Potatopak for providing me with the resources to produce this report, and for creating environmentally friendly products that will be used to make a difference to reducing waste in New Zealand.

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