Managing Your Household Waste

www.underthechokotree.com
Sustainable Living in the Suburbs

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1.0 Introduction

In Australia, households generate a substantial amount of waste.

As of 2020, Australian households generated a total of 12.4 million tonnes of solid waste, which translates to 512kg of waste per person per year. This is a 5% increase since 2016-17 and is 16% of total solid waste produced in Australia.

Included in the above figures, Australian households generated a significant amount of plastic waste, with households being the largest contributor at 47% of the total plastic waste generated. In 2018-19, households generated 1.2 million tonnes of plastic waste, with only a small percentage (9%) being recycled, while the majority (84%) ended up in landfills.

Australian households also generate a significant amount of organic waste, with food waste (at 2.54 million tonnes per annum) being a major component. Households account for 42% of all organic waste, which is more than any other sector. This waste, including food scraps and garden waste, contributes to landfill issues and greenhouse gas emissions, particularly methane.

On top of all of this solid waste the average household in Aus. has 2.5 occupants who will produce up to 350 litres of wastewater, including sewage, per person, per day. That's almost 1,000 litres of wastewater generated per household every day on average.

Any way you want to look at it, that is a lot of waste, and it can be seen that the contribution of Australian households to the waste problem is a significant one. So, the question then becomes, what can we as members of Australian households do about it?

That was why I put this eBook together!

What you find here is not a discussion of scholarly theory about what we should be doing about waste at a federal, state or local government level, but rather, what we as householders can do. Indeed what we have been doing to reduce our waste production in our suburban household for forty plus years, what has worked for us and, in some cases, what has not. Hopefully it is provided in sufficient detail that if you want to give it a go, you can too.

The eBook is set out as follows:

General Waste – This section talks about measuring household production of solid waste and what can be done about it

Plastic Waste – This starts off with a discussion of the problems associated with plastic waste, how a household can measure the amount of plastic waste they generate specifically and offers some suggestions of how to deal with it.

Organic Waste – There are a number of ways we deal with organic waste (including feeding some to our chooks) but this section focusses on using composting and worm farms to deal with household organic waste.

Human waste – This one is a bit more tricky, but covers the use of urine as a fertiliser and talks a bit about how to build a composting toilet, for entertainment purposes only, of course!

Wastewater (greywater) – this section talks about the techniques we use to purify greywater and how we use it.

Towards Zero Waste – this section talks about what the idea of zero waste is, how you can check out your purchases and plan to go zero waste. Then practice it by doing 'No-Buy July' and various challenges you can try to change your habits slowly, some zero waste projects and how my daughter Angie did several 30 day zero waste challenges over the years.

Reusing waste stuff – This is a selection of fifteen articles on how to repurpose all sorts of random things from a pram and old hardware to cardboard boxes, drink bottles and hessian sacks, using them to make articles that help you live more sustainably.

Resources – These are a whole stack of books that you can get hold of to help you in your journey in reducing the amount of waste that your household produces.

Each section will provide some ideas and information on how you can take ownership of the waste your family produces and reduce it, effectively and thoughtfully.

Go for it, and good luck!

2.0 Waste - General

2.1 The Waste Audit

Every day half a tonne of municipal solid waste is deposited into land fill for every single Australian. This is a problem not only because we are running out of landfill sites and it is a shocking waste of finite resources but also as it degrades the waste releases large amounts of greenhouse gases. To begin to reduce this waste and live more sustainably each of us must take responsibility for the waste we generate. To be able do that we need to have an appreciation for types and amounts of waste we generate, hence the idea of a waste audit. A waste audit is a close look at the type and amount of waste produced by your household on a weekly, monthly or yearly basis.

To conduct your waste audit, every week for a month or so before you put your waste out for collection (recyclable and non-recyclable) get hold of a large plastic groundsheet or shower curtain and spread it out on your lawn or other open area where you have a bit of space. Put on a pair of thick rubber gloves and separate the solid waste into categories, below are some suggested categories you may wish to use –

Recyclables

- Paper e.g. Newspapers, magazines, corrugated cardboard cartons, cardboard food boxes, paper bags, catalogues, papier-mâché packaging, office paper, egg cartons; paper plates (non coated)
- Glass e.g. Glass food and drink jars and bottles, green brown and clear glass
- Metals e.g. Steel food tins, aerosol cans; Aluminium drink cans
- Compostable Food Waste e.g. Fruit and veggie peelings; citrus skins; other kitchen waste; bread, cereal
- Non-Compostable Food Waste e.g. Fish, meat, bones, cooking oil; fatty wastes
- Other Compostables e.g. Tissues and paper towel; lawn clippings; leaves, tree shreddings; shredded clothing (natural fibre), sisal bags; tea leaves/bags;
- Plastics (Category 1 & 2) Soft drink and water bottles; milk bottles, detergent bottles, juice bottles, butter tubs, and shampoo and toiletry bottles

Non- Recyclables

- Plastic (other Categories) e.g. Polystyrene foam; uncategorised plastic food packaging, plastic grocery bags; disposable nappies; poison bottles; syringes; plastic plates; bread bags
- Paper/Cardboard e.g. Waxed cardboard; foil or plastic coated paper or cardboard; frozen food boxes
- Glass e.g. Mirrors, window glass, ceramics; poison bottles; light bulbs; cookware
- Clothing with Synthetic fibres;
- Big stuff e.g. Carpeting, underfelt, treated or contaminated timber; insulation
- Metals e.g. Aluminium foil; aluminium trays; cookware
- E-Waste e.g. TVs, computer, monitors, printers (unless at a specialised E-waste collection/drop off point)
- Hazardous Waste eg Pesticides, weedicides, paints, fuels and oils, battery acid, caustic soda, fertiliser; chemical cleaners

Using kitchen scales for the smaller amounts and bathroom scales for any large amount weigh each category and enter the weight into the “week 1” column on the waste audit

form (appendix 1). Repeat this process as often as you are game, but try giving it a go for a month then add up the weekly lines to give you a monthly total. If you are of a mind, you can also multiply the monthly total by 12 to understand how much solid waste you family contributes to the environment in a year.

Obviously if you have kerbside collection of recycling and/or green waste you are ahead of the game, but even these services come at an environmental cost with the resource depletion and greenhouse gas emission due to the fuel and electricity consumed to collect and process this recyclable waste.

In any case you will be in a better position now to understand your impact on the environment.

However, this is not the end of the story, because the goal of all of this work is to get you to modify you behaviours and reduce the amount of waste which you and your family produce. One way to help you do that is to use the hierarchy of waste i.e. the

action at the top is the most desired, but if you can do that you move to the one below and so on.

2.2 The Hierarchy of waste (The 5 R's)

1. **Refuse** – refuse to buy shoddy products that break easily and opt for better quality products, refuse to buy food and other products that are over packaged and/or packaged in non-recyclable materials. Refuse plastic carrier bags.

2. **Reduce** – reduce packaging waste by buying items in larger packages or bulk, or where possible provide you own recycled packaging, buy the product with the least amount of packaging, home produce your own food, cleaning products and other materials to reduce waste.

3. **Reuse** – donate superfluous items to charity; use empty glass food jars to hold homemade preserves; turn two empty 5 litre washing detergent buckets into a self watering plant pot. Think about reusing waste (grey) water in this space too.

4. **Recycle** (including composting) This is the removal of your recyclable waste at the kerbside which is then treated off site. The most important blow you can strike for recycling where you live is to start composting, a worm farm, a bokashi bin, or all three!

5. **Remove** – When you have worked through the hierarchy of waste with all of you waste materials, this is the residual waste you have left over where there is no option (currently) but to send it to landfill.

Action Planning

Now that you know what sort of waste you are generating and the amounts, you can make a judgement on what sort of waste you will make a priority to reduce. A good start might be the category with the largest weight of the one you would find easiest to reduce. It is probably best to start out working towards reducing your families' waste output in only one or two categories, three at the most. You don't want to take on too much then get overworked, start out slow and build on your successes; this is a long term project.

Write down the category at the top of the action chart and then use the waste hierarchy to work out what strategies you wish to use to reduce the amount of your target category(ies) then write them down in the space next to the appropriate part of the hierarchy. You could allocate family members to one or more of the projects and even a completion date if you want to be that organised.

Once your waste reduction project is in full swing, wait for 6 to 12 months then conduct another waste audit and see how much you've improved.

2.3 Waste audit 2.0

Years ago we conducted a waste audit as per the process above and we have gone a fair way to reducing the waste which we produce, almost everything recyclable is recycled, all organic waste is composted or consumed by the chooks or worms, we refuse single

use plastic bag and other single use plastics where we can and have even started to reduce our recycling in favour of reusable packaging. But things change.

As the great Edwards Demming said, “what you don’t measure, you don’t control” and so I built a re-do of the waste audit into our yearly plan, but this time focussing on what we actually send to landfill rather than everything, in other words – Waste Audit 2.0. So I dutifully spread out my tarp on the garage floor and donned my (thick) rubber gloves and prepared to do battle with our waste! And this is what I found –

This translated into the following list of waste -

Catfood tin lids	12
Grated mozzarella cheese bags	3
Other tinned food lids (peaches x2 beetroot x 1)	3
Soap wrapper	3
Baby wipes (soiled)	3
Muesli bags	2
Childs yoghurt pouches	2
Bread bags	2
Toilet paper outer wrapper	1
Grape bag	1
Frozen peas bag	1

Dry cat food bag	1
Landscape pebbles bag	1
Chicken container (free range)	1
Easter egg box (turned out to be recyclable)	1

The way we have been working on dealing with each one follows –

Catfood Tin Lids – The difficulty with these is that they are composed of two metals; the ring pull is aluminium and the rest of the lit is steel. We have dealt with it by cutting off the ring pull and recycling the majority of the steel lid. The remaining small amount of aluminium and attached steel is still junked unfortunately. This is still considerable better than the plastic pouches which were the containers for the only cat food our black cat would eat. He has passed on and our remaining cat is OK with the tins (thankfully!)

Grated mozzarella cheese bags – this one has become a bit problematic. Finding this kind of cheese without some form of plastic packaging has proved to be somewhat difficult. Yes, I know, one option is to make it ourselves and I have tried it. The result was…….interesting. So, as of today, the search continues!

Other tinned food lids – See catfood tin lids above at least as far as the peaches go. The beetroot tin lid needed to be taken off with a can opener and so was straight steel that now gets put into the empty tin and the tin bent over a bit so it can't come out. The whole shebang then gets put into the recycling.

Soap wrappers – this has proved remarkable easy, we have found a manufacturer and supplier of soap in our area, which we have been able to buy a cardboard box of "seconds" soap remarkable cheaply. This has eliminated the soap wrap problem entirely. We also do make our own soap, but the soap ingredients come packaged as well, of which some is recyclable, some is not. So we would still be generating waste if we were making our own soap exclusively, although it would be somewhat reduced.

Baby wipes – also an easy one as they turned out to be compostable (my bad!)

Muesli bags – we have sources a bulk supplier of all sorts of goods (https://thesourcebulkfoods.com.au/) and we can take in our own cereal container which holds about a kilo of muesli at a time.

Childs yoghurt pouches – we are currently experimenting around making small amounts of yogurt. More on this as things develop.

Bread Bags – we do produce some of our own bread but also buy it in too. We have found a local bread supplier (who makes wonderful bread!!!) that packages in a paper bag with a cellophane panel and so is completely recyclable and have certainly been enjoying that recently. There are also other suppliers like Bakers Delight who can supply unpackaged bread into your bag or container.

Toilet paper outer wrapper – we have sourced a supply of toilet paper which is made in Australia and has a recyclable outer paper covering.

Grape bag – this proved a bit problematic as all of the suppliers at our local shops give you grapes in bags, but by going to a shopping centre a bit further away we get access

to a fruit and vego shop which has unpackaged grapes which we buy in our own fabric produce bags.

Frozen peas bag – This is a rare thing for us, we usually grow beans in the summer and peas in the winter but we are currently in a dry period between it being too cold for beans and the peas coming into production. Admittedly, due to a glitch in our system I planted the peas somewhat later this year.

Dry Cat Food – a bit of a conundrum this one, if we were to go for bulk purchase, with only one cat, the crunchies become stale long before they are used up, so it does not work. No fix for this one at present.

Landscape pebbles bag – another one-off to fill a particular need, not likely to be repeated.

Chicken container – We did have a local supplier of free range chicken bits which we could pick up in our own containers. Unfortunately, they have recently ceased to stock them because of low demand, which was very frustrating. We need to go to a bulk meat supplier and get a meat supply which we can pack off into our own containers. Our meat consumption has decreased considerably in recent time such that we only have a couple of meat meals a week, so it is not the problem it once would have been.
So, there you have it! I found it quite educative (if not particular pleasant) to carry out this research into our rubbish and plan to do it at least once a year to keep track of how well we are dealing with our waste.

2.4 Waste Audit Process Summary

- Talk to your family about what you intend to do and get their buy-in, if possible.
- Collect a week's worth of waste (can be non-recyclable and recyclable of just non-recyclable depending on your focus.
- Empty the collected waste on a tarp, don rubber gloves.

- Inspect and record all waste generated during the week.
- Place the waste in the correct bin.
- Repeat weekly for a month.
- Compile and review results.
- Develop and implement an action plan to reduce waste generation.

3.0 Plastic Waste

3.1 The problem

Whole books have been written about the problems we face with plastic waste; I just want to provide a short summary of the issues here that I put together to educate myself.

Plastic waste poses significant problems, impacting the environment, human health, and the economy. It contaminates ecosystems, harms wildlife, and releases harmful chemicals into the air and water, potentially causing health issues. The waste itself is a persistent pollutant, taking centuries to break down and forming microplastics that can enter the food chain. Plastic production also contributes to greenhouse gas emissions and the consumption of fossil fuels.

We have a reserve near our place, this rubbish was collected in about half an hour, and is 70%+ plastic waste

Here's a more detailed look at the problems:

Environmental Impact:

- Marine Pollution: Plastic pollution in the ocean is a major threat to marine life, with animals ingesting or getting entangled in plastic, which can lead to starvation, suffocation, and injury.
- Land Degradation: Plastic waste on land pollutes soil and water, impacting ecosystems and potentially harming human health.
- Ecosystem Disruption: Plastic waste can alter habitats and natural processes, reducing the ability of ecosystems to adapt to climate change.
- Microplastic Contamination: Microplastics, formed from the breakdown of larger plastic pieces, contaminate the food chain, including human food sources, and can accumulate in the human body.
- Climate Change: Plastic production relies heavily on fossil fuels, contributing to greenhouse gas emissions and climate change.

Human Health Concerns:

- Ingestion and Absorption: Humans can ingest microplastics and be exposed to chemicals released from plastics through various pathways, potentially leading to health problems.
- Exposure to Chemicals: Plastics contain various chemicals, like BPA and DEHP, which can disrupt hormones, affect reproductive health, and increase the risk of certain diseases.
- Health Risks for Vulnerable Groups: Vulnerable groups, including children, women, and marginalized communities, may be particularly exposed to the harmful effects of plastic pollution.

At least the straws are no longer plastic

Economic Impacts:

- Waste Management Costs: The disposal and management of plastic waste, including recycling and landfilling, are costly and can burden local communities and governments.
- Healthcare Costs: The health consequences of plastic exposure can lead to increased healthcare costs for individuals and society.
- Economic Activities: Plastic pollution can negatively impact economic activities, such as tourism, fishing, and agriculture, by affecting the health and availability of natural resources.

Don't believe me? Here are a selection of websites that cover the hazards associated with plastic waste –

Plastic Pollution - Our World in Data

Plastics and Human Health | Plastics and the Environment Series – Geneva Environment Network

Plastic Pollution Facts and Issues | The Problems With Plastic

The Plastic Waste Problem and its Solutions - Plastic Collective

In the words of Inger Andersen, UNEP (United Nations Environmental Programme) Executive Director: "We will not recycle our way out of the plastic pollution crisis: we need a systemic transformation to achieve the transition to a circular economy".

So, what can we do? We can do things as individuals, and we can do things collectively. As always, my focus is on the individual 'What can I do?' end of the scale. That should not stop anyone who wants to work on the larger picture from doing so, by for example –

- Lobbying businesses to move away from plastic products or packaging.
- Advocating for stricter regulations by contacting your state and federal members of parliament to support legislation that reduces plastic production and waste.
- Supporting improvements to recycling infrastructure by advocating for better recycling services in your community.
- Volunteering for beach or river cleanups or organising your own,
- Supporting organizations working to combat plastic pollution by donating to or volunteering with organizations like **WWF Australia** or **Plastic Free July**.

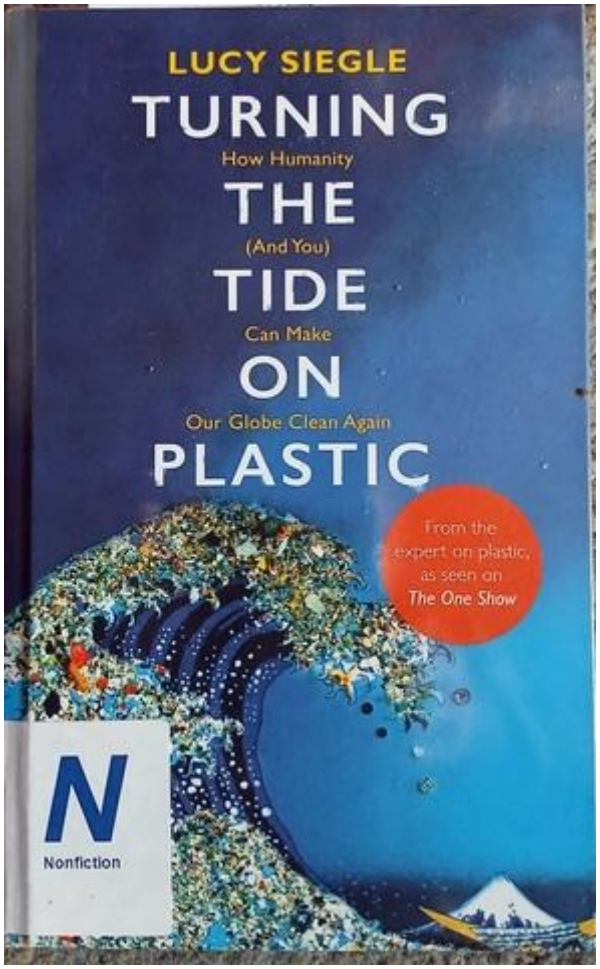
The two approaches are not mutually exclusive, or as the little girl says in that old taco commercial – "Por que no los dos?" (why can't we have both?)

Following this will be a series of articles covering the actions that we as individuals can carry out to reduce our negative impact on the environment, health and economy due to plastic waste. The next article in the series can be summarised by my favourite Edwards Demming quote – "what you don't measure, you don't control". It describes a tool to help you understand how much plastic waste you and yours generate.

3.2 Measuring our own Plastic Waste

We know that plastic waste is an issue for the environment, our health and the economy but the question may rightly be asked, what can we as individuals do about it? If you have read a bit of my stuff, you will be aware that one of my favourite quotes is by Edwards Demming: "What you don't measure, you don't control". So having decided that plastic waste is an issue that we as individuals can have an impact on, the first thing to do is to work out how big the problem is for us personally.

One method that I have used before (and written about) is the Waste Audit (See above). From my previous article – “To conduct your waste audit, every week for a month or so before you put your waste out for collection (recyclable and non-recyclable) get hold of a large plastic groundsheet or shower curtain and spread it out on your lawn or other open area where you have a bit of space. Put on a pair of thick rubber gloves and separate the solid waste into categories, (EG paper, glass, plastic, steel, clothing, chemicals etc) weigh each category using kitchen scales for the smaller amounts and bathroom scales for any large amount and enter the weight into the waste audit form.”



Just recently I came across another method, specifically focussed on plastic waste, that I put into practice for the month of April (2025) called the Plastic Waste Diary. I found the idea in the book ‘Turning the Tide on Plastic’ by Lucy Siegle. She suggests you set up a grid on paper or on a computer and then set aside all plastic waste that you produce

and enter it onto the diary before disposing of it. I had some issues with the design and made a couple of changes so that it worked for me. Below is what I came up with –

This is the original design from the book:

Plastic Diary

Plastic/Product	Source	Status A = Avoidable U = Useful N = Necessary	Number of uses S = Single Use M = Multiple Use	U = Uninvited P = Purchase (or given with a product) F = Free	Features (description of item)	End B = General bin (landfill or incineration R = Recycling	Number

This is my modified design

Plastic Waste Diary

Plastic/Product	Source	Status A = Avoidable U = Unavoidable	Number of uses S = Single M = Multi	Disposal R = Garbage Bin Y = Recycle bin B = Bag Pick Up K = Keep	Number	Comments

In some ways it is more detailed that the Waste audit and is set around the numbers of pieces of plastic rather than weight, which to help identify and analyse the large numbers of small plastic bits and pieces makes a lot of sense to me! Copies of the plastic waste diary can be accessed as appendix 2.

What is most important, I believe, is the concept of putting together and using the plastic waste diary. Feel free to check out the modified version that I put together because it made sense to me, but don't take it as cast in stone. Modify it so that it

makes sense to you and your situation in the same way that I took hers and modified so that it made sense, and was useful, to me!

My modified plastic waste diary has seven columns –
Column 1: plastic/product – I use this to describe the plastic, the product that is associated with and what function the plastic was performing. Eg soap packaging bag, nut and bolt packaging or cake surround.

Column 2: Source - This column I used to record where the plastic had been purchased from and I eventually came up with such classifications as 'Supermarket', 'Greengrocer' ,'hardware' etc.

Column 3: Status – The original author came up with three possibilities here: A = Avoidable, U = Useful and N = Necessary, although to me she does not really define or explain very well what each one means. For my money, the important distinction was, if the plastic waste was avoidable (by buying in bulk, making at home, using packaging free stores or other strategies to be discussed later) or was it unavoidable like medication blister packs because we need the medication, and it is unlikely we will return to the days when all our drugs came in glass bottles. Hence I have reduced the options to just two: A = Avoidable or U = Unavoidable.
Most of the items in the diary were avoidable but some would be too much hassle to replace. I found items like medication blister packs to be unavoidable because we need the medication, and it is unlikely we will see a return to the days when all our drugs came in glass bottles.

Column 4: Number of uses – this one has two possibilities S = Single and M = Multi. I struggled with this one also, stupid as it sounds! Is a bag of, say, bread which will be used over several days single or multiuse? I came to the conclusion that most of the plastic we had coming to our place was single use in that it was not refilled or repurposed but used until empty then discarded.

Column 5: Disposal – What was the ultimate fate of the plastic we had brought into our home? I developed four categories which made sense for how we do things around here, which are: R (red bin) = Garbage bin; Y (Yellow bin) = Recycle bin; B (Bag Pick up) RecycleSmart monthly soft plastic and blister pack pick up. Last one is K (Keep) because there are some plastic containers that we find useful and keep them for reuse rather than recycling or dumping.

Column 6: Number – this is simply the number of items in each entry. Initially I added a separate entry for every item but quickly worked out that when the items were the same eg chip packet, bread bag or frozen food bag it was easier just to add on to a previous entry rather than create a new entry with everything the same.

Column 7: Comments – This column I reserved for anything else I wanted to put in but practically it was mostly comments about the type of plastic and if there was an identification number.

The process

This was pretty simple. After drawing up the diary on in Word on my computer, I set out a large shopping bag in the back room near the recycling bag, and any plastic waste was put directly into it. Twice a week I would take it up to the office, then empty it one piece at a time as I recorded it in the diary. I then removed each piece to its final destination (recycle, bag pick up etc.) and reset the bag in position. Simple as that!

The plastic waste bag!

We decided that the diary still was in force when we went out for the day so that if we, for example, got takeaway food that had had a proportion of plastic while we were out, we had to take the plastic bits home with us, or at least make notes so that the pieces could be added to the diary at a later stage.

A side effect of the diary process is that it helps you focus on the plastic waste you are generating and gets you looking at recycling numbers to see what waste is recyclable where we are, or if it is not recyclable. This caused us to started looking more carefully at what we were buying. We didn't make any changes during the time we were writing the Diary because I wanted a true reflection of how much plastic waste we were generating.

The Analysis (how did we do?)

To give some context, in her book "Turning the Tide on Plastic", Lucy Siegle states that for a two-person family in the UK the number of items of plastic waste generated over a four week period would be "running at between 300 and 1000 items". A pretty wide variation, but it is what it is, I guess! Our total was 142 pieces of plastic waste generated for the month of April, or less than half the smallest UK total.

Some of the plastic waste we collected in April 2025

To be fair, we had already been through a waste reduction process previously, but I was still happy with the waste diary result, although I am sure we could do better. How to do better? First analyse the results to give us a better picture of what we were dealing with.

There were some 'one-off' purchases that included plastic packaging of some description, but there are likely to be one-off purchases in any given month, so the reduction strategy can be twofold – consider plastic waste free options (where they exist) before making a new purchase and look at options to reduce the plastic packaging/waste content of regular purchases.

This is what we got:

Source of Plastic	%	Disposal	%
Supermarket	54	Garbage Bin	14
Fast food	12	Recycle Bin	12
Online purchases	9	Bag pick up	65
Greengrocer	6	(Total recyclables)	(77%)
Chemist	5	Keep	9
Feed Merchant	4		
Appliance Sales	4		
Hardware	3		
Other	3		

Status	%	Uses	%	Plastic Type	%
Avoidable	80	Single	89	Soft	70
Unavoidable	20	Multi	11	Hard	30

So, Where to from Here?

For us, the first thing is to set a target, then work out a plan to achieve the target, then program in another Plastic Waste Diary for some time in the future to see how we are going at achieving it. Here is my plan –

The Target: Reduce the plastic waste produced by 42 pieces, or in other words, reduce our plastic waste production by 30%.

Ideas for Plastic Waste Reduction

Some possibilities of how we can reduce our plastic waste are covered below:

Possibilities for plastic reduction	Reduction in pieces
Replace plastic packaged ice blocks with alternative	18
Buy chocolate from packaging free shop only	15
Stop buying fruit an veg in plastic bags/wrap	9
Bake our own bread products (buns, muffins etc)	8
Replace groceries in plastic bottles with glass	7
Buy unpackage pies or make our own	4
Buy sanitiser in bulk	3
Refuse cakes with plastic surround	2
Total Piece Reduction	66

There are also a number of changes that would deliver single piece reduction of plastic waste figures such as buying soy sauce in smaller glass bottles or buying soap in bulk plastic free. Implementing all these totally would deliver us the target without difficulty, but things may not be as easy as they appear as we go forward with the plan. We will be looking towards conducting a confirmatory Plastic Waste audit in October 2025 to see how well (or otherwise!) we have done.

3.3 Plastic Waste – Some solutions

Plastic is pretty much everywhere these days. It is handy stuff and can be used for all sorts of purposes and in all sorts of products. Unfortunately, it is not the unalloyed pleasure that it appears to be and has a whole stack of problems associated with its use. For a summary of those problems, check section 3.1 above. Of course, this begs the question of what we as members of the public can do about it, and we can use the six 'R's (seven if you count 'Record') to help us work out how to deal with plastic waste.

It used to be the “3 R’s”. From what I have read the “3 R's”: Reduce, Reuse, and Recycle were developed in the 1970s as part of a logo by University of Southern California senior Gary Anderson. It was developed as a result of the passing of the US Resource Conservation and Recovery Act in 1976, and growing environmental awareness and concerns about waste management. In the intervening years several other ‘Rs’ have been introduced to broaden the options for dealing with waste in general, with some that can also be applied specifically to plastic waste.

“If it can’t be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled, or composted, then it should be restricted, designed or removed from production.”
– Pete Seeger, Folk Singer & Social Activist

The list of ‘Rs’ includes: Refuse, Replace, Reduce, Reuse, Refill, Rethink, Recycle, Recover, Repair, Repurpose, Remove, Refurbish, Refinish, Record, Rebuild, Redesign. At

least those are what I have seen, there probably are others. They are usually expressed in the form of a hierarchy ie actions start at the top, or first on the list. If the fist action is not possible, go to the next one down and so on until an 'R' that fits that particular waste stream is found. The hierarchies that I have seen usually start with 'Refuse' at the top and go through various other 'Rs' and finish with either 'Recycle' or 'Remove'.
I have trawled through the 'R's and come up with a hierarchy of actions that make sense for me and that I have used in the past to help manage our plastic waste.

Context

The idea behind my writing this article is not only that it applies particularly to plastic waste (because that is my current focus) but it could also apply to other waste streams. My focus is also generally around personal action in our lives rather than big picture, collective action stuff. Not that I discount the importance of those actions, but it is with personal actions that I am most familiar, and it is where my experience lies.

'Record'

Before we move on to the hierarchy of how to treat the plastic waste we have been saddled with, knowledge is power! So it is good to know how much of what sort of plastic waste it is that we have to deal with. One way of doing that comes under the term 'Record' and uses a tool to help you measure the amount and types of plastic waste you will have to deal with. This is covered under another article, which may be accessed in Section 3.2 above.

The Hierarchy of 'R's – My Take

Refuse to buy food and other products that are over packaged and/or packaged in non-recyclable materials. Refuse plastic carrier bags and all single use plastics. Consider the amount of plastic packaging or parts involved in the product before making purchases.

Packaging free shops are a great choice if you have access to one, our local one also has packaging free organic produce (photos with permission from ***Nom Bulk Foods****)*

Where this is not possible, consider other options within the hierarchy –

Replace plastic heavy materials with plastic light or plastic free alternatives, for example, replace food products supplied in plastic containers with ones in glass containers where possible, replace home food storage containers like Tupperware with glass containers with wooden lids, replace plastic toothbrushes with bamboo or

wooden ones. Replace single use plastic fruit and veg bags in the greengrocer or supermarket with home made or bought fabric F&V bags. Replace mainstream tea bags with loose tea or certified plastic free teabags.

Reduce packaging waste by buying items in larger packages or bulk, or where possible provide your own recycled packaging, buy the product with the least amount of packaging, home produce your own food, cleaning products and other materials to reduce plastic waste. Buy from the butcher, greengrocer and fishmonger directly and supply your own containers rather than buying prepackaged in plastic from the supermarket.

Bulk buying saves money and packaging and can be an opportunity to buy cooperatively with friends and family

Bulk buying also works for cleaning products, often retailed in small plastic bottles

Reuse of plastic waste can be difficult, but options do exist such as products like washing detergent in plastic buckets that can be reused in various capacities around the home and garden. Also takeaway food containers that can be reused to store leftovers and excess food in the fridge or freezer, as pots in the garden or to grow sprouts in. Before buying materials in plastic packaging, consider their potential for reuse. Trigger spray bottles can be cleaned (assuming no nasties in the original product) and then used to apply homemade cleaners.

Pre-cooked meals and leftovers can be frozen in reused takeaway food containers

If none of the above work, then it is basically down to these last two ‘Rs’.

Recycle Placing recyclable plastics in your kerbside recycling bin (assuming your council provides such, if not contact them and ask why not!) but this does not cover all plastics so check with your council to find out which types of plastic they take. Just because the plastic is labelled as recyclable, does not mean that there is a system in place to recycle it. Soft plastics are generally not accepted in council recycle bins but there are now emerging systems by companies such as **RecycleSmart** and **Terracycle** to deal with these more difficult plastics.

Having a yellow recycling bin can be handy, although there is ever much in ours


We compress and recycle our soft plastic packaging through 'RecyleSmart'

Remove – When you have worked through the hierarchy of waste with all of you waste materials, this is for the residual waste you have left over where there is no option (currently) but to send it to landfill. It is better to accept this and ensure that the plastic that goes into the recycle bin can be recycled by the current system, than assume it is recyclable because it is plastic. Plastics that aren't able to be recycled will cause problems where the recycling is sorted, and wind up in landfill anyway.

The quote by zero waste chef Anne-Marie Bonneau encapsulates the idea of imperfect plastic waste solutions: "We don't need a handful of people doing zero waste perfectly. We need millions of people doing it imperfectly".

Our waste bin is the smallest available from out council and is never full, but it's still needed

Be Aware

Unfortunately, in this day and age, there are products on the market that appear, on the face of it, to be plastic free, but which have had plastic snuck into them by the manufacturer for various purposes. Examples of products of this nature include:

- Aluminium drink cans, they have a thin layer of plastic on the inside of the cans to prevent the contents from reacting with the aluminium.
- 'paper' disposable coffee cups have a thin layer of plastic on the inside surface of the paper to give the cup resistance to moisture and heat.
- Teabags (mentioned earlier) have a layer of plastic mesh as part of their construction to keep them sealed, prevent them from falling apart during brewing, and sometimes for structural support.

Another 'R' not really part of the hierarchy but that you may wish to consider is 'Raise' or to be more obtuse, 'pick up'. That is to say, be part of the solution rather than the problem. While you are working though how to process your own plastic waste also

consider plastic (and other) waste left in your local environment by others and include it in your efforts to reduce the problems caused by plastic waste.

We have nice reserve down from where we live, I collected this bag of rubbish from there in about 30 minutes. 70%+ was plastic waste.

So, there you have it, my take on some of the options we have as individuals and consumers to reduce the volume of plastic waste entering environment. Every small win is still a win!

3.4 Compressing Soft Plastics – The Bag Pipe

After Redcycle collapsed back in late 2022 I was uncomfortable with just tossing our soft plastics into the red bin, so I started to stockpile them in the shed around the side of our house. Then, a bit over a year ago, we signed up with RecycleSmart, through our local council, where we could get two shopping bags of recyclable materials (including soft plastics) collected every 4 to 6 weeks. We have been availing ourselves of this service which is paid for by council. Using it, we have been reducing our stockpile considerably.

Our bag of soft plastics

One thing with the soft plastics is that they can take up quite a bit of volume, for not a lot of mass, and so were taking up quite a bit of space in the shed. I had seen adverts for a gadget that could compress the soft plastic waste, reducing its volume and I wondered if I could come up with something that could do the same thing.

And it seems I can!

It is a combination of two sizes of PVC pipe with associated caps that I have dubbed the "Bag-Pipe"!

I did not have any of the bits needed to make it in my stockpile (except for the 100mm diameter end cap), but if you do, or can access second hand PVC pipe this would make things cheaper and easier.

To make the Bag-Pipe I used:

A length of 90mm diameter PVC pipe,

A length of 100mm diameter PVC pipe

1 x 100mm end cap

2 x 90mm end caps

The outer tube is on the right, and the inner compressing piston is on the left

And that really is about it!

I cut both pipes to 340mm long, although that dimension is not critical, it just works out to be a good size for using bread bags as a liner, and the end caps are not glued on, just pressed on. If you have to buy in your pipe in 1 metre lengths all up it will cost you about $35 for the pipe, but this will be enough to make three Bag-Pipes.

To Operate

Place the 100mm pipe on a hard surface, with the cap on the bottom.

Put a bread bag into the 100mm pipe and press it down using the 90mm pipe so that t reaches the bottom of the 100mm pipe and there is 20mm to 30mm overlap of the bread bag (or whatever bag you wish to use) liner so you can hold it with one hand while putting the soft plastic items into the 100mm pipe.

Bread bag inserted, some soft plastics compressed inside

While holding the overlap outside the 100mm pipe, place items into the bread bag/100mm pipe and press down with the 90mm pipe to compact them. Repeat until the soft plastics are about 20mm down from the top of the pipe.

Using the inner piston to compress the plastics into the bread bag

To get the bread bag filled with soft plastics out of the 100mm pipe, remove the bottom cap (this was on pretty tight, so I used a cross pein hammer to tap it off) then push the bread bag out the bottom of the 100mm pipe.

Bottom cap removal hammer!

Then it is just a case of tying off the top of the bread bag and it is ready to store or recycle. I found I was easily able to compress 300g of soft plastics into the Bag-Pipe.

End product

There are also benefits from compacting your soft plastics after they leave your place:

- Space Efficiency: Compacting soft plastics significantly reduces their bulk, allowing for more material to be stored in the same space.
- Reduced Transportation Costs and Emissions: Less volume means fewer trips for collection and transport, saving on fuel and reducing carbon emissions.
- Improved Recycling Process: Compacting can make it easier to process and sort soft plastics at recycling facilities.
- Environmental Benefits: preventing soft plastics from ending up in landfills or the ocean, compacting helps reduce plastic pollution and its associated environmental impacts.

So there you have it! This is a quick (took me less than an hour), easy and inexpensive but very useful project that can have space benefits for you, but also environmental benefits for the planet.

When not in use, the inner piston can be stored inside the outer pipe

3.5 Compressing Soft plastics – The Bag-Pipe Mark II

The original 'Bag-pipe' (see above) worked well, if I do say so myself, but had a couple of downsides –

- Once filled, I needed a cross pein hammer to get the end off so that I could get the full bag out, and
- I wanted a way to hold the inner bag firm so that I didn't have to hold it while I was doing the stuffing!

Screw-on End Cap

After considerable thought I decided that I could (at a bit of extra cost) add a screw on cap to the bottom of the bag pipe which would facilitate removal of the full bag. This would entail me purchasing a 100mm diameter threaded insert and cap (cost at around $20). My original idea was that there would be something available that fitted over the 100mm outer pipe which could then be fixed in place and allow the end to be screwed off and on. Unfortunately, the threaded insert was also 100mm in diameter, meaning that it sat on the end of the pipe rather than fitting over it, so it needed to be secured by an extra piece, a PVC 100mm slip covering (cost $14).

Slip cover, threaded insert and screw on cap

all three assembled

Due to the threaded insert being 70mm long, it meant that to maintain the original length of 340mm for the whole shebang, the 100mm diameter outer tube would need to be shortened by 70mm to 270mm long. This was not a big issue as I was making the Mark II from scratch rather than modifying the original. When I put it all together it looked pretty impressive, and I figured it would work well.

With the rest of the pipe inserted

Holding the Bag

The extra fitting to secure the inner bag was an easy fix. I just cut a 25mm to 30mm band (length is not critical) from a spare piece of 100mm pipe and then cut one side through using my small band saw to make a holding clip. With the inner plastic bag in place, it was a simple matter to slide the holding clip over the end of the bag-pipe, thus securing the end of the bag. (To be fair, I could have done this for the original too, but didn't think of it at the time!)

With the clip in place

Securing the bag

The inner tube that is used to push inside the outer tube/plastic bag set up to compress the soft plastic waste did not need to be modified in any way.

Operating the Bag-pipe

To operate it used a similar process to the original –

Place the 100mm pipe on a hard surface, with the screw-on cap at the bottom.
Put a bread bag into the 100mm pipe and press it down using the 90mm pipe so that it reaches the bottom of the 100mm pipe and there is 20mm to 30mm overlap of the bread bag (or whatever bag you wish to use) liner at the top. Then place the 25mm – 30mm holding clip on to secure the top of the bag so the soft plastic items can then be compressed into the 100mm pipe.

It is then just a case of placing the items into the bread bag/100mm pipe and pressing down with the 90mm pipe to compact them. Repeat until the soft plastics are about 20mm down from the top of the pipe then remove the holding clip and tie off the end of the bag to secure the contents.

To get the bread bag filled with soft plastics out of the 100mm pipe, unscrew the bottom cap, place the 90mm inner tube into the 100mm pipe, turn the bag-pipe upside down and push down, using the 90mm inner pipe to push the bread bag up out of the cap end of the 100mm pipe.

Job done!

While both bag-pipe designs will work, I found the Mark II to be easier to use. Whether it is worth the extra cost is up to you.

Before compacting

After compacting

4.0 Organic Waste

4.1 Composters I have known

Do you feel guilty every time an apple skin or the potato peelings end up in the rubbish bin instead of being recycled? Do you feel that you are depriving your beloved veggie garden of vital nutrients and are contributing to global warming and the filling up of our rubbish tips at the same time? I must admit to such worries and have had a number of shots at composting over the years, quite often without success. Following is an outline of the methods that I tried that didn't work or didn't live up to my expectations. None of the methods are my own invention but are ideas picked up from organic gardening books and magazines.

The classic method of making compost using the three bays, each capable of holding a cubic metre or more of compost (one freshly laid, one composting and one ready for use) is without doubt the best. However, in the average urban/suburban backyard it takes up quite a bit of space, can look unsightly and add to the atmosphere in an unpleasant way, but most of all is the problem of the amount of organic matter required to operate this system. Each bay would take months or even years for the average city dweller to fill, but the idea is to have all the materials ready to go and then build the pile in one operation. So for me this method was unsatisfactory, I needed a composting system that would not be too unsightly, not take up too much space, be able to deal with regular small additions of materials be hopefully inexpensive and produce good compost. No small feat you may imagine, but here is my journey towards compost heaven.

The Pit

This is one of the simpler composting methods and was the first that I tried. As the name suggests the organic matter is shovelled into a hole in the ground and then covered and allowed to break down. How low tech can you get? On most counts it did pretty well, but the problem came with the first rain. We have clay soil and the rain seeped in and stayed, the result was a cold, sodden, stinking mass; some decomposition occurred but you couldn't call it compost. Back to the drawing board!

The Heap

This is perhaps marginally simpler than even the pit in that the organic material is dumped on the ground and then covered. The problems that I encountered with it were twofold. The first was that once the chooks discovered it they immediately set about distributing it for me, free of charge, repeatedly! The second and more serious problem was the perennial one of being unable to accumulate enough organic matter to build a heap big enough so that the heat generated did not escape through the sides. A heap that big would also have looked mighty untidy and lost me brownie points with my lovely partner in sustainable living.

The Inverted Garbage Bin

This is based on getting a plastic garbage bin, cutting out the bottom, inverting it and putting the lid on the hole in the bottom (which is now the top, if that makes sense...). When the compost is ready lift up the bin and bingo, there it is ready to be shovelled to wherever you want. All very well in theory but in practice the mass was not large enough or well insulated enough to retain its' heat and the result when the garbage bin was removed was a partially decomposed pile of yuk. There are other proprietary bins on the market that work on the same principle but they tend to be larger with thicker plastic walls and these may actually work but can tend to become a bit pricey.

The Partially Buried Garbage Bin

This is a similar idea to the one above but the bottomless garbage bin is buried to around half or more of its height in the ground, right side up. The idea here is to provide a degree of insulation using the earth that the bin is buried in so that a higher temperature can be achieved and maintained. Again, a nice theory but the clay soil has its part to play and on the first rainy day water percolated up into the would-be compost and drowned it. This cold wet pile of rotting garbage was starting to be a mighty familiar sight, not to say smell.

The compost Roller

This consists of a metal drum on its side, elevated so a wheelbarrow can be fitted underneath to unloading purposes and fitted with pivots so the compost can be mixed

by rolling. As a base I used a 205 litre drum due to low cost and easy availability. The rolling action introduced a new factor – the organic matter tended to form balls an inch or two in diameter that were fibrous on the outside and disgusting on the inside. Interesting but not very helpful. Again the main problem seemed to be lack of mass and/or insulation so the temperature could not build up for sufficient decomposition.

Plastic vertical and horizontal compost rollers are available these days

The Incinerator

For years we have been forbidden to burn off in our area and during this time the old cement block incinerator sat alone and unloved in a corner of the yard. It wasn't unsightly, was cheap to get (free actually), takes up a small amount of space and copes

well with small to medium sized additions. It also retains the heat and drains well so the quality of compost wasn't bad, but a batch took a year to mature.

The Dalek

You know – Dr Who and all that – The square-ish, top loading black plastic bin that sits on the ground and you harvest the compost from little doors at the bottom that is commonly seen in back yards today. We had two and they gave us reasonable service over the years. They were in the chook pen but didn't get much sun so I transferred them down to the northern side of the southern fence and they worked tolerably well. They didn't cost a lot and produced a dense but well flavoured compost (well nutriented any way and the veggies never complained).

The Aerobin

After our visit to Michael Mobbs place in inner Sydney and seeing the row of council owned Aerobins in the part near his place, as well as his one, we decided that that was the bin for us. It looks good, has reasonable capacity, built in air flow and insulation to retain the heat of decomposition, even in winter. After installing it and removing the old Daleks I put the non-ripe compost into the Aerobin and was surprised at the amount of heat produced, even in late autumn/early winter. It is a bit too early to be definitive but it looks like it might be a winner.

It took some time but over the years it became obvious that this method also had its faults and eventually we passed it on to others and went for the three bay composting system described later on in this eBook.

Compost hints

• Aerate your compost regularly by pushing a pipe down into it or digging it over.

• Where possible balance your nitrogenous materials like lawn clippings, veggie peelings fruit wastes etc with carbonaceous materials like straw, dry leaves, shredded paper or sawdust so that you get a ratio of about 25:1 carbon: Nitrogen.

• In my experience the “activators” you can buy don’t do much. If the pile is OK no

activator is needed, if there is a problem the activator won't fix it. Having said that it you MUST use an activator, try peeing in the compost, it adds nitrogen and may give it a kick start! (preferably at night when the neighbours aren't watching.

• Don't worry about adding lime, in a well managed compost bin the pH will take care of itself.

One more thing before I finish, if you read the books, especially the older books on veggie growing and composting, the thing you tend to see is that you should turn your compost over once it has had an initial heat up and break down time. The thing they say to do is to remove the compost from your bin then replace it such that the material around the outside is now on the inside and vice versa. The only comment I have to make on that is that the persons who recommend this practice have never actually tried to do it!

4.2 Making and Using a Bokashi Compost Bucket System

What on Earth is a Bokashi bucket?

It is a small scale food composting system that uses an airtight bucket and special micro-organisms to break down the food and it does so without the yuk factor of the disgusting smells usually associated with anaerobic decomposition. It will also handle some materials that are verboten in normal composters and/or not particularly enjoyed by worms such as onions/garlic, citrus rinds and uncooked/cooked meat. They are ideal for those living in the city and suburban environment that want to compost their waste but are put off by the associated stink and hassle. Does this interest you? If so, then read on!

Making the Bokashi Bucket

Of course it is possible to go out to Bunning's or wherever and pick up a commercial Bokashi bin, but they can cost over $70 and if you are a bit short of cash you can make yourself one for a bit over $10, or less if you have any 20 litre buckets already hanging around.

1. Get hold of the raw materials – 2 x recycled plastic 20 litre buckets with tightly fitting lids, a valve and hollow bolt to go through the side of the bucket. The big hint, particularly if you are using recycled buckets, is to ensure that both buckets are the same size otherwise even a small difference in size can mean that when they are put one inside the other there will be a gap meaning they are not sealed, or they can seal so tight you can't get the buggers apart when you need to!
2. Pick the bucket that you are going to use as the inner bucket and drill some 6mm or so (it's not critical) holes in the bottom to allow excess liquids to drain off.
3. Get hold of the outer bucket and drill a hole as low down the side of the bucket as you can the same size as the hollow bolt or a bit smaller, I used a speed bit and my battery drill.
4. Insert the hollow bolt through the hole form the inside out, wrap the threads in Teflon tape (plumber-on-a-roll) and then screw the valve onto the bolt and

tighten up. At this point it is best to test your seal by putting some water in the bucket and checking for leaks around where the valve goes through. If you don't do this now you may find unmentionable fluids leaking onto your floor and it will be much more difficult to fix. If you do find some water leaking out when you test it, run a bead of the appropriate silicon sealer around where the valve comes out and allow to dry.

5. The material in the bucket must be compressed to remove air spaces so you can make a tool to do this from the second lid, which will not be needed. Measure the bottom of the inner bucket and then draw a circle the same size around the lid using a pair of dividers. You can then cut out the circle using a band saw or jig saw. The plastic top is still a bit flexible to effectively compress the organic material so I grabbed a couple of pieces of recycled 70mm x 20mm DAR and cut two lengths the same diameter as the plastic disk, I then cut a jigged edge lap joint so that the timber formed an X. I screwed the X to the back of the disc and the tool, was ready to go.
6. I grabbed some pieces of scrap timber that I had lying around and cut them to size and screwed them together so that I had a box to sit the whole assembly on to get it off the floor and give better access to the drain valve.
7. The DIY Bokashi bucket was ready to compost (or bokash, or whatever you call it....)

Operating your Bokashi Bucket

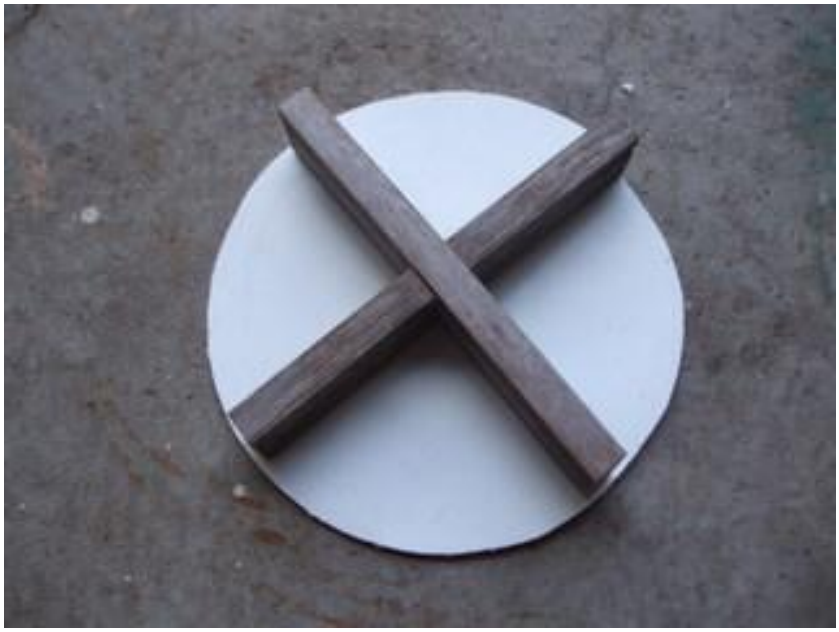
1. When you start out, place a 3cm to 4cm layer of your finest veggie scraps etc in the bottom of the inner bucket, then add in a layer of the Bokashi material, which you will need to buy from a hardware store or other supplier. This is one of those rare times, like eating chocolate, where more is better so don't skimp, if in doubt add more. In any case at least a handful per layer of organic matter.
2. Take your faithful compression tool in hand and press down on the organic material to push all the air out. If you want you can leave the tool sitting inside the bucket on the surface of the organic material, I certainly do.
3. Replace the lid on the inner bucket making sure that you have a good airtight seal, because this is needed to reduce the oxygen inside the bucket to get the Bokashi doing its thing.
4. Just repeat steps 1 to 3 every time you get some organic material until the inner bucket is completely full, making sure you put plenty of bokashi material in the last addition before sealing.
5. During this time you should regularly open the valve on the bottom of the outer bucket to drain off any liquid, preferably into a container, the pour it onto your garden beds as a liquid fertiliser.
6. Then seal up the top and leave it for two weeks to finish "Bokashing" (which is a fermenting type process), regularly draining off any liquid as in step 5.
7. Having a second set of bokashi buckets at this point would be good, but otherwise if you don't have too much organic material accumulating you can freeze it and use it to start up the next bucket once it is empty and clean.
8. Once the bucket has finished Bokashing you can use the output for a number of things (See the next section) and once the bucket is empty, clean it out thoroughly and it will be ready to go again either when you other bucket is full or to start now with your frozen stuff.

Any Problems?

If you bucket has not been doing what it is supposed to you may start to get anaerobic decomposition that produces the characteristic rotten egg smell or it may show the presence of black or blue green fungi, and this may be due to one or more of the following causes –

- You haven't put in enough bokashi material between additions of organic matter, remember more is better!
- You haven't drained off the liquid often enough and it is flooding the organic material, although with the larger reservoir of the home made bokashi bucket this is unlikely, it is still possible.
- The bucket lid has not sealed adequately, this is why it is important to make sure your lid seals before you make your bin and to always ensure you seal the lid tight after adding more organic material.
- The bucket has been too hot or too cold for a prolonged period of time. Again this is unlikely if you keep your bucket inside, but don't stick it out in the shed

particularly if you are subjected to the 42°C that we get here in a Western Sydney summer!



Now What Do I Do?

Now that you have the output of your Bokashi the question is what can you do with it and there are a number of options –

- Add it to your existing outdoor composter if you have one
- Add it to a worm farm if you have one of those
- Dig it in directly into one of your veggies patches as is.
- Use it to attract black soldier flies. This is the stuff of a whole 'nother article but briefly you can use you bokashi output in a commercial or homemade black soldier fly larvae farming set up. This set up induces the black soldier fly to lay eggs in or around vegetable waste then captures the larvae (maggots) as they go looking for soil to pupate in. The maggots can then be fed to chooks or fish in an aquaculture system. I have found that the bokashi material attracts black soldier fly like nothing else!

Helping your Bucket do its work

- Do not add water, milk, juice or other liquids to your Bokashi bucket
- Keep the lid firmly sealed at all times

- Cut up any large lumps of organic matter to facilitate packing down
- If you only get small amounts of organic matter you can freeze them until you have enough to make a 3-4cm layer
- Don’t put paper, plastic wrap or meat bones in your bucket
- Keep the bucket in the shade

The only real down side to the Bokashi system is the continuing outlay on the Bokashi material itself, and I have read that it may be possible to home produce something similar, but I haven’t tried it so more research is needed. Watch this space!

Update 2012

No I haven't gotten around to making my own bokashi stuff yet, but the bucket itself is still in daily use. I must admit that I was never happy with the tap in the original design above, it is just too expensive. I have done a couple of workshops on composting which included making a Bokashi bucket and in the lead up to those I spent some time wandering around the local hardware shop to try and come up with something just as effective but cheaper and lo and behold I did! There are black plastic taps made to screw into 20 litre plastic cube shaped liquid storage bottles but need to be secured in the bottom of the bucket and if you get hold of a 25mm plastic female plumbing connector it will screw straight in. You don't even need the full length of the connector so you can (as I did) saw them in half with a hand saw or band saw and use one connector to fit two bokashi bins with taps. Just drill a 25mm hole in the bottom of the bucket with a speed bit, push the threaded bit of the tap through into the bucket and screw on the half 25mm connector on the other side to secure the tap. It works pretty well but even so I would run a bead of silicone around the outside of the tap seal, just to make sure, so you don't get any Bokashi water making a break for it. Good luck!

4.3 Our Three Bay Composting system

Over the years I have tried many composting systems (previous thoughts can be read in section 4.1 above) but for one reason or another, none really worked out for me. I had, of course, considered the classic of composting – The three bay compost system. This works by placing a mix of organic matter into one of the bays, letting it heat up and cool down, then turning it into the next bay along (then refilling the first bay with new stuff), allowing the material in the second bay to heat up and cool down, then turning the finished compost into the third bay, where it is ready for use. The process then continues.

I have always found it interesting that in the books, the way it is described that the material in one bay is turned into the other is that it should be done in such a way that the material on the outside of the pile, is placed on the inside of the pile. Makes may wonder if the people advocating it had actually tried to do it!
Anyway, I always seemed to find reasons for not giving it a go. Things like –

- We don't produce enough organic matter to make it feasible,
- We don't have enough room,
- It will look messy and crappy (to be fair this was Linda rather than me!)

Our council provides us with a green bin so for the most part our FOGO waste went in there, after removing some small amounts for the chooks and the worms, and grass clippings often being used as mulch.

It has taken a while but I have been noting lately that the green bin is quite often going out full. Trash from the banana circle including banana 'trees' that have produced and passed on, choko trimmings and all of it once it has died back over winter, mulberry trimmings and corn stalks (which could be shredded) as well as some grass clippings, prunings and other miscellaneous vegetable matter. Over time it all adds up and results in lots of full green bins which I could be composting myself and it seems that we do produce enough organic matter to run a three-bay system!

The area prior to cleaning and demolition

So the question was – where? We only have a 600m2 block and a lot of it is taken up with trees, water tanks, house and sheds, veggie beds, green house and so on. I had a place earmarked for other things against the northern fence, but after much consideration I decided that it would become the compost area after some demolition. I spent a couple of months clearing the area in preparation and conducting said

demolition. With the area cleared, it just remained to obtain some pallets (my choice of construction material for the bays) and put them together.

Oh no! It's full of crap!!!

Empty and ready for demo!

In general terms pallets are constructed of softwood or hardwood. Softwood pallets tend to be lighter (and therefore easier to work with) and quite often available free, but rot more quickly and need replacement more often. In contrast, the hardwood pallets are quite a bit heavier, can be more difficult to come by/expensive, but last considerably longer. My dilly dallying about getting hold of the pallets was sorted out by the kids, and a nice load of hardwood pallets arrived in time for Father's Day (2023).

Raw materials arrive

Deniz came to give me a hand putting it up. First we stood the pallets up to work out the best configuration, which turned out to be run a continuous wall of pallets along the back and then attach the side pallets to that. We then moved the pallets away to dig out a bit of dirt so that the pallets along the back were straight and level. With the pallets along the back in place and steadied, we put the first side pallet in place and screwed in a couple of brackets to hold it, then did the same with the next side pallet and so on until all four were secured in place with two brackets per pallet, per side.

Looking along the back

Bracket close-up

A part of the area where we were installing the compost bins was covered by pavers, which helped to keep the pallets level so I didn't remove them entirely, but I did remove some from the middle of the bays to allow the compost contact with the soil, so that the soil biota could help with breaking the organic matter down and forming compost.

Pavers removed

It is semi-finished, because I do want to set up and install some slats on the front of the compost bins to stop material from spilling out the front, as a friend of mine has done (see pic below). He also harvests material from his constructed wetland to be added to the compost pile, which would otherwise go off site to be composted, which I hadn't thought to do.

Amazingly enough, though Linda was concerned that the compost bins might look scrappy, even she was pleased with the compost bin visuals and noted that they tidied up what had been a messy area previously.

It is surprising that once the compost system is there, you start to see things that can go into it straight away, and what was a waste material before has become a resource. I have been packing in dead choko vine, banana trash, grass clippings and peelings etc. I was even able to make use of an unwanted area out the front of a neighbour that was producing a very nice white clover crop by mowing, then incorporating the clippings into the compost.

A lovely (if unwanted) stand of white clover, now harvested and in the compost bay

Another happy thing that I wish I could say I planned but was sheer coincidence, was that because of the compost bays' closeness to the greenhouse, materials like dead plants, excess filled newspaper pots and leftover seed raising mix from punnets, can now directly into the compost instead of a heap outside the greenhouse door.

So, now I look around with a new eye for compostable material, Linda is happy because the area looks better and I am pleased because material which used to go offsite (albeit to commercial composting) is now retained here and the fertility it generates will help us grow better veggies. Everyone is a winner! (except maybe the council, who gets less in their green bin, although I could not bring myself to add used cat litter to ours, so the council still gets that!)

Update One

Back in early September (2023) with the help of Deniz I built a three-bay composting system to see how it would go, having had only partial success with my previous composting efforts. Once it was built I immediately started to fill it up with dead choko vines and trimmings from the live one, dead leaves and trunks (?) from the banana circle, grass clipping, kitchen waste and whatever other organics I could lay my hands on. There did seem to be some decomposition, but I was not sure how much.

For Christmas my lovely wife gave me a compost thermometer, which meant I could now use measurements rather than guesswork! The measurements said I was getting some decomposition, but the temperature was at best only a bit over 40°C in some parts and around 30°C in others. For the decomposition I was looking for I needed to get to at least 50°C and preferably over 60°C. I decided to add some water and then use my hay fork to do some aeration. Even that didn't seem to have much effect, so I decided it was time to turn the entire pile into the next bay!

I have also been getting a build-up of banana stuff and rather than add it to the top of the original pile, I decided to make a new one. Anyway…

I grabbed my hay fork and proceeded to heave forkfuls of decaying matter from the first compost bay into the second. During this process several things started to become obvious –

- The decomposition which had occurred was somewhat uneven. There are several areas, particularly toward the lower and inner parts of the pile that were decomposed quite nicely, while others had barely decomposed at all.
- A lot of the banana leaves and stems had barely decomposed at all because they were still very dry. I figured that the bit of water I added plus natural rainfall would be enough but clearly this was not the case.
- It was bloody hard work! One of my more common observations about life can be summed up thus: “I am getting too old for this crap!”, however, in this case it may actually be true!

So what to do?

Once it became obvious that dryness of the organic matter was a problem, I hooked up a hose with a sprinkler gun to one of the tanks and every couple of forkfuls of organic matter I transferred into the new bay got a liberal sprinkling of water. I did this especially over the drier bits. I also shook things around while transferring the pre-compost so that the pile had plenty of aeration all the way through. I also cut up the larger banana leaf and stem lumps somewhat to increase the surface area.

I think that this time there will be enough air and moisture to ensure that we get a good rise in temperature and better decomposition but only time will tell. At least now I have my faithful compost thermometer to help me monitor the situation.

The day after all this work was carried out, the compost thermometer registered 60°C in the centre of the pile, continued to do so for a week or two afterward. Other parts of the pile registered down to around 50°C. From there it took a few days for the centre to slowly drop to 50°C. At the same time the height of the pile had dropped about 20cm to 25cm. At the two week mark after the previous turning I 'fluffed it up' with the hay rake, rather than a full turning and most of the material appeared darker and damper as the composting carried on.

Update Two

Things are moving on, there is now compostable material in all three bays of the composting system, but not exactly in the order that I envisaged!

The first (lefthand) bay is now mostly full of a mixture of chopped banana leaves and stems, food waste, grass clippings, tree trimmings, excess choko vines (chopped) and miscellaneous weedy materials. It is working itself into a frenzy of microbial decomposition (hopefully) and will soon be mixed, aerated and turned into the second (middle) bay, once that bay becomes empty.

Mmmm! Yummy Compost!

The second (middle) bay heated up to 60°C for a couple of weeks then slowly cooled to 50°C and sat there for a few weeks, thence it dropped slowly over about a month back to around 30°C to 35°C, where it currently sits at the moment. But! Most of the pile is now a wonderful fragrant dark and very fertile compost material. I am adding it to the veggie beds as they become ready for replanting. Once the chooks have done their thing, I add a layer of this compost, followed by a layer of straw that has been worked over by the chooks in the retirement village as mulch. I then plant through the mulch into the compost/soil and away we go!

Compost applied and mulching in process

The third (Righthand) bay was scheduled to have the material from the centre bay turned into it, but this does not seem to need it, being pretty much broken down already. I have begun decommissioning the Aerobins, starting with the second one, which I was given a long time ago and it was very second hand then. After all the years in the western Sydney sun it was in poor condition with lots of bits missing and has been removed for disposal. The material it contained was in variable condition but a fair amount was hardly broken down at all so it has been transferred to the third bay, thoroughly rehydrated and then covered with two hessian sacks (also removed from the composter).

I am hoping that my original aerobin will be able to be emptied (with appropriate material being transferred to the third bay of the composter) and passed on to someone to use, who will hopefully have more luck (or perhaps skill) than I did. I use the term ‘appropriate’ because some years ago I transferred material from the aerobin to a veggie patch and it did not work very well. It seemed to have gone anaerobic, so I have been wary of material that could have anaerobic breakdown. Such material will be placed in our green bin for commercial composting.

4.4 Testing Compost for Completion?

Recently (Feb 2024) I have been reading a book called ‘Futureproof Your Garden’ by Angus and Emma Stewart, and I have found it to be an interesting and quite informative book. While poring through said book I came across the idea for a test to check if your compost had broken down sufficiently to be able to use.

The theory goes that compost which has not completed decomposition will consume nutrients in the decomposition process rather than releasing them for use by plants. As they put it “The consequences of the compost not fully being broken down is that it will take away precious nutrients from nearby plant roots rather than add nutrients to the soil”. Which sounded reasonable and in line with what I had learned.

So, by sowing seeds of a fast-growing veg into the compost to be tested, a poor germination rate means that there is a lack of nutrients and therefore the compost has not completely broken down and should be left to complete its ‘compostation’.
A photo is provided of two pots, the one on the left being labelled as ‘low-quality compost’ with one or two seedlings barely showing over the rim of the pot, and the one on the right filled with what was labelled as ‘good quality potting mix’ as a control showing lots of healthy, (if slightly leggy) seedlings.

Unfortunately, that did not gel with my understanding of seed germination, where the seed itself contains sufficient nutrients to get at least to the seed leaf (two leaf) stage

without external input. It seemed to me, however, that it was an interesting idea and certainly worth a go!

The Test

To conduct the test I used my own Bok choi seeds rather than the radish they used, although the radish seeds were just a suggestion and so long as the seeds were quick growing for a quick result it should be fine.

Dark Loamy Compost from the centre of the pile

To act as the test materials I filled three small plastic punnets with –

1. Dark loamy compost from the centre of the pile,
2. A mix of semi broken down and poorly broken-down leafy material from the outer edge of the compost pile, and
3. Some of my own seed raising mix as a control.

Semi-broken down material from the side of the heap

I feel that some commercial compost would have been better as a control but didn't have any. Anyway, potting mix is the control they used in their photo.

Having filled the punnets I then sowed 20 bok choi seeds in each punnet, and placed them on a capillary bed (to ensure enough water) in the greenhouse.

The authors suggest to look for "high germination rates and healthy dark green seedlings" and if they are not forthcoming, "you may need to add some extra nutrients to the compost so it reaches full maturity."

The Results

Day 1

Day 3

Germination rates

1. compost from the centre of the pile: 17/20
2. semi-broken-down material from the side of the pile: 18/20
3. Seed raising mixture (control): 17/20

So, essentially the same result for each.

Day 10

After ten days there is no significant difference between the seedling in the three punnets, the bok choi seedlings growing in the material not completely composted seem as green and healthy as the other two punnets. In all punnets, some of the seedlings are sprouting their first set of true leaves.

Conclusion

This test is not effective in quickly demonstrating that a sample of compost has or has not completely broken down.

Comments

It is a shame, I wish this test would have worked, it would have been handy. As mentioned previously the book is quite good in other respects, but this particular technique is a bust.

4.5 Making a Worm Bath

I have a stacking plastic worm farm but it was never much of a success, partially due no doubt to lack of attention on my part but the worms never seemed to do very well and anyway I needed something bigger. After reading "Organic Growing With Worms" by David Murphy, I liked his design for a "neverfill wormery" but it was all constructed out

of "Ammoniacal Copper Quaternary" treated timber, and at about $1.60 per linear metre (well the stuff that I found was) it would have been a very expensive worm farm, and contain very little recycled materials.

I had intended to site the bath between the new greenhouse and the first veggie patch, not ideal because the site was very exposed, but the space was there and it was accessible. Then it occurred to me that I should construct it inside the second "goat" shed. There are two well ventilated sheds against the north fence that one day may house a goat or two depending on lots of factors, but I would like to have home produced milk and cheese. One is currently the deep litter chook shed, the other is untenanted (except for the spiders!). The worm bath is very sheltered in the shed and if I ever do get the goat(s) I won't have to transport the manure very far to compost it. Having decided where to site the bath I then made a support frame of 100 x 100mm oregon timber left over from the veggie patch surrounds and then dragged out the bath.

The bath itself was an old Malleys one, it was a short one at 1300mm long all up rather than the more conventional 1500mm or so long. It is of the standard enamelled steel construction bought for $25 from a local recycler.

The original design called for one row of slits around the bath for ventilation, but I put in three rows all the way around the bath because of the importance placed on getting gas exchange by David Murphy. I also made no provision for harvesting the leakage (the so called "worm wee") because in David's book he argues that it rapidly becomes anaerobic, smelly and unhealthy within a week or two so is useless. He says that the liquid manure should be made by dispersing mature worm castings in water. Taking this into account made the job a bit easier because I was trying to work out a way of getting the worm wee out easily, now all seepage and be absorbed into the ground directly below the baths' plug hole.

Before I could set it up I had to make the cuts in the side of the bath with an angle grinder. This is a fun job that is noisy as buggery (not to be contemplated before midday on a weekend lest your neighbours lynch you!) and emits showers of sparks that HURT if they hit unprotected skin, but are entertaining to someone watching you from a distance. I put in three layers of ventilation slits, about 45 to 50 all up, and went through about half a dozen disks doing it. The 100mm angle grinder also got mighty warm so I had to have about 3 bites of the cherry to get it done. The warmth may have been because the angle grinder (like me) is getting on a bit, but it was a fair job of work to do.

Once the bath had been cut and was set up in the shed, I put in about 30mm of gravel over the bottom for drainage, I used crushed terracotta as the gravel but I am sure almost any kind would do. Just before doing that I put a small piece of sarlon over the plug hole to prevent the gravel going AWOL. The gravel I then covered with sarlon (better drainage than weed matting) to separate the worm castings from the gravel.

Then went in a layer of shredded paper obtained from work and then a layer of broken down straw and chook poo from the deep litter shed. Both materials were soaked with water first by placing the materials in a wheel barrow, spraying them water from one of the tanks and mixing and massaging the materials in the water by hand.

Finally a layer of cow manure was placed over the top. I picked up 1000 tiger worms from a local supplier and placed them on top of the manure layer and they seemed very happy to dig down into it. It was finished off with a sheet of wet hessian sacking to keep the top of the bath moist and give the forms some protection when they come up to the surface to feed.

Here's what it looks like after couple of years continuous use.

I feed the worms about once a week, during the week we save up veggie scraps and peelings and over fruit and veggie waste in the freezer, I then thaw them out on Saturday and feed to the worms. The freezing starts to break down the cell walls, making it easier for the worms to ingest. I only put the feed on one half of the bath, harvesting the other side to make seed raising mixture and potting mix from. Once one side is exhausted, I fill it up with cocopeat and move the feed over to that side. Give the worms a week to migrate and then the worm castings are ready for use.

4.6 Making a Low Tech Worm Farm

We have the worm bath (see above) but you may not have the space or a spare bath floating around so there must be another way I hear you say, no not picking up a black plastic worm Taj Mahal from Bunnings – there must be ANOTHER way. There is of course and, you guessed it, that is what this article is all about.

If you are short of cash, space, a bath or whatever but want to recycle your veggie scraps you can still do it by following the steps below, and the most expensive part of the whole shebang will be the worms themselves, so the big hint there is to ask around to see which of your friends has a worm farm and pinch a “seed” population from them!

What you need to get hold of is –

- two polystyrene broccoli boxes complete with at least one serviceable lid,
- some shade cloth,
- a PET soft drink bottle which is preferably empty,
- and some means of making holes in the polystyrene,
- Some polystyrene friendly silastic (ie no solvents), a brick of cocopeat and some hessian would also be good.

The process is –

1.Get hold of the best looking broccoli box, the one that will be used as the worm chamber at the top, and make sure that the lid fits well. Pump a whole stack of holes in the bottom for drainage. You can use a say 6mm drill to do this but it will generate vast amounts of those little polystyrene beads that get EVERYWHERE! If you can get access to a hot wire cutter that is better, or even a nail held in pliers and heated over a flame. We got a hot wire cutter that has a long stiff wire from a hobby shop that works well.

2.Grab the bottom one and in the middle of one of the ends, as low down as you can manage cut another hole about 30mm in diameter as a drain hole to harvest worm wee, should you so desire. The drain hole is optional, you can still harvest the wee by removing the top box and just tipping out the bottom one, but I like to get a little techo. To form the tap I bought a comparatively cheap plastic 25mm control valve although what it was designed to control I have no idea – but as a tap it sucked! Damn thing leaked like a sieve; anyway I ended up by cutting off the end of a PET drink bottle complete with lid then by insinuating it into the hole and screwing the lid on tight (plus a bit of silicone) it worked tolerably well holding back the wee but allowing harvest as required.

3.That's most of the construction work completed. Now all you need to do is to put down a layer of shade cloth over all the holes in the bottom of the top box to stop the worms falling into their wee, dump in a hydrated brick of cocopeat and cover the surface with some hessian to keep the worms comfortable and install the lid.

4.To operate add worms and worm food and away you go! Freezing the vegetable material first starts it breaking down making it easier for the worms to consume too.

By placing food on one end and encouraging the worms to work there you will get a build up of castings in that end, after a while you can place the food at the other end and give the worms a few days to migrate. You will then be able to harvest the worm castings from the original end and use them in your seed raising/potting mix or added to pots or beds as a fertiliser or used to make a fertiliser tea or whatever.

4.7 Making a Worm Tower

When I constructed the **fruit tree circle** I just put a chook statue in the centre, but after doing some thinking and reading I decided that the chook could sit on top of a worm tower. A worm tower would keep the area moist and provide nutrients for the inner circle of red currants and the fruit tree circle proper. But what is a worm tower? I'm glad you asked!

A worm tower is merely some wide tube or pipe, with holes drilled in the end, planted end-on into the soil and then stuffed full of compost worms. You regularly put some organic material into the tower in the same way you would any worm farm, but in this case the garden plants harvest the nutrients directly through the soil without any need for you to collect and distribute the worm castings. Simple!

Another advantage for those of us who are .....let's say a bit more of a mature persuasion, the tower can be made so that it sits up half a metre to a metre above the ground (as this one is) so that you don't have to bend over to empty your veggie scraps into it. Convenient!

I was lucky in that an old plumber mate of mine dropped off some 30cm diameter

plumbing pipe that was regarded as excess on one of the jobs he was working on and was to be thrown out, so thoughtful chap that he is, he saved it and brought it to me.

How I Made Our Tower

While is suspect the exact amount is not critical, the bit that goes in the ground should go down 30cm to 50cm and be filled with holes. This is so that the garden worms can get in to share the bounty and the compost worms can get out and go on holiday if they want to (although they usually don't seem to want to).

The pipe I had was too long so I cut off a 1 metre section so that 300mm would be in the ground and 700mm would be above. The section that would be below ground needed to have the access holes drilled in it so using my (solar charged) battery drill I drilled a stack 0f 3/8" (about 10mm) holes all around the bottom. I drilled the holes on roughly 50mm centres but in reality, apart from the line around the pipe marking off

the 30mm level, none of the other holes were measured I just drilled them where they looked reasonable.

I had bought a terracotta plant pot saucer to go over the top of the tower to keep rain and light out. Worms only work in the dark so a cover is important, as is making sure all the drilled holes are under ground, keeping the inside of the tower light free. With the addition of the saucer, the tower construction part was completed, now for the installation.

How I Installed It

OK, so here is a hint. When you have a mind to make yourself a worm tower, make sure the place you want to put it can be easily got at and easily dug. While my idea was good in theory, it would have been much easier to install the tower BEFORE the fruit tree circle want in, not a couple of years later! Anyway, the centre of the circle was somewhat difficult to access but after some expert pruning I had a way in to be able to dig the hole. Another issue that I had forgotten about was that the centre of the circle was built up to cover the remains of the carob tree stump, which was there previously. After being under ground for a few years you would think the thing had rotten away..... but apparently not.

If you have hole digger a bit bigger than the tower it works wonders but I didn't so it was really a case of dodging between the trees and starting off the hole by hand with a trowel. After having the living daylights scratched out of me by the kaffir lime on one side and the macadamia on the other, both got trimmed back even further to make a safe accessway. Fortunately the carob stump was off to the side and after several close encounters with the pick it didn't seem tom want to hang around anymore. Once I started to get down a bit I used a pick to break up the bottom of the hole, and then scraped it out by hand with the trowel again. It was reasonably hard work but better access would have made the job a lot easier.

Once I got about two thirds the way down (about 200mm) I filled the hole up with water and then let it drain out. This did two things; it made the soil in the hole softer and easier to dig but also showed me how quickly the hole would drain in heavy rain. In the event it drained in a few minutes, and this was a good thing because while the worms like a moist environment if it floods they will not be happy and quite likely decamp for pastures greener.

It was then just a case of completing the excavation and then trying the tower in to ensure that all of the holes I had drilled would be covered when the dirt went back in. To make sure it looked OK I used a spirit level to make sure it was vertical then scooped some of the fill dirt back in around the area between the tower and the edge of the hole. After packing it in a bit around the tower and watering it in, it gave the tower a solid foundation.

Installing the Worms

With the tower now in place and steady, it was time for the worms to be added to their new hi-rise home. Once the tower was stabilised I tossed in –

- a (9 litre) bucket's worth of well dug over straw (with just a hint of chook poo) to help with drainage;
- on top of that a bucket of well wetted down paper went in to provide moisture and something for the worms to chow down on.
- Then a bucket of cocopeat for the worms to live in,
- Then the worms themselves,
- A bit more cocopeat to cover, and then once they had settled in a bit;

- Organic waste (veggie peelings and stuff) which will start them off on their main food.

Now all is well and it is just a case of checking them every few days and adding more organic matter once they have chewed through the last load. Simple and convenient!

5.0 Human Waste

5.1 Using Urine as a Fertiliser

While urine may be considered (to use the scientific term) 'icky', it may also be considered a valuable resource. It is a high nitrogen fertiliser and also contains other plant nutrients such as phosphorus, potassium, sulphur, calcium and magnesium as well as sodium and chloride and other micronutrients in varying amounts depending on the donors' diet. The amount produced per day will vary depending on how much water the donor drinks but it usually somewhere between 0.8 to 1.5 litres per day for an adult. Over a year the urine of one adult can provide 2kg to 4kg of nitrogen.

I found the above information while trawling through the net on various sites as well as reading through some scientific reports. A good one from Finland is available below.

Frontiers | Nitrogen Recovery With Source Separation of Human Urine—Preliminary Results of Its Fertiliser Potential and Use in Agriculture (frontiersin.org)

For several years we have been using urine as a fertilizer, particularly on fruit and other trees, by the simple method of keeping a watering can (white, to fit in with the toilet décor of course!) beside the toilet. Whoever wants to donate (usually me) uses the watering can instead of the toilet.

Collection vessel in place

Once we have accumulated a couple of centimetres in the bottom of the watering can I dilute it approximately 1 part urine to 10 parts water. Although I have read that anywhere between 1:8 and 1:20 is OK, so I don't think that the dilution is ratio is critical beyond a certain point. In fact, Jackie French in her book 'Organic Control of Common Weeds' recommends undiluted urine which has been aged 24 hours as a weedicide, so fresh and diluted is the way to go.

Undiluted pee can be added to your compost pile and counts as a high nitrogen 'green' (as opposed to high carbon 'brown's) component. Adding pee to your compost may also act as an activator, speeding up the decomposition process.

Recently I have become concerned about the level of sodium in urine, particularly as our soil is somewhat clayey and sodium is detrimental to its texture. Also, unless regularly flushed through the soil, sodium can build up, resulting a salty soil that plants

won't do well in. Some plants tolerate salt in soils better than others but I think the key is to not use lots of urine in one place for a long time, but spread the good news around!.

Also, while the current opinion seems to be that urine is sterile, a study (see below) challenges this idea but in the end has determined that it is still safe to use as a fertiliser. However, if a pee donor is unwell, their pee should not be used, particularly on edible crops, as a precautionary measure and if the pee donor is on medications such as antibiotics or antivirals it would be prudent to flush rather than use their pee as fertiliser.

https://www.sciencealert.com/researchers-tested-large-scale-use-of-human-pee-as-fertilizer-and-here-s-what-happened

Should you have any doubt, I have read that people can kill any bacteria present merely by sealing up the fresh pee in a sealed container for weeks or months, allowing the urea to break down into ammonia and thereby killing off any errant bugs. What the studies don't mention is how badly the smell of the aged pee takes your head off when you finally open the sealed container!

*Dilute stuff being applied to a fruit tree using a **deep pipe waterer***

Anyway, the controlled and thoughtful use of your pee as a fertiliser as part of your fertility management program can help you recycle nutrients and replace some imported fertiliser, thereby allowing you to grow your produce more sustainably and productively.

5.2 A DIY Composting Toilet

About 20% of the water used by householders is to flush their toilets. Even with water restrictions we still use an average of 342 litres of water per person per day, so that means every one of us flushes almost 70 litres of drinking quality water down the sewer every day! How much sense does that make?

We here at the Choko Tree are trying to reduce our water consumption as much as possible, while converting to sustainable water sources eg rainwater, so it seems to me that doing something about our toilet habits would be a good thing. "If it's yellow, let it mellow; if it's brown flush it down!" is a good credo to live by (alright, to save water by) but will only take you so far. I wanted to do better. There is also all that shocking waste of nutrients, flushed away to pollute the oceans – surely we can save water, recycle our nutrients and reduce pollution all at the same time? Let's face it, if there wasn't you wouldn't be reading this.

My initial thought was to put in a commercial system and after much searching found the Sunmar™ Excel NE. It is produced in the 'states and is mostly plastic, plus the damn thing costs $2500 so I figured there had to be a better way. I got hold of a book from a friend called the "Humanure Handbook" which can be had for free in PDF on the net (See the links section of this site) and in it is a deceptively simple way to make a composting toilet that any remotely handy householder can do safely.

I admit that I have added a few wrinkles to his process to make it a bit more feasible for the suburban and urban dweller, but I have a friend who follows the Humanure Handbook process to the letter, and it works for him.

Now the disclaimer – This information is presented for entertainment purposes only and if you try it and they come in the night to take you away, don't come crying to us, we have enough of our own problems!

With that over with, we can get into the good stuff!

This toilet is really a collection device; it allows you to gather the output of your households' bowels and bladders without upsetting yourselves or your neighbours and it starts the composting process. The process generally needs to be completed elsewhere, and this will be the subject of another article (composting toilets part 2, if you will).

The basic principle is a bucket with a toilet seat on it, it is a bit more techo than that.....but not much and OK, so I'm not a master cabinet maker – but let's not lose sight of the fact that this is a toilet! First gather your raw materials, recycled is best. I picked up some particle board being thrown out by a local manufacturer that was 1820mm x 318mm x 20mm. I am a simple man so to make the sides I just cut it into four pieces of equal length. I have been looking around for a plastic bucket to use as the "receptacle" and according to the book you need 4. I was unable to find any that suited

my purpose so (shame! shame!) I went and bought some from Bunnings. At least they are all the right size and white so you know they are clean.

Having cut the sites I measured the bucket to get the height, allowing for 15mm or so of the bucket lip to protrude through the hole in the top of the cabinet I was making, so that the toilet seat would just make contact with the top of the bucket. To make sure the cabinet was the right size and to give me something to screw the side panels into I got hold of some of the 120mm x 36mm timber left over from making the trellis.

I drilled and countersunk two holes in each side of the particle board then screwed the particle board to the uprights, so that the particleboard was flush with one end of the uprights, which would become the top.

I did the same on the other two and then screwed them onto the 120mm x 36mm uprights so that now we had a box, open at top and bottom and the uprights protruding below the level of the particleboard sides. The top was to be made out of plywood that I had floating around, cut to size with the circular saw (powered through an inverter by the 12 volt system, of course!).

The original design called for this to have a 75mm strip cut from one end then the rest hinged to it after it is secured to the carcase of the toilet. I decided not to do that because of the size of the box and the old wooden toilet seat I was going to use, the hinged section would interfere with the hinged toilet seat, so I just screwed it down to the top of the carcase with four screws. The idea was that when it came time to change an empty bucket for a full one, I would lift up the whole toilet and remove the bucket that way. That is the theory anyway, we'll see how it works in practice.

I placed the top of the bucket on the plywood top and marked it out with a pencil, drilled a pilot hole then cut out the circle with my jig saw. Before fitting the toilet seat, look underneath and you will probably see some plastic cross bars that support the bit you sit on. To allow the bucket to come up under and bear on the bottom of the seat, you need to remove the inner screw and move the plastic cross bars through 90 degrees so that they are parallel with the outer edge of the toilet seat, and then reinstall the second screw to keep them in place. After that the only thing left to do is to bolt the toilet seat to the plywood top and, you're all finished!

I still need to lacquer the top a bit but it looks reasonable now and hopefully will be functional.

I suppose at this point a bit of a discussion on how to use it would be in order. This is not the thunderbox of old, you don't just leave your deposit and wander out. Once you have used the convenience you need to throw in some high carbon, absorbent material to balance out the carbon : nitrogen ratio, soak up liquids and prevent odour. My friend with the composting toilet used shredded paper but you could use wood shavings or sawdust, chopped hay or straw, cocopeat, dry leaves etc. Every time you use the composting toilet you must cover your deposit with dry carbonaceous material to keep your toilet operating properly.

Having built the composting toilet, and are now presumably getting ready to use it, we need to work out what to do when the bucket is full. As I see it, there are three options –

Option one is to have looooooots of buckets! Once a bucket is full, remove it from the toilet and stand it somewhere to compost, for 18 months to 2 years, after which it can be used on non-edibles or buried under trees etc or put into the centre of your banana circle and covered with more organic material. This presupposes lots of buckets and plenty of room. I must admit that when I was considering this option I was going to use the greenhouse to store the full buckets in, it can get above 50°C in summer!

Option two is the one in the Humanure system – enclose the output of the bucket in a functioning (and hot) compost pile. A hot composting process will kill off the pathogens so that you can use the compost in the normal way. At least that is the opinion of Joseph Jenkins who started the Humanure process.

Option 3 is the one that I would explore. It involves a number of ventilated wheelie bins, black or dark in colour to absorb solar heat, that you put the output of the buckets into. To put together and install the ventilation to need to do as follows –

1.Get hold of 1340mm of nominal 50mm diameter PVC pipe; 4 x 50mm x 85 degree PVC right angle bends; 4 additional lengths of 70mm long x 50mm PVC pipe and 4 x 50mm vent cowls (with stainless steel gauze) for each wheelie bin you want to convert.

2. Cut the 50mm PVC pipe in half (ie getting 2 x 670mm PVC pipes) and then drill 6mm holes (lot's of 'em!) about 25mm apart to allow airflow into the ventilation tubes. I found it easiest to clamp the pipe in a vice then drill a couple of lines along the pipe, then turn the pipe through 90 degrees and do the same again until there are holes all the way round the pipe.

3. Install an 85 degree right angle bend onto each end of the pipe is the ends are facing the same way and install the 70mm long pipe into the other end of the right angle bend. Just pushing them in should hold them while you are setting things up, the gluing comes later.

4. Place the pipe with both right angle bends against the outside of the wheelie bin and mark where you want the holes to be, remembering that the pipe will be mounted inside the bin.

5. When you have marked where the Pipe is to go in, a 50mm hole saw and power drill makes short work of the side of a wheelie bin. If your anything like me (you poor thing if you are!) the holes won't exactly line up with the ends of the tube and a wood rasp is very handy to remove a bit of plastic to get a good fit.

6. Glue the pipe assembly together (pipe; 2 x right angles and 2 x 70mm lengths in place using PVC pipe glue and let is set, it doesn't take long.

7. Now it is simply a matter of putting the pipe assembly on the inside of the bin so that the end of the 70mm length protrudes from the side of the bin – affix the vent cowl

with a screw rather than gluing it so that you can take it off later, allowing you to remove the pipe assembly cleaning.

Find a place to keep your bin or bins (we have 3) out of the way but in the sun and dump in your unmentionable materials as soon as you create them. Once full leave each bin for 12 months to compost then transfer the much reduced contents – into the centre of your banana circle!

6.0 Wastewater (greywater not blackwater)

6.1 Introduction

Greywater is water that has been used once and would normally be disposed of to a sewer system and lost to the household. This greywater can be made to do more work and fulfil duties that would normally be expected of fresh, reticulated water such as flushing toilets or watering lawns and trees. Greywater can be given a decontamination process before it is used or used as is, but should not be stored due to bacterial contamination. The water from a flushed toilet is referred to as black water and should not be re-used on site, water from the kitchen sink may be too heavily contaminated by fats, oils and detergents and likewise should not be re-used.

6.2 A Backyard Constructed Wetland

We try and live as sustainable a life as we can manage. However there is one area where our performance sucks pretty comprehensively and that is treatment/re-use of greywater. One of the issues has been that while our banana circle (a greywater recipient) was in the front yard, all our greywater plumbing was at the back of the house. For years I fantasised about complicated tank/pump/plumbing set ups until I realised that it was not going to happen, so with the help of friends, we relocated the banana circle to the back yard. We also corrected a plumbing problem with our spa so now all shower/bath water was directed into said banana circle. We were on our way!

It is possible to put raw greywater onto lawns and fruit trees and when we had our original top loading washing machine, I had a hose on the greywater outlet and did just that. The amount of water we used to wash our clothes was considerable, so we upgraded to a front loader. That meant that we used less water (good!) but also meant that the concentration of pollutants in the greywater now produced by clothes washing was increased (bad!) so I didn't feel right about running it directly out to the yard. I needed some way to treat it first.

My original thought was to put in a system similar to the 3 tier bathtub set up described by Scott Kellogg and Stacy Pettigrew in their book “Toolbox for Sustainable City Living”, to save horizontal space. I had problems working out where it would go even so and I would be back to needing a pump and surge tanks and the frame would need to be well engineered to suit the weight. Fortunately, with the removal of the lemonade tree to accommodate the banana circle it seemed to open the area up. There was room for two bathtubs horizontally, both below the level of the laundry sink which would act as a surge tank and I could still use gravity to move the water around.

The bathtubs

I have had two bathtubs sitting on top of the chook retirement village for some years waiting for this moment! Once I was able to manhandle them down onto the ground, it was a case of arranging them in the space that I had to see how they fit best. There is another dug-in bath acting as a water garden in that area and the other two seemed to fit best when lined up parallel with the water garden but the lower on a bit off set from the higher one. I used silicone and bath plugs to permanently block the drain holes before starting work.

Roughly positioning the tubs

The weight of the bathtub, plus gravel, plus water, plus plants means that I needed to have a stable base that could support the weight. I had some solid besser blocks, right angle ones with one long and one short side, left over from an old incinerator. So I laid one with the short side down at each end of the bath, and used a brick to support the other side. I dug them in a little bit to ensure the tub was level but also to give a more stable base. In the end it was not high enough to allow drainage into the next bathtub, so I put in one besser block capping (40mm thick) under the drain end and two under the input end, when I realised the bath had a bit of fall the wrong way!

Supporting the first tub

The other bath I put in by turning two of the blocks upside down and placing one under each end of the bath. This ensured that the second bath was lower so that they would drain naturally by gravity. To improve stability of the baths and to make small adjustments to the fall, I put some offcuts of 6mm fibre cement board between the bath and the blocks to act as shims. In the end it all looked pretty good, or at least I thought so!

Supporting the second tub

The Plumbing

I needed to set the water flow up so that there was maximum contact with the bacteria which would (hopefully) grow on the gravel and the plants and plant roots so I didn't want to just dump the greywater on the top of the gravel and hope for the best! I wanted to run it so that it went in at the bottom of the batch, rose up through the gravel, then drained into the next batch and did the same thing before draining out of the second tub onto the trees.

To do what I wanted to do I got hold of three one metre lengths of 50mm PVC pipe and a series of 50mm pipe fittings which included –

- 3 x 50mm PVC end caps
- 3 x 90^{o} elbows
- 1 x Expandable Connector Waste Pvc Abey 50mm Trap Flxz22up
- 2 x Holman PVC 50mm floor flange
- 2 x 50mm mozzie proof vent cowl
- 2 x 50mm to 25mm barbed reducer
- 1 x 50mm two way valve

One of the reducers and the valve were for use on the inside part of the system (more on that later).

As it turned out a one metre length of pipe fits into the bottom of a bathtub really well so that became the basis for my horizontal part of the plumbing, which sits in the bottom of the bath. The first part of the work was to drill a whole stack of holes the length of the pipe, to let the water flow out slowly into the tub. A good size hole is 12mm or so but it can be difficult to drill into the pipe with this size twist drill and there is a tendency for the twist drill to snap out bits from the side as well as drilling the desired hole. To reduce this I used a 3mm twist drill to drill pilot holes about every 100mm down the pipe, with 4 rows at 90^{o} to each other.

With the holes in place in two of the one metre lengths I glued an end cap on one end and a 90^{o} elbow onto the other of each one, using the blue PVC plumber's glue. I then cut the third one metre length of 50mm pipe in half and slid half into the other side of the 90^{o} elbow giving two L-shaped sections. The idea was that the pipe with the holes would sit along the bottom of the tub horizontally and water would flow in through the vertical section of pipe.

I put them in place to try them out and found out that the vertical section on the one in the second tub was too tall to allow water to flow by gravity so my intention was to cut it off level with the edge of the bath. After some thought however I worked out that the drain from the upper tub could be directed down into the horizontal tube just by using the PVC expandable waste connector and ensuring it sealed by applying silicon both ends. That did work out to be the best way to do it and gave me some spare pipe.

The was one more job before they were complete, and that was to put some fly screen in place over the holes in the horizontal pipe to keep rocks and plant roots from blocking the pipes and preventing greywater from flowing into the system. I got hold of some aluminium fly screen because it is stronger than the polyester stuff and wrapped one layer around the horizontal section of pipe with the holes in it. To keep it in place I took some of the spare 50mm pipe and cut 12mm thick rings from it, then made a cut in the side of each ring so they could be opened out. These rings were then put in place over the fly screen and around the tube to hold the fly screen in place.

The next thing to organise was the drain holes in the bathtubs. Yes, I know I blocked the standard bath drain hole, but that is because I need the greywater to slowly move up through the gravel and overflow in a controlled way into the next tub then through it and out to the garden. I needed to drill a 55mm hole near the top of the tub at the opposite end to where the water flows in to fit the outside diameter of the standard 50mm (nominal) pipe. I didn't have 55mm hole saw that would cut through ceramic and metal (I tried to sort it out but failed, looooooooong story!) but I did have a 70mm one.

Cutting through the side of the bath was a pretty noisy and hard job. It requires you to keep pressure on and some water going over the cut for lubrication for up to 10 minutes. I was using a battery drill and it was about as happy with me by the end as the neighbours were with the noise. I would use a 240v drill next time I think. The hole needed to be such that the bottom was 50mm to 75mm below the estimated level of the gravel. This was to ensure that there would be no standing water at the surface of the gravel and so no issues with mozzies.

50mm floor flange

The hole I had cut was about 15mm too big(because of the larger hole saw) so I inserted a 50mm floor flange in the hole and siliconed it in (silicon is my friend, again!). This took up the difference in hole size and allowed me to provide a seal to prevent leakage. The 50mm pipe I was using to make the drain from slid in with little moving about and was also siliconed in place. To stop the drain getting clogged with gravel or whatever I glued on a 50mm mozzie proof vent cowl on the inside end of the pipe. The cowl uses strong stainless steel mesh and it resisted any funny business by the gravel quite well.

Attachment of the 50mm mozzie proof vent

With that in place I siliconed the outside end of the drain in the first bathtub to the expandable waste connector referenced above, expanded it down so it fitted into the top of the elbow bend in the second tub and also applied a bit of silicon. Now the two bathtubs were connected I needed to fit the drain to the second tub.

Expandable waste connector in place

That followed mostly the same process: cut out the hole, insert the floor flange, apply silicon, insert 100mm or so of 50mm pipe and glue on the 50mm mozzie proof vent cowl. To allow me to connect a 25mm hose I put on a 90^{o} elbow after inserting and gluing in the 50mm to 25mm reducer into it. The reducer has a barbed fitting so that the hose slips on and won't fall off again.

System for the rear drain

In place

With all of the plumbing in place all that was needed was to fill both baths to the top with 20mm blue metal gravel. This is heavy stuff! I ordered half a cubic metre which filled both baths fully with enough left over to make a bathtub wicking bed. I had to shovel the gravel into a barrow then barrow it from the front yard to the back yard then, due to the position of the bathtubs, shovel it out of the barrow, into each tub.

During this process two things occurred to me –

1. It was hard work! (yes I know I am a genius!), and

2. If I had set up the baths as I originally wanted to (3 of them, one above the other) I have no idea how I would have gotten the gravel into the middle bath, let alone the top one!)

With the gravel in place I ran some tank water into the system to check flow and, believe it or not, it worked perfectly!

Gravel in place

To finish this part of the system off I needed to put in plants, preferably from a functioning constructed wetland. Fortunately two of my friends have such a beast and I was able to score irises, taro and papyrus which were then dug into the gravel far enough for any part of the plant bearing roots to be submerged. Plants in a greywater system should not be used for food but they can be periodically trimmed and cut up to make mulch or compost. Where our baths are located also means that the foliage with shade some of the back wall of the house in summer, to reduce the solar heat gain of that part of the house.

Plants in Place

The Inside Bit

The last bit of engineering required was to put something in place to get the greywater from inside house to outside the house and into the system. The easiest way to do this was to just run a flexible 25mm hose from the discharge hose of either the washing machine or the dish washer, whichever was in use directly to the input pipe of the first bathtub. I didn't want to do that for two reasons –

1. It would be effectively increasing the length of the discharge hose which would have meant the water pump in the appliance would have to work much harder, resulting in possible early failure of the part, and
2. If the discharge from either of the appliance pumps was at a greater rate than the system could accept, it would overflow everywhere, defeating the purpose of the plumbing and reducing the effectiveness of the greywater system.

What I needed was an intermediate or surge tank, which would accept the discharge from the appliances, but then allow it to drain into the system via gravity. I worked out that I could do this using the laundry sink. I bought a 50mm two-way valve so that if the

valve was in one position the greywater would go straight to waste, in the other position I could run it outside through a 25mm flexible tube into the greywater system.

Pre-valve

Valve set up

Post Valve

To fit the valve I cut the drain pipe leading out of the bottom of the sink about 220mm up from the floor using a crosscut wood saw (which made short work of it!). I unscrewed the S-bend and upper part of the pipe from the bottom of the sink and then cut off about 100mm from the free end of the pipe I had taken out. I then reassembled everything with the valve in place, just to make sure everything fitted where it should. It did! So I used the blue plumbers glue and put everything back in place and re-screwed the s-bend back onto the bottom of the sink. I also glued the other 50mm to 25mm barbed reducer into the horizontal outlet of the valve. I then left everything in place and did not use the sink for 24 hours to allow the glue to set.

Testing the Operation

The next morning I attached some 25mm flexible tube onto the 25mm barbed fitting and ran it out the back door and into the input pipe of the first bathtub. Unfortunately the 25mm flexible tube is flexible (funny that!) so it goes well around corners but is not self-supporting, any greywater in it would cause it to sag dramatically. To get around this I ran it through a spare one metres section of 50mm pipe supported on a couple of buckets and it did the job fairly well. It is only temporary for testing purposes and I will need to develop something a little more robust for final installation. Anyway the test went perfectly, no leaks anywhere. I am somewhat impatient (alright I am very impatient!) so I put the washing machine on and allowed one load of wash water to go through the system and again it performed flawlessly.

Once the constructed wetland is put together you are supposed to leave it for 3 months to allow the plants and beneficial bacteria to establish themselves before running any greywater. After the test I diluted the greywater in the system with more tank water and it seems to be doing OK. Just after completion we had two freakishly (for spring at least) hot days, both over 37^{o}C but the system seems to have handled it OK and we haven't lost any plants. The secret is to keep an eye on them and top up with clean water periodically.

Another fun project is completed and once the establishment period has elapsed we will be using it full time.

6.3 Testing the Output of the Constructed Wetland

Once the wetland was constructed I left it to sit for a bit over two months while the plants and beneficial bacteria established. We have been using it for most of our washing loads (say 5 – 6 loads per week) for the last four months roughly. Was it making a difference? I really had no idea. The water coming out the other end looked

pretty good but that meant little and gave no indication as to dissolved salts etc. I was doing it on faith, but I wanted data!

Fortunately a good friend of mine works for a local water utility and has access to a water testing laboratory. He agreed to run some tests for me then help me interpret the results.

Test Conditions

Usually water testing of this type would require multiple "before" and "after" samples to be taken over a period of time and then the results analysed statistically. Due to the access to facilities being limited we took two "grab" samples, the first being from the outlet of the washing machine part way through the effluent discharge from the washing cycle or in other words, worst case scenario. The second sample was taken at the exit from the second part of the constructed wetland, where the water goes to water the fruit trees. The previous loads were washed 3 days ago so the water tested had 3 days residence time in the system before it was tested. Samples were taken about 10:00am in late summer.

So, make of the results what you will, they give an indication of what is happening but are not a comprehensive analysis. I won't keep you in suspense any longer, this is what we got.

Test 1 – Oxygen levels

Ex washing machine = 5.7mg/litre

Ex constructed wetland = <1 mg/litre

Clearly the oxygen has been consumed in the wetland breaking down pollutants in the water, but sufficient oxygen is being fed into the beds by the plant roots to prevent the beds becoming anaerobic (there is no unpleasant smell).

Test 2 – Electric conductivity (EC)

Ex washing machine = 2170 uS/cm

Ex constructed wetland = 1600uS/cm

The conductivity of the water is a measure of the level of dissolved salts it contains (this was a major concern for me). While the numbers show that the dissolved salt levels have been reduced by 26% the point worth noting is that the absolute upper limit for salts in drinking water is 1600uS/cm so it has gone from definitely brackish to almost drinking water quality.

Test 3 – pH

Ex washing machine = 9.6

Ex constructed wetland = 7.4

pH is of course the measure of acidity or alkalinity of a solution, 14.0 being highly alkaline, 1.0 being highly acid and 7.0 being neutral. As a control, tap water in our area is reported to be typically from 7.6 to 8.2 so water which was clearly alkaline is now almost in our drinking water range.

Test 4 - Oxidation/reduction potential (ORP)

Ex washing machine = 442 mV

Ex constructed wetland = 465 mV

In this case there was no significant difference between the two readings. ORP is a measure of water quality particularly in terms of if it is well disinfected. Generally an ORP of 650+ mV means that it is suitable for use in pools and spas or for drinking. However, a reading in excess of 250 mV indicates that the water is not anaerobic (resulting in foul smells) so in this case the ORP, being between these two limits, shows biological activity which is what we want.

Test 5 – Turbidity

Ex washing machine = 365 NTU

Ex Constructed wetland = 10 NTU

Turbidity is a measure of cloudiness or haziness in the water. It is measured by detecting light scattered at 90^{o} from the incident light beam using (in this case) a

nephelometer with the units of the resultant reading expressed as NTU (Nephelometric Turbidity Units). Generally drinking water should be less than 5 NTU. But in this case the wetland has reduced the turbidity by a huge amount, and that works for me.

Conclusion

So, from the test results it appears that the water coming out the exit from the constructed wetland is somewhat improved in several important criteria over the washing machine grey water going in to the wetland.

6.4 Home Testing the Constructed Wetland

Our constructed wetland has been in and operating for about 5 years, we put water from the washing machine in one end and then use the water that comes out the other for watering some trees and things. But was the water really any cleaner? About six months after it was commissioned I took up the offer of a friend of mine who has access to water analysis stuff to do a 'before' and 'after' check on the grey water as it went into and out from the constructed wetland, and in fact it did make a difference. The results of those tests are recorded above.

The Constructed Wetland

and again

It must be said though, that was almost 5 years ago. Was the constructed wetland still functioning as intended? I don't have access to water analysis facilities so I just had to take it on faith. That was up until a week ago.

I was doing some reading (as you do) and by chance found a method of checking the performance of a constructed wetland, that could be done at home and at no cost. The results will not be numbers, but would give me an idea if the effluent from the constructed wetland had improved at all from what was going into it. The test was also reproducible and so easy I could do it again at any time.

For those playing at home, the source of this wonderful information was "Toolbox for Sustainable City Living" by Scott Kellogg and Stacy Pettigrew, published by South End Press back in 2008.

The idea behind the test is that the water coming out the end of the constructed wetland should look more like clean tap water than the wash water going in. To conduct the test I needed to take a water sample direct from the washing machine output, a water sample from the output of the constructed wetland and a sample of tap

water to act as a blank for the test. I then had to keep them all in the dark for a week and see what they look like at the end of that time.

While they don't specify, I thought it best to use three bottles of the same size and type. I filled and labelled each bottle and then placed them in a cardboard box, which I then placed in the lounge room, mainly because it is winter here and I didn't want the samples to get too cold just in case it inhibited any of the biological effects.

The Results

Anyway, after a week I pulled the samples out and in fact the sample from the end of the constructed wetland did look much more like the blank than the stuff coming out of the washing machine, so it seems that even after 5 years (and in the middle of winter) our constructed wetland is still doing its thing!

6.5 Spa Bath Greywater and the Banana Circle

A few years ago we had our bathroom renovated, which included among other things replacing the bath with a spa, let's face it, you gotta have some luxury in your life! As part of the renovation I did ask them to put a two way valve in the drain line so that I could run the greywater either down to the sewer or into the back yard and onto the fruit trees. They did as I asked, gluing in a blocked off pipe into the line into the back yard to prevent leakage and left the valve running to sewer until I got a chance to plumb it in properly.

The valve they used - less than $5 at a local hardware

Well, life gets busy and it was a number of years before I got the chance to finish the job. To complete things I got hold of a cap the same size as the outlet pipe and drilled a 25mm hole in it, then used silicon to attach a barbed irrigation fitting suitable to fit a 25mm hose. While I considered using garden hose it is only 12mm and would not drain quickly enough when the shower was in use.

Under the house

Having done the easy stuff, I ran some of the hose through one of the under-house vents which was in roughly the right area so when the time was right I could force it onto the barbed fitting. I then crawled under the house with the fittings, glue, torch and my trusty saw to remove the blank plug and install my pre-prepared cap with the barb on it. Installing the cap proved as easy to do as it could have been, lying on my back in amongst the spiders and dirt (I'm getting too old for this crap!), anyway, job done.

All that was left to do was to turn the valve from discharge to sewer to discharge to back yard……easy! Well, maybe not so. For some reason the valve simply would not turn, regardless of what I did. I tried heating up the outside of the valve with a gas flame to break what was holding it, but no go. I even sent my son-in-law under there to try his hand at it (I told you I was getting too old for this crap) but to no avail, it was stuck solid.

The original discharge pipe, blocked by a cap

There is a lesson here! When you have stuff like this put in, try and operate it as soon as they are finished installing it. It is my belief that some of the glue they used to install it in got into the moving part and gummed it shut, but because it was now a few years down the track, any warranty period had well and truly expired.

My cap with the barbed fitting siliconed on

Due to the way it was constructed down there, and all glued together, it was not just a case of simply replacing the valve, and whole stack of pipework needed to be replaced

too. In the end I broke down and got a local plumbing company in and they did a great job of crawling under the house, fixing the problem and then actually checking to make sure it worked before they left. So we now have a functioning process for reusing greywater from the spa and if we get a spate of wet weather I can crawl under the house (*sigh*) and turn the valve so the spa empties to the sewer again. Woo hoo!

The Results -

Front yard – no greywater

Backyard – with greywater

6.6 The Spa Bath and Greywater Outlet – New Developments

In 2010 we had our bathroom renovated, which included among other things replacing the bath with a spa. As part of the renovation, I asked them to put a two-way valve in the drain line so that I could run the greywater either down to the sewer or into the back yard and into the banana circle. They did as I asked, gluing in a blocked off pipe into the line into the back yard to prevent leakage and left the valve running to sewer until I got a chance to plumb it in properly. Five years later I finally got around to setting it up only to find that the original valve had been glued shut when installed. I had to get some plumbers in to replace the valve, I completed the set up and ran perfectly. (see above)

The original set up, with the drain from the spa bath coming down, through the valve and over to the sewer

Line coming out the front of the valve, out through a ventilation gap in the bricks and into the banana circle

Until it didn't (run perfectly!).

For the past 10 years or so, the drain from our shower/spa bath has gone directly out to the banana circle. Occasionally we do get a blockage, and I usually fix that by taking the shower head off the flexible hose and applying water pressure down the drain and that clears it.

Under the house I go!

We got such a blockage recently, so I applied my usual fix, but to no effect. I went out into the back yard and fought my way through a forest of bananas, arrowroot and cardamom plants, eventually finding the exit point of the drainpipe. I applied the garden hose to that end to use the water pressure to push the blockage back up into the spa. After a few unsuccessful trials there was a sort of 'pop' and there was no longer a barrier to the tap water, and at the same time all of the remaining shower water drained out of the spa.

This did not fill me with joy!

The outlet

What I had to fight through to get there!

Clearly something had come unglued, but I needed to crawl under the house to access it. (did I mention I have become somewhat claustrophobic of late?). I kitted up with an old shirt and pair of jeans and crawled under the house. As I suspected, all of the drained water had gone onto the ground and turned underneath the bathroom into a bit of a bog.

What I found when I crawled into the slop was that the top of the valve I had put in to shift discharge from the banana circle to the sewer had popped out due to the pressure and a panther sized hairball was leaning drunkenly out of the valve case. Clearly this was the source of my problems. (disgusting!)

The hairball!

I was able to fit the valve back in after considerable cursing and swearing, but the screw-on ring that secured it appears to have vanished! Anyway the system seems to work at the moment and at least some water is finding its way to the bananas, plus none is going on the ground under the bathroom. I can see that it is only temporary and I may need to crawl back under at some stage and try and secure the valve again somehow.

As we all know, prevention is better than cure, and when I originally posted this on the Under The Choko Tree Facebook group, a friend posted that installing a filter over the drain in the spa to catch the hair before it made it as far as the valve would be a good idea. This seemed to me to be a wonderful idea as I was not aware that such a thing existed. I have since obtained and installed such filter and I await to see how well it works. (Thank you HGT)

Hairball preventer in place

October 2024 Update

It didn't work!

We started to get issues with the spa not draining properly again. I checked the end of the hose in the banana circle and while water was coming out, it was not what I would describe as free draining. Over the years a banana had grown over the middle of the drain tube, compressing it somewhat and I figured this might be the problem. So I got some flexible tubing to fit the end of the drain tube coming out from under the house and cut the drain tube before it went into the banana circle. When I checked it, there still wasn't much water coming out of the cut end so clearly the problem was up stream.

I applied water pressure to both ends and a small hair ball was belched up into the spa (looked disgusting!) but I still had very poor drain flow. After battling with getting under the house again I chickened out and rang a plumber. He turned out to be local, he crawled under the house and was able to clear the blockage. What he did say was that there was an issue with my original design, where the PVC pipe came out of the valve was 40mm in diameter and the flexible hose I used was only 25mm, it resulted in a place where blockages could occur.

New system showing drainpipes now going out through the house back wall

The other issue which I knew about but did not have a resolution for was that the valve to change the greywater from the spa between going into the sewer and going into the banana circle was under the house. If I wanted to change the direction of flow I would have to climb under the house (again!) and as I get, aahhh shall we say more 'mature', this is getting more difficult.

His suggestion was to actually change the piping so that the valve was located outside the back of the house, easy access to change and if there were blockages again I could open the top of the valve and access the areas that were prone to blockages. While this would cost some cash, it would prevent the need to pay someone to crawl under the house to clear the blockage as I could access all the blockagey bits at the back of the house.

Valve now outside the back of the house and fully accessible for maintenance

We agreed a price and a couple of plumbers turned up a few days later. There were some initial technical difficulties to be overcome to make it work but in the end after quite a bit of work and under-the-house-crawling by the plumbers, the relocation was completed, tested and declared to be operating.

It works really well, and I am not on tenterhooks waiting for the next blockage to occur, causing me to crawl under the house or pay someone else to do it! Money well spent!

7.0 Towards Zero Waste

7.1 An Introduction

"We don't need a handful of people doing zero waste perfectly. We need millions of people doing it imperfectly." - Anne Marie Bonneau (the Zero Waste Chef)

"There is no such thing as 'away'. When we throw anything away, it must go somewhere." – Annie Leonard (The Story of Stuff)

"It cannot be right to manufacture billions of objects that are used for a matter of minutes, and then are with us for centuries." – Roz Savage MBE FRGS (United Nations Climate Hero, athlete ambassador for 350.org)

Waste is a big problem in this world, and all need to step up. According to the experts at 'Clean Up Australia' -

"Australia has a plastics problem. Australia now produces 2.5 million tonnes of plastic waste each year, equating to 100 kg per person. Of this, only 13% of plastic is recovered and 84% is sent to landfill.

More concerningly, around 130,000 tonnes of the plastic we consume leaks into the marine environment each year."

Clearly, we all need to do something, and this is where this eBook comes in!

After this introduction, in Chapter two we start with some ways to gather data. You don't control what you don't measure, so we start off with how to conduct a waste audit on yourself and your family, a pantry audit to understand your food choices and a buying audit to understand what you are bringing into your household, particularly in terms of food. Then what to do with your results.

Chapter three talks about how we developed the idea of ‘No-Buy July’ to help us put into action some of the ideas we had developed to reduce our consumption and, consequently, reduce our waste output.

Chapter four talks about a couple of tools we used to help us ease into the ‘Towards Zero Waste’ lifestyle along with the practice we got from No-Buy July. The tools allow you to dip your toes in the ‘waters of change’ so to speak without diving in headfirst! That way you get to try things out in a limited fashion, dropping things that don’t work for you and your lifestyle, but keeping and/or expanding the small changes that do.

Chapter five (entitled ‘DIY’) details some projects you can get involved in to help you on your Towards Zero Waste journey, from putting together a ‘zero waste go-bag’ to making bag to store your bread in, so you can kiss those plastic bread bags goodbye. You could also start making your own stock powder from bulk and home-grown ingredients or shampoo soap to reduce your need for plastic bottles.

Chapter six tells the story of how my daughter developed her own zero waste challenge which she ran over a month, two years in a row. She documented her challenge on social media and came up with lots of ideas, implementing one per day, for a month. All of this is recorded as well as some of her thoughts on why she did it, what worked and what didn’t.

The final chapter is a list of books about waste and consumption, each with a short, one paragraph review, just in case you want to extend your knowledge and skills as you approach zero waste.

7.2 Gathering Data

Conducting a Pantry Audit

Using a pantry audit (and including the fridge) can give you a handle on the food packaging waste you are generating and have on hand, and then provide the information needed to help you start reducing it. Addressing food packing waste is a great way to start on your journey towards zero waste!

It doesn't take long to do, I did ours in about half to three quarters of an hour, with some extra time taken to sit down and analyse the results. The prime issue is plastic food packaging, especially after all the issues we have been having with sending Australian recyclable plastics overseas, then the receiving countries no longer accepting it. We have little in the way of local processes to recycle it, so now a lot is ending up in land fill. As you conduct your audit, making a note of the type of packaging the food was bought/stored in will make later analysis easier as you can hit the stuff in plastic packaging first.

Also, the frequency you use each item is worth recording so that you can hit the biggest fish first (to coin a mixed metaphor). I did this by using three numbers to set out the highest use stuff –

1. used daily to weekly (high use)
2. used monthly or less (low use)
3. Dead stock. (forget it!)

If you are anything like us you will have dead stock in your pantry. That is to say stuff that we never use and which has been sitting around forever, taking up valuable space in our pantry. It may be dead stock because our tastes have changed over the years, it was something which looked good but when we tried it we found it not to our tastes, or it may be something we over-bought which has gone out of date and we are not game to use it. Or it may be that it was an impulse buy which seemed like a good idea at the time but, if we had thought about it, we would have known it was not really 'us'. Rare, but it does happen!

To conduct the audit is fairly simple, download the **excel spreadsheet** I put together, or develop your own, then go through your pantry (and fridge if you want that in your terms of reference) item by item and write down every product in there. Against each item you can also make a note of the packaging type (plastic bag, paper bag, glass jar, cardboard carton, plastic jar etc.) and if you want to be really thorough, the pack size and number of packages which you have. You can then make an estimate of the frequency of use of each item using the one to three scale above. By looking at the amount you store, and the usage score it will give you an idea of which items to hit first to get the best bang for your buck in terms of the volume of packaging waste you are generating.

The next trick is to highlight any and all pantry and fridge contents which are in packaging which you find unacceptable. To help you decide how far you want to go, I suggest you consult the hierarchy of packaging See point 2.5 below), which lists packaging types from the best (ie none) at the top, to the worst (non-recyclable plastics) at the bottom. You decide how far up you want to go.

Once you have developed all this data, it is then a case of analysing it and working out what changes you are going to make. From the work I did with our pantry/fridge audit, it seemed to me that there were four (or in reality five) options that I could see –

The Options

1. Buy a similar product, packaged further up the hierarchy
2. Buy from one of the emerging 'bulk buy/packaging free' places
3. Make the product at home (ideally from bulk sourced or home-produced raw materials)
4. Use up and not replace
5. Oh yes! I have no idea at the moment!

The Details

1. Buy a similar product, packaged further up the hierarchy – So maybe you buy your mayo in a plastic jar and there is another brand available in glass, or you have been buying your flour in 1kg plastic bottles, but it is available in paper bags or even better, bulk, packaging free! I realise there are some other issues at play here. You favourite hot sauce may be available in a non-recyclable plastic bottle, and you know the other brands packaged in glass bottles just won't do the trick. It can leave you in a quandary because you really, REALLY like that hot sauce! If you can't make an equivalent one yourself, one approach I suggest is a blind taste test.

The Blind Taste Test

Get hold of a small amount of all the readily available hot sauces, which have been appropriately labelled, from friends and acquaintances or even buy a small container of each. Have someone trustworthy (this is NOT the time for practical jokes!) put a small amount onto a plate or in a container like a shot glass labelled as 1,2,3 or a,b,c; etc, anything so that you don't know which is which. Try each one and rate it from best to worst according to your taste. Then review the results with your trusted colleague to find out which brands were high on your list of acceptable ones and what they were packaged in. I tried this approach when we were looking at mayo and found that my pre-conceived notions were just not correct. By doing a blind taste test, it is the actual flavour of the product you are rating, not the brand and you may find that hot sauce in a glass bottle is actually OK!

2. Buy from one of the emerging 'bulk buy/packaging free' places etc. – There are a whole stack of places opening up which will allow you to by bulk pantry staples such as flours, pasta, rice, sweets etc. into your own containers or glass jars you can buy in the shop. We have a number around here including The Source, Nom Bulk Foods, Honest to Goodness, Naked Foods and Scoop Wholefoods. They are scattered all over Sydney, although if I were honest, the concentration is greater in the east than out here in the west. We now buy flour, dried beans, oats, dried fruits, nuts and sweet treats (shh!) and other staples in our own bottles and jars regularly.

There are other options too, particularly for refrigerated items, like your friendly neighbourhood deli and greengrocer, who are likely to allow you to buy their products weighed into your containers, especially if you become a regular customer. Food coops are another possibility and if there is not one in your area, maybe you could start one? Farmers markets quite often are not just for fruit and veg (although packaging free fruit and veg is great too!) but also have lots of artisan and value-added products like jams, sauces and chutneys etc in re-usable glass jars.

3. Make at home – There are many books and websites out there dedicated to people who want to make their own stuff, including pantry staples like jams and sauces, preserves, spice mixes, pasta – all sorts of things. We have put together a couple of spice mixes that allow us to use some of our home-grown herbs and other packaging free components to create superior substitutes for the commercial products. We make a stock powder, equivalent to chicken stock, which is based on nutritional yeast (see section 4 – DIY). The stock cubes it replaces were wrapped individually in a paper/foil composite which was not recyclable. Likewise, the Mexican spice mix (See section 4 – DIY) we use for our burritos used to come in foil throw-away pouches, but now that we produce our own from packaging free and home-grown ingredients that source of waste has been eliminated. It is also enormously satisfying to make this stuff yourself!

4. Use up and not replace – This is mostly our go-to for dead stock, unless it has well and truly exceeded its use by date, then it gets composted and not replaced! I bought lentils to try, but found that Linda is not a fan, I don't mind them, but it won't be a huge disappointment if we use the ones we've got and call it quits. Likewise, we have fooled around with wine vinegars in various guises, but I am not a fan and Linda isn't much of a fan either so I am casting around for recipes that are not too disgusting, failing that they will be used as weed killer or disinfectant!

5. I got no idea! – Hopefully you won't get too many of these. One that came up for us was marshmallows, packed in soft plastic, we use them rarely in winter over the fire when the kids are here.

Now with your recording an analysis done, you are primed for action! Have a recce in your local (or as local as you can find) packaging free store and see what they have that will allow you to switch some of your purchases over to bulk. Or pick a product or two and work out your waste reduction strategy for them and then implement it. The whole process is interesting, gives us an appreciation for the waste we generate, and can be lots of fun. It will also move you towards your waste reduction goals, whatever they may be. Good luck!

Conducting a 'Food Buying' Audit

A buying audit is complementary to a 'Pantry Audit' in that the pantry audit tells you in some detail of the food which you have on hand at the time of the audit, the 'Buying Audit' allows you to track the type, amount and cost of foods coming into the household over time.

I have a fair idea of the sorts and amounts of food which we buy in general, but there is no substitute for measuring and for recording the data. We have a supermarket, greengrocer and butcher within walking distance and to save transport energy these tend to be our go-to.

I wanted to know what we were spending so I could see what opportunities there were for –

- Home production
- Bulk buying
- Substituting from other sources.

First, I set the criteria for the audit. It would cover food purchases from the supermarket and greengrocer and to a lesser extent, butcher which we have been using less and less as we move towards a plant-based diet. It did not include: takeaway (traditional on a Friday night) or bulk purchases like a 25kg of rolled oats and skim milk powder ($90 and $120 respectively) which occurred during the time of the audit.

To help me record the data I was generating I put together a (very) simple Excel spreadsheet. Excel spreadsheets also have a 'sort' function which helps me to analyse the data by grouping together purchases of similar products over time. The headings I used for the grocery sheet was –

Date – so that I had an idea of the time that items I purchased regularly would last before they needed to be rebought.

Item – this one is important to get right and by that I mean to use the same item name each time they are entered on the spreadsheet. If an item is entered as 'baked beans' initially then 'beans, baked' when bought next and then as 'Fred's Baked Beans' a third time it makes sorting for analysis very difficult. Entering each item under the same name each time means they will group together when sorted. Simple I know but it easy to make a mistake……. Or so I've heard!

Size – how many grams, kilos or litres of each product is bought at a time, which can give you a feeling for how much of each product is bought over the time of the audit, and can then be extrapolated over a month, 6 months, or year or whatever. Thus you can hit the high use stuff first.

Number – This is just there so that when I bought multiples of the same item, I didn't have to enter each one separately, but I would still be able to work out the total numbers of that item over the period being measured.

Total cost – how much each item (or number of items) cost all up to give me an idea of how much I was spending over time. This column could be aggregated to give me a total spend during the audit timeframe.

I then put together as similar sheet for Fruit and Veg, and meat. If you want a blank copy to model your own on, it can be downloaded **here**.

A	B	C	D	E
Date	Item	Size	Number	Total cost
2/01/2019	Peaches - Sliced	825g	2	$7.00
21/12/2018	Peaches - Sliced	825g	2	$5.60
16/12/2018	Peaches - Sliced	825g	2	$5.60
6/12/2018	Peaches - Sliced	825g	3	$7.50
23/11/2018	Peaches - Sliced	825g	3	$10.50
17/11/2018	Peaches - Sliced	825g	2	$7.00
30/10/2018	Peaches - Sliced	825g	1	$1.75
21/10/2018	Peaches - Sliced	825g	4	$11.20
8/10/2018	Peaches - Sliced	825g	3	$10.50
25/09/2018	Peaches - Sliced	825g	3	$8.40
15/09/2018	Peaches - Sliced	825g	2	$5.60
15/09/2018	peanut butter - smooth	780g	1	$6.50
8/10/2018	Pie apples	800g	2	$8.60
15/09/2018	raisin toast	650g	1	$3.50
5/11/2018	Salada wolemeal crackers	250g	1	$2.00
5/11/2018	Salmon tin - spring water	95g	2	$3.00
15/09/2018	Salmon tin - spring water	95g	2	$3.00
5/11/2018	Shampoo Elvive	325g	1	$8.00
21/10/2018	Soy Sauce - Kikkoman	1 litre	1	$8.00
16/12/2018	Tartare Sauce	220g	2	$4.00
21/10/2018	Tofu - Macro Sate	200g	1	$4.00
16/12/2018	Tomato sauce	500ml	1	$1.47
21/10/2018	Toothpaste - Cedel	110g	1	$1.75

Sample of what the records may look like

To operate the audit was a fairly simple matter. Every time I made a purchase within the criteria I had set out I made sure to get the receipt and then as soon as I got home (mostly, alright I saved them up until the end of the week!) entered the data for each one into the spreadsheet. I did this for a period of four months, but you could do it for as long or short as you like, bearing in mind that the longer it goes on for, the more information it will yield.

After four months I sat down and did a bit of analysis, the easiest way to do that (for me) was to sort for item name so that the items were aggregated, and it turns out over those 4 months we bought –

- 9 tins of sliced beetroot, total weight 7.5kg for a bit over $21 (could be home produced and/or preserved)
- 26 tins of sliced peaches (in juice), total weight 21.5kg for $80.65 (no way to grow at our place but could be bought in bulk in season and home preserved)
- 16 x 750g loaves of bread for $76 (home baking)

- All up $746 worth of groceries, $260 worth of F&V and $10 worth of preserved meats for homemade pizza (we did have some meat in the freezer we were working through to use up).
- Not too bad for a family of 2 for four months, I think!

It depends on what is important to you and what your big-ticket items are in your journey towards living a sustainable life, but whatever they are decide what you need to measure to control them, and then do it!

Food Packaging Hierarchy

We all face choices when we buy food and one of the choices we make is how the food is packaged.

The idea of a hierarchy is we start at the top (best case scenario) and work our way down, looking for the most appropriate answer, until we hit the answer which works for us, hopefully before we hit bottom (worst case scenario). It may be that we have no choice and do end up at the bottom of the hierarchy, but by using the tool to look at our options, sometimes we can choose an option higher up the hierarchy than our current 'go-to' option.
Thus the food packaging hierarchy is a tool to allow us to evaluate our choices in one small area of our lives. An area which can have a negative impact on the environment and, after thinking about it, come up with the best solution for us.

The Food Packaging Hierarchy

1. Packaging free – if we are talking about packaging and its impact on the environment once it is thrown away, then to buy something packaging free just has to be the ideal way to go. There are now options for buying in bulk and taking your own containers for refill as well as supporting traditional businesses like your local purveyor of fruit and veg or delicatessen who can provide food packaging free. Obviously if we produce it ourselves it is packaging free also. Unfortunately we can't always get what we want

packaging free because either it is not offered packaging free by the retailer or because we are not in a position (for whatever reason) to make use of a packaging free option.

2. Reusable glass jars/bottles – Even in this day and age, where plastic is king, there are still lots of food products provided in glass jars and bottles, which are by and large re-usable. The use that comes first to my mind is to use them to make our own food preserves and we have found over the years that by accumulating glass bottles and jars we can increase the amount of preserving we do each year at no extra cost. The weak link in this chain can be the lids which may eventually have issues with the sealing ring, but there are places now where you can even by the new lids (while recycling the old ones) and keep the glass containers in use. Of course preserves are not the only thing they can be used for, they can also be used as a storage container for stray nuts, bolts and screws in the garage (another old habit which needs reviving), to produce food by using them to grow sprouts or even to do soil testing eg the soil texture test or even to replace plastic as ffod packaging in the freezer. There are sites on the 'net which can give you ideas on how to reuse glass jars and bottles from the sublime, to the ridiculous!

Even if you don't want to use these handy glass containers yourself you can pass them on to friends, family and neighbours to help them in their own preserving efforts or to schools or preschools for craft use. By using our purchasing power to buy a glass packaged product over its similar, but plastic packaged rival, we can send a powerful message to the product producers.

3. Reusable steel containers/aluminium – sadly, over the years these have become less and less common, and when they are available they are usually only produced for a short time as a product promotion. They are still out there though and can be used to store the product which they originally held when bought in bulk, or other bits and pieces as required.

4. Recyclable glass/steel/aluminium containers – Some glass containers aren't really practical for anything other than what they were originally designed to do, such as the

smaller, irregularly shaped containers used for jams or condiments. So any glass container that won't be reused in your system immediately fits into this category. To be fair, some steel food cans can be re-used in crafty situations (eg pen holder etc) or as no cost pots for plants, or even to construct a rocket stove. The downside of these ideas is that over time the steel cans will rust out and deteriorate to the point where they will be absorbed back into the soil and entropy wins again (a small win for entropy but a win nevertheless). The up side is that glass, steel and aluminium can be recycled endlessly and will turn out a product as good as the original, in fact as far as glass is concerned, less energy is required to melt a tonne of glass recycling than is required to melt the raw materials (silica sand, soda ash, limestone etc) to make a tonne of glass, not to mention the mining costs, so it is a win/win!

5. Compostable/recyclable paper/cardboard containers – strangely enough these actually seem to be becoming more popular. I have noticed a number of products including some sweet treats, packaged in paper/cardboard rather than clear plastic or polystyrene foam. This is a change also worth encouraging, although the downside is that if we compost these containers they may miss out on going to landfill but the embodied energy is lost and entropy wins again. Another downside is that paper and cardboard products cannot be recycled indefinitely. Every time they are recycled the pulping process reduces the fibre length to the point where the stock becomes useless, at which point composting is the best option.

6. Reusable plastic containers – Some of the food containers which were once served by glass packaging are now contained in plastic containers which with a bit of thought can be re-used, eg peanut butter, fruit, mayo, honey, jam etc. once they are washed out! These can be used for a number of things but because they are plastic and can't stand heat they are no good for home preserving. You could use them for storing spices, dry goods, grains etc.

7. Recyclable plastic container – Recyclable plastic containers have a number symbol which tells you the type of plastic it is made from and while all of these are able to be recycled, there needs to be a system in place to recycle them. In Australia at the

moment (April 2019) our recycling system is in a shambles because we relied on it being done overseas and the countries involved have refused to take our rubbish. This has resulted in plastic packaging which is theoretically recyclable going to land fill. Regardless of this fact, plastic is downcycled, rather than recycled, meaning that it is used to make a lower grade of plastic and so eventually winds up in an unusable dead end in most cases. Which plastics are being collected for recycling in your area will vary over time, so it is best to talk directly to your local council or their waste contractor to find out what is happening.

8. Non-recyclable plastics/mixed – any plastic not marked with an identification number cannot be recycled, with the exception of soft plastic bags which are now used by Redcycle to generate new municipal road infrastructure. There are also containers made of mixed materials like tetrapak which are difficult to recycle.

7.3 Practice, Practice, Practice

‘No Buy’ July - Putting it Together

I was reading a very nice article in the latest Earth Garden magazine (No 184) by Rachel Altenbacher where she ate only out of her garden for a month. This included a 7.5 x 2.5m veggie patch, produce from her orchard and chooks and some other pantry and swapped items. I thought this was an intriguing idea. I am also about halfway through David Holmgren’s book “Retrosuburbia” in which he talks about a “Home-based lifestyle” which I also found intriguing.

We decided to synthesize these and a few other ideas (it dovetails well with Plastic Free July and Zero Waste) together and came up with “No Buy July”. The idea of no-buy July is to just use what we have on the property as much as we can for the next 31 days, so that we can –

Reduce unnecessary consumption and with it, waste – I think we are pretty frugal, but I want to test that theory and at the same time challenge ourselves to be more resourceful and innovative with what we have.

Save money – We have a fixed amount of cash to live on and we need to get the most out of it.

Make best use of existing resources – We do rely on our own resources, but I feel we could do better and by focussing on doing better we will –

- Learn new ways of looking at things.
- Learn new skills.
- Reduce our consumption and waste production,
- Have fun – I think that by challenging ourselves to do better we can have a lot of fun rising to that challenge.

What about the extra stuff can't produce?

We have allocated $50 per week maximum, which we won't touch if we don't have to but can cover minor unforeseen shortages.

Exemptions

There are a number of exemptions to the no buy rule being mainly -

- Pharmaceuticals
- Regular bills (energy, water etc)
- Gift cards, birthday money etc accumulated prior.

Petrol

Just to make things interesting I have allocated 1 tank of petrol for the month, which I topped up on the afternoon of June 30th. We usually go through a tank of petrol every one to two weeks, so this will encourage us to use walking, biking and public transport more. I still want some petrol available for things like our monthly permaculture Sydney West meeting, which is at night and we have a whole stack of crap to take with us. Travelling home on bus and train at 10:00pm loaded to the gunwales with PSW gear does not exactly thrill me.

How will we do it?

Home Harvest

We only have our 600m2 block to draw from, but having said that it does provide us with fruit, veg, herbs and eggs. The chooks are firing pretty well at the moment and giving us 2 eggs a day, we have lots of citrus: lemons mandarins, oranges and limes and all the usual herby suspects are available from the herb "wedding cake" and other parts of the garden.

In terms of veg we have lots of leafy greens with silver beet, bok choi, tatsoi etc and some brassicas such as cabbage, kale, broccoli and cauliflower starting to come on. We also have celery, snow peas, water chestnuts, lettuce, carrots, chokoes (of course) and Jerusalem artichokes. Unfortunately we have just run out of home grown onions, until the next crop comes in.

We do also make use of wild greens like sow thistle, wild lettuce, mallow and dandelion which we mainly harvest from around the yard but can also forage.

Shopping in the Pantry

We have a fairly comprehensive pantry anyway and have recently been getting back into bulk buying to reduce costs and packaging waste. We have a bulk supply of flours, whole wheat (plus we have a nice electric grinder), skim milk powder and now we have red kidney beans and black beans as well as our own home preserved tomato pasta sauce and diced tomatoes. We don't grow enough potatoes so buy them by the bag (organic) through our friends Greenhills organics. A bag usually lasts us about 2 – 3 months and we restocked a couple of weeks ago.

Doing stuff we know how to do but stopped

In the past we used to make bread a lot more and make our own pasta and the like but due to a number of factors like too much to do (and laziness on my part) we don't do as much of anymore, so that is going to re-start.

Doing stuff we haven't tried before

I want to give some new stuff a try, like using our stored skim milk to make ricotta cheese (for homemade ricotta and silver beet ravioli or tortellini) and Greek style yoghurt. I like sour cream on our home made Mexican bean tortillas, but I want to try substituting with homemade Greek style yoghurt and see how it goes. Also we want to try new vego/vegan meals to widen our repertoire.

Freezer

Which I suppose brings us to meat. We have some in the freezer but our current meat consumption is down to one or two nights per week, so I don't see this is a big issue. It has been interesting to note that with the reduction of the importance of meat, the freezer has become a less critical piece of equipment for us too. Once upon a time we

would buy a side of beef (pasture fed) a side of lamb and/or pork and some chook bits. If we were to do that now the meat would go out of date well and truly before we could use it. So it is more a case of buying stuff as we need it.

We also have some (homemade) ready meals in the freezer if we do hit a patch where we don't have time to cook, reducing the likelihood of dipping into the cash reserve to get takeaway.

Shopping at the Shops

We did one last "standard" shop on the Saturday. It covered the stuff we would buy on a usual grocery shopping trip, although the variety and volume of stuff we have been buying over the years has declined somewhat due to the bulk buying and home production.

So there you have it! We are ready to go "home based" and see where that takes us. I am looking forward to the challenge, and also having the time to do more "from scratch" stuff as well. I am hoping that being barred from that quick trip to the shops will make us more creative, and as a by-product make things more fun and satisfying when we rise to the challenge.

'No Buy' July – How it Went

If you remember, here at the Choko Tree we were going to get by on the contents of our pantry and garden, and avoid going out and spending unnecessary cash, we were going to do this for the entire month of July and christened it: No-Buy July (NBJ) (see above). If you want to know how it went, read on!

Initial Thoughts

The first few days of NBJ felt strangely like a final exam. Sort of like just having finished a class where you have been taught a whole stack of techniques and then have to put them all together for a final exam. Probably because we had been doing a lot of these

thing on and off for years but not necessarily all at once. Anyway, that's what the first few days were like, until we settled into a routine and then it just became "how we do things around here" or in other words – business as usual.

In terms of what we set out to do as mentioned in the previous article, ie –

- Reduce unnecessary consumption and with it, waste.
- Save money.
- Make best use of existing resources by learning new ways of looking at things and learning new skills, and
- Have fun!

It was a resounding success on all fronts! Here is some detail on how things went –

FOOD

Breakfast – I usually have muesli and Linda usually has porridge in winter, and we had sufficient of both of those in our stores to continue on as we usually do for the month, but during this time I did think about my muesli. I am going to buy in a larger supply (25kg) of organic rolled oats then design up a "muesli concentrate" which can be mixed with the oats to make…….muesli!

Lunch – typically I/we like a cheese and salad sandwich or wrap for lunch. Anyway, this is simple in summer but to provide fodder for a salad-based lunch is a bit more difficult at this time of year (winter!). We have some cheese in the fridge but would need to buy in salad fixings. That was until I came up with the idea of teaming up some of our bottled diced tomatoes which were already in the pantry with pickled beetroot (also a pantry staple), lettuce from the garden and then a boiled egg or two (from our own chooks). This made a nice salad sandwich or wrap, depending on what bread was available.

Ah, yes! Bread. We had made quite a bit of bread in the solar oven over the years, but at this time of year I can make it in the oven attached to the slow combustion wood heater. I have gotten a bit lazy and it is easier to buy a loaf of stone ground wholemeal, which comes in a recyclable/compostable paper bag than to bake our own. But this is NBJ! So I needed to get back into baking. We use a fairly simple bread recipe but it takes a number of hours for rising and such and I need to be organised to do it so we have bread when we need it, so what to do if time was short?

The answer? Make unleavened tortillas! I can throw them together in less than an hour (and most of that is waiting time) and they make a great wrap, as well as bean burrito or whatever else. I just needed to take a bit of a mind shift to realise that tortillas also make a great lunch as well as dinner. That was a winner!

Dinner – For the most part this didn't change much and we still made stuff which is mostly vegetarian, but we also tried some new stuff, like making spinach and ricotta dishes based on our own home made ricotta and likewise vegetarian Indian dishes based on our home made paneer.

The dishes we normally made that have sour cream (I lurve sour cream!!) in them could have been a problem, but we have been converting over to Greek style yoghurt instead

and have started making our own based on powdered skim milk and using commercial pot set yoghurt as a starter. (which you buy once).

We have also been making our own desserty type stuff like choc chip biscuits, impossible pie, apple pie, which we restrict to Friday nights……and possibly Saturday nights as well.

Friday night dinner has been, since time immemorial, special and we usually get takeaway. This is often a hamburger/steak sandwich/chips/fish cocktails or whatever from our really nice, privately owned (ie not chain or corporate) local hamburger shop. When we originally talked about NBJ I was in favour of laying in a stock of the bits and pieces to make such treats and do that at home, however, my sweetie pointed out that there was little point in buying in all the stuff just so we could make it at home. So I caved and we used some of our discretionary fund (to the tune of about $16) to pay for dinner on Friday nights. We also used to buy in dessert for Friday nights but as mentioned above, we now produce this ourselves.

DISCRETIONARY CASH

Well, to me the above bit is a great segue into how (or if) we used our weekly $50 allowance. Taking into account the four full weeks in July and how much we allowed per week, that gave us $200 to cover off any stuff we needed but could not produce during NBJ.

How much did we spend? All up of the $200 allotted we spent $106.45.
This mainly went on Friday night dinner, stuff we couldn't produce but needed for a certain dish such as mushrooms and a small tub of pot set yoghurt to kick ours off. Linda was taken to a farmer's market by the kids and picked up a couple of small bits and pieces and then there was coffee, which requires an entry on its own!

Coffee

I don't smoke, drink or gamble, but over the years I have come to look forward to a cappuccino at our local shops after breakfast and Don (our local barista) makes a good one. However I found over the years that a small drain on funds can cost a bit when you add it up and I would get my cappuccino (in a keep cup by the way) on average six times a week.

Unfortunately, when I did the math this worked out to somewhat over $1300 a year. (say what?) To be fair I had resisted some efforts to get me to reduce my consumption previously but NBJ meant that I had to get serious and so I cut my store-bought coffees down to 1 per week (to be consumed with the other members of Grumpy Club). This in itself would save us over $1000 per year. So on the other days I would have a home coffee, using jars of coffee we had accumulated and which Linda could no longer drink. This meant that the coffee I was consuming had already been bought and which would have gone stale over time and had to be thrown out if they were not used, so it was essentially free. After doing this for a month, I have found it is possible to habituate myself to this coffee and still enjoy it.

PETROL

To make things interesting I decided to allow one tank of petrol for the whole of NBJ. A tank will usually last us from one to two weeks, and I was hoping to push it to a month. Unfortunately, that was not to be, not because we went out all over the place and ignored the whole NBJ thing, but because neighbours and family required being ferried around all over the place. While I wanted to see if we could make it or not, unusual circumstances cropped up and I needed to do the driving because assisting neighbours and family comes before arbitrary limits set up as an experiment. In the event we made it to halfway through the third week before I needed to refill the tank.

Going Out

As luck would have it, for most of NBJ we spent at home with the odd outing to visit family or attend required meetings such as the permaculture Sydney West general and committee meetings and our own sustainability group. We did intend to go on an outing one day but for various reasons it did not happen. Planning it did make me more aware that a greater percentage of our going out involves a "retail experience" at some point in the outing and the opportunities for doing free stuff in our area are not that great.

WHERE TO FROM HERE?

In the words of my brother, Jim, now we move into "spend like a drunken sailor August".

A couple of days after the end of NBJ we sat down and had a look at what we did, how it all went, and then talked over where we were headed next. Surprisingly, we liked most of the experience of NBJ, and the challenges of making do with what we have on hand. Another amazing thing was that all of the experiments we tried with making new foods from scratch or using exiting supplies in new ways turned out well. They were edible and tasty to the point where we are going to keep doing most of them.

Saving the cash did not hurt either.

We have decided to continue doing most of what we started, but with the odd coffee, meal and trip out thrown in. Next year we might even give No-Buy July another go, but take it to the next level (whatever that means!)

7.4 Tools for Change

This chapter talks about a couple of tools we used to help us ease into the 'Towards Zero Waste' lifestyle along with the practice we got from No-Buy July (see above). The tools allow you to dip your toes in the 'waters of change' so to speak without diving in headfirst! That way you get to try things out in a limited fashion, dropping things that don't work for you and your lifestyle, but keeping and/or expanding the small changes that do.

The 'One Day a Week Challenge'

Quite often the environmental impact we have (positive or negative) can be linked to the actions and behaviours we exhibit, ie the way we live our life. What we eat, how we cook, how we travel, what we buy and from whom, etc, etc. The way we live our life is not only important for ourselves, but also for those around us. If the people around you see you changing your life to make it better, it empowers them to change too.

The way we live is also linked to the habits we have developed over the course of a lifetime, particularly if you are, like myself, of a more mature persuasion, and habits can be difficult to change (ask any smoker!). I myself have wanted to change my life for the better and to reduce my load on the environment but found breaking old habits and creating new ones difficult. So, where is all this leading you ask?

We have found a way to make changing our lifestyle easier and less painful, but still heading us in the right direction. We challenge ourselves to make the change for one day a week, hence the "One Day a Week Challenge". We decide on the change we wish to make then commit to doing at least one day a week until the change is locked in. Once the change is locked in, it can be extended to more days, or you can leave it at one day and go for another challenge.

As an example, we started out eating a meatless meal one day a week, but that has now been extended to the point where we will eat 3 to 4 meatless meals a week and the transition has been almost pain free! I can't see us becoming full time vegetarians, but I

am happy that we have been able to reduce our environmental impact due to meat consumption considerably.

Your challenge day does not necessarily have to be the same day of the week, so long as you commit to one (or more days if you like) day every week and then stick to it. That is the challenge.

Following are some suggestions for "One Day a Week Challenges" which you and your family might find interesting, and worth committing to reduce wastage of food, water, energy or whatever –

- Eat from the backyard.
- Eat no processed food (Make from scratch day).
- Shower with a friend day.
- Catch the warmup water (for use elsewhere, like watering plants or flushing toilets.)
- Buy no packaged goods.
- Compost food waste.
- No-buy day.
- Brown bag it for lunch.
- Carry around your waste (umm not icky waste obviously!)
- Pick up litter as you walk.

Or any other changes you have been wanting to make but want to ease your way in by starting one day a week rather than jump in headfirst!

The '50 Percent' Challenge

Some of the hardest things to change are our habits. We may WANT to live better, more sustainable, more resilient, more eco-friendly lives but the siren calls of our habits can drag us back to our old way of living. I know this is true because I have felt it and succumbed myself.

Some people go best with a ‘cold turkey’ approach while others such as myself do better easing into new ways of thinking, being and doing. That was the original idea behind the ‘one-day-a-week’ challenge (see above). You commit to doing something which improves your environmental performance (or not doing something which reduces it) for one day a week. Then you can move on to more days per week as you want. We started out eating vegetarian one day a week, but now only eat meat one day a week.

Anyway, there are some things that don’t work well on the ‘one day a week’ challenge but work well for the new type of challenge: the ‘50% challenge’.

Some examples of a 50% challenge which you can take include –

- Using 50% of the cleaning products you would normally use in specific situations such as clothes washing powder, hair shampoo (and conditioner) and dish washing detergent. This will not only save money and less chemicals will be pumped into the environment, but quite often we use more of these products than is needed, generating waste.

- Going shopping 50% less than you usually do. Most people shop at some point and we used to do grocery shopping once a week. We now do it every two weeks and find that it reduces the opportunity for impulse buys, reduces travel costs and gives us more time for other things. This results those impulse buys that sit

in the cupboard until we realise we are not going to use them and toss them out!

- Wash items such as sheets, tea towels and bath towels 50% of your current frequency. There may also be other items which could be washed less often as well and for a more detailed discussion of clothing washing and its frequency, check out the article **here**.

- Reduce your current level of food waste by 50% using improved planning, storing correctly, getting creative with scraps etc.

I'm sure you can think of other examples where you can improve your life 50% of the time.

There are also crossovers between the 50% challenge and the 'one-day-a-week', so that if you have your challenge down pat for one day a week, you can improve your performance by rising to the 50% challenge.

Such crossovers include – using alternative transport (biking, walking or using public transport) instead of your car, making your food from scratch (as opposed to takeaway or ready meals), or reducing your meat intake by 50%.

The whole idea is to challenge yourself to improve an aspect of your life without having to go the whole hog straight away. It may be that you find the challenge is no challenge at all and you feel you can even increase the percentage, or you might remain comfortable at 50% and don't want to go higher. It is all up to you.

It can also be fun to engage your family, friends and/or workmates in your challenge, or even try a team-based approach. There are many opportunities, work out one that suits you and give it a go!

7.5 DIY Zero Waste Projects

Making a Zero Waste Go-Bag

There has been a lot of talk about waste in the news lately. We know we have a problem and landfill is not the answer, but even our efforts towards recycling have been called into question because most of the stuff was sent to China for recycling and they are no longer accepting our waste. It seems to me that while recycling is a good idea, we need to go further up the hierarchy of waste from “recycle” to “reduce and refuse”.

We live a suburban lifestyle, we don’t live in a cave cooking over an open fire, so we do accumulate some waste, particularly when we go out. It might be plastic bags with the shopping, a disposable coffee cup, plastic cutlery with lunch or a plastic water bottle. Over the last few years, we have been working to reduce our environmental footprint but it has become time to start focussing on the waste we produce (or is produced in our name) and what we can do about it.

Coincidentally, my daughter has recently started moving towards zero waste in her household and this has given me the motivation to see if we can reduce our waste production even further than it is. One of the ideas which she introduced me to (on day 19 of her 30-day Zero Waste challenge) is the Zero Waste Go Bag.

The idea behind the zero waste go bag is to have with us reusable replacements for all the disposable rubbish we are likely to be presented with while we are out. That way we can refuse the disposable items and save a least a little bit of rubbish from land fill. Items in the Go Bag (This is for the two of us so you can halve amounts for one)

Drinks

Keep Cups – we have two plastic coffee (or hot chocolate) keep cups. I get them from a local retailer. I have tried a couple and found that my first foray into the keep cup world was not really good, it was a double walled ceramic cup with a silicone lid. It was heavy, fragile and I found the "mouth feel" (for want of a better term) of the silicone lid to be objectionable. The current cups we have fill the bill exactly.

Water bottles – We do have a couple of aluminium water bottles but also re-use commercial water bottles as they are light and seem to work pretty well. While the bottles are strictly speaking, part of the kit, we do keep them in the front of the car with us for use when needed and find that that works very well for us.

Containers

Chinese Food Containers – several different sizes – These perform a twofold purpose, they can be used to put any extra food in when dining in a restaurant and you order too much, rather than use a disposable doggie bag provided by the restaurant. They are also used to buy meat/cheese etc. from the butcher or deli, rather than accepting them packaged in a plastic wrap, inside a paper wrap, inside a plastic bag as provided by the shop.

The shop server can attach a sticker directly to the top of the container with the price bar code on it, so they do not need to use disposable packaging. There are glass containers which can be used for the same purpose but if they don't tare the scales correctly you can be paying a lot of money for your own glass containers!

Some people get it, some don't – and I have had meat placed in the container wrapped in a plastic bag, which kinda defeats the purpose. Shop staff are generally becoming more aware and we are less likely to just meet outraged stares or nervous giggles these days when we present reusable containers for filling.

Fruit and Veg Bags – These are mesh bags or cloth of varying sizes, with or without draw strings, which take the place of those thin clear plastic produce bags provided by fruit and veg shops as well as the produce area of supermarkets. The idea is they are light and you can see through the mesh ones at least, you place the fruit/veg you want in them and they can be weighed up as they are or the produce can be removed prior to weighing if you prefer.

You can make them yourself from muslin cloth if you have the skills, but they are now also starting to appear commercially online and in shops like Howards Storage World.

Utensils

When you eat out in the food court, they always give you disposable cutlery (including chopsticks) which then wind up in the bin after the meal. While it is possible to buy special cutlery which nests together to save room or folds up or whatever, we just grabbed stuff straight out of our cutlery drawer. The only specialised bit of kit we had to buy in was two stainless steel straws (to replace plastic ones) and the cleaning brush which came with them.

We have two knives, spoons, forks; four chopsticks and a teaspoon as well as the stainless steel straws, all wrapped up in a folded tea towel. The tea towel is a bit of a pain, the utensils easily fall out of it, but Linda is going to make a utensil roll, similar to the things people used to keep their knitting needles or crochet hooks in, to hold our utensils.

In terms of the straws, we do use them sometimes, but when ordering drinks, I just ask for no plastic drink cover and no straw, they are usually pretty good about it. We then

drink directly from the cup without using a straw at all. It just depends on your preference.

Fabric

To replace the usual paper products provided with just about any takeaway meal and for general clean up duties we have included two hand towels, two face washers and two handkerchiefs. The hand towels are used to replace paper napkins to keep food out of the lap as well as seeing duty as hand wipers.

Bags

We are still experimenting with the outer bag which holds everything together. It is basically a trade-off between being big enough to hold everything and strong enough to stand up to the repeated use without being too heavy before you even start loading it up. We have settled on a cotton bag from a bookshop which seems to work pretty well so far.

There are also two cotton shopping bags in the go-bag and a couple of re-usable plastic bags which fold up into almost nothing and are very light to carry. They enable us to refuse those single use plastic shopping bags provided almost everywhere you buy stuff. Alternatively, we just carry the merchandise if there is not too much.

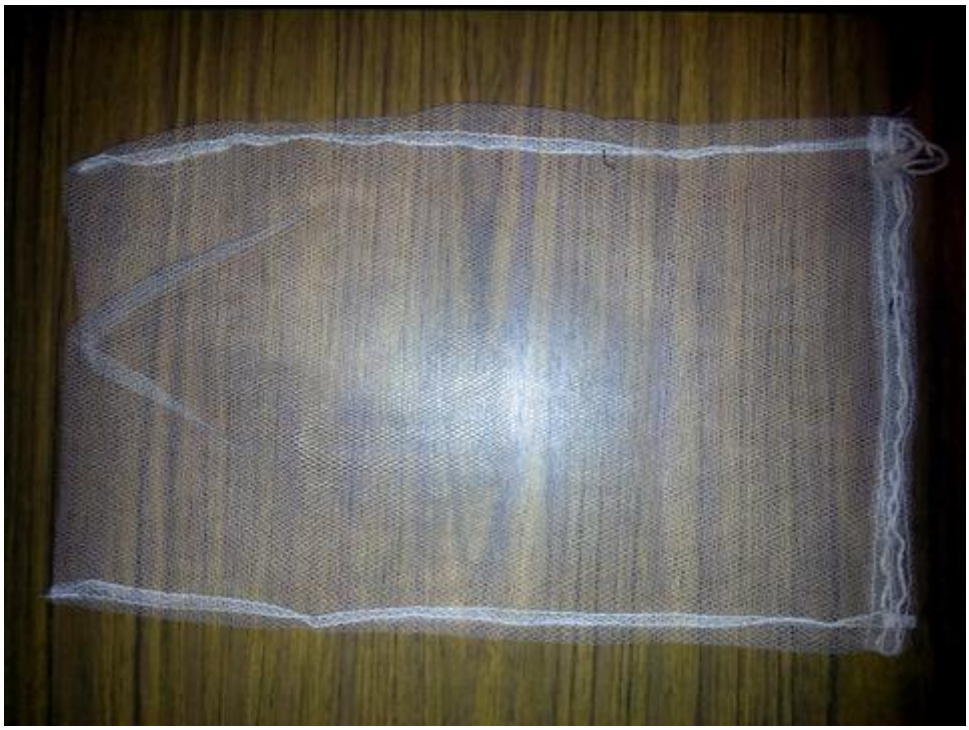
Within the last week or so we went in towards town on a bit of an expedition by public transport and took the go bag with us. It was pretty much of a success, reducing the amount of disposable plastic we picked up to almost zero. We did not use everything in the bag and so, depending on where you are going and what you are doing, you might

not want to have all items in there for very outing. For us it has proved to be well worth the effort of putting it together and bringing it along!

Making Re-usable Fruit and Veggie Bags

Back in May 2018, Linda's mother stayed with us for a few weeks, and got a good view into our Permaculture lifestyle. Since she went home, she has been trying to improve her sustainability credentials and one of the first things she did was to sew herself some re-usable veggie bags.

She first went through her stock of fabric and found some leftover dress net or tulle, she has a reasonable stock of fabrics as she is a keen seamstress from way back! When I asked her what size bags she made, she said she used the plastic bags they use in the supermarket as a guide (works for me!) and that translated into a bag 30cm x 44cm.



They were simple to run up with the fabric cut 30cm x 88cm and folded over in half with a running stitch a couple of runs up each side using a sewing machine stitch size 2.5 to 3. To put in the draw string she just folded the open end of the bag over, using some cotton twine as the drawstring and sewed it in. The process is similar to the reusable tea bag, (see 4.3 Below) but larger!

She used the bags successfully for years.

Making Re-usable Tea Bags

Teabags have gotten some bad press lately, because where they used to be made from just paper it seems that they now contain a plastic web as part of their makeup to improve their wet strength. This certainly reduces their capacity for recycling or composting. While I am not a tea drinker I was fascinated when Les Davison showed me some of his home-made reusable teabags while we were at the latest PSW permablitz.

To make your own teabags

Start with a fine gauze or chiffon fabric, or a loose weave cotton such as muslin or voile, the advantage of using a cotton fabric being that at the end of its service life, it can be composted. The colour doesn't matter although Les uses white fabric for black tea and a light greenish fabric for herbal teas.

The size isn't critical either but cut a square of fabric roughly 150 mm a side and then fold it in half, this will allow you to make two tea bags.

With a machine or by hand, run a straight stitch up each side roughly 5mm in from the edge and stopping roughly 4 centimetres from the open end. Then measure into the centre of the fabric (75mm in from one side) and draw a pencil line to divide the fabric into two halves.

Sew a line of running stitch on each side of the pencil line and about 6mm away from it, from the closed end to about 4 centimetres from the open end and cut down the pencil line to make two tea bags.

Place some cotton string around the open end of the bag and tie the ends off to make a drawstring to close off the open end of the bag and give you something to hold when you're jiggling. Fold one side of the open end of the tea bag over the drawstring so that it forms a cover for the drawstring roughly 2 centimetres wide.

Sew a line of running stitch over one side of the open end, near the edge of the drawstring cover to keep the drawstring in place. Turn the teabag over and do the same on the other side. Repeat with the other teabag.

You now have two complete tea bags, ready for filling with your favourite type and brand of tea, but before using them it is always a good idea to give them a wash first, just to remove any soluble fabric treatments which are on the fabric. That way, on their first use you only get tea!

You can charge them up ready for use with a teaspoon of tea in each bag, or take empties with you and fill them up with tea provided where you are going.

After use, compost the used tea leaves/material and wash the bag ready for next use!

Making a Re-usable Bread Bag

One of the things that has come out of my daughters' 30 day Zero Waste challenge (covered below) was the issue of plastic bread bags. How do you get away without them, but keep your bread fresh? Well, it seems, for a sheaf of years those

connoisseurs of fine food, the French have been using linen bags. Linen, of course, being a fabric made from flax (not cotton) and it appears it helps to keep the bread fresh while lessening the risk of it going mouldy (like it tends to do when stored in plastic).

Other benefits of using linen bread bags include –

• Keeps the bread in the dark. Light is bad for bread but great for fungi and mould.
• The bag is washable – linen bread bags are re-usable, so waste is reduced, and you can just throw them through with the wash to keep them clean.
• The bag keeps bread from drying out, keeping it fresher for longer.
• Linen naturally attracts moisture (so they tell me)
• When you are out doing your weekly (or whatever) shop you can carry the bread in the bag by its drawstring, so it doesn't get crushed by the other stuff you have.

The idea is that you buy uncut bread from a baker (or make it yourself) and store it in the linen bread bag, and voila, no plastic! But where does one find such an animal? The answer is you make it!

As with the initial item in a recipe for tiger stew (ie first catch your tiger!) some true linen needs to be sourced. You can still buy linen fabric from fabric shops occasionally but it is Expensive (note the capital "E"), but the best place to obtain such material is to

get hold of second hand linen tea towels or table cloths from places such as the Salvation Army or St Vinnies etc.

My daughter bought a pure linen tablecloth from the Salvation Army and proceeded to cut it up for bread bags, and we were the recipient of one such bag.

To make a bread bag

1. Cut a square out of your tablecloth 55cm x 55cm. If using a tea towel, jut cut the long side to 55cm or leave it whole to make a baguette bag (how French can you get?).

2. Fold the fabric over with the top surface of the tablecloth or tea towel on the inside.

3. Sew the long side and one short side, to form the bag. If you have an overlocker this would be ideal. If not put in a running stitch about 1 cm from the edge of the fabric and then between the running stitch and outer edge of the fabric put in a zig zag stitch, this will prevent fraying. I have also been reliably informed that some sewing machines can put both sets of stitching in together.

4. Fold the open end over about a centimetre once and place some ribbon or other material to act as a drawstring inboard of the fold. Fold the open end over the top of the ribbon and sew a running stitch along the edge to secure the drawstring.

5. Turn the bag inside out and you are ready to go!

We have been using ours for our homemade bread but it is just as easy to take to your local baker and get them to put the bread directly in the bag, avoiding the need for any plastic.

Spice Mix – Making Stock Powder at home.

Making your own stock at home can be fun and rewarding, but it can also be time consuming and if (like me) you are crap at stock making it can be disappointing and frustrating. So if you want to make up a batch of stock quickly for, say, a soup noodle or you want to add some concentrated flavour to a dish you are working on, stock powder (commercial or home produced) can fill that need.

There are other reasons why you may want to make stock powder –

- You know what's in it – if you don't put in any MSG, artificial colours, flavours or preservatives you can be absolutely sure there is none of them in your mix.
- Zero waste – this applies particularly when you are looking to replace stock cubes, but if you get your raw materials supplied bulk, into your own glass jars or (in the case of dried herbs) produce them yourself, the product will be zero waste.

- Blend to your own taste – it may be you find the commercial stuff not to your taste, so you can experiment and come up with your own version which suits you.
- Freshness – you know the freshness of your ingredients and if you are regularly using your stock powder you can be sure it will always be fresh.
- Interesting – making your own stock powders from scratch is a fascinating pastime – and you get food at the end!

Having decided to have a go at making our own stock powder, I did a bit of research and came up with a starting formulation based on a recipe in the "Naked Kitchen Veggie Burger Book" by Sarah Davies. This is what I came up with:

½ cup nutritional yeast
1 tablespoon onion powder
1 teaspoon garlic powder
3 teaspoon salt
1 teaspoon thyme
1 teaspoon parsley
¼ teaspoon ground sage leaf
¼ teaspoon rosemary crushed or ground
Pinch turmeric

A couple of notes about the ingredients –

Nutritional yeast – this usually comes in the form of flakes and can be bought bulk into your own containers at places like the Source Bulk Foods or packaged in health food stores and sometimes supermarkets. It is baker's yeast which has been "deactivated" (read "killed") by toasting and gives a wonderful nutty cheesy taste often described as umami.

If you have some yeast which is no longer giving your bread a good rise, try toasting it in a pan on the stove until it is golden, thereby making your own nutritional yeast.

Onion and Garlic Powder – this is also available in bulk from a local spice supplier and we get it weighed into our own jars. It also comes in flake or granule form and because we use the flake in other recipes I buy that and use a coffee/spice grinder to grind it to powder when powder is required.

It is quite doable to dice up your own bought or home grown onions and garlic and dehydrate them so that you can reduce costs, use up home grown produce, or ensure only organic ingredients are used.

Parsley, Sage, Rosemary and Thyme (sounds like a good line for a song) – these can all be easily grown and dried at home, or bought packaged or bulk if home production is not feasible for you. They can be ground in a spice grinder or mortar and pestle before use to improve ease of mixing. It is also possible to rub the fresh herbs through a fine sieve before adding to the mix but the shelf life of the stock powder will be very short, requiring it to be used immediately or stored in the fridge for only a few days.

Turmeric – is a bit trickier but can be grown and processed at home, we did it.

Testing

My flavour reference was Massell Chicken Stock Cubes because we like them and I use them quite a bit. Once I had a mix I was happy with I got two identical cups, put in half a stock cube in one and a teaspoon of the stock mix (figuring one was equivalent to the other) and added a (250ml) cup of hot water into each. Without her knowing which was which I gave them to Linda to taste. Without hesitation she identified the homemade one as very weak and bland. (bugger!)

To discover what my problem was I weighed both the half a stock cube and the teaspoon of stock powder. Low and behold, while the half stock cube weighed 6 grams the teaspoon of powdered stock only weighed 3 grams. No wonder it tasted bland! I added another teaspoon of stock powder to the original cup and we both had a taste test. This time the two cups were difficult to tell apart. Success!

Storing and Using

So the big hint is, for stock equivalent to good chicken stock add two teaspoonsful of stock powder per cup (measuring cup = 250 mls) of hot water. Store the made-up stock powder in a sealed container stored in a cool, dark, dry place and it should last 12 months.

Spice Mix – Mexican Spice

This took a little bit of work. We used to buy the packet stuff but had some concerns with it as noted above. We downloaded a few recipes off the net but it took some fooling around to get to a formula we liked the flavour of and was not so hot it took our heads off.

The formula we worked out is as follows;

- 1 teaspoon chili powder
- 2 tablespoon + 2 teaspoons ground cumin
- 1 tablespoon salt
- 1 teaspoon ground black pepper
- 2 teaspoons garlic powder
- 2 teaspoons onion powder
- 2 teaspoons paprika
- 1 teaspoon dried oregano
- 2 teaspoons cornflour

This is a good start, and you can go from here. We buy the spices whole or grow our own and grind them just before use, which keeps the flavour fresh. As far as the onion and garlic powder goes, you can buy the powder, buy dried granules and grind in the spice grinder before use or grow your own, dry and then grind. The oregano is also easy to grow, dry and grind. We have not tried anything with DIY paprika, so it is bought in as well.

Add 3-4 dessertspoons to the filling mix below, cook up for a minute or two then add ¾ to 1 cup of water which will thicken things up nicely as it reheats.

Making Shampoo Soap

Introduction and Safety

Okay, now we can get into using the dangerous chemicals and have more fun, but a word to the wise before we go further –

Caustic soda (or Sodium Hydroxide) is nasty stuff so when working with it ALWAYS make sure the kids are a safe distance away and always use eye protection (goggles or a face shield is preferred, safety glasses do not provide enough protection) and PVC or nitrile gloves. You should also wash your hands after working with this stuff and before you eat, drink, smoke or use the toilet. (If any ladies have made is this far, please go elsewhere now – embarrassing story alert!)

Back *mumble* years ago when I was a young chemist working in the chemical industry I was doing a lot of work with sulphuric acid. After a while my hands got used to it and I took it pretty much for granted, until the day I forgot to wash my hands before peeing. I got a neat 5mm diameter chemical burn each side of my, umm sensitive area and that was a lesson leaned for me. It took two weeks to heal! So, gentlemen, when I say to wash your hands after working with caustic soda and before eating, drinking, smoking or using the toilet…….I MEAN IT!

The process of saponification – the chemical word for making soap – is based on adding a solution of alkali (in our case, caustic soda) to animal fats, vegetable oils or any combination of the two. There are many vegetable oils used in making soap and they each add different properties to the finished soap and they all require different amounts of alkali to fully saponify them. In this article I will be concentrating on showing you how to make a shampoo soap bar that I have been using successfully for years, but you can design a soap to your own specifications. At this point I must

recommend the book “Soap Naturally” by Patrizia Garzena and Marina Tadiello, their website is in the Links section of the site. It gives you more than enough information to design your own soaps.

Ingredients

As mentioned earlier, soap is made using a water solution of an alkali and a fat/ oil or mixture of fats/oils. What I want to do here is list the oils in my soap and show what each oil is in there to do –

• **Olive oil** – the base of the soap, olive oil soaps last a long time but are not high lathering soaps, they clean well and are not rough on the skin. If you can, get “pomace” grade olive oil which is best for soapmaking.

• **Coconut oil** – available as “copha” in the supermarket (remember chocolate crackles?), coconut oil gives a wonderful lather but in high percentages can be hard on the skin. Coconut oil soaps, while quite hard, tend to wear away quickly.

• **Rice bran oil** – used for hair care soaps, it contains natural antioxidants and sun block.

• **Castor oil** – used in small amounts, castor oil gives a rich lather that is valuable in hair shampoo soaps.

• **Avocado oil** – again, used in small quantities, avocado oil provides a mildness to the soap so that it not too hard on the skin and hair.

• **Apricot kernel oil** – is used as a superfatting oil that gives the soap nourishing and soothing properties.

• **Rosemary oil** – this essential oil does not take part in the saponification process but is good for the hair and adds a pleasant fragrance, although in my experience the fragrance is preferred by men rather than the ladies of the household.

Most of these oils are available at the supermarket but you may need to try a chemist or health food shop for apricot kernel oil. You can also find coconut oil in Asian food shops.

The Formula

The formula for my shampoo soap is –

Olive oil	680 grams
Coconut oil	445 grams
Rice bran oil	150 grams
Castor oil	75 grams
Avocado oil	75 grams
Apricot kernel oil (added at trace)	75 grams
Sodium hydroxide	217.5 grams
Water	450 grams
Rosemary essential oil	10 mls

The amounts need to be reasonably accurate so it is worth investing in a digital scale with a tare feature so you can tare off the container and add in the exact amount of ingredient. These amounts are designed so that a batch just fills the soap mould in the

previous article. Obviously you can scale the batch up or down but you must keep the ratios the same. After the first batch of soap was such a success I needed to scale it up a bit to completely fill the mould but I wound up increasing all the ingredients but the sodium hydroxide, the result was a major “what have I done wrong?” panic and a waste of a soap batch. My suggestion is if you do alter the size of the batch, get someone else to check your maths, it can save you considerable angst and loss of raw materials.

The Process

By and large there are two types of soap making processes, the hot process and the cold process. I use the cold process and that will be the way I describe how to make my shampoo soap, but if you want to know more about the various types of hot process for making soap, get hold of “Soap Naturally”.

1. Prepare the mould, I have tried all sorts of things to make the soap release cleanly from the mould but the only thing I have found to date that works is siliconised baking paper, so prepare the mould by lining the mould with the baking paper.

2. Prepare the oils in the main batch ie olive, rice bran, coconut, castor and avocado oils. If the weather is cold you may have to stand the coconut oil in hot water to melt it down. Weigh them all into a stainless steel pot that is large enough to take the whole batch, I use a 2 litre pot.

Warning: Don't use anything in the way of aluminium cookware for soapmaking, the high alkalinity of the caustic soda and raw soap will react with it, causing all sorts of problems – glass and stainless steel are OK.

3. Apply heat to the oils and get them to about 45°C, check with a good thermometer, a laboratory one is good, or one used for sweetmaking.

4. Put the required amount of COLD water into a heatproof receptacle, I use a Pyrex measuring jug, add the caustic soda to the water slowly with stirring, this is one of those reactions where a considerable amount of heat is released as is some fairly unpleasant, choking fumes, so I do it outside.

5. When the lye (caustic solution) is clear and all the sodium hydroxide is dissolved allow the temperature to drop to no more than 40°C, it will start out considerably hotter than this so it may take some time to cool. Keep track of the temperature with the thermometer.

6. Once the temperatures are right (you will probably have to fiddle with the oil temperature a bit to keep it where you want it) get out your stick mixer, put it in the oil, turn it on and slowly add the lye solution. The soap will go from very liquid to a think creamy consistency as the saponification continues, keep mixing until you hit "trace".

7. Trace is a soapmaking term and refers to the point in mixing where soap falling back onto the surface of the batch does not sink straight in but sits on the surface for a few seconds ie it leaves a trace….. The saponification reaction doesn't take very long just a minute or three, so pull the stick mixer out regularly and let some drops fall off it to check for trace.

8. Once you have hit trace, add the apricot kernel oil, this can be done best weighing by difference. Place the bottle of oil on the scales and hit tare so that the scales read zero, then add in the oil slowly, reweighing regularly until the scales read minus 75 grams. Then stir the oil in by hand. Add in the roemary oil and stir by hand again.

9. The soap is now ready to pour into your pre-prepared **mould**.

With the soap now safely in the mould, place a top on the mould (I use more of the plywood) and wrap the whole thing in a blanket to retain the heat and place the assembly in an out-of-the-way area for 12 to 18 hours.

The End Product

When you open up the blanket and then open up the mould, the soap should look…….soapy! An obvious thing to say but at least once it looked pretty blecchy for me and if this is the case for you too then something has gone wrong. Assuming it looks soapy, cut the big bar into a whole stack of smaller bars, I use a cheese cutting wire to accomplish this. The way the cold process works, the raw soap will still be too alkaline to use at the moment, so sit it aside to dry and continue reacting for at least one months. After that all bets are off and the soap is ready for use.

While this is officially a shampoo bar I have found it quite good for most uses such as hand and body wash as well as to provide lather as a shaving soap, and of course it washes hair really well.

The way I designed this soap is that it is 4% superfatted, that is to say there is 4% more oil in there than the amount of lye added in can saponify so after the reaction is complete 4% free oil remains, not that you can tell this when using the soap. The effect of the unsaponified oil is to act as a conditioner for your hair. So as well as being able to throw out that evil petrochemical based shampoo, you can also do away with your conditioner and I don't need to tell you how much money that is going to save you.

So, I've done all the hard stuff, designing for you the best soap ever don't upset me by not making it……go for it!

7.6 Angela's 30 Day Zero Waste Challenge

Introduction

Back in 2018, my elder daughter decided to go on a 30 day zero waste challenge to see how much she could reduce her waste output, (more detail on the whys and wherefores later in the chapter) and keep her friends updated via Facebook. It also challenged us to make some changes too.

It is a simple idea which almost anyone could have a go at, and reproduced below are the actions that Angie carried each day of the challenge in 2018 and 2019. Also recorded are her motivations for the original challenge, how the challenges worked out, what actions she kept going with and what she didn't.

Angela's 30 Day Zero Waste Challenge - 2018

Week one

Day 1– Drink Bottle

I'm going to try and do the zero waste 30 day challenge for this month. First day is my drink bottle! I don't like room temperature tap water so I am going to use a thermos to hold cold water! It holds it for up to 24 hours and it also means I don't have to buy bottled water.

Day 2 – Straws

When I go out to a cafe I love milkshakes which use straws. I read that if you ask for no straw it's a 50/50 if you get one unless you make a bit of a deal about it and show the straw you brought. I did that and only got a small amount of mocking from my friends but I got no straw! I got this straw from eBay for $10 for 8 of them plus a cleaning brush. They were so cheap I'll be interested to see if I get rust, but I don't use them too often so it should not be a problem. You can

get bamboo ones if it becomes a problem.

Day 3 – Beeswax wraps

Since there was talk of beeswax wraps yesterday I made mine today. You can buy them for about $30 for 3. I used material from around the house. I used pinking shears to cut the edges. I grated the beeswax and I used the iron method where you iron it between 2 sheets of paper. It was difficult to know how much wax to put on. I think one I put too much than the other 2. We will see when I use them! The wax I got from Bunnings for $10. I got about 4 * A4 sheets out of 1 lump. Unfortunately the paper created waste to make these. So I need to add that for regular baking I use reusable black nonstick baking sheets. They are by far better than the silicone kind which was almost impossible to clean and you can get them from spotlight.

Day 4 – Bread

I have in the past gone to bakers delight with a pillow case. It's just a cotton bag but I got some funny looks! Not that I cared really, but I did some research and I read that the best material to make a bread bag out of is 100% linen because it takes moisture out of the air and stops the bread from getting mouldy. It's hard to find 100% linen and

is expensive so I went to a second hand store and found a vintage table cloth for $8 that looked and felt and behaved like 100% linen and made a bread bag out of it! The girl at bakers delight didn't bat an eyelid when I told her "I brought my own bread bag". We fit a loaf and 6 rolls in it. Other options available to me were to put rolls into a produce bag, make my own bread, or use a bread maker to make bread overnight and wake up to fresh bread. If none of these options work Lawson's bread comes in paper packaging or Coles recycles plastic bread bags but remember reuse comes before recycle. *(Note: a detailed article on how to make a fabric bread bag is available above*)

Day 5 – Milk

Today at lunch I popped over to Bondi Westfields Harris Farm Markets and got myself some milk on tap! It's milk you fill into a glass jar. Then you can take the jar home and wash it and come back and refill it! Unfortunately this is the only source of non-plastic milk I have found in Sydney and it's only in Bondi and Drummoyne. The milk tastes yummy! But it is full cream only if anyone else has any ideas for zero waste milk in Penrith I'd hear it.

(Note: We use skim milk and to reduce our waste we got hold of a 1 litre glass screw cap juice bottle - Sunraysia brand - and make up skim milk from skim milk powder and then put it in the bottle and keep it in the fridge. Next step is to find a bulk supplier of skim milk powder then we will hopefully have zero waste milk.)

Day 6 – Shampoo and Conditioner

Shampoo and conditioner. Lush sells shampoo and conditioner bars! They sell them without any packaging and you can get these cute little tin boxes for them the ladies there tried very hard to help me pick the best one for my hair but I think like any hair products it's going to be trial and error as to which is best suited for my hair. The ones I got were very strong fragranced and it didn't help that when I bought them a few weeks ago, I was starting to come down with a stomach bug and so the smell makes me think of that I think that the next ones I get will smell different and hopefully better my dad makes his own bars (Check out Section 4 – DIY) which would not be fragranced at all! That would also be a good option.

Day 7 – Babies

We use cloth nappies. Our fav brand is **www.babybare.com.au** but we have friends that also love bubble bubs! Cloth is messy and takes practice and specialised washing, but I have found it worth it. When she's not in these she is in Naty eco disposable nappies. Our daycare provides us with huggies but we give them eco ones! These are more expensive but we save using the cloth nappies. You can get reusable wipes but Dez Bas drew the line at that and so we got bamboo compostable wipes. All compostable materials/wipes go into compostable bags which get put into our council compost bin! Unfortunately she hates frozen baby food and during our work days it's hard to give her a healthy meal so we now use the baby food during those days that are in glass jars. These are fully recyclable. She drinks tap water now out of her reusable water bottle and I was one of the lucky ones where she was able to be fully breast fed all her life. She even has a bunch of second hand clothes! You can get bundles of clothes cheap on Facebook marketplace. Things we could improve on still is using reusable pouches to put homemade yoghurt into and making more homemade snacks.

Week Two

Day 8 – Meat

We went to the butcher in Glenmore Park and brought our containers to be filled. I tried this once before and got some crazy looks and very flustered butchers so I only brought 2 containers to make it easy. This guy I asked looked at them and was like oh yeah what do you want? I went into my spiel about zero waste and he didn't care and knew exactly what to do! So I asked and he said another lady comes in every week with her containers!! I was so relieved! I'm going back to him every time maybe it's just becoming more popular. He put the container on the scale, clicked the tare function and used clean hands to put the meat in. Then was able to tally it up at the end!

Day 9 - veggies and plastic bags

Not all veggies need to be in bags. They have outsides that can be composted or they can be washed. But if you have a few things to keep together you can get reusable produce bags. Howard's storage sells them and Harris Farm who have banned all plastic bags sells them. We got some veggies using these and no one batted an eyelid. We bring our own shopping bags we find the padded handles ones to be the best which also fits much more. They also have cold storage bags! Sometimes we find we have to help pack at the checkout because the people don't fill them up enough or use the cold storage for cold products. For any of them that we have, Coles recycles them and some

get made into other plastic products. I have also today emailed the minister for the environment NSW and asked when we will be banning plastic bags!


thanks you!
Don't have a #BYOBAG?
Grab one of these and BYO next time!
thanks you!
Don't have a #BYOBAG?
Grab one of these and BYO next time!


macro
MINDFUL
GOODNESS

Day 10 – Junk Mail

Penrith get a lot of catalogs. Everything is online so I'm not sure why they need paper. They go from the post to the bin for us with maybe a small glance. It's a waste of paper and recycling power. So I put up a no junk mail sign! Refuse is the first part of zero waste!

Day 11 – Gifts

Yesterday Elise received a gift that was "wrapped" in a small back pack for her to use and keep toys in. Today I gave a gift and it was "wrapped" in a black tshirt which makes the wrapping wearable too. Last weekend I went to a birthday party and "wrapped" the present in a new towel. It doesn't have to be something like that. It could be newspaper after you finish reading it, it could be wrapping paper or a gift bag from a previous gift given to you. I frequently keep gift bags that are given to me and then dip into my stash when giving gifts. Why throw them away when they are so reusable!

Day 12 – Cheese and cold meats

Cheese and cold meats. I went to the Deli at Coles and put the containers on the counter. She looked confused and I explained my cause. She seemed to be pretty excited by it and said she knew a few other people doing my challenge she put the stuff in the containers. Unfortunately she used a bag to pick the stuff up but hopefully reused it! It was a great way to get cheese too as most cheese I know of comes in large packaging.

Day 13 – Compost

We have 3 compost outlets technically. We have a small bin in the kitchen, a large bin outside which the small bin heads to and a green council bin. If you don't have your own bin, the green council bin can take food scraps, egg shells, meat scraps, dairy and yard clippings. Our meat scraps and dairy will go there because you are not supposed to do that in a home compost as it will take too long to break down. We also compost in the green council bin Elise's nappy liners and bamboo wipes, and the cats kitty litter and dogs poops. We have a small home compost for the dog poop which we can put in the yard but have not installed yet. Let's see if I can get to it before the pets post!

Week Three

Day 14 – Junk Food

Generally, junk food has a whole bunch of waste around it! It's best to get the full experience and go to a restaurant and sit in as there will be lots less waste. It's also better to bring your lunch or some food wherever you go. We have been avoiding junk food and bringing food when we used to just pop off to Maccas. So far no junk food these past 2 weeks and I feel quite a bit healthier!

Day 15 – Snacks

The Coles at Glenmore Park have some bulk snacks that we got. We used 1 of the plastic bags that they supplied us and used that to weigh them out the stuff in the containers. The **Source bulk foods** also has a bunch of snacks that are yummy which would require containers. I've also been baking 1-2 baked goods per week so far. Snacks is all about peeping stuff beforehand. Even cutting up some veggies or cooking some and putting them in the fridge for later. You can also make your own yoghurt! We use an Easiyo yoghurt maker. It uses some waste in the packets but I've heard you can use them without the packets.

Day 16 - Cleaning

I got this 10 pack of washable cleaning cloths. It came with a bunch of different types and their tags said what they were for. I used an empty spray bottle, filled it with vinegar and grabbed the baking soda. It was in a cardboard box but you can get it loose from the **Source**. I then cleaned the whole bathroom! The bathroom cloths were pretty great at removing soap scum even without the baking soda, but the bath got a baking soda hit. The mirror used the glass cloth and it worked great! I used the dusting cloth and it also worked quite well. Now the bathroom is clean and the cloths are in the wash! Also the Source sells a generic spray that you can fill up which I have used before and that was great previously.

Day 17 – Tea and Coffee

At work if I go downstairs to the coffee shop for a hot chocolate, I bring a mug. A usual mug and walk it back. So you don't really need anything special, but! I also have been using a plastic keep cup and now I just ordered a glass keep cup for me, Dez and a mini plastic one for Elise. The glass ones are so pretty! If I have a tea at work, they use tea bags and single sachets of sugar. The single sachets actually cost them 3 times as much as loose sugar but I've told them about that and nothing's changed. So! I made a little pack of loose tea and sugar to use. The tea was from the source so its package free too. The other option is to sit for the coffee and use their mugs.

Day 18 – Bulk Food

We just took a trip to the **Source** in Rhodes! We brought our own jars and they weighed them first. Then we wandered around collecting things with their numbers written down in our phones. It has expended a little I think since we were there. They had more teas and more lentils and we got fresh peanut butter to try. We also got some pasta to try (and cous cous plus Popping corn! We got some snacks like jaffas, chocolate honeycomb, coconut ice and peanut brittle. I bought some baking powder because we use a lot of it in the baking for this challenge. I got some muesli which looks very similar to the one my local Coles sold in their bulk food section except it was half the price. They also sell waste free products like bamboo toothbrushes, produce bags, reusable straws and bottles. I looked for shampoo soap but they only sold the liquid stuff, which is also good. They sold dog soap and hand washing soap though. We got a loyalty discount because we had shopped there before of $16! There are lots of other bulk

food places eg, **Blue Mountains Food Coop** in Katoomba, **Green Hills Organics** in Richmond, **Naked Foods** in Newtown, and Coles. I plan to visit them all.

Day 19 – Go bag

My go bag includes: a hanky, napkin, reusable straw, keep cup, water bottle, fork spoon knife and chopsticks, produce bag and folded up shopping/tote bag. Most of the stuff I got laying around the house or here and there when I went shopping. I didn't go to some fancy eco place to get it all or anything. Except for the keep cup of course. Other things that would go in there is a container for leftovers and a bento lunchbox. (For more detail on Zero Waste Go Bags - see Section 4 - DIY)

Day 20 – Rechargeable batteries

You can recycle batteries at designated places but if you put them straight into the bin they can leak chemicals everywhere. We got some rechargeable ones to use for tv remotes and Xbox controllers. They are quite expensive but will save on money and waste in the long run!

Day 21 – Tooth Care

I bought a recycled plastic toothbrush from the Newtown macro market which was very good but I feel like is still plastic so not the best from an environment point of view. I bought this box of bamboo toothbrushes on **biome.com.au** which is better for the environment! You can make your own toothpaste but I like the idea of fluoride. I know it's bad in large doses but I'm not using it in large doses and I'm not swallowing it. Unfortunately you can't get any toothpaste in glass or tin with fluoride so I'm stuck using normal toothpaste for now. Someone suggested to use mouth wash that has it and then make your own toothpaste which is an option. Other thing is flossing. There is an air glosser that I want to get at some stage which is better than using floss. You can get natural silk floss that would be the next best thing but so far I have only found it online.

Week Four, Plus

Day 22 – Pets

With pet food we either make it ourselves or buy it in recyclable packaging like cans. Not all of the packaging is recyclable though which makes it difficult. The source needs to sell cat and dog kibble in bulk! I've not found a place that does it. The cats and dog have bowls that are not plastic and we compost both the dog and cat poop/litter in the green bin using compost bags. That's a change I just made the last few weeks not realising this could be done! Toys I just realised also it's better to buy organic or bamboo or cotton toys. He shreds most of them and they end up in land fill otherwise. You can buy bulk treats which I am hoping to buy on the weekend from the Richmond farmers market from Koly's treats! They deliver to us usually in plastic packaging. I'm thinking to chat to her though to try and find another alternative. She's super lovely and helpful! Also you can get books on making craft things with cat and dog hair. I've not gotten that far yet but with a husky maybe I should.

Day 23 – Picking up waste

On my dog walk this morning I took a bag and picked up some trash. About 80% of it was recycling. Some people have started an exercise class where they run and pick up trash. The only thing is make sure you take gloves. I picked up a maccas cup and on the other side of it was a nice big red back spider. The other thing that I found interesting is the picture below shows “biodegradable”. I watched “War on waste” on ABC iView earlier and one of the environmentalist people on there said that biodegradable plastic is even worse because animals that would not be effected by a big plastic bag, would be effected by a billion tiny plastic pieces. I could not pick up the biodegradable bag so had to leave its billion pieces there. I got a pretty big bag back. I barely scratched the surface.


Cola

Day 24 – Cold drinks

Obviously the most zero waste is tap water. But what if you want to get a little creative. You have an option of getting loose leaf tea and making a cold tea. Also you have the option to use a soda stream! This used canisters but I read that you can exchange the empty ones at some Coles for new ones. If you make your own cordial it's even better than using the cordial bottles also. There is a pineapple cordial recipe that's from "a year on the farm" by sally wise. I've made it before and it uses the pineapple core and skin so as to not waste it! There is also an option to make your own juice. We have a few juicers and that can be super yummy also.

Day 25 – Grow your own

We are currently growing capsicums, basil, oranges and lemons. It is super easy and fun to grow your own stuff. If you grow herbs then you don't have to buy them at the store and get the plastic that comes with them! I have a million little pots that seedlings have come in which I one day plan to go back to Bunnings and offer them back. I found it super easy though to grow beans from seed as they have a bigger seed. In another month or 2 it will be bean season so I will be planning to grow long beans and snow peas! It can be super easy and quick to grow things like radishes if you are into that and super useful to grow lettuces! My stuff currently are in pots but we have plans for a full garden when we have a little more time. Check out http://www.underthechokotree.com for more info on growing stuff!

Day 26 – Repair

These pants were the most favourite pair of pants Dez Bas has. She's looked everywhere for another pair but jay jays doesn't sell them anymore like this. They had crazy rips all down the thighs. So! I took to the repair. I watched a bunch of videos on YouTube about how to repair rips in material. As usual YouTube was great. I even had some thread sort of the right colour. I ran out and had to use some black but when she's wearing them you can barely notice the repairs. We throw things away so easily these days for the newer stuff. Sometimes it's not that hard to repair it. There is a cafe in Sydney called **http://bower.org.au/repaircafe/** it helps people repair things rather than throw them to land fill. Such a great idea!

Day 27 – Fashion

Apparently clothes are one of the top causes of waste going to landfill. Second hand stores are so great because you can buy clothes but also donate clothes. For things past their use by material can be used for so many different things! Most people know the whole rip clothes up to be cleaning rags but the most interesting I found is you can get a bean bag, cushion cover, dog bed etc and jam it full of your old clothes to use as bedding/wadding. I'm in the middle of making an ottoman that will have some old clothes added to it. Otherwise there are so many tutorials on the net about ways that people have used old clothes. See a few links below that I have found super interesting.
Old jeans into a picnic blanket - **http://housefulofhandmade.com/easy-water-resistant-upcycle**…/
Old tshirt into mop heads - **http://gogingham.com/2012/09/how-to-make-mop-cover/**
Tshirt quilt - **https://www.nationalquilterscircle.com/…/quick-easy-t-shir…/**

Day 28 – Breakfast

Today's zero waste breakfast was muesli from a bulk place, with toast that was bought in a bread bag, with peanut butter out of a glass jar with an apple and water. The milk was out of a plastic carton but it's recyclable at least. Sometimes I pair it with a homemade muffin or a loose leaf tea. We have also gone to a bakery when we needed a fast breakfast with a keep cup and a bag for them to put pastries and cheese and bacon rolls in. Everyone has been fine to put the bread in our bag. Another option is to have breakfast in at coffee club for example which we do regularly on weekends.

Day 29 – Lunch

Today's lunch was an orange juice in a glass bottle fully recyclable; a sandwich made from bread out of a bread bag, spinach bought loose in a produce bag, chicken and cheese bought in containers at the deli counter, and mayo from a glass jar; carrot sticks in a container reused from something with homemade garlic dip.

Day 30 – Dinner

I had pasta from a bulk place, with meat from a butcher put into a container, with homemade sauce tomato sauce made with homemade passata, and basil from the garden! With a water!

The 30 day challenge - How and Why

The Zero Waste Challenge which Angela completed I found to be interesting in and of itself, but I wanted to explore her motivations and what she got out of it. These were my questions to her and the answers which she gave.

Why did you do the challenge, what did you expect to get out of it?

I have always had an interest in zero waste and have tried to do a bit in the past. My friend was doing a new diet and was blogging about it on Facebook and everyone seemed interested in it, so I thought why not do a 30 days zero waste challenge to see if I could do it and then blog about it for people to see. To be honest I didn't know if I would annoy enough people that they would start unfriending me but I thought I'd give it a go. I guess I wanted to see if it could be done or how close I could get and I also wanted to advertise the lifestyle and the choices that people could make to try and better our country and planet.

What preparations did you make (if any) before commencing the challenge?

Before doing the challenge I went onto Pinterest and looked up other people's ideas and other peoples 30 day challenges. I even found a 60 day challenge. I was able to formulate my own ideas and then I chose a month to start it. This gave me some time to put together a zero waste go bag and a few ideas on what I might do each day.

When the challenge was finished - what were the lessons or insights the challenge taught you, any perspective changes etc which have happened as a result of doing the challenge. Did you get out of it what you expected?

When I started I got an overwhelming positive response from all my Facebook friends and they messaged me all month with ideas and options that I had not posted about. It was great because I got to see what was available locally and see what they all thought about it.

I didn't really plan it, I just did things as I went making it a little bit flexible per day which was easiest for me. I got sick during the challenge and that was the hardest point for me as I wanted comfort items quickly which meant packaging. But otherwise overall it was a great experience that we hope to continue.

I got our waste down and didn't really go without much, just looked for non-waste alternatives to what we were already doing. I learned that 30 days cold turkey is not really possible. It's an ongoing process as you change little bits here and there. I got out of it what I hoped and that was to touch other people about the lifestyle and to reduce my own waste myself.

Angela's 30 Day Zero Waste Challenge - 2019

Week One

It's 30 days zero waste again people!! It's been a year since I did the last challenge. I've grown and some things I still use and some things I've fallen off the wagon. So let's try again for a new journey. Please give me your tips!

Day 1 - Water

Last year I started using a thermos as a water bottle to keep it cold. That fell away. Mainly because it was too big, and didn't hold enough water and was very heavy. So! Today my client gave me a bottle of water and instead of grabbing another one I re-filled it up at their office at the tap before I left. Feel free to give me recommendations on what worked for you.

Day 2 - **Takeaway!**

I'm mixing it up from last year a bit. Today we went to do the shopping (with our reusable shopping bags that are common place and not so shocking anymore) and we wanted some lunch out and had previously saved some plastic bowls from wokken at our shops because they were so sturdy and awesome! So I ducked home and grabbed them with our cutlery. The guy was so happy that we brought our own containers and cutlery that he threw in a free coke! (For Dez not me).

Day 3 - Toys!

Unfortunately Elise loves kinder surprises which are the worst for Zero waste. I try however to make some toys. For example, she loves it when I make play dough. She asks me to make it and sometimes we make it together. We use normal kitchen ingredients so it can be composted afterwards and it doesn't come in a little tub that will get thrown away after it is done being pummelled. I use cookie cutters so she can use them to play with the dough and she likes to make shapes too. If you have the ingredients on your shelf then there's always playdough to make when requested! Other than that I have made edible paint for her before and we have a bunch of

wooden toys too. She enjoys getting handed down toys from Cassie Rowlands and we sometimes make bikkies, cakes, muffins together.

Day 4 - **Shaving!**

I have a razor with replaceable blades. I have not recycled them yet but I hear you can. So far I have just kept them ready to recycle. I use shaving soap in a wooden bowl and the shaving brush is horse hair. Usually they are badger hair but I chose the horse hair because it's more sustainable and comes from shaved horses not dead badgers. It takes a little longer to shave but I have the process pretty good now! There are YouTube videos I watched of how to shave as a girl with one of these things.

Day 5 - **Snacks.**

I have attached a whole bunch of options. Things like cut up veggies, fruit and boiled eggs so long as the remains are composted. I made the muffins from scratch on the weekend and I made a banana cake from dying bananas which is a little less heathy but yummy option. Also bulk stores are full of snacks which is where the cashews came from. These are the snacks I am preparing for tomorrow at work. I found today a bar of "chocolate" made from Mylk. It's vegan but wrapped in recycled cardboard printed with vegetable ink and wrapped in a compostable "plastic". It's not real chocolate. But it was pretty green and an experience

Day 6 - Kitchen Cleaning.

We have been using the brush on the left which was good but also not really environmentally friendly as the packaging said because of the plastic on the replaceable head. We got the one in the middle recently which you can compost or recycle the head and the bottle brush for Elise's bottles since we were using a plastic one. The cloth I made myself out of an old towel and some cotton. Hopefully the new brushes work well! We usually clean with vinegar. I hear there is a soap bar you can get for dishes. I've not looked too far into it though. Also we use the Coles brand dishwasher tablets because they are the only ones with cardboard packaging and wrappers that dissolve.

Day 7 - **Pegs!**

We bought some new pegs that should last a very long time. Our plastic ones are basically dead. The sun has eaten the plastic. These ones will last longer and so should create less waste!

Week two

Day 8 - Ice Creams!

Today we went to nom bulk foods and tried their ice creams! They are all no preservatives and colours and such and the wrapper is made of biodegradable material! We are going to make our own ice cream in our ice cream maker too.
https://www.facebook.com/nombulkfoods/videos/367727627384450/

Day 9 - **Tea!**

When I go visit a client they most of the time have packets of sugar and tea bags. So I made a little tea kit. I would still need milk, but I can use the bulk sugar and tea. At work actually I tried to get them to buy a bag of sugar but instead of little sugar packets but even though it would be 2/3 cheaper, they still liked the convenience.

Day 10 – Juice

how cool is my boost juice reusable cup!!! It's got a watermelon crush inside it and the insulation keeps it cold!

Day 11 - **Second Hand Clothing.**

I went to the salvos the other day and got these! Paid all of $3.50-$4.50 per item. The best part about the jeans is that I don't have to wear them in! Super comfy already. I heard once that the Queen has someone to wear her shoes in for her. Just saying!

Day 12 - Leftovers from a restaurant.

We went out to dinner today and brought our own containers for the leftovers! Lucky we did because with Valentine's Day they were so run off their feet that we would not have been able to get one anyway! They looked at us a little appreciative because they didn't have to deal with getting us containers.

Day 13 - **Dog treats.**

We usually get our treats from https://www.kolysdogtreats.com.au. We made a deal with her as she delivers our treats that since she gets them in bulk and packages them herself, that for us she either doesn't package them or packages them in paper bags. It's been great so far! She does as much as she can as sometimes they come in packaging but otherwise we get a whole bunch of fun stuff all in paper!
https://www.kolysdogtreats.com.au

Day 14 - **Canning.**

Today mum and dad came around and helped us can a bunch of tomatoes that dad helped to buy for us at the markets. He helped all day with canning our stuff also. The jars were all previously used, lots of the lids were reused. The tomatoes were bought in cardboard boxes from the markets! We got 30 jars out of our 2 boxes!! It was mostly dad and Deniz that did stuff really.

Week Three and Beyond

Day 15 - **Produce bags**.

Since our last 30 day challenge reusable bags have become the norm. However, the produce bag still exists. However, since then some companies have tried to cash in creating them. Some good and some not so good. The best ones I have found are from Harris farm. They have organic cotton ones that are great. There are a lot of mesh ones out there that are ok but still pretty cheap. The ones in the pictures are from Coles and hsw. The problem with these ones is that the mesh is cheap and it breaks easily. The hsw one is better but still not as good as the others we have used. I would suggest getting the ones that are better quality like you can get online or from Harris farm. I wish we had one in Penrith if we get stuck, we use mushroom bags that can be recycled or composted.

Day 16 - **Deodorant.**

I made some deodorant. It seems to work well. I made it out of Shea butter and coconut oil and corn flour and an essential oil. It can get a bit less solid in the extreme heat but otherwise has been good. Here is the recipe. It took me a little effort to find Shea butter. But I found it in the rainbow shop in Penrith.

https://wellnessmama.com/1523/natural-deodorant/

Edit: actually after reading this I remember dad saying he used a small sponge to apply the deodorant. I usually use my finger but I just remembered I salvaged a makeup sponge from my wedding makeup that I didn't throw away and I could probably use that to apply!

Day 17 - Travel Toiletries Kit!

My travel kit includes wooden toothbrush, soap and tin, body wash, shampoo and conditioner bottles, deodorant and spare jar. The shampoo bottle could be replaced with a shampoo bar. Is there anything else I am missing?

Day 18 - **Reusing/repurposing.**

Deniz made a soap holder out of an old bottle. I'm now using an old makeup sponge for my deodorant and we have refilled the same Ajax bottle full of vinegar solution for ages. There was an episode of blues clues yesterday and they reused a whole bunch of old stuff to make new things for kids like musical instruments. There are a whole bunch of things you can reuse!


EASY
REMOVAL
AJAX
SPRAY n WIPE
MULTI-PURPOSE

Day 19 - Buy local and Australian made.

Today I was in Hobart and at the airport in the 15 minutes spare time I had I got some locally made stuff. It has some bags it's in but the bags could be reused. Tasmania is always great for that sort of stuff but the idea is that it's local and it's supporting local businesses. The food has less to travel and so has a smaller footprint!

Day 20 - **Water.**

Today we bought. Bucket that can collect excess water waste. We use a lot of water actually because washing nappies takes lots of rinses to get clean. So our little bucket is nothing really. I watered the plants today without a sprinkler and just targeted the plants needed rather than a random spray. Of course there is normal ways like turning the tap off when you brush your teeth. It's interesting but when I listen to a tap running needlessly it sounds like nails on a chalkboard to me!

Day 21 - **Drinks.**

Since the last challenge I was bought a sofa stream as a present. I am not a huge fan of fizzy sugar drinks but I like fizzy water. We really should try and make some cordial to put in it maybe. I have a pineapple cordial recipe that uses only the offcuts from a pineapple. The other day I also used my tea infuser bottle. It was great for a tea on the go!

https://www.facebook.com/angesweeney/videos/10161551618270405/

Day 22 - Bread.

As for last time we have our bread bag, but I love to make a loaf of bread. Next thing is to start a sour dough!

Day 23 - **Buy Less!**

Buying less means looking at what you buy and not buying junk or things you don't need. This is super difficult with a child because she wants everything. But we are trying to buy less so as to save more money also.

Day 24 - Old Clothes.

There are lots of things you can do with old clothes but I have a bean bag that my parents bought me. I've been slowly filling it up with old broken warn out clothes. I intend later to take them up into strips to make the seat less lumpy once it is full.

Day 25 - Shampoo Bars.

Since the last challenge I have used quite a few shampoo bars. I have found the lush ones to be the best ones still by far. I used one from the source Rhodes where it barely lathered. That lasted ages but was not good for my long hair. The picture below is the one that works best for me. There is a honey one too that's very nice and quite gentle with my hair. I've not found a conditioner solution yet but lush seem to have a new conditioner bar that I may give a try.

Closing Comments

This year's waste challenge was quite a bit more challenging than the one last year. This year I decided to try and find further items to broaden my challenge. I had planned to add items to the list that were updates so people that I was posting to could see them but I felt like it was too easy for that so I tried to find new items and that was difficult. It got a bit more expensive as I needed to put more money into items that would replace what was being used in my household. Though I did and it was a great learning experience, I lost steam and stopped at day 25.

The feedback this year was different too. People got a bit more annoyed at my posts than they did last year and I think it was because it wasn't common household Items that I was targeting anymore and it was more towards my own lifestyle. It could also be that last year it might have been a bit more in fashion and this year less so. Some people were still excited but I didn't get anywhere near the amount of excitement than I did last year. That being said it was still good to poke people with new ideas that they might not have thought about and keep the conversation going.

I fear what I will be doing next year and I feel like I would need to change the challenge in some way. Maybe post a guilt post of these are the things that I am doing that are too wasteful and ask for feedback on other options or something of the link. I'm not too sure.

Angie's 30 day Zero Waste Challenge – 2023 Review

A few years ago my family and I did a zero waste month. During the month I posted on Facebook each time I had a switch or change that I made in our lives. It was in February so it was 28 day challenge. I actually did it twice. Once the next February, so technically it was 56 switches. This is an update on where we are, what we have kept, what we have not and why.

Fifty Six is a lot of swaps, so I'll just be highlighting a few of the bigger ones that come to mind. To be honest, the ones we still do have become so ingrained in our lives that it's difficult to think of them. But a few are: reusable cloths instead of paper towels, toilet tissue that has paper instead of plastic around it, baking as much as possible with 2 kids, reusable bags (amazingly this is before it was a thing), reusable produce bags, composting, making our own yoghurt if we can (though the kids prefer the bought stuff), reusable straws, grow our own food, use green bags, reusable water bottles

especially for the kids. Since doing this I also bought some Modibodi undies which have been really good and better than the reusable pads I was using.

The things we don't do is mostly because this was pre-Covid and now there are lots of things we can't do. For example, the butcher won't take our containers anymore, we work mostly from home and don't work near a Harris farm who are the people that had milk in a reusable bottle, I've had issues stepping into a bulk food store because the handles are not sanitised every time, I even have issues with reusable coffee cups because I'm worried I'll give Covid to people.

Since doing the one month challenge we had a second child. That has also caused time problems. Sometimes there is more cooking and cleaning in the low waste options and a couple of kids with 2 parents working mostly full time can cause issues. That being said we did reusable nappies for 2.5 years still of the second child since she was at home for that amount of time due to Covid! So that was good.

The other thing we don't do is the soap bar shampoo. It's weird, but after using them for a while I started to get some really bad reactions from them with itching. I have needed to switch to head and shoulders in a bottle just for medical reasons. It was so disappointing because I bought so much of it and it was so expensive!

Things I'd love to start again is to go to a bulk food place. The source has opened in my local shops so it's super close. It's definitely not convenience that's the problem here it's Covid. I'd also like to do something new and that's make ALL of my clothes. Down to my underwear. It would be great to get that done and is on the list! The kids make this difficult because of time, but hopefully one day will be achievable.

8.0 Repurposing and Re-using Random Waste Stuff

8.1 Repurposing an old ironing board

I regularly see ironing boards in the “dump” piles out the front of peoples’ houses and it seems such a pity that they will be going straight to landfill, but if you see one grab it, this article will show you how to use it in the garden to help you sow your veggies more easily!

A short while ago I was able to get hold of an old iron board free for repurposing and it has come in very handy since as an all-purpose potting bench. You can use it to sow seedlings, mix up potting/seed raising mix, pot your seedlings on into the little paper pots or regular pots, you can do your cuttings and other plant propagation tasks as well. It really is multipurpose and the good thing is you don’t need to make any changes to the board itself beyond removing any fabric covers, leaving the wire mesh surface exposed.

Some advantages of using a repurposed ironing board as a potting bench include –

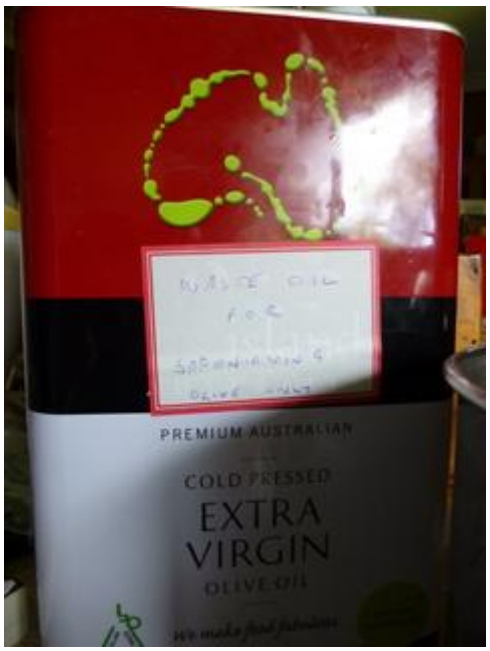
- It is light and portable; some even come with wheels on one end to making moving it about even easier.
- Because it is portable you can move it into the sun in winter or out of the sun in summer to make the job more comfortable.
- It folds up, so if you are pressed for space (particularly if you are growing in a flat or townhouse) you can fold it up and hang it on the back of a door.
- It is adjustable you your height, so no more aching backs and you can set it up so you can work sitting or standing, whichever you prefer.
- The wire mesh allows any potting mix etc that falls out of the pots or whatever you are doing to fall straight through to the ground rather than grit up your work surface.
- The work surface is large enough for most work you would want to do.

As you move around, keep an eye out on those rubbish piles you may be able to pick yourself up a very handy potting bench for no cost, on the other hand if you are upgrading your ironing board you can repurpose the old one. Either way, you save money and there is less good stuff cluttering up our landfills.

8.2 Making Soap from old Cooking Oil

The disposal methods for the oil that comes out of your deep fryer or whatever else you cook your chips in are fairly limited. It can be environmentally nasty if it gets into the waste water stream and be very difficult to extract so they recommend you put it back in the bottle you bought it in and toss it in the rubbish. But then it still goes into landfill. Biodiesel is an option, but if you are anything like us it would take months before you got enough biodiesel for a run down to the local shops. As you've probably guessed from the title of this article, the way to go is to make a useful product out of a waste one: make soap from waste vegetable oil!

The first bit of information you MUST have is the type of vegetable oil you want to make soap out of. We use generally either Australian olive oil or occasionally rice bran oil so for us it was pretty easy. So the big hint being from now on is to only use single oil types for deep frying or other activities where you may want to recover the oil. It can be almost impossible to work out what is in the generic "vegetable oil" bottles and if you have been using the oil to cook roasts or whatever, animal fat will also impact on the amount of caustic soda (also called "lye") you need to make the soap.



If you do know the makeup of the oil you want to saponify there are **lye calculators** on the net that you can plug your numbers into and they will tell you how much lye you need for a givenbatch of oil. Otherwise you may have to make an educated guess, but if you do go that way, leave a bit of the caustic soda out so that the chance of unreacted caustic soda remaining in the soap is reduced.

To use up our oil I wanted to make pure castile soap, which is traditionally olive oil, lye, some water and not much else. While tooling around looking at formulations I found one that had 5% of the oil substituted with castor oil to improve lathering so I decided to use that (bad idea) but more of that later. The grade of olive oil will also affect the

soap, virgin or extra virgin olive oil usually used in cooking gives a yellow to green soap while the pomace grade olive oil usually used in soapmaking gives a whiter soap.
I worked out the formulation to fit our **soap mould** exactly so below the first formulation is based on a kilo of oils to make it easier to calculate the right amount of soap for your mould and the second one is resized for our mould. The ratios are the same in both formulations.

The formulation has a built in superfatting ratio of 7% ie there is only enough caustic soda in the formulation to react with 93% of the oil, giving a soap that is kinder on the skin.

Olive oil	950gm	1498.6gm
Castor oil	50gm	78.9gm
Caustic Soda	124gm	195.6gm
Water	250gm	394.4gm

To start out, add the caustic soda to the water (which should be in a glass or stainless steel bowl, not aluminium) and stir to dissolve. It is nasty stuff so wear gloves and eye protection and it also gives off irritating vapour so do it outside with the wind behind you. The caustic soda solution will heat up so you need to allow it to cool down to 40°C, putting it in a cool water bath will speed up this process. Keep this stuff away from children!

While the caustic soda solution is cooling put the oils into a stainless steel pan and heat them up to 40°C as well. Once both liquids are at temperature the process is simple (I thought), put a stick mixer into the pot containing the oil and then slowly add the caustic solution until it is all in, mixing the whole time. Then continue to mix with the stick mixer until the soap batch gets somewhat thicker. The thickening may take 5 minutes up to 20 minutes and then you pour it into your mould, insulate it with a layer of towels and let it sit for 24 hours to complete the reaction. That was the theory.

In practice, I had gotten about two thirds of the caustic solution in when the thing went damn thick, like starting to solidify! Unfortunately there are no photos of this part of the process although photos of the panic on my face would have been pretty funny. In the soap making world this process of premature thickening up is called “seizing”. When it happened it became a mass panic to get the rest of the caustic solution in and mixed, and then the soap mix into the mould before the whole damn lot went solid! I did manage it sort of and the soap looks OK but there are a few small pockets of caustic solution in the finished soap. After a bit of research it turns out that soaps with 5% or more castor oil in them can seize on manufacture. I wish I’d read that first! Anyway, the next batch will be all olive oil.

Once demoulded and cut up the used oil soap doesn't look to bad, it has a nice (I think) light yellowy green colour and seeing as there was not time to add any essential oil smelly stuff it just smells like. Um...well, soap. Due to uneven mixing there may be some areas that are a bit harsher than others so I will need to be careful when trialling it, but even if it is a bit rough on hands it could still be grated up and used to make clothes washing powder. That could be a topic of conversation at your next dinner party – "Can you believe I washed these clothes using waste cooking oil?"

This method is called the Cold Process (CP) for soap production and once the soap has reacted, set, been demoulded and cut into bars it needs to sit for at least a month to let the soap making reaction run to completion. If you do want to use the finished soap in washing powder the mix that I have tried and used effectively is –

Soap 50%
Washing soda 25%
Borax 25%

8.3 Making a Self-Watering Pot from a PET Bottle

One of the great ideas that has been developed in recent years to help us out with the long hot summers is the concept of self-watering pots. That is to say, pots for growing plants which have a built in reservoir of water, which keeps the plants hydrated. As usual, the idea has been latched onto by pot manufacturers but they seem to have missed the point. The commercially available self-watering pots have a very small reservoir and tend to be gimmicky, rather than a serious alternative to standard plant pots.

However, it is possible, even desirable to make your own.

1. To start out you will need a bottle that has enough volume for the roots of the plant to grow, so use at least a 1.25 litre bottle, although a 2 litre or 3 litre bottle would be even better! And don't throw away the lid, you will need it.

2. Using a sharp knife (and wearing a solid leather glove on your non-dominant hand, I'm just sayin') cut around the bottle about two thirds the way down towards the base. The top will be the growing space and the bottom will be the reservoir, and now you just need to connect them. This will be done with some wicking material, I use synthetic rope. Natural fibres can also be used but will rot down in time.

3. Nylon or polyester braided rope is ideal (polyethylene is hydrophobic and so not a good choice). Unfortunately quite often the material which the rope is made from is not put on the label, in which case you could ring or email the company to find out or just use one which is labelled if you can find one. I was able to find some labelled as being polyester where other types from the same manufacturer were not labelled.

4. Cut sufficient length for your wicking material to go from the bottom of your reservoir up to a least half the way up your growing area. If you are using a synthetic wick, apply a bit of heat to one or both ends to melt them, it will stop the wick fraying and make it easier to get though the bottle lid. Since the material is a wick and not a tube, this will not affect its ability to conduct water.

5. Drill a hole through the centre of the lid approximately the same size as the wick you are using, I used 6mm wick so I drilled a 6mm hole. Push the wick up into the growing area, ensuring you leave enough length for it to get to the bottom of the reservoir and coil around a bit.

6. Fill the top section with growing medium and the bottom section with water, assemble you pot and install your plant!

There will be no more coming home after a weekend away at the beach (well, it's hot, right?) to find all your beloved pot plants have dehydrated and died.

8.4 Making a garden in a Polystyrene Vegetable Box

In this article we will be talking about how to grow a load of seriously tasty veggies in a recycled polystyrene veggie carton, and some soil and stuff of course! Why a recycled polystyrene veggie carton? They are a good size, readily available quite often for free and they are light and easy to move around so it makes sense to use polystyrene boxes if you can get hold of them.

Reasons why you might want to make one of these little white marvels include –

- A veggie box is a good way to start small if you are new to veggie gardening, and
- You can add more boxes as your confidence and interest grows,
- They are a great project to do with the kids, you never know they might be the start of a lifetime of gardening,
- They make a great present for a family member or friend who isn't a veggie gardener,
- If you are in rented premises you can pick up and take your veggie garden with you if you have to move, or the landlord won't let you dig up the lawn.

The Process

The process is simplicity itself!

1. Get hold of the polystyrene box and make sure that it has sufficient drain holes to precent water logging. If there are no drain holes, like with a broccoli box then cut or push some through using a hot wire or hot soldering iron etc. Holes can be drilled into the polystyrene but it creates a whole stack of little white balls that get EVERYWHERE!

2. Half fill it with grass clippings and weeds making sure that none of the weeds have a seed head that will create problems afterward. It would also be better to leave out

things like wandering jew or couch grass runners unless they have been left to dry out in the sun first, just in case. The weeds will decompose slowly and provide nutrients for the veggies so to get a better result use a mix of weeds providing a mix of nutrients.

3. Get hold of or make some good quality potting mix. If you want to make it you could try the 1 sand: 2 worm castings or compost:3 cocopeat mix or if you are buying it in get some middle of the range stuff (not too el cheapo) that is designed for growing veggies. Fill the box right to the top, the soil surface will drop somewhat as the weeds decompose.

4. Plant appropriate veggie seeds or seedlings , these may include –

BROCCOLI - Mini; broccolini

CABBAGE - Earliball ; Sugar Loaf ; Golden Acre

CAPSICUM - Most varieties can be grown in containers and are non-hybrid.

CARROT - Baby carrots are most suitable eg. Baby Pak , Baby , Amsterdam Forcing or Thumbelina.

CHILLI - As for capsicum .

CUCUMBER - Bush varieties eg. Spacemaster

EGG PLANT - Most varieties eg. Short Tom or Long Purple.

LETTUCE - Cos eg Romaine or Cos Green; Butter Head eg Buttercrunch or Green Mignonette

ONION - Any spring onion (shallot) variety.

PUMPKIN - Bush pumpkin eg Golden Nugget or Bush Butternut.

RADISH - All varieties are OK.

SILVERBEET - Fordhook Giant

SUMMER SQUASH - Bush varieties such as Early White Bush or Marrow , long white

TOMATOES - Small bush varieties eg Tiny Tim or Small Fry and "Egg" Tomatoes eg Roma.

ASIAN VEGETABLES - Many of these also lend themselves to container gardening for example Adzuki Beans; Pak Choi; Chinese Mustard; Mizuna; Mibuna and Chinese Broccoli.

5. Mulch any seedlings with a light mulch such as sugar cane but don't mulch areas where seed is planted, particularly small seed like carrot or it may have difficulty breaking through once it is germinated.

Keep your box 'o' veggies in the sun, but near at hand so that you can harvest them when you need them. Even if you are an experienced grower, it can be nice to have salad veggies or herbs in a box near the back door when it is cold and raining.

8.5 Making Plant Pots from old Newspapers

For years the process that I followed to produce my veggie seedlings was to put the seeds into punnets, then once they were at the four-leaf stage I would fill cardboard tubes with the same homemade mix we used to state the seedlings off and then pot on the seedlings into the tubes. I got the tubes from work, they were 800mm long and 60mm wide, so I used my band saw to cut them into 100mm long planting tubes. Unfortunately, about 12 months ago, I was retrenched from that particular job so the supply dried up. It took me the 12 months to burn through the tubes I had in storage but all of a sudden i had to come up with something new.

I have been aware of the old newspaper pot trick for years and never had to use it, but with my tubes all gone, the newspaper pot seemed like the answer to a maiden's prayer, or at least mine anyway. I was concerned that they would not stand up to the task of being moist and full of growing medium for weeks at a time, but they have surprised me! Another surprise has been that the seedlings actually seem to hold better for longer and are happier in the newspaper pots rather than the old tube style, so if you want to follow my ideas give it a go.

So now I suppose you want me to tell you how you can make your own.....and if I wasn't going to do that the title of this article would be different!

There are apparatuses that you can buy to help you make the pots that consist of a plunger and a base (OK so it is a hopeless description.....just look at the photo!) but you can achieve the same thing with a straight sided drinking glass or jar. For the purposed of making the pots to take out seedlings to grow them on before planting out, a base size of 60mm to 80mm would be best.

1. Get hold of some newspaper and cut it into strips 10 to 12 cm wide by about 60cm long (ie the length of an open newspaper page). If the glass you are using is bigger than the recommended 6 to 8cm the strips will need to be proportionally larger.

2. Wind the strip around the open end of the glass with about half the diameter of the glass or a bit more overhanging the edge.

3. Fold the free edge over into the open end of the glass so that it is lying along the inside surface of the glass. Then slide the paper off the open end of the glass.

4. Place the bottom end of the pot on a flat surface and fold down the inner flap of paper to form the base of the pot then reverse the glass and push it into the pot bottom first so you can push down and flatten out the bottom of the pot. This is easier to do if you are working on a firm, flat surface like a table.

5. Job done!

The pot can now be filled with the seedling raising/potting mix and a seedling. Making the pots is easy; you can make a stack while sitting in front of the TV at night and then plant them out as needed.

8.6 Making a Small Greenhouse from Waxed Veggie Cartons

It can be very handy to have a place to raise seedlings or to coddle a frost tender plant through the colder parts of the year, and I'm sure everyone would love a 3 metre by 2 metre commercially made, glass clad greenhouse but what do you do if you don't have the room or the money or both? The answer of course is in the title of this article; you go out and make yourself a mini greenhouse.

The greenhouse requires very few tools to make, is made almost entirely of recycled materials and costs next to nothing and while this sounds too good to be true, I assure you that it is genuine. Our choice of material of construction is the waxed veggie carton and it is a good one for a number of reasons –

- It is strong - the waxed veggie carton being stronger than the sum of the strengths of the paper and the wax.
- It is water resistant – the wax coating the cardboard not only increases its strength but also prevents water to getting to the cardboard and turning it to mush.
- It's Free – The cartons are generally single use and then they are discarded by the fruit and veggies shops so if you approach them for a couple they will be very pleased to offload them to you.
- It's recycled – or is the new buzz word "repurposed"? Our recycling technology cannot cope with waxed cartons so they are generally sent to land fill so you will be keeping a useful material out of the ground.

To make the greenhouse you will need a couple of waxed veggie cartons, preferably one bigger than the other, a recycled clear plastic bag (mine was packaging on a folder that I bought but any decent sized clear plastic bag will do), a Stanley knife or

equivalent, some aluminium foil, some duct tape and some double sided tape. A pair of scissors to cut the tape instead of the knife, while not being critical, is a safer option and a rule or tape measure rounds out the equipment needed.

To make your own mini greenhouse the steps are as follows –

1. Grab the smaller of the two boxed and using the Stanley knife cut the front and side flaps from the top of the box.

2. To make maximum use of the sun you need to make the top into a sloping surface. There may be ventilation holes and/or hand holes in the side of the box so you may have to vary your angle to miss them. The angle I had to use meant that the front of the box was about 19cm lower than the back. The angle isn't hugely important so long as it is the same on both sides.

3. It is also unlikely that you will remove all the holes when you put in the front cut out to make the angle, so any remaining holes should be covered by putting duct tape over them both inside and outside the box. Ventilation is good but the whole idea is to keep the inside of the box warm and air leaks through hand holes etc will work against that.

4. If you want to increase the amount of light rattling around inside box you should line it with aluminium foil, secured by double sided tape, and this then completes the bottom.

5. To make the top, cut out one large side of the other box, along with its flap and place it on a flat surface, using the Stanley knife cut out a hole in the centre a couple of centimetres smaller all round than the clear plastic bag so the overlap can be used to secure the bag to the top.

6. To fit the top to the main box part of the mini-greenhouse place the flap that you left on the top on the flap that you left on the rear of the bottom and then run tape around them both so that they form a hinge.

Once the top and bottom are joined via the hinge the mini greenhouse is complete and you can set it up in the sun with some seedling flats inside full of seeds ready to sprout. If the weather gets a bit warm and you are concerned for seedlings or other plants inside you can fit a couple of clothes pegs on the front of the box under the lid so that the lid is elevated, providing some ventilation.

8.7 Repurposing a hessian Sack as Vertical Garden

By Angela Sweeney-Bas

(Note: coffee sacks also work well)

I have a balcony on my apartment. This is the only "land" I have to work with to grow veggies. Because of this a vertical garden on the side of a wall helps to grow on all areas of the balcony. I have used mine to grow salad greens, but you could use it to grow smaller veggies or herbs.

Materials:

Potato sack or old clothes

Sewing machine

Scissors

Pins

Hooks

Plants

Mushroom Compost or nice soil


BLACK
CROW
ORGANICS
Growers of
Quality
Organic Potatoes
Tenthill Qld
Australia
20KG NET

Method:

I chose a potato sack for a few reasons. Firstly it re-uses something, Secondly it already has the sack look to it which does some of my work for me and lastly the thread in the material is woven loose enough to hold the soil but still pass water through.

1. Mark out where you will sew the sack. I marked it out into 9 equal squares, but you could make them bigger and make 6 squares or 4 squares. I would not go smaller than 9 though.

2. Sew along the pins to sew both pieces of fabric together. It should look like the side of a rubix cube but stretched a little. My boxes were 6 inches by 10 inches.

3. Sew again over the squares but use the zig zag stitch to make it stronger.

4. Sew around the outer seams with zig zag stitch to strengthen them. Just make sure you do not sew the top together.

5. Sew buttonholes into the back piece of fabric at the top of each box, or as many as you feel it might need. At this point you could also use eyelets. I used 3 buttonholes at the top of my sack. This was one per pocket since I had 3 pockets at the top. You could do more but I would not do less than 3.

6. Cut the tops of each box to create a pocket. At this point you could hand blanket stitch across the top of each pocket to stop fraying and make it stronger.

7. Use cup hooks to hold it onto your wall or a door. This is what I did, but you could use lots of things to hang it and it depends what you will hang it to. You could use wire, coat hangers, 3M hooks, string.

I read somewhere that planting the plants into Mushroom compost is best so this is what I did. It could be that it holds better in the material as Mushroom Compost is coarser. Might have nothing to do with nutrients. I also used Seedlings. Use seedlings if you are going to plant into Mushroom compost. Otherwise you can plant seeds into nice potting soil.

So far it has seemed to work well. The bag seems to hold the water too to keep the plants moist. I feel like the eyelets would be sturdier but it has not fallen down so far. I have planted it on a wall that gets lots of sun so it should work well.

8.8 Growing vertically in Reused Milk bottles

This was an idea that I stole from my mate **Salman**, it used recycled materials and allows you to grow food vertically with a minimum footprint, so what is not to like?

We go through a reasonable amount of milk and until recently bought it in 2 litre bottles, but it was brought to my attention that the 3 litre bottles are made from thicker stronger plastic and can be repurposed to make all sorts of interesting things. One of the interesting things that can be made is a vertical veggie garden. However small containers like these have a tendency to dry out pretty quickly on a hot western Sydney summer afternoon so I have made them "self-watering" by using the same method as used in the wicking beds.

Making the Containers

I found it easiest to save up a load of milk bottles and then convert them to plant containers all at once. After washing them out I made a cut just in front of the handle and then down and around the neck so that the main area of the body was intact but there was enough of an opening for a plant to grow out. I used my small band saw to make the cut but you could probably use a Stanley knife (with a leather glove on the other hand!) or a coping saw, or perhaps even a jig saw would do the job.

Once the bottles were cut I got hold of a bag of 12mm scoria left over from a previous project and poured 20 to 30mm into the bottom of each bottle, then drilled a 6mm hole

in the side at the surface level of the scoria. That way the bottom 20-30mm acted as a reservoir and turning the bottle into a self-watering pot or verrry small wicking bed.

Once the scoria was in place it was just a case of topping up the bottles with potting mix and then plating a seedling in each. With the containers now ready to go, it was time to mount them on the side of the shed.

Mounting the Containers

I needed strapping of some description to wrap around the handles and secure them to the side of the shed and after a bit of looking around I found “Abey” brand builders strapping, used to join timbers together in construction work. The particular strap I used was 25mm wide x 0.6mm thick and at $4.50 or so for a 6 metre length it was pretty good value and it was pre-drilled with 6mm and 4mm diameter holes to make fitting even easier.

Having found my strap I cut off 10 x 90mm lengths using tin snips, one for each milk

bottle, and bent them around in a U-shape with the ends flared out slightly to go over the rib in the shed wall. The shed is a Colourbond steel prefabricated shed with stiffening ribs formed vertically in the walls and by taking the strapping around the handle and down each side of the rib, I could put fastenings through the strap and into the sheet metal rib. This gave the bottles a secure attachment.

I must admit my first thought was to drill and pop rivet the straps to the shed wall, but it occurred to me that if I wanted to take the bottles down for any reason, like replace the potting mix, replant them or even replace the whole bottle I would need to drill out the pop rivets first. So after a small amount of consideration I decided to drill the ribs and then use self tapping screws, put in with my cordless drill.

It didn't take long to put them up with the minimum of dropped screws and swear words. Although there were times when I was holding up the bottle, holding the strap in place, holding the screw on the end of the driver while driving it home, where a few extra hands would have been useful. As you could see I tried to be a bit artistic in mounting them, well I tried!.

I have been putting them up in the middles of a pretty hot summer and while the seedlings are staying wet enough, they are still suffering from the strong sun and are not particularly happy. I need to give them a bit of protection with some shade cloth or better yet, plant earlier in the year and give them a bit of time to grow on before the real hot weather hits.

Jan 2014 Update

While the veggies seemed to do OK, the hot weather really took it out of them. The containers are too small and too exposed to maintain a steady and reasonable temperature for good growth. The best thing would be to get them well and truly established earlier in the season before the hot weather came and to install them in a less exposed position where they have some relief from the midday summer sun. Another problem has reared its ugly head. The containers are starting to fall off the wall because UV embrittlement of the plastic means they can no longer support their own weight, so about 12 months is the best you can expect from the untreated containers. If

you want to try this method I suggest painting the containers first with a non-toxic outdoor paint to put a barrier between the plastic and the UV. Again, a more sheltered position would probably extend their life too.

8.9 Making a Fruit Fly Trap from a PET Drink bottle

The Queensland Fruit Fly (*Dacus Tryoni*) and the Mediterranean Fruit Fly (*Cerititis Capitata*) are significant pests of a wide range of fruits and fruits that generally get called vegetables (tomatoes, capsicums, chillies, eggplant). If you live in an area affected by these pests, as we do, you have our sympathy because they can really cause havoc with the affected crops, there is nothing like cutting open a beautiful ripe tomato and finding it full of maggots! One home grown way of reducing the effect of their predations is to install fruit fly traps in the areas where you are growing fruits and vegetables likely to be affected.

To make the traps you will need a 1.25 litre or 2 litre PET soft drink bottle, a hobby knife or pair of scissors, some electrical tape, preferably red or yellow, some wire or string and an attractant/poison which will be discussed later.

Making the trap

Take the PET drink bottle and cut the top off about 1 centimetre down from where the shoulder meets the body of the bottle.

Now invert the funnel shaped piece of plastic formed by this operation and insert it in the open end of the cut away bottle.

Secure the funnel by placing red or yellow (or both) plastic take around the end of the bottle/funnel set up. Flying insects are attracted to red and yellow which is why these colours are used.

Cut, drill or pierce two small holes, one on each side of the top and thread some wire or string through to hang the trap on the tree with.

Pour the attractant/poison mix into the bottle and hang in the tree.

Inspect the trap regularly to see how successful you are and empty and replace the attractant every three weeks, the attractant and dead flies can go into the compost. The trap works by attracting the flies then sticking them up or poisoning them and either way making it difficult to get out of the bottle again. You can either make up the

attractant into a sticky paste or add a poison that will finish the flies off once they contact or feed on the attractant mix.

Attractants may include – molasses, fruit juice, vanilla essence, jam, vegemite, ammonia

Pesticides that could be use include – borax, pyrethrum or derris dust

8.10 Making a child's playboard from repurposed hardware

One issue with waste today is that the majority of kid's toys are 100% plastic. Cheap junk most of it, which will find its way into landfill before it is a year old. There is another way, of course, and that is to make your own. There is an article about toymaking **here** and there are suggestion on books about toymaking **here**.

I wanted to have a go at toymaking and to start out by making a playboard for my granddaughter and I chose the idea of a playboard for several reasons –

- We could use bits and pieces hanging around the house thus recycling material we already have,
- It is comparatively easy to make.
- It is robust and will last for years.
- Her mother asked me to make one for her!

To make a playboard, you start out with a base board of some description and then affix things to it that do stuff! Things that turn, move, latch, unlatch, click, jingle, jangle, make noise and generally do fun things. While it would have been easy to include battery powered lights and noise makers etc, part of my design philosophy was that the inclusion of bits that required batteries which needed to be bought and replaced were to be avoided.

This is how I made mine –

Base Board

First choice was to use something hanging around and while we do have particleboard that would have done the job, particleboard can off-gas formaldehyde so it was off the list. I did have some small pallets that were composed of a plywood sheet with other timber nailed to it, which seemed pretty robust. The board, once removed from the pallet was 10mm thick, by 1060mm wide and 610mm deep. I cut it in half so I could double it up, giving me a bit more depth for fixing screws to penetrate, so that the final base board is 20mm thick, by 530mm wide and 610mm deep.

To make the baseboard a bit more presentable I gave the best face a quick sand and then after hunting through the garage found a small tin of gloss white paint that was still (thankfully) liquid. This allowed me to give the front and sides of the baseboard three coats of the gloss white paint.

Activities

After a troll around through the garage, my spare parts boxes and sundry cupboards and sheds (I KNOW it's here somewhere!) I came up with a number of things that made sense to me to be included on the board. Some things which I was positive that I had I was not able to find, and some of the things I did find came as a surprise to me. After reviewing what I had, I decided that I wanted a few more items, requiring a quick trip to the local hardware. I suspect that the local op shop would also be a goldmine for such things as well.

What I wound up with is –

Jingly things – I had an old bicycle bell in the garage so that was a no-brainer, we also had (I thought) a push button desk bell but a full search of the house didn't turn it up, and I really wanted one so I was forced to go out and get one, but it did prove to be somewhat cheaper than I expected.

Turny things – I found an old doorknob, I think it was taken off the linen cupboard doors when one side broke and had been sitting around for yonks, it still turned so was a good bet. On closer inspection I found the turny bit extended below the base of the door knob, so to fit it I had to drill out a hole with a space bit, big enough to take the turning mechanism. Easily doable!

I also found a wheel, still in the original plastic packaging, which I had bought probably 30 years ago and never used. The wheel would be secured to the playboard by a coach screw and with a washer between the wheel and the board to ensure it could be turned easily.

Slidey Secury things – I already had a collection of a couple of bolts in my hardware/parts boxes so they were easy. The green gate latch was also in the box too, so after some consideration I decided to put that in as well. I had a hook latch which was also new in its packet, and who knows how old it was and I included it too!

Jangly things – I thought that keys are fun to play with but they would need to be attached to the board, we have plenty of keys we no longer have locks for! Thankfully the bottom part of the bracket that was designed to hold the bicycle bell to the handlebars was no longer needed and would work perfectly to hold the keys in place. I

had also seen a door chain bolt on a pic of someone else's playboard, and thought it would be a fun addition, but we didn't have one so I had to buy it.

Bangy Things – The hinge was easy, another bit of hardware I had bought over the years but was still sitting in the parts box in its original packaging. Again I had seen the doorknocker on the pic of the other playboard, and thought it would be nice shiny, noisy and fun, but it was a new buy, because I really didn't have anything like that which would do.

Clicky things – I was a bit disappointed because I was sure I had some spare electrical switches of one sort or another, but after spending the day ratting around in the garage, sheds and various cupboards it seems I was mistaken. Both the rectangular set of four switches and the single round one, needless to say, were new buys.

Zippy things – Also one of the things I noticed on the other playboard was a zipper secured to the board by four screws. Linda has a collection of haberdashery and sewing stuff analogous to the contents of my hardware parts boxes, so I had quite a few to choose from.

Rolly/turny things – Something else I found in the deep dark bowels of the spares boxes were two different sizes of casters, the wheels rotate on their axles as well as on their bases, so they are guaranteed to be fun.

With the board painted it was actually a fairly simple, if time consuming, process to set up all of the activities on the board in some semblance of order that made sense to me. Some of the hardware bits had screws included while others, particularly some of the stuff I found here, did not. This required a continuous back and forth between the garage and the dining room table where the construction was being carried out.

After half a day, I deemed the playboard to be completed and was very happy with how it turned out and on the day it went over very well!

8.11 Making a Herb Garden from Repurposed Ice Cream containers

My elder daughter lives in a unit in western Sydney which has a large and a small balcony area. We did up a permaculture plan for the larger balcony but I left the smaller one out because it is really small and only gets light at certain times of the day. A while back I gave her some recycled containers that I got from a friend and she has gone full steam ahead and used them to create a herb garden on the smaller balcony.

The containers are white plastic ten litre ice cream containers, my friend runs a nursing home and they use this ice cream on a regular basis. If nobody has a use for them they are thrown out so I got hold of nine and kept three for myself (they are great for storing compostable materials before I toss them in the composter).

To create the herb garden all she did was drill a couple of 5mm drainage holes in the front, bottom of each container, then drill two holes in the back of each container near the top. Through these holes she threaded some thin rope and tied the buckets to the rail. The rope is sized so that back bottom of the containers are balanced on the edge of the bricks which make up the wall at the edge of the balcony and on which the steel handrail is mounted. This creates a tilting effect so that the water runs forward to drain holes and supports the containers so that most of the weight is taken on the bricks rather than on the rope.

She filled each of the pots with a good quality potting mix and then planted each of the six pots with a different herb – sage, parsley, chives, thyme, basil and mint. With everything in place she has a space that is newly productive, herbs to use whenever she wants and it has been accomplished by reusing containers which would have been thrown out!

8.12 Making Fertiliser sausages from hessian sacks

First of all, credit where credit is due: I stole the idea from Annette McFarlane as described in her book “Organic Fruit Growing”, (check out page 43).

The idea is to find natural fibre (ie biodegradable) fabric which is no longer required, collect organic materials which will rot down to release plant nutrients then wrap the latter in the former to form long “sausages”. These sausages are draped around the drip line of fruit trees and bushes etc and act as slow-release fertilisers. They are especially good for keeping stuff together and in place if your land is sloping, which mine is not, but I liked the slow-release part!

This is how I put mine together

The Casing

In terms of the fabric “casing” of the sausage, a friend of mine has access to the hessian coffee bags which raw coffee beans are packed in when imported into Aus for roasting, which are then discarded. So if you want to do this the way I have check out any local

coffee roasters and see what they do with their excess bags. Also if you have any local purveyors of organic produce, some of it (potatoes definitely) is shipped around the country in hessian bags.

The bags are made by being folded over and then sewn down the edges, when I get them they are already opened at the top so this is not an issue. To get the most out of each bag they need to have the sewing undone so that they can be opened out to form a piece of fabric 2 metres long. Most of the bags seem to be sewn with a hemming stitch, and you can either cut along it or unpick it from the edges. Either way takes a similar time but if you unpick it you get the twine and can use it to tie around the sausage to keep the filling in.

To fill the sausage, lay it out on the ground and heap some filling along one side, then take the edge closest to the filling, pull it up over the filling and roll it tightly so that you get the filling covered by one and a half to two turns of the material. To finish off, use biodegradable twine and tie it around both ends, with two or three intermediate ties to keep the filling from falling to one end during transport.

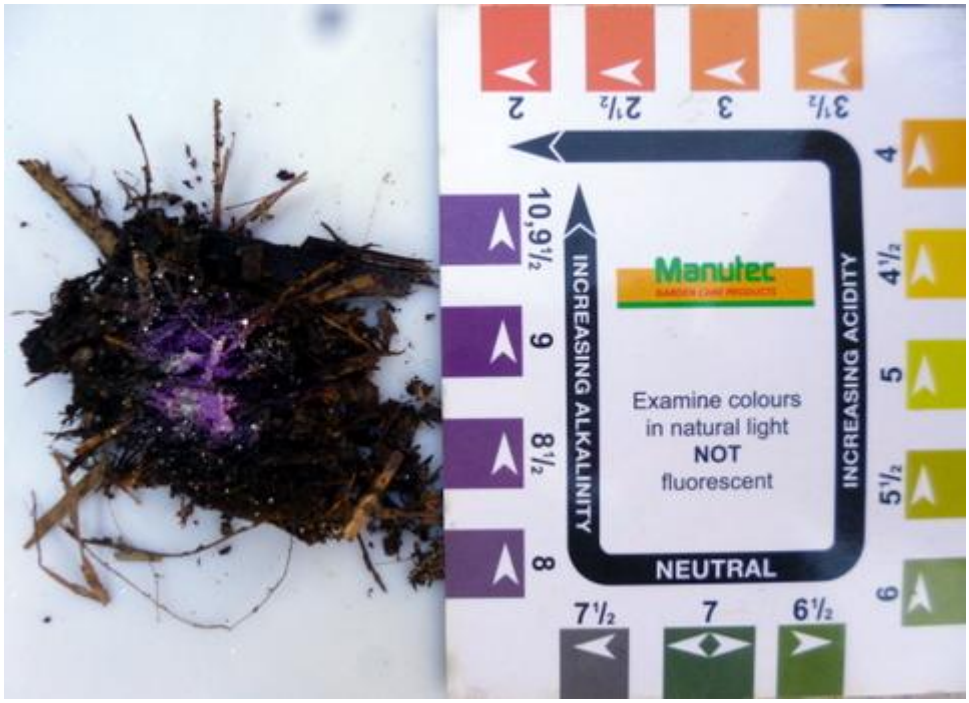
The Filling

The filling can be composed of whatever organic material you have available.

There is a place near us where the kids make pocket money by selling their pony poo, so I got a bag of that, probably about 25kg worth. The chook poo we produce is applied directly to the veggie patches by the chooks themselves so I had to buy in a bag, also 25kg.

To make the filling I put half the bag of pony poo and half the bag of chook poo in my wheel barrow, followed by 2 chook-food bags of our home made compost. To top it off I threw in 500lm of rooster booster (my daughter gave me a couple of bags when they moved), 2 x 500ml containers of wood ash for potassium from our fire and a handful of rockdust for trace nutrients.

The pony poo was pretty dry so I gave it all a thorough dowsing and then a thorough turning with my garden fork, to the point where the mix was moist but not dripping.



The wood ash did bring the pH up to a bit over 9 but I only took a couple of grab samples to check and it was just after mixing so I think it will settle down over time.

Installation

Once the sausage is filled and tied it is just a case of dragging it into position around the drip line of a tree or bush. I have installed a run of fertiliser sausages around the inner circle of the fruit tree circle to provide a bit of extra nutrition come spring. I have also installed them in around a couple of other fruiting plants include our coffee bush.

I have also made some smaller sausages, using the same process as above, but not opening the bag out, just using it as is to provide a double layer of casing.

8.13 Repurposing an Old Pram to Make Shopping Easier

While we are attempting to be more sustainable and self-reliant in the suburbs, as much as we wish it were not so, we cannot produce everything we want on our 600m2 of land, so we do still have to go shopping. We live about 10 minutes' walk away from our local shopping centre and it would be evil to drive, as much petrol is consumed in small hops, so for the most part we walk, even if we have a load of stuff to being back. The stuff we get can be quite heavy on occasions and there is somewhat of a temptation to take the car down "just this once...", so my lovely partner in suburban sustainability came up with an idea – The grocery pram.

Before we go any further, yes, it is possible to borrow a shopping cart form some shopping centres, but the large number of lazy people who borrow a cart then just leave it out in the street drive me crazy. It is just something we refuse to do.

We obtained an old pram from the Salvation Army, for manoeuvrability sake the pram had four wheel steering and four wheel parking brakes for security. There was some rust but by and large it was in pretty good condition and while you may not have wanted to cart your child around in it, it was more than adequate for our purposes. On the base chassis she then set about retrofitting it for its new duty as her grocery-mobile by grafting on the following features –

1.The front basket – this holds the blue insulated cold bag used to transport frozen and refrigerated items without having them defrost or warm up to much.

2.The central orange basket or plastic box – this is where the majority of the materials being picked up goes – 10 kg bag of potatoes or rice, a load of flour or whatever is required. The small area behind the main container is ideal for holding biscuits or other items you don't want crushed.

3. Two underslung wire cages – ideal for glass bottles or a load of toilet paper. These two wire cages increase the storage area remarkably, although you must be careful going up a steep incline as items in the back on can slide out.

4.The light basket attached to the handle – good for smaller items you don't want crushed, or to keep the handbag in (if you are game!).

The grocery pram works remarkably well, we also have a "shopping jeep" which is good for lighter items but if it is too heavily laden drags your arm down and has the most disconcerting habit of rolling over and taking your wrist with it when you least expect is,

especially on uneven ground. For heavier loads the grocery pram is certainly a much better choice.

The grocery pram does fetch us some weird looks when we go shopping with it and I suspect that some people may think we are homeless, but most people seem to like it and we have been given some very positive comments, but we are still the only people we have seen who have one!

My wife even took the cat (inside a cat carrier) down to the vet in the grocery pram. One bloke who saw the cat in the pram thought this was hilarious and got a good laugh out of it, it made his day.

Mind you, when heavily loaded the shopping pram may need the bigger engine!

8.14 Making a Solar Oven from cardboard Boxes

I love the idea of using the sun's energy directly, no pollution, no waste and no (energy) cost, it's fun to experiment with to dry or cook food or generate electricity and helps you become more independent from the power grid. Ten years ago I became interested in solar cookers, they are the obvious answer for when you have no fuel to cook your meals with, you want to increase your level of self sufficiency, do something good for the planet or you just want save money. It was one of those ideas that was just so good!

After a quick trip around the net I found **www.solarcooking.org** with plenty of low or no tech plans for building solar ovens and after some consideration I decided I wanted to build solar box cooker, this is basically one cardboard box inside another, with a clear panel to let the sun in (construction details to follow). It was mind bogglingly, cheap and easy to build, real alternative technology .....and it worked like a heap of crap!

I made it as per instructions, tried to cook a number of dishes using several different food containers and the best that I could do was attain 60°C and that was in full sun! All it would do was warm the food and after a full day in the sun I still had to do most of the cooking in the gas oven.

The principle or theory that I was working on was that the inside box was insulated by then outside box and the inside box was then lined with aluminium foil to reflect the sunlight back onto the cooking pot once it had made it through the clear panel. So much for that theory! So I put it away in the shed and forgot about it for a while.

After doing some more searching on the net I found a small footnote on another website where a bloke who had been experimenting on his own account said that the secret was to have thin walled, matt black painted cooking pots and a matt black steel

panel in the bottom to absorb the heat. This heat was then passed on to the cooking pot, in direct contact with it by conduction. This was exciting stuff and sounded like a serviceable new theory, but would it work?

Well, I put in a matt black steel panel and believe it or not, it did! All of a sudden I could get up to 90°C and was able to cook an aluminium billy full of spuds perfectly in less than two hours. This technology made sense and worked fine if you set it up right. So before I get too carried away, here is how I made the no-tech solar oven –

Construction details

1. Get hold of a large cardboard box, a smaller cardboard box (one which allows at least an inch of dead space all around once it is inserted in the larger box) a Glad® or equivalent brand oven bag, some aluminium foil, PVA glue and the steel plate with some matt black paint. Car engine enamel works well and puts up with the high temperatures.

2. Centre the bottom of the smaller box over the top of the larger one and, using a Stanley knife or equivalent, cut a hole in the top of the larger box so that the smaller one can slide into the larger one.

3. Now line the larger box with aluminium foil, shiny side out. This can most easily be done by getting hold of some PVA glue and a paint brush and painting the glue onto the cardboard and then smoothing on the foil. If the glue is a bit thick to use a brush, thin it down by mixing in a bit of water.

4. Cut the corners of the top of the smaller box into flaps and fold them out so that they support the smaller box centrally in the larger box. If you are going to insert insulation this should be done before the flaps are glued into place, locking the smaller box into the larger one. The insulation could be crumpled newspaper, straw, wool, polystyrene beads or what-have-you, anything that provides insulating dead-air spaces.

5. The smaller box may now be lined with aluminium foil, also shiny side out.

6. Once the inner and outer box are assembled and glued, the lid can be made by placing a flat piece of cardboard over the top of the double box and cutting it to leave a 25mm edge all around. The line where the box sits can then be scored and the ends cut to form flaps, the flaps are then folded down and around at the corners and glued, forming a tray shaped lid. This lid then has a three sided cut to put in the top of it to form a large flap the size of the inner box and then tape an oven bag over the hole to form a clear window to let the sun in.

7. The bottom of the flap should also be lined with aluminium foil to act as a mirror to reflect sunlight into the oven. A Z-shaped piece of wire is then inserted in the edge of the flap and the top of the box to keep the flap open at the right angle to act as a reflector.

8. To finish off the oven cut a piece of sheet metal to fit the bottom of the inner box, and hit it with some non-toxic matt black aerosol spray. Install the plate and you're ready to cook!

All it took was a couple of hours work and very little outlay (mostly for the oven bag) and I had raised my level of self reliance a notch! Well worth a go..... and as I said at the start - if I can do it, anyone can.

8.15 Making a skylight from a PET Drink Bottle

Many moons ago I was over a mates place inspecting his garage and noticed that he had some clear panels installed in the roof so that about every couple of metres the roof sheeting was clear fibreglass or plastic material rather than the aluminium roof sheets. This provided heaps of light, removing the need to have lights on in the garage during the day if he was working, this impressed me and I made comments to the effect it was a terrific idea. He made a somewhat long face and said “yeah, but the garage gets too hot to work in during summer!”.

My garage is a decent size and tends to be a bit dark up the front and now that we have a carport at the front the problem has gotten worse, so I needed to work out what to do about it. While tooling around the net one day I found a clip on u-tube showing how to use a plastic drink bottle as a skylight and decided that it looked pretty good to me. All I needed was a PET drink bottle, some roofing material the same profile as the roof of the garage, some silicon sealant and a few pop rivets, which as luck would have it I had hanging around. This is how I did it –

Hmm, one thing before we get into the fun bits, while it is not absolutely necessary, it does help if you have a nibbler (that is to say the tool, not the little alien critter on Futurama). A nibbler allows you to turn your electric drill into a tool that cuts through sheet metal like a hot knife through butter, although it does spit out little half-moon shaped bits of metal that I would hate to get in my eye, so wear safety glasses unless you are using it over head in which case I would opt for goggles and it is also as noisy as buggery so a pair of ear muffs would not go astray either.

1. A mate had dropped off some spare roof sheeting he had, so using the nibbler I cut off a roughly 30cm square lump that took into account two raised bits and one flat bit in the middle. (if you can't understand all this technical jargon, look at the photos).

2. Using a pair of callipers, I measured the diameter of the bottle, halved it to get the radius then drew out a circle in the middle of the flat bit the same size as the bottle. I drilled a small 1/8 inch hole in the dead centre of the circle as a pilot hole then drilled 3/8 inch hole to allow me to cut from the centre out to the circumference of the circle.

3. The first “cut” I made was with the nibbler but it took out a 3-4mm swath through the metal so I decided to make the rest of the cuts with a pair of tin snips, and if you have offset tinsnips you will find the job easier.

4. I used the tinsnips to make a series of radial cuts from the centre hole out to the circumference of the circle so that the metal now looks like a pie cut into a whole stack of wedges. Once the cutting has been completed (or even before) you might like to find a pair of thick leather gloves, the sides of the metal slices are razor sharp and you can do serious damage without much effort!

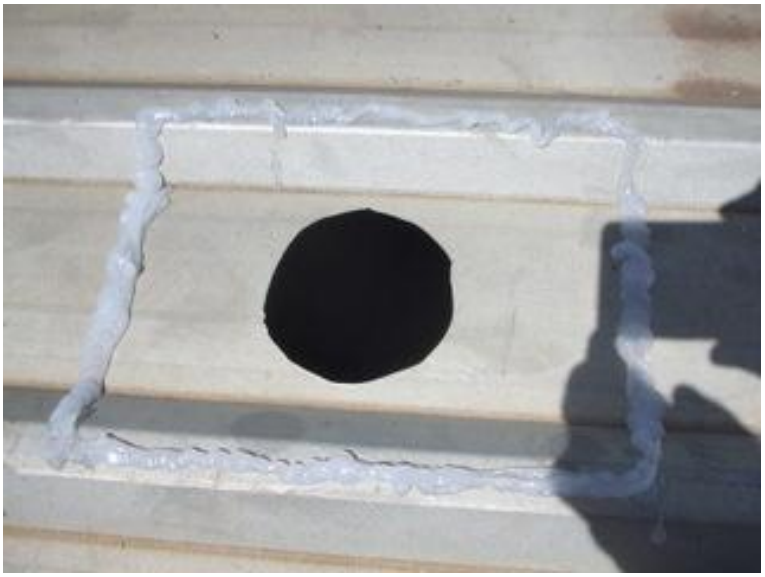
5. With glove wrapped hands I grabbed a set of good solid pliers and proceeded to bend the slices up and outward so that eventually I had a series of jagged teeth standing straight up and at a right angle to the hole and the surface of the metal.

6. I could then do a test fitting of the empty bottle in the hole, and as luck would have it the hole was a little small so I had to spend some time with the tin snips and pliers moving each of the teeth back a bit to enlarge the hole. The trick is to check with the bottle regularly and not get carried away; you want the bottle to only just fit through otherwise it will take a lot more effort (and sealant) to keep the rain out.

7. After a bit of work the bottle fitted well. At this point I filled the bottle with clean tap water and bunged in a tablespoon of bleach to stop the water going green, I left at about 12mm of freeboard in the bottle to allow for the water to expand. The full and tightly capped bottle is easier to manoeuvre and seal into the metal.

8. With the bottle now full, I set it up with timber blocks so that the roofing metal sat about half way up the bottle, and I then put a stack of silicone sealant around each of the metal “teeth” (Repeat after me:”silicone is my friend”) and smoothed it out to ensure it formed a seal. Once it was set enough to hold I also ran a small bead around the bottom where the bottle protruded through the roofing metal to complete the seal.

9. I left it a few days to make sure the silicone had set and then proceeded to set it into the roof of the garage. I measured the bottle up and set the callipers to the radius of the bottle then used the callipers to scribe a circle on the top surface of the garage roof, drilled a 3/8 inch hole and then put the nibbler in and cut out a bottle-sized hole in the roof. This was a pretty big moment because I knew that if I screwed it up I would get a garage full of water next time it rained (Repeat after me: ”silicone is my friend”).



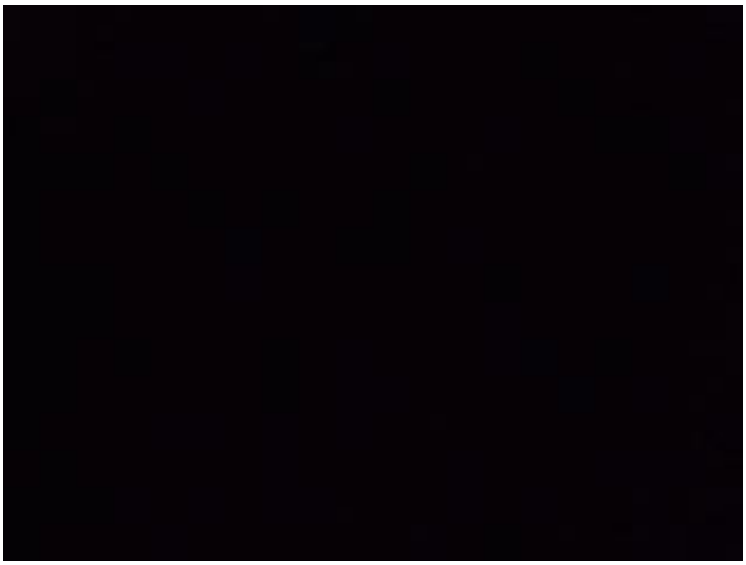
10. Fortunately the bottle and roofing fit very well when I did a test fitting so I cleaned the metal surfaces with metho and applied a liberal amount of sealant to the roof, put the bottle and roofing square in place then put in a couple of pop rivets at each end to hold it in place.

11. I then ran a bead of silicone around the edge of the roofing square, and the last finishing touch was to go back inside the garage and run a bead of silicone around where the bottle protruded down through the roof to form a final watertight seal.

I have to say that this works remarkably well! It provides enough light to work by with the garage door down, even at 5:30 in the afternoon. As soon as there is direct sunlight

hitting the top of the bottle, there is light in the garage. I have seen it compared to a 50 watt bulb and to me seems to provide at least that much light.

If you have a single skin roof and an area where you want light during the day you too can create one of these little masterpieces, probably out of stuff that you have hanging around, so give it a go! It has worked so well that I am thinking about making a few more to give more light in the garage and even light up a couple of our sheds!



2019 Update

It has been seven years since it was installed and the light is still working. The top has gone a little milky, and I found that the screw cap had become brittle to the point of falling off so that I had to replace it, but the amount of light provided does not seem to have diminished at all.

2025 Update

Yup, it is still going!

9.0 Resources

9.1 Books about Waste in General (Including Zero Waste)

Concern about waste has become a bit of a fad at the moment, the concern is good but clearly it needs to be more than a fad. Anyway, here are some books which will help you to reduce your waste output.

A Zero Waste Life in Thirty Days – Anita Vandyke – Penguin Random House Australia (AUS) 2018 ISBN 978 0 14 379137 9 – I love this little book! It is an easy way into reducing your waste, not heavy on the why, but comprehensive on the how. It sets you up for a thirty day journey, introducing a new strategy every day for a month. You get three options – reduced waste, low waste and zero waste so you can ease your way in. Easy to read, practical and fun to do. No photos, a few line drawings.

Waste Not – Erin Rhoads – Hardie Grant Books (AUS) 2018 ISBN 978 174379462 3 – Another really good, recent Aussie offering. The book is divided into 3 parts: part 1 is "Tools" which deals with the "why" and gives you an idea where to start (usually things start with a waste audit, but her process is different). Part 2 is "Tips"and it is a series of "how to's" around waste reduction including DIY recipes for some foods, cleaners, body care stuff etc. The last part is "Tricks" and covers zero waste travel and also a section called "acting your vision" about what would best be described as activism. Colour photos and line drawings scattered throughout the book.

Zero Waste Home – Bea Johnson – Particular Books (USA) 2013 ISBN 978 1 846 14745 6 – Bea Johnson has been credited with developing the Zero Waste thing as well as putting together the 5 R's (Refuse, Reduce, Reuse, Recycle and Rot). The book starts out with a discussion of the benefits of the zero waste life and the 5 R's, then moves through kitchen and groceries, bathroom and toilet, bedroom and wardrobe, workspace, travel, activism and what the future holds. Lots of tips, DIY recipes and processes you can implement to reduce waste in your life. A couple of illustrations.

Don't Throw it Away – Jan McHarry – Gaia Books Ltd (UK) 1993 ISBN 978 0 7318 0303 5 – An oldie but goodie, which focuses on re-use and recycling of waste. The first part of the book covers ideas and actions at the household (including refill, re-use, repair) and national level including recycling processes and reducing waste. Part 2 is a trip around the world and the recycling practices of 25 countries/continents (Africa is treated as a whole) and what happens to their waste (this bit is probably a bit dated). Part 3 is a recyclers A to Z covering over 100 alphabetised wastes and facts about the waste stream, and what can be done at a personal level to reuse, repair, recycle. A couple of line drawings.

The Throw Away Society – Sally Lee – Franklin Watts (USA) 1990 ISBN 0 531 10947 X – Part of the "Impact" series of books, this one is fairly big picture about the problems faced with waste generation and treatment and some detail on the options. Chapters cover detail on what the problems are (in a chapter titled "In a Heap of Trouble"!) collecting and transporting solid waste then a chapter each a series of strategies including dumps and sanitary landfill, incineration and resource recovery, recycling and ocean dumping (!!!!!). The treatment of hazardous waste is also covered and a very small chapter at the end on possible answers. Interesting but dated. Some line drawings and B&W photos.

Cradle to Cradle – William McDonnough & Michael Brungart – North Point Press (USA) 2002 ISBN 978 0 86547 587 3 – This is another "Big Picture" book but rather than talk about how to treat/recover/recycle/reuse/recycle waste streams, this book argues that the current system is "cradle to grave" – we mine, manufacture, sell, dump resources – and that a whole new system is needed. That system is "cradle to cradle" and that the recovery and reuse of resources has to be factored in at the design stage. On a personal level they also discuss the "5 steps to Eco-effectiveness" and the ways to implement them. An extremely important book in the waste discussion. No illustrations.

Work from Waste – Jon Vogler – Intermediate Technology Publication Ltd & Oxfam (UK) 1981 ISBN 0 903031 79 5 – This book was written to outline strategies for taking waste produced in third world countries and remaking it into new products in what would be

almost cottage industries. The book is in two parts, the first one covering the technologies around remaking wastes from paper, iron and steel, non-ferrous metals, plastics, textiles, rubber, glass, minerals, chemicals, oil and human waste. The second part discusses strategies for turning it into a business including – which waste to use, what you need to start the business, how to collect the waste, process and store it, then market and transport the finished product. It is a bit dated but still a great book. Some line drawings and B&W photos.

Waste Matters – Patricia Armstrong & John Laffin – Gould League of Victoria (AUS) 1993 ISBN 1 875687 06 8 – This is a book of ideas on teaching kids about waste. The book has three parts, the first part – About Waste – is an introduction to what waste is and the problems associated with it. Part two – Some Waste Issues – talks about litter, energy, recycling and waste disposal. Part three, comprising the last half of the book, covers waste solutions, primarily composting for organic wastes and reuse, reduce and recycle for the rest. Lots of interesting activities for kids. Lots of line drawings.

9.2 Books about Composting Organic Waste

Many, if not all, veggie gardening books will have a section on composting which covers the basics and gives you an idea of what composting is all about, but if you want to enquire a bit deeper it can be difficult to find whole books on the subject. Below are some books that I have been able to acquire over the years that may be able to provide deeper insight.

Composting : A Study of the Process and its Principles – Clarence G. Golueke PhD – Rodale Press Inc (US) 1972 ISBN 0 87857 051 9 – If you are after a techo composting book, this is it! It does go through the process in considerable detail with only a graph or line drawing or two to leaven the text. It is a bit dry and some of it is more about an industrial process rather than the home garden, but there is a section on home composting according to the University of California method. Good luck!

Let it Rot! – Stu Campbell – Garden Way Publishing (US)1990 ISBN 0 88266 049 7 – This is a good one, it talks about how to build and where to site a compost bin, covers the raw materials used and what you can use the compost for when it is finished. There is some technical discussion about the process of composting but not so technical I couldn't understand it so you should be fine. There is also some discussion of composting on a larger scale. No photos but a few line drawings.

Backyard and Balcony Composting – Mark Cullen and Lorraine Johnson – Bookman Press (AUS) 1992 ISBN 1 86395 027 3 – This was originally a Canadian book but has been adjusted to Australian conditions. It is another good one covering the how and why of composting, the various types of composter available and how well they work , what should and shouldn't go in as well as a section on troubleshooting. The book does cover the issues with composting in small scale balcony composting, but applies just as well to backyard composting. No photos but good line drawings.

Resurrection in a Bucket – Margaret Simons – Allen & Unwin (AUS) 2004 ISBN 1 86508 588 X – If you are after a compost book that
is really a narrative you can read from end to end, this is the one. There is lots of info and stuff on the history of composting and about the authors particular composting journey. Good book but no photos!

Recycle your Garden – the essential guide to composting – Tim Marshall – ABC Books (AUS) 2008 ISBN 978 073330984 7 – A very good and comprehensive Aussie book that covers building a compost heap, compost ingredients and tools, using worms, anaerobic composting and solving compost problems. Nice drawings and lots of colour photos.

No Garbage: Composting and Recycling – Allen Gilbert – Lothian Publishing (AUS) 1992 ISBN 0 85091 485 X – A good basic Aussie book, plenty of line drawings and some colour photos. The book covers composting how, when and why; soil structure; composting methods; volunteer and community gardens; using compost in the home garden and more. This book is part of the Lothian Australian Garden series.

The Compost Book – David and Yvonne Taylor – Reed New Holland (AUS) 2004 ISBN 1 87633 428 2 – This is a small book with a few colour drawings and rather than being set out in chapter is arranged under headings alphabetically in the manner of a dictionary, making reference fairly easy. There is a paragraph or two on each entry so this is not an in-depth technical discussion but good for those just starting out.

9.3 Books about Dealing with Food Waste

The Less Waste No Fuss Kitchen – Lindsay Miles – Hardie Grant Books (UK) 2020 ISBN 978 1 74379 583 5 – The book is mainly composed of a series of articles a page or two long up to five or six pages long, each one being copiously illustrated with colourful drawings. Part one (The story so far} talks about the current food system and why it is unsustainable, then takes issue with three points where action can be taken: Plastic and Packaging; Carbon Footprint and Climate change; Food Waste and Landfill. It also talks about things like making a food waste diary and making a recycling checklist. Part two talks about why plastic packaging is a problem and develops strategies to reduce it. Part three talks about making climate friendly choices including plant based diet and part four talks about food not waste and keeping groceries out of landfill, including food safety and correct storage. Part Five talks about getting started with your 'less waste no fuss kitchen' including kitchen equipment and food preservation (as well as the ever useful what to do with leftovers). A great book with lots of ideas and lots of colourful line drawings.

Too Good to Waste – Victoria Glass – Nourish Books (UK) 2017 ISBN 978 1 84899 316 7 – This is mainly a book of recipes (over 100) for using up ingredients past their prime or leftovers from the fridge and making stocks and preserves. Part one (Veg Out) has section titles like 'In pod we trust' for broad beans and peas; 'Rooting around' for root crops and 'A bit of squash' for pumpkin and squash. Part two (Getting Fruity) has sections such as 'Going bananas' and 'Berry good'. Part three (from bin to buffet) covers food waste under headings like 'Against the grain', 'Nip it in the Spud' and 'take stock'. Part four (Heads or Tails) with 'Chicken or the egg', ' the ins and outs of it' about

skins and offal, and ‘The fat of the land’ about……. Fats! The book has whole page colour photos every few pages.

Use it All – Alex Elliott-Howery & Jaime Edwards – Murdoch Books (AUS) 2020 ISBN 978 1 76052 568 2 – This book is structured around a series of weekly shopping baskets, 8 in all and provides a series of reci pes tailored to each basket. The idea is you buy only what you need and the book gives you a series of options (recipes) on how to use them, thus eliminating food waste. The is a total of 230 recipes. Each basket has recipes around the ingredients organised under the headings of ‘meals’, ‘sides’, ‘snacks sweets and drinks’, ‘quick preserving ideas’ and ‘nothing goes to waste showcasing innovative ways to use up ingredients and parts of ingredients that may go to waste. Great book with lots of colour photos of the dishes they are talking about.

The Food Saver’s A-Z - Alex Elliott-Howery & Jaime Edwards – Murdoch Books (AUS) 2022 ISBN 978 1 92235198 2 – This is a BIG book at over 500 pages! I has over 150 monographs cover fruits, vegetables and kitchen staples. Each monograph talks about other foods the ingredient can be paired with, how it should be stored and what other ingredients can be used to substitute for it if you have run out. This is then followed by strategies to use up the ingredient once it has passed its prime and then a series of recipes showing how to use up small and leftover quantities of the ingredient. This book is a mine of information on reducing food waste. It has a few line drawings.

Love Your Leftovers – Love Food Hate Waste (AUS) 2011 (No ISBN) – This book was produced by the Holroyd City Council in association with the NSW Office of Environment and Heritage. It is a series of recipes, organised around the leftovers available rather than a desired finished product as would be done in a conventional recipe book. The book is broken up into chapters around bread leftovers; pasta and rice leftovers; meat leftovers; vegetable leftovers; fruit leftovers; cakes and biscuits using leftovers. There is also a chapter where the recipes are ‘so good you won’t have any leftovers’; a chapter on basic recipes like mashed potato, roast vegetables and corned beef plus one on planning, buying food and storing food. The book has lots of colour photos.

No Waste Kitchen – Giovanna Torrico & Amelia Wasiliev – Hachette Australia (AUS) 2019 ISBN 978 0 7336 4118 3 - There is an introduction with some suggestions on avoiding food waste including using the freezer. The rest of the book is taken up with recipes under various headings including part one: vegetables with information on how to use offcuts, parts normally thrown away including things like making radish leaf frittata, tomato skin powder and stock from corn-on-the-cob once the kernels have been removed. Part two is fruit including apple peel chips, citrus peel infusion and pickled watermelon rind. Part three is dairy and eggs with never ending yoghurt, various cheese scrap recipes, egg yolk mayonnaise and egg white meringues. Part four is meat and seafood with beef and chicken scrap stock, fish head soup and prawn shell laksa. Part five is bread and legumes including croutons, stale bread salads and pudding and mixed pulse soup. Finally, part six covers leftovers generally including leftover porridge muesli bars, beef scrap sausage rolls and leftover spaghetti pancakes. The book has lots of colour photos.

9.4 Books about Consumption (and how to reduce it!)

The Story of Stuff – Annie Leonard – Free Press (US) 2010 ISBN 978 1 4391 2566 3 – I have been using 'Story of Stuff' stuff from their website in presentations for years, but only recently found this book. It is set up similar to her presentations, giving considerable details on how raw materials are extracted, turned into stuff, distributed to retail outlets, consumed by us 'consumers' and then disposed of. It is an absolutely fascinating work and has three indexes containing examples of promising policies, reforms and laws, actions which we can take as individuals and a sample letter to PVC retailers, manufacturers and lobbyists. No photos, some line drawings. The website can be accessed here.

The Secret Life of Stuff – Julie Hill – Vintage Books (UK) 2011 – ISBN 978 0 099 54658 0 – This book starts out looking at how we got here, in terms of consumption and the types of raw materials needed to keep things going, how they are extracted and the environmental costs of doing so. She then covers why all this matters and how we

interface with our stuff, then finally where we need to go and how we get there. A comprehensive read at almost 300 pages. No photos or drawings.

A Life Less Throw Away – Tara Button – Thorsons/Harper Collins (UK) 2018 ISBN 978 0 00 821771 6 – This book is written by the CEO of BuyMeOnce, and in parts can (ironically enough) come across as an advert for BuyMeOnce (UK). She is ex-advertising 'industry' and provides a lot of info on how they trick us into buying, and how those tricks may be defeated. She also introduces the concept of 'mindful curation' where you only buy (and look after well) products that are long lived and you really love. The BuyMeOnce buying guide (Chapter 13) is worth a look but will become dated with time. An interesting read, no illustrations.

Minimalism – Joshua Fields Milburn & Ryan Nicodemus – Hachette Australia (AUS) 2016 ISBN 978 0 7336 3908 1 – This written by two guys who, after living the modern life in its consumptive glory, realised they weren't happy and tried to find a better way. The book describes their 21 day kickstarter plan to help you focus on what is important. The cover five essential values – health, relationships, passions, growth and contribution to others and the world. This enables you to take stock of your life, then plan to improve it. No illustrations.

What's Mine is Yours – Rachel Botsman and Roo Rogers – Harper Collins (US) 2010 ISBN 978 0 06 204645 1 – This book is about (buzzword ALERT!) collaborative consumption is 'sharing'. One way to reduce our consumption is to share resources, with our friends, family and even (via the medium of the internet) strangers. Tis book covers why we should be sharing more (part 1 – Context), how old forms of sharing are being revived and new ones developed (Part 2 – Groundswell) and how we can design and implement collaborative consumption (Part 3 Implications). The book as come fascinating ideas! No Illustrations.

Simple Prosperity – David Wann – St Martin's Griffin (US) 2007 ISBN 978 0 312 36141 9 – David Wann is the co-Author of the American version of 'Affluenza' and 'Superbia!'. The book is broken up into 2 sections, the first is Personal Assets, wich talks about the

things which make life worth living from a personal standpoint such as personal growth, social capital, time to do what we want to do, wellness, nature and the value of work and play and how you can maximise them to live a more satisfying and sustainable life. The second section covers Public and Cultural Assets which talks about our neighbourhoods, energy savings, right-sizing our homes and gardens, eating more sustainably and the food system and getting the right information when you need it to live more sustainably. There are a few B&W photos.

Voluntary Simplicity – Duane Elgin – Quill (US) 1993 (Revised Edition) ISBN 978 0 688 12119 5 – Originally published in1981, this is one of the first books pointing out that our consumptive habits were not only not satisfying us, but would get us into big trouble in the long run. The book talks about living a simpler more ecological life, including interviews and quotes from people who are doing it. The meat of the book is covered in the centre section – The Philosophy of Simplicity and its 3 chapters: appreciating life; living more voluntarily; living more voluntarily. It is not about living an impoverished life, but iving a richer life through consuming less. No illustrations.

Just Enough – Azby Brown – Tuttle Publishing (US/JAP) 2012 ISBN 978 4 8053 1254 4 – I LOVE this book! It talks about Japan in the Edo period (1603 – 1688) and how the culture developed to make the optimum use of the resources available to a small island nation. A lot of the thing things we know about the original Japanese culture make so much sense when thinking about living a sustainable lifestyle. The book is fascinating and there are lots of wonderful line drawings which illustrate the concepts being described. It is not all beer and skittles and some things are a bit off putting. Like the use of infanticide to control population levels, but they could be easily sorted out today. A wonderful read!

The Ethical Consumer – Rob Harrison, Terry Newholm and Deidre Shaw – Sage Publications (UK) 2005 ISBN 1 4129 0352 1 – This is essentially a university text describing the ethical consumer and how they can be reached to sell stuff! Interesting. The book explores ethical consumer behaviours and motivations, the context within which the ethical consumers operate, the responsibilities of businesses and the

effectiveness of ethical consumer actions. Chapter 14 on how businesses Can access the 'ethical market' is interesting. Long and somewhat techo, but interesting if you have the will (and time) to trawl through it. Some tables and stuff, but no illustrations.

Share or Die – Neal Harris and Neal Gorenflo (Ed.) – New Society Publishers (CAN) 2012 ISBN 978 0 86571 710 7 – This book is a series of articles about such things as creative options for creating your own job or housing, collaborative consumption, DIY higher education and rejecting the corporate ladder and embracing a 'lattice lifestyle'. It is aimed at those who have just completed 'college' but can provide ideas for anyone looking to live at the edges or outside of the mainstream economy. Fun to dip in and out of rather than a cover-to-cover read. Some line drawings and even a couple of comics.

The New Green Consumer Guide – Julia Hailes – Simon and Schuster (UK) 2007 ISBN 978 0 7432 9630 7 – Rather than being a general book on how to reduce your consumption, this book lists 'greener' alternatives to main stream goods and services. As such it may be a bit dated, but still has some good info. It covers the 'why' in chapter one, home and garden, food and drink, transport and personal matters in chapters 2 to 5 and then do's and don'ts and making a difference in the conclusion – the way forward. Lots of photos, lists, tables etc.

Affluenza – Clive Hamilton and Richard Denniss – Allen and Unwin (AUS) 2005 ISBN 978 1 74114 671 2 – There are actually two other books by this name (By James, 2007 and by De Graaf, Wann & Naylor 2014) but this is the original. The book starts off with what affluenza is and how it got to be such a problem, then goes on to describe the effects of it (debt, overwork and wasteful consumption) then moves on to what we can do about it such as downshifting. No illustrations.

How to Give up Shopping (or at least cut down) – Neradine Tisaj – Hardie Grant Books (AUS) 2009 ISBN 978 1 74066 735 7 – This is a small book (5" x 7" 120 pages) has lots of tips and tricks about keeping your money in your pocket, starting out with the authors personal journey with shopping, why she shopped and working out how she broke her

shopping habits. She talks about running a shopping detox, how sales are not your friend and that credit cards are the devils' work. She then details the road back to conscious spending. A great little book and the 'tips to remember' at the end of each chapter make it easy to use. There are some line drawings.
Spoiler Alert: On almost the last page of her book, Neradine confides in her readers that she has just been diagnosed with breast cancer. I read this about 11:00pm one night and, realising the book was published 10 years ago, the answer would be out there somewhere. She survived and is still alive as far as I know!

9.5 Books about plastic waste

Turning the Tide on Plastic – Lucy Siegle – Trapeze (UK) 2018 ISBN 978 1 409 19298 6 – This would be my favourite book on plastic waste currently! This book does cover issues from the UK perspective. The book is in two parts (halves almost), the first part discusses the authors experience with plastic, how plastic came to be everywhere as is today and the wakeup call for the UK that the author took part in. She also discusses the impact of plastic on the environment and the sorts of single use plastic that cause problems and talks about the 'Everyday Plastic Project. Part two talks about how to address the plastic problem from a personal perspective using a series of 'R's – Record, Reduce, Replace, Refuse, Reuse, Refill, Rethink and Recycle. I found the 'Record' Section to be very enlightening and used her process (slightly modified) to assess our plastic waste problem. A book worth getting. There are no illustrations.

Living Without Plastic – Brigette Allen & Christine Wong – Artisan (UK) 2020 ISBN 978 1 57965 940 0 – The intro discusses the history, and hazards of plastic, particularly single use plastic, answers to the plastic problems that are greenwash, some solutions and the types of plastic out there. The rest of the book is mainly composed of a series of 'swaps' that can be made to reduce plastic in our lives. Each swap is given a couple of paragraphs on a single page, along with a photo on the facing page. The swaps are divided up into five categories: At Home; Food and Drink; Health and Beauty; On the Go and Special Occasions. At the end of the book is a process for a '30 day Plastic Detox

Plan' (sort of like 'plastic Free July' but whenever you want) with each day given a paragraph on what you can concentrate on that day. Starting off with an assessment, then a day each to commit to an 'R' (rethink, reuse etc.) and then each day after gives ideas for reducing your plastic waste (bulk buy, buy naked produce). Not a bad book, lots of ideas and lots of colour photos.

Plastic Free – Rebecca Prince-Ruiz & Joanna Atherfold Finn – New South run by UNSW (AUS) 2020 ISBN 978 1 74223 655 1 – This is the story of Plastic Free July, which is pretty cool! The book is divided into ten chapters, chapter one discusses how the author came up with the idea, chapter two talks about how the first and second plastic free July went and chapter three goes back to how we became a throwaway society. Chapter four discusses the top four single use plastics and how to combat them, some are now covered by legislation here in Aus. Chapter five discusses the issues with plastic and the sea, chapter six talks about how to use PFJ to as a catalyst to keep reducing plastic in your life. Chapter seven talks about 'sharing the challenge' chapter eight talks about how the movement to reduce plastic waste is growing and chapter nine talks about working collaboratively to reduce plastic waste. Chapter ten talks about life beyond plastic, benefits, future generations and imagining a cleaner future. This is an amazing book, well worth getting if you are concerned about plastic waste. The book has no illustrations.

Life without Plastic – Chantal Plamondon & Jay Sinha – Page Street Publishing (US) 2017 ISBN 978 1 62414 425 7 – The authors founded 'Life Without Plastic' a corporation who have been selling plastic free products since 2006. The book has seven chapters, chapter one talks about the authors journey into becoming activists and chapter two is a three page 'quick start' guide to plastic free living. Chapter three is a discussion of the hazards of plastics in general and specifically, according to the plastic type as well as some alternatives to plastics. Chapter four provides a framework and actions that can be used to reduce the impact of plastic in your life, chapter five talks about going plastic free while outside the home. Chapter six talks about methods of sharing your plastic free life with friends, relatives and co-workers, and chapter seven discusses

embracing a life without plastic and the circular economy. The book has lots of colour photos and colour drawings.

Quitting Plastic – Clara Williams Roldan & Louise Williams – Allen & Unwin (AUS) 2019 ISBN 978 1 76052 871 3 – This book has eleven chapters and is very 'how to' on how to reduce your plastic footprint. Chapter one talks about how people have reduced plastic in their lives and includes a list of ten things you can do today. Chapter two discusses the types of plastics, good and bad plastics, microplastics and chemicals in plastics. Chapter three talks about how to start quitting plastic, chapter four discusses getting started and the following six chapters talk about ideas for replacing plastics in: the kitchen, laundry and cleaning, bathroom, clothing, around kids and eating out, respectively. Chapter eleven discusses the possibility of the end of single use plastics and where things are headed, which is followed up by a piece entitled 'what more can I do' and provides suggestions for personal and cooperative action. There are no illustrations in this book.

Ending Plastic Waste – Britta Denise Hardesty, Kathryn Willis, Justine Barrett and Chris Wilcox (Eds.) CSIRO (AUS) 2023 ISBN 978 1 48631 229 0 – This is not so much a personal 'how to' as a series of articles on community projects around the world that have come into being to reduce plastic waste. Chapter one is an introduction by two of the editors, chapter two is about plastic waste, the scale and some solutions and Chapter three is about waste pickers in third world countries, their contribution and risks. Chapter four is a review of nineteen community programs from all over the world that are designed to reduce plastic waste. Each review covers the name, location and contact details, how the program works, the resources they have, the environmental and social benefits, what barriers to their success exist and their scalability and future outlook. Chapter five gives a process for community based waste production identification. Chapter six talks about identifying seed funding for waste projects and chapter seven discusses how to design a scalable project. Chapter seven gives closing thoughts, written by the other two editors. The book has lots of colour photos.

Appendix 1

Family Waste Audit form

Our Family: _____ Date: _____

Your Priority (ies)	Category	Weight in Kilos					
		Week 1	Week 2	Week 3	Week 4	Monthly Total	Yearly Total
	Recyclables						
	Paper						
	Glass						
	Steel						
	Aluminium						
	Compostable Food Waste						
	Non compostable food waste						
	Other compostables						
	Plastic (Cat 1 & 2)						
	Non-Recyclables						
	Plastic(Other Categories)						
	Paper /Cardboard						
	Glass						
	Clothing						
	Big stuff						

Action Plan

Our Priority One Target Category:

Waste Hierarchy	Your Waste Control Ideas/Projects	Who will be involved	When do we want it by
Refuse	• •		
Reduce	• •		
Reuse	• •		
Recycle	• •		

Our Priority Two Target Category:

Waste Hierarchy	Your Waste Control Ideas/Projects	Who will be involved	When do we want it by
Refuse	• •		
Reduce	• •		
Reuse	• •		
Recycle	• •		

Plastic/Product	**Source**	**Status** A = Avoidable U = Unavoidable	**Number of uses** S = Single M = Multi	**Disposal** R = Garbage Bin Y = Recycle bin B = Bag Pick Up K = Keep	**Number**	**Comments**