

WASTE

DESIGN



***The Journal of
Resourcefulness***

Volume 1, 2018



RESOURCEFULNESS

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Introduction

Juliet Arnott

We are waste-creating creatures by nature. We are part of ecosystems that rely on the degradation of waste for health. Yet our current rate of resource disposal is far beyond healthy, and this inculcates our consumption habits. Many people are familiar with the degree to which waste is problematic, and solutions are growing, but these are far from mainstream. For others, waste is not a high priority – it is but one of many complex challenges facing a people and planet in significant suffering.

A variety of indicators in the earth's biosphere suggest that our habits of consumption have significantly contributed to change at a global scale from 1950 onwards, so much so that earth system scientists have named this period the 'Great Acceleration'.¹ This period signifies the beginning of the Anthropocene era, a time when the human imprint on the global environment has become so large that the earth has entered a new geological epoch.²

There is great work being done internationally to find a way forward. We can look to the work of the Stockholm Resilience Centre, the Ellen MacArthur Foundation and others who have found meaningful solutions. We can look with hope and determination to the UNDP's 'Sustainable Development

Goals',³ the circular economy, Caroline Saunders & Paul Dalziel's *Wellbeing Economics*,⁴ and to Kate Raworth's *Doughnut Economics*.⁵

Yet despite the undeniable global impact of the last 60 years, and the incredible work being done to counter this, we, in OECD countries, continue to consume beyond the means of the planet, potentially to the point of an earth system crisis.⁶ Dire as it is, perhaps there is some benefit to reaching this critical point, as scholar and journalist Nafeez Mosaddeq Ahmed suggests:

For the first time in human history, we are standing at a point where we need to basically undergo fundamental systemic adaptation. Exactly what that looks like we're still trying to work out. But what is very clear is what it doesn't look like. It doesn't look like seeing each other as separate material entities that just fend for themselves and produce and consume to an endless degree. It looks quite different.⁷

The Journal of Resourcefulness takes a look at how this 'fundamental systemic adaptation' might translate into our daily lives. This process of adaptation involves considering what the opposite state to wastefulness looks

like. But it can feel confusing and complicated to live according to the things we are not supposed to do: all the waste we are not to create, all the actions we need to avoid for our wellbeing and for planetary health. Is it possible that we can find a way to simplify these necessary demands upon our behaviour? This journal aims to explore the notion of resourcefulness as a vital frame of reference for 'fundamental systemic adaptation'.

When we are able to create what we need from what we have, we are resourceful. When we are resourceful we make the most of our own inner resources while living carefully in relation to the resources upon which we depend. It is an intimacy between us and the planet, one that enables us all to thrive. Resourcefulness is an active state of *doing* that we can all live, involving knowledge and skills specific to place and people. As Kate Derickson states: 'The analytical object of a politics of resourcefulness is the social formation, and the way in which it has produced uneven infrastructure in ways that make world-making so hard for some, and so much less so for others.'⁸ Valuing and using what we have, or could have if we had a politics of resourcefulness, gives us a shared sense of resourcefulness that connects our communities and values what everyone has to offer.

In New Zealand there is recent progress towards one aspect of the systemic adaptation required to enable resourcefulness. In January 2018 the Territorial Authority Forum, a sector group of WasteMINZ made up of 64 city and district councils from around New Zealand, published The Local Government Waste Management Manifesto.⁹ It recommends four main key actions to central government to address the volume of waste going to landfill:

- 1: Changes to the waste disposal levy
- 2: Better waste data
- 3: Container deposit scheme
- 4: Mandatory product stewardship for key products.

These actions would go some way towards genuinely growing a circular economy as a basis for resourceful living.

This first edition of *The Journal of Resourcefulness* explores three main areas aligned with Rekindle's journey towards resourcefulness: waste and reuse, design as a solution, and resourcefulness itself. We are not alone on the journey – this publication celebrates the work of a number of experts in the sphere.

My work as an occupational therapist since 1996, and as a craftsperson with waste since 2002, has given me some understanding of the waste problem, but many unanswered questions remain. With our rate of consumption off the charts, and our lifestyles wasteful, what do we know of how our wasteful habits influence our wellbeing?

This is a given in Māoritanga, as is reflected in this traditional saying or whakatauki: 'E tangi ana nga reanga o uta, e mahara ana nga reanga a taima ta aha ra e whakamahana taku ora kia tina – When the land, river and sea creatures are in distress then I have nothing to be proud of (Ngāti Wai).¹⁰ Māori see that they have a responsibility as kaitiaki or guardians of the te taonga/treasures of te taiao/the natural world. This echoes a world view that regards te taiao/the natural world and te tangata whenua/the people of this place as inseparable, as it is said here: Ko au ko te taiao, ko te taiao ko au – I am the natural world, the natural world is me.

If we were to learn from this, we might see that those of our habits which damage the earth make us unwell too. Over time, this journal series will explore this connection and celebrate resourcefulness as a mutually beneficial, healthy relationship between the

earth and our species by encouraging further discourse, funding and research into resourcefulness and our need for it.

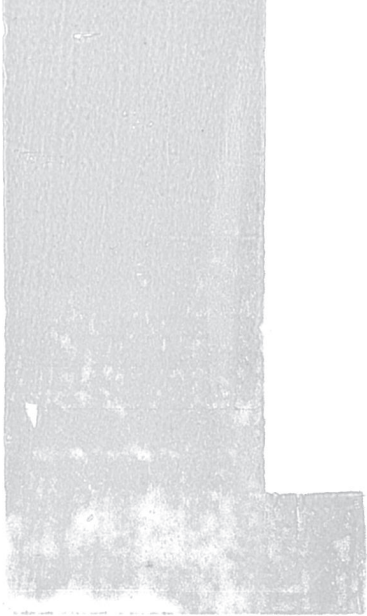
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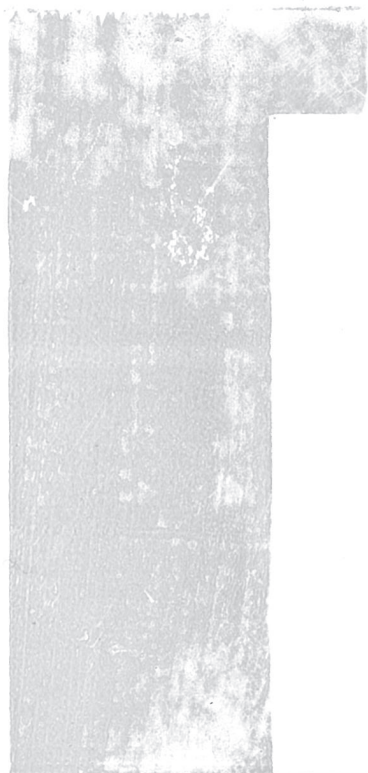


A symbol of the inherent resourcefulness of traditional craft: an Orkney chair made from Orcadian black oat straw grown by Harry Flett, and driftwood found at Marwick Bay on the Orkney Isles, Scotland. Juliet Arnott 2004.

Image by Katy Frances Shields



Waste



WASTE

Rekindle's journey towards resourcefulness did not start out with waste itself, nor with a purely environmental motive. It started with the opportunities waste presents to wellbeing.

In my work as an occupational therapist and beyond this, I have frequently observed the struggle people have when they feel they are living without adequate purpose. Out of all the complex needs I have witnessed, a lack of purpose seems to have the most debilitating and pervasive impact on quality of life. In this regard, I will never forget how terrible it felt to witness people leaving the support of a health service knowing they were going back to the same sense of hopelessness and disconnection.

These experiences made real the relationship between wellbeing and purpose, and it is not surprising to see that research finds purpose to be a protective factor in relation to mental health.¹ During the last decade, research findings have been notably consistent in providing varied evidence that having purpose is so significant to us that it also impacts our physical health. For example, it can extend life expectancy and significantly reduce heart disease, stroke and Alzheimer's disease.²

It was the purpose that I saw in waste that caused me to act – the potential of turning something discarded into something valued. I made an assumption that other people would also find purpose in waste, both because of the inherently rewarding nature of the act of reuse and because we all share the same planetary resources, which are being wasted.

When I saw piles of furniture being taken to the dump, I saw missed opportunities for furniture repair, and all the craft skills and self-worth that go with the successful completion of a project. When I saw timber disposed of in skip bins, I saw lost chances for woodwork projects, building repairs, or small-scale buildings. This waste represented a loss of purpose that was needed by so many, including myself.

This was the impetus for starting Rekindle in 2010 as a social enterprise, initially aimed at addressing wood waste. It began in Auckland with the reuse of demolition timber, which was made into dining furniture and then sold to fund further salvage and furniture making. The Auckland Council Solid Waste team (now the Waste Solutions team) encouraged this work given its concern with construction and demolition timber, which was,



Some of the 250 people who made Whole House Reuse possible, 2014–2015.

Image by Kate McIntyre and Emma Byrne

and is, a problematic waste stream. I continued to work with Auckland Council as they began the roll-out of significant waste minimisation innovation across New Zealand's largest city. This was where I came to know Matthew Luxon, who we have been fortunate to interview for this publication. Matthew is one of the leading voices for waste minimisation in the country. He sees waste management's economic model as the primary barrier to progress, and deems

mandatory product stewardship, a higher waste levy and more strategic spending of this levy as essential to a circular economy.

Despite progress in Auckland, Rekindle and I moved to Christchurch in 2012. Post-quake Christchurch presented an urgent need for a solution to demolition waste, but there were complex barriers in the way.³ For people who lost their homes, workplaces, schools and other places of

significance, demolition waste often seemed senseless and distressing to witness. This waste was caused by many factors including lean demolition budgets that externalised the true cost of this hurried disposal.

But we were able to create a system that enabled salvage before demolition took place. We worked for three years to divert thousands of metres of timber from waste into hundreds of thousands of dollars of furniture and other products – the sales created significant employment for over 20 people. We added value to a resource that otherwise did not have sufficient market value to fund its salvage. In this way, the reuse enterprise delivered in terms of creating employment, promoting the precarious craft of furniture-making, and diverting timber from waste, but it felt like there was a wider, more significant impact. Through feedback from the local community, customers, media and supporters from around the world, we realised that it was the constructive nature of resource recovery and reuse that resonated with people. This rings true with others working in post-disaster settings as Hazel Denhart reflects: 'Building removal does not have to add trauma to a neighborhood. It can act to facilitate emotional recovery through dignity, respect and empowerment.

The approach to the pile on the ground makes all the difference.⁴ This speaks to the unique opportunity that the diversion of waste presents to wellbeing.

Regardless of how right or purposeful it felt to save timber from waste, making the case for reuse over the cheaper, quicker demolition process was difficult because we lacked data to express the economic and environmental case for reuse. We began to address this, however, through our Whole House Reuse project, led by Kate McIntyre with a large team of people. The material of an entire home was deconstructed, photographed, measured and catalogued. The resources retrieved from this loved home were then turned into objects of use and beauty by over 250 people across New Zealand and abroad.

Through the work of Kate McIntyre and the environmental research scientist Dr Atiq Zaman, we now have a means of revealing the value of one whole house's diversion from waste. Dr Zaman's unique analysis of this material quantifies the potential impact of demolition, especially in relation to reuse. This work has already been of use to others in Kaikoura, Auckland, Detroit and London, and it is an honour to publish it here.



Juliet Arnott and Rob Wilson at the Burwood Recovery Park, 2012.

Image by Ash Robinson

Another set of impacts has also emerged. The many people who supported and took part in Whole House Reuse and our other creative reuse initiatives often alluded to the shared purpose they felt in being resourceful. Unfortunately, we did not have the ability to collect that information at the time. The frustrating absence of data in support of resourcefulness as a source for purpose and wellbeing is partly why this journal exists – to encourage more research and funding dedicated to a deeper exploration of resourcefulness and its benefits.

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*The business
of waste*

Interview with
Matthew Luxon

Matthew Luxon, director of zero waste consultancy Envision New Zealand, works at the intersection of public, private and community sectors, which is an environment and challenge he loves being part of. Envision is the agency responsible for conceiving of, advocating for, and supporting the development of Auckland's internationally acclaimed Resource Recovery Network. The agency provides consulting services to councils, social enterprise mentorship and, in 2016, established Resource Rescue – a successful community owned enterprise repairing whiteware. Matthew is on the board of the Zero Waste Network Aotearoa (previously CRN), has a Master of Social Work, and currently lives in Auckland, New Zealand.

When examining the New Zealand landscape in relation to waste and reuse, it is important to consider the key influences on the state of this relationship and to understand the factors that determine what is able to be diverted and why. Currently all New Zealand councils have a waste minimisation goal mandated by central government. But how do we encourage this resourceful movement across other sectors of society – notably in the waste industry and business?

Matthew Luxon, the director of Envision and an advocate for community-led resource recovery enterprises, believes that zero waste takes cooperation between three very different worlds: the public, private and community sectors. We spoke to Matthew about how he came to be focused on

the waste problem; Aotearoa's history of responses to waste; the potential for product stewardship and waste streams that could be harnessed for reuse; the viability of business models working in the sphere; and where we need to go from here to promote reuse more effectively.

To start off with Matthew could you talk about your role and background and how you came to be interested in waste minimisation?

In 2007 my wife and I were living in Toronto and the city was debating what to do about its rubbish. At that time, they were trucking it on 600-mile round trip from Toronto into Michigan in the US and disposing of it in a landfill there. Toronto is a big city – twelve million people live there – and they were essentially driving their

rubbish the distance from Auckland to Wellington and back to dispose of it. They were having a debate about what to do with their rubbish, and their responses included landfill and incineration. No one was really talking about waste minimisation.

This rubbish issue really grabbed my wife and I, so much so that we thought about what we could do on a simple level – what about if we tried to live without rubbish ourselves and see if it could be done? We moved back to Christchurch and in February 2008 started our rubbish-free year. And we lived for one year rubbish free: we would compost, recycle and we would avoid sending anything to landfill. At the end of the year we had about 2 kg of rubbish left. So that was our initial foray into waste minimisation – we knew nothing about the waste industry in its broader context.

Yet one thing we did quickly realise was that rubbish connects us to all these other issues. For example, it feels like a social injustice to extract mineral resources from a developing country, potentially contributing to the resource curse (where developing countries often end up worse off from having significant mineral reserves), just to create a single-use product that ends up in a landfill after a very short amount of time. So, for

me reducing waste in my life was as much a statement about the environmental issues of waste as it was about not wanting to contribute to those social justice issues. To me it seems that social justice and environmental advocacy are two sides of the same coin.

I now consider myself an environmental social worker. I was working in palliative care at an Auckland hospice and heard about the Resource Recovery Network from my wife who was working at Auckland Council in waste minimisation. At the same time, I was becoming aware of the concept of social enterprise, because my hospice job was paid for by the charity stores they operated. I thought, 'Hang on, how is this resource recovery network going to impact these hospice stores that fund my job (and the jobs of others)?'. So I did a scoping study.

Through this process I met Warren Snow. Warren was one of the founders of the zero waste movement in New Zealand (the concept involves reusing everything and redesigning resource systems to divert material from landfill or incinerators), which became an international movement. He invited me to join Envision. After two and a half years working with Warren, I took over completely two years ago. Our work is focused on

supporting the development of community and social enterprises in the resource recovery space, by finding alternatives to the transfer station or landfill model. We work with local authorities, community organisations and social enterprises.

How do you think resourcefulness as a response to waste has evolved in recent times? And what has encouraged or brought about these changes?

Well maybe I will just talk locally, about Auckland. Three years ago, the situation was very different to what it is today. In fact, the change has been incredible. Now that is because so much work was done for many years previous, so it is not as if everyone suddenly switched on – there's been a lot of pushing. But now there is this momentum. And really it comes down to access to the waste stream, which is the biggest issue in Auckland.

The legacy councils of Auckland largely privatised the waste infrastructure in the 90s, so Auckland Council as a super city owns very little infrastructure and has little control over the waste stream (they control about 17 per cent of the waste stream). Despite that, they have a vision of Zero Waste by 2040, which has driven them to try and bring in

strategies and policies that would achieve that goal. The outworkings of that is we are now able to access more areas of the waste stream than previously.

I guess on top of that society is demanding more. Waste providers are also stepping up and responding to that challenge really – to divert where they can.

If you were to frame the problem of waste in New Zealand, what would you say were the determining factors – obviously access to the waste streams is one of them. Are there other important factors?

Yes, the economic model. The underlying economic model of how waste is handled here is, in my opinion, the major issue because everything comes down to money. And this is where the tension lies between private business just trying to be profitable or even just break even in a tough economic climate and the community groups that are environmentally focused or employment focused, so they have a different driver. And then you have councils, who have a mandate to central government to reduce waste to landfill. So you've got three different sorts of motivations.

Ultimately, they all come down to money. I'll give you an example – mattresses. If I have a queen-size mattress and want to get rid of it, at the moment the most cost-effective thing for me to do is to send it to landfill (if I can't give it away). That would cost about \$5 to dump it at the landfill. However, 90 per cent of a mattress can be recycled. We could be salvaging 90 per cent, but the economic model means that the cheapest response is still to dump it.

If we were to bring in something like product stewardship, where when you buy the mattress you pay for the recycling of the mattress up front – say \$1500 for the mattress and another \$15-\$25 for the recycling, then that \$25 would sit there for when you pay the recycler after you are done with the mattress. Then I would go out and I would start a recycling business, because I know I am going to get \$25 and then I also know that I would be able to get income from the recovered material on the commodity market, which goes up and down.

To put it simply, the reason there is no mattress recycling business at the moment is that it is economically unviable. It cannot compete with landfill, which also signifies that landfill is essentially too cheap. The government has done something – in

2008 they put on a levy of \$10 per tonne. But if you look at New South Wales, it's at around \$168 a tonne. You look at the UK it's around £82 a tonne. So not only do we not have mandatory product stewardship, we don't have the levy as high as it could be.

The other really good example of this is bottles – a bottle deposit legislation. The idea here is that when you buy a bottle of Coke, you pay ten cents extra, and when you return that bottle you get the ten cents back. Cash for containers. In Australia it's spreading like wildfire. In New Zealand the packaging industry keeps fighting it but I think that sooner or later common sense will prevail.

Now that would solve two things. It will take litter out of the waste stream but it also provides an underlying model to build recycling and reuse centres. Because if you know you are going to get a handling fee for every bottle that gets brought back to you, the commodity market is a bonus, it is not essential. Then you can do other things on top of that – like potentially recycle mattresses. Because you can make it work economically.

In terms of product stewardship, who do you think is doing good work in this area? Who is

demonstrating the business case for this?

There are thirteen voluntary product stewardship schemes currently operating in New Zealand that are accredited by the Ministry for the Environment. Despite being common internationally (and arguably much more effective), we are yet to introduce any mandatory schemes here.

It is really hard to get a successful voluntary scheme up and running. Aside from the difficulties of getting consensus and buy-in from stakeholders, dealing with 'free riders' (those organisations in the industry that choose not to be involved) and establishing the operational infrastructure that allows the scheme to work, scheme operators need to get buy-in from the consumers, which can involve extensive education campaigns.

With that in mind I think any business or industry that is involved in establishing a voluntary product stewardship scheme deserves full credit for what they have achieved and also for making the financials work. In particular the Resene Paintwise scheme, operated by 3R Group, seems to have done an awesome job of connecting with mainstream consumers and encouraging them to make use of the scheme.

There is a lot of great work being done by non-profit organisations such as the Zero Waste Network, NZ Product Stewardship Council and Entrust Foundation, all of which are advocating for an introduction of mandatory schemes. Local authorities are supportive of mandatory schemes, particularly in relation to beverage bottles.

How do you see recycling relate to reuse? Is it an easier first step?

I get really frustrated with how the word recycling is being used to describe down-cycling. Often no one disputes it when we say that something is off to be recycled, when it is going to be turned into a lower-grade product, which ultimately just delays the trip to landfill. That is not true recycling. I think glass bottles are a great example of recycling, or steel cans – they get turned back into glass bottles and steel cans.

Why then the emphasis on recycling as opposed to reuse or upcycling and so on?

This comes back to the economic model again – without mandatory product stewardship it is very difficult to process materials for reuse and make a profit, or even just break even. That's why it is generally

not-for-profits or community enterprises that engage in reuse over recycling.

I was intimately involved in this as I founded and managed a social enterprise called Resource Rescue. Resource Rescue takes washing machines and dryers and dishwashers from Auckland's inorganic collection and we fix them so that they can be reused as washing machines and dryers. The easiest thing to do would be to strip those items and recycle them. At the moment, you wouldn't get a great return because the prices are low, but when the prices go up, it would be fantastic and it would be a lot easier. But through reuse we are able to create more jobs and highly skilled jobs, so we've got four guys working there now and there is a really clear employment pathway. What we are finding right now is that because scrap prices are low, people are actually saying that the scrap dealer isn't taking their old washing machine and so they are giving it to us. It's easier for us to get them for reuse, but when scrap prices go up, they will be struggling.

When we were starting up I went to one of the major retailers that sells whiteware because out the back of their store they had a massive pile of whiteware, which were trade-ins

– stuff that works, good as gold – heaps better quality than what we are getting to deal with. I said to them can we do a deal and we will take this stuff and we will process it and sell it. They said no, we don't want it competing with our new products. The result is that it all goes to the shredder and gets shredded and recycled. And those items were functioning.

We are actually working with stuff that is very marginal – imagine what we could do if we could get hold of the other materials. It is criminal in terms of the amount of energy that is going into that stuff being shredded and recycled, just so it doesn't compete with the brand new market.

It's economics once again.

Do you think there are particular product industries that would benefit from a product-stewardship focus? Or to put it another way, what is currently going into waste streams that could be reused?

Well the big one is construction and demolition waste – taking away organics of course (you get that out of the waste stream and it's fairly obvious what to do there). But in terms of reuse, construction and demolition waste is the huge one. Timber and all that sort of material – we keep

wanting to crack that, and I know Juliet has certainly given it a good nudge. But again, it is really difficult to make a dollar from recovering timber waste for reuse, or even resource recovery, but there are still some opportunities there.

I think the next step down is the growing tsunami of e-waste. We play around with that at Resource Rescue too. We get a lot of electric plug-in weed eaters, and we are able to fix them and resell them (and all sorts of things like that), but you start messing with power and things get a bit tricky. You've got to make sure that you have the right people to sign off – you need a qualified electrician to sign that off as repaired under the act.

These are the ones that stand out for me.

I think furniture and household stuff is pretty well dealt with, and the whiteware that we are dealing with at the moment seems to be doing alright. There are still opportunities there – there is still heaps of machinery we can't fix. We've played around with taking the drums out of front-end loaders and washing machines and turned them into compost tumblers – but then there is the time and everything it takes. But there are lots of opportunities there too.

So where do you think we need to go from here in terms of promoting reuse? Obviously there is the economic model, but do you see the solutions as being grounded in policy change or levies or funding directed towards studies and education – or a combination of all of these things?

My wife would give a different answer – this is where we differ philosophically. I am all about using the big levers of policy and legislation.

I think it is really unfair to put all the onus on the consumer, who has gone about their day and is bombarded with about 3500 ads a day or something ridiculous, which essentially say 'Buy this, buy this, buy this and your life will be better'. We are asking them to withstand that daily barrage of really clever messaging that millions of dollars have gone into, and then someone like me comes along and makes them feel guilty for having purchased that item – I just feel that is an inherently unfair approach.

I think we need to encourage business to behave in a way where we will get the outcome we want. I don't think businesses are inherently evil at all – clearly, as I run one. And I am all for it, and I am for big business as well – the employment, the advances

achieved for society etc. – these are the benefits. And as anyone would, businesses behave in way that responds to the context they are given. So, I think we just change the context and business will evolve to match it. I am all about the legislation.

I don't think it's right that a big-box retailer can send good, functioning machines off to be scrapped. I think that some legislation would encourage some innovative thinking about that. And with all the skills, logistics and distribution that businesses have, by partnering with artists and craftspeople, they would come up with some great alternatives.

How important do you think funding research around reuse is (the first step towards legislation), as well as viable economic models for it?

Absolutely. If we are going to make any big shifts it is absolutely vital. It is an investment in innovation really – R & D investment – and that innovation, if we are going to fund it, we then expect to drive results. I'd be absolutely fascinated if there was a decent funding stream for us to tap into to be able to try different things.

With R& D, we could potentially address these various waste streams. The default setting is recycling, as

opposed to reuse, and it's not easy either. It's hard running a recycling company and there are some great recycling companies like Reclaim. But imagine if we could incentivise those guys to offer reuse as the first option.

Do you think that subsidising social enterprise is important?

It's a tough one because, by its very nature, when we are talking about social enterprise, we are talking about viable business. There's a certain hunger that comes with having to try survive in the market place, but starving businesses don't help anyone either. So, I am all about start-up or seed funding. But there are some ideas that really shouldn't be funded. I also worry about social enterprise becoming the get-out clause to stop traditional funding – there are some organisations and activities that should just be funded through charitable giving and they shouldn't be encouraged to start a social enterprise, because they simply may not have that expertise.

But the waste space is the perfect vehicle for social enterprise. The thing we struggle with in Auckland is space – Auckland land prices. We have businesses that are viable on every measure apart from paying the lease and this limits abilities. If we could

get funding to help the lease costs for a year or two, that would make a big difference and enable us to see what people could do. Elsewhere in the country there is a lot of funding able to be given out by council, but in Auckland that is not viable. For example, they've got to fund the rail loop, among other things.

There is such a long history of social enterprise and community enterprise in waste and resource recovery in New Zealand. When you think about CBEC starting in Kaitia 25 years ago, it started down this route and since then there has been a whole bunch of them. In the early 2000s a whole bunch opened up such as Wanaka Waste Busters, Xtreme Zero Waste and Innovative Waste Kaikoura. So there is a good legacy of this in New Zealand and it's expanding. In promoting community-led resource recovery, we are standing on the shoulders of those who have gone before us.

So how do we achieve scale and wider uptake of reuse?

For me it is about the economic model of the whole thing, and if we are going to get some scale (and therefore impact), that is what we are going to have to crack. It is just amazing to see what people are doing

around New Zealand with reuse, and the ideas and the innovations. It's tough at the moment, but if we can get through some of these things, like mandatory product stewardship and get some big legislative levers being pulled to make that happen then yeah, the sky is the limit.

Ultimately, we are having to deal with planned obsolescence and having to deal with items that are made cheaply and made in a way that break. And I am finding that with the washing machines. We are trying to fix items that were inherently not designed to last or be repaired. Seven years and they are supposed to just be replaced, and we are trying to keep them going for another seven. I guess we still have to address that issue of the quality of stuff we allow into the country at the beginning and what we are buying, as this directly affects the material we have available for reuse.

*Sustainability assessment
of the 'Whole House
Reuse' project*

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This essay analyses the various benefits and barriers to residential deconstruction in the context of environmental performance and the circular economy based on the case study project Whole House Reuse. This project aimed, firstly, to harvest materials from a residential house, secondly, to produce new products using the recovered materials and, thirdly, to organise an exhibition for the local public to promote awareness on resource conservation and sustainable deconstruction practices. Through a systematic deconstruction process, the project recovered around 12 tonnes of various construction materials, most of which would otherwise be disposed of to landfill in the traditional demolition approach. It is estimated that the deconstruction of

a similar residential house could potentially prevent around 27,029 kg of carbon emission to the atmosphere by recovering and reusing the building materials. In addition, the project invited local designers to produce 400 artefacts using the recovered materials and to exhibit them to accelerate public awareness.

The findings from this study suggest that the deconstruction project not only has significant environmental benefits, but also creates social benefits by involving the local community and unemployed youth as a part of their professional skills development opportunities. However, the project faced a number of economic and institutional challenges. The study concludes that with proper economic

models and appropriate institutional support, a significant amount of construction and demolition waste can be reduced through a systematic deconstruction process. Traditionally, the greatest benefits from such projects are often ignored and remain unreported to wider audiences as most of the external and environmental costs have not been considered in the traditional linear economy.

Introduction

The consumption of natural resources has increased significantly in the past. In fact, the extraction rates of minerals, ores, biomass and fossil fuels tripled globally during 1970–2010.¹ The circulation of global primary materials through trade has grown at an ever-increasing rate over the past four decades and around 10 billion tonnes of materials were exported globally in 2010.² The UNEP's recent report suggests that decoupling of material use and environmental impacts is the imperative of modern environmental policy.³ Material recovery from waste could ease the stress of high dependency on extraction of primary materials. Even in a circular system, we need to be highly dependent on our natural system. A study shows that with a very high aluminium collection and pre-processing rates of 97 per cent

each (which is very high compared to current rate of aluminium collection of 49 per cent) and recycling process efficiencies delivering 97 per cent recovery in the smelting process, only 16 per cent of the aluminium remains in the cycle after ten years.⁴

It was found that homes and buildings in developed countries represent 40 per cent of energy consumption, 38 per cent of GHG emissions and 40 per cent of solid waste generation.⁵ Although the contribution of GHG emissions to the atmosphere would be very low from the end-of-life (demolition) waste considering the whole life cycle of a house, recovering resources could be more environmentally beneficial. Additionally the recovered materials would usually offset the burdens of resource extraction. A study conducted by Blanchard and Reppe showed that a typical residential house in the USA contributes only 0.2 per cent of the total global warming potential from waste and mostly contributes during the construction phase (7.39 per cent) and the use phase (91.9 per cent).⁶ However, housing materials contribute around 63 per cent of carbon emissions during the construction phase, and thus reusing and recycling construction materials would potentially reduce a significant proportion of GHG emissions to the atmosphere.

Demolition generally takes place at the end-of-life phase of a residential building. The traditional demolition process involves knocking down buildings using heaving machines without much care for waste materials – as a result, most of the demolition waste is generally sent to landfill. Demolition is an opportunity lost because lots of useable and valuable materials are lost forever due to landfilling. Yet construction material prices are rapidly increasing and result in higher housing prices.⁷ The deconstruction of buildings, which is ‘systematic disassembly of buildings in order to maximise recovered materials reuse and recycling’ involves carefully taking apart portions of buildings or removing their contents with the primary goal of reuse in mind.^{8,9} Due to the growing awareness of environmental issues and global climate change, a systematic deconstruction is an alternative to demolition. In addition, demolition could positively contribute to housing affordability by reusing and recycling construction materials.

This study conceptualises the key challenges in applying deconstruction to a residential building in New Zealand by considering Whole House Reuse as a case study. It also proposes a number of recommendations for the development of comprehensive

strategies for deconstruction practices in the Pacific region.

Residential deconstruction and circular economy

Deconstruction is not a new phenomenon. In fact, it is a common practice in many developing countries around the world, where the costs of building materials are extremely high and the labour cost is comparatively low. Due to high labour costs, deconstruction is not widely applied in many developed countries. Only a number of studies have been conducted under the form of pilot project and case study analysis to investigate the key challenges and barriers to the deconstruction process. A number of studies found that deconstruction costs could be 17–25 per cent higher than demolition costs due to labour cost and disposal cost (tipping fee and transportation). However, deconstruction could save approximately 37 per cent more than demolition by conserving salvage value (excluding materials storage, inventory, and sales personnel costs).^{10,11,12}

Denhart conducted a study on deconstruction programmes in the USA soon after Hurricane Katrina hit in 2005.¹³ The study reported on the reclaimed materials from four deconstructed houses. The project

redirected around 44 tonnes of building material – enough to build three new buildings. The study found that demolition would cost more: around \$5.50 per square metre instead of \$3.80 per square metre for deconstruction. Deconstruction could even be profitable (at \$1.53 per square metre).

Housing deconstruction could have significant influences on the circular economy, as the fundamental principles of a circular economy include preserving and enhancing natural capital by controlling finite stocks and balancing renewable resource flows; optimising resource yields by circulating products, components and materials in use at the highest utility at all times in both biological and technical cycles; and fostering system effectiveness by revealing and designing out the negative externalities.

Since the construction industry is one of the main global resource consumers and environmental polluters with a significantly low rate of resource recovery from waste, deconstruction could potentially be a restorative system that supports a circular economy. There is an opportunity to foster this through the deconstruction of housing because the process creates employment opportunities,

conserves materials, recovers resources and circulates materials within the construction industrial system. It would also be possible to phase out the negative externalities through sustainable design and construction practices so that there is no leakage in the system and no waste for landfill.

Construction and demolition (C&D) waste management in New Zealand

Each year around 850,000 tonnes of C&D waste are sent to landfills in New Zealand, depending upon the level of building activity (Level, 2014). Although New Zealand had set a zero-waste target for construction and demolition waste, which was to reduce the weight of C&D waste going to landfills by 50 per cent by 2008, it has not yet been enforced as a law and offers no strategies for accomplishing this objective.¹⁴ Flexible and comparative low clean-up rates compared to MSW rates encourage landfill.¹⁵ The C&D waste in New Zealand mainly consists of timber, metal, concrete, paper, glass and other construction materials.

There are many policies in New Zealand that regulate waste recycling and disposal activities. Table 1 (page 34) shows the statutory requirement of C&D waste management in New

Zealand. Among all relevant regulatory policies, the Resource Management Act (1991), the Climate Change Response Act (2002), the Building Act (2004) and the Waste Management Act (2008) would be very important in promoting deconstruction in New Zealand.

Whole House Reuse project

The earthquakes in 2010 and 2011 in Canterbury, New Zealand resulted in much devastation and loss. Ten thousand homes were declared fit for demolition and by 2014, around half of the homes within the residential red zone were demolished. Traditional demolition, which crushes and removes materials in a relatively quick and tightly scheduled timeframe, is the most commonly applied method and homeowners often describe feeling alienated by the demolition process. The Whole House Reuse (WHR) project was initiated and it celebrated the careful nature of deconstruction and enabled products to be made from salvaged resources. The project was seen as an opportunity for examination, transformation and reuse of the often over-looked resources that make up one home.

The house was located at 19 Admirals Way, New Brighton, Christchurch and the project was facilitated by Rekindle

with the support of the Sustainable Initiatives Fund Trust, Creative Communities and Jamon Construction Ltd. A professional team of salvagers from Silvan Salvage and a team of dedicated volunteers undertook the work of carefully dismantling the home, piece by piece. The recovered items were categorised and catalogued with details of quantity.

Assessment of recovered materials

Various construction materials were recovered during the deconstruction process and all materials were catalogued based on the type, volume of the materials and the number of units available. The physical classification and assessment of materials and the potential of recovery were determined using the catalogue based on the following criteria presented in table 2 (page 35). The scores 1–10 were used to rate the materials in the context of reusability, reparability, recyclability and disposal to landfill. A score of 10 meant the item could be reused as is without compromising any material and aesthetic value; a lower score meant low efficiency in reusability and recyclability. The study only considers all low hanging fruits, which require the lowest level of effort to recycle. Thus, the study only considers the materials that scored

Table I
Waste strategy and regulations related to C&D in New Zealand

Legislations/Policy/Strategy	Brief outlines/relevance
The Resource Management Act 1991	The Resource Management Act controls the environmental impacts of waste facilities such as disposal facilities, recycling plants and clean-fills. ¹⁶
The Local Government Act 2002	Solid waste collection and disposal is identified as a core service to be considered by a local authority. ¹⁷
The Climate Change Response Act 2002	This Act also enables the New Zealand Emissions Trading Scheme (ETS). ¹⁸
The revised New Zealand Waste Strategy 2002	The revised New Zealand Waste Strategy sets out the government's long-term priorities for waste management and minimisation. ¹⁹
The Building Act 2004	The Building Act 2004 contains sustainability principles including the efficient and sustainable use of materials and the reduction of waste during the construction process. ²⁰
The Waste Management Act 2008	The Waste Management Act 2008 was introduced to encourage waste minimisation and reduce waste disposal by applying a levy on all waste sent to landfills. ²¹

five or more in the analysis of environmental benefits.

Measuring the environmental benefits of harvested materials

The environmental benefits of harvested materials were calculated

based on energy and associated carbon dioxide emission reduction to the atmosphere. The study used the Inventory of Carbon and Energy (ICE) database to calculate the embodied energy and carbon emission reduction from the recovered materials used in table 3 (page 36). The

Table 2
The scores used to characterise catalogued materials

Scale (1–10)	Description	Interpretation
01	Disposal/landfill	Not suitable for recycling/composting
02	Composting	Suitable for biodegradation
03	Low recyclability	Recycle requires high efforts
04	Medium recyclability	Recycle requires medium efforts
05	High recyclability	Recycle requires low efforts
06	Repair requires high efforts	Substitutes functions with high efforts
07	Repair requires low efforts	Substitutes functions with low efforts
08	Reuse for alternative purposes	Replaces other functionalities
09	Reuse as is	Substitutes similar functions
10	Reuse as is	Substitutes similar functions and aesthetics

calculation used in the ICE database takes the geographical context of the United Kingdom into consideration. Since there is no similar database for the context of New Zealand, the study assumed the context for the United Kingdom and the authors acknowledge that there might be minor errors in the calculation. However, the intention of the article is not to produce a 100 per cent accurate database on the environmental benefits of the deconstruction of a house in New Zealand. Rather, the paper initiates the discussion on the necessity of conducting a wider application, and on the benefits of deconstruction projects similar to the WHR project.

Results and discussion

A. Characterisation of recovered materials

The catalogued items were carefully categorised based on the physical assessment of the quality of the harvested materials and level of reusability, reparability and recyclability. A total of 480 items were catalogued. Only 1 per cent of the materials (mainly shelves) were rated as 10, which means that these items and materials could be reused as is without compromising quality, functionality and aesthetics of the materials. Another 1 per cent of the harvested materials scored 9 (mainly timber and hardboard materials),

Table 3
The embodied energy and carbon emission reduction from C&D materials ²²

Material types	General material		Virgin material	
	Embodied Energy (MJ/KG)	CO2e (Kg/Kg)	Embodied Energy (MJ/KG)	CO2e (Kg/Kg)
Brass	44	2.64	80	4.8
Copper	42	2.71	57	3.81
Aluminium	155	9.16	218	12.79
Lead	25.21	1.67	49	3.37
Stainless Steel	20.1	1.46	35.4	2.89
Bricks	3	0.24	3	0.24
Ceramic	10	0.7	20	1.14
Concrete	0.75	0.107	1	0.15
Glass	11.5	0.59	15	0.91
Masonry	1.1	0.174	1.1	0.174
Melamine	97	4.19	97	4.19
Textile/Fabric	74	3.9	74	3.9
Plastic	80.5	3.31	95.3	3.76
PVC	68.6	3.23	77.2	3.1
Plywood	15	0.45	15	0.45
Timber	10	0.31	16	0.58

which means that these items meet the purpose of similar quality and functionality. Around 7 per cent of catalogued materials scored 8 and most of the materials scored between 5 and 7 (around 70 per cent), which indicated that a significant amount of construction materials (around 79 per cent) can be harvested through the deconstruction process and can be recirculated in the consumption supply chain by reuse, repair and recycle practices.

A number of studies indicate that successful recycling practices require willingness and efforts.^{23 24} Thus, this study considers all those materials that require low efforts as rated 5 or above, based on the assumption that under current recycling practices these items would be easily recycled instead of disposed to landfill. A total 12053.5 kgs of various materials (scored above 5) was recovered, mainly from timber (58.1 per cent), bricks (24.16 per cent) and aluminium (14.16 per cent).

B. Quantifying the environmental benefits of harvested materials

The environmental benefits of harvesting materials through deconstruction were measured by assessing the embodied energy savings and abatement of carbon emission (CO₂e) using the values in table 3. The 'general' material means the item has pre-selected recycled content, which is usually available in the market, and the 'virgin' material means the item has been extracted from primary virgin material. Table 3 shows the embodied energy saving and carbon emission abatement of harvested materials through the WHR project.

Timber was the highest contributor in terms of material saving (58.2 per cent), followed by bricks (25 per cent) and aluminium (14.2 per cent). However, in terms of embodied energy saving, aluminium contributed the most – 75.37 per cent – followed by timber (19.98 per cent) and bricks (2.57 per cent). A total 350977 MJ of embodied energy was potentially saved, and around 18862 kg of carbon emissions (CO₂e) were potentially reduced by recovering materials. In terms of offsetting general materials, around 502,158 MJ of embodied energy was potentially saved and around 27,029 kg (CO₂e) of carbon emission was potentially reduced.

Potentially, the WHR project could save around 139,488 kWh of energy, which is equivalent to the annual electricity use of six households in Christchurch, and the amount of carbon emissions prevented could offset the annual emissions of six passenger cars in New Zealand. Now, using the environmental benefits from the context of the 10,000 homes that were declared fit for demolition in 2011 in Christchurch, a similar deconstruction approach could save around 5,021,580 gigajoules of energy and 270,290 tonnes of carbon emission could be potentially prevented.

New Zealand set national emission reduction targets in July 2015 under the United Nations Framework Convention on Climate Change. New Zealand has set an economy-wide target of 30 per cent below 2005 levels by 2030 (which equates to 11 per cent below 1990 levels). New Zealand also has a longer-term target of reducing emissions to 50 per cent below 1990 levels by 2050 [22].²⁵ Without an alternative and innovative approach, it might not be possible to achieve this emission reduction target. Thus, activities similar to the WHR deconstruction project could potentially prevent a significant amount of national carbon emissions, which will assist in achieving national emission reduction goals.

C. New products from harvested materials: a restorative industrial system

The WHR project was not only limited to resource recovery from deconstruction, but also created innovative products from the recovered materials. The WHR project was sequenced in three different phases: the deconstruction of the house, the creation of innovative products and a public exhibition of the products manufactured from harvested materials. After the completion of the dismantling process, the deconstructed materials were stored for the next phase of project activities. The project involved 282 people, and around 400 objects were produced from the harvested materials in the WHR project.

D. The key challenges and lessons learnt

The project significantly relied on the voluntary work of local community and artists. Around 1105.5 hours were spent to produce 52 objects, i.e. local artists spent an average 21 hours to create new products from the recovered materials. Though around 122 objects were sold at a value of NZD \$43,425, the project may not be economically viable under current market conditions. However, the project indicates that by minimising labour cost

and involving local communities and artists, the products can have the economic value of fostering a wider application of the deconstruction project.

Landfill tax is an important institutional and policy tool to encourage more recycling and less dumping, as it involves costs. Thus, under higher landfill tax, deconstruction activities would be more viable in the context of cost-benefit analysis. Nevertheless, the WHR project was considerably successful in engaging local communities and, to some extent, preserving the owners' attachment to the house through the deconstruction process. Deconstruction not only provides resource recovery but also rehabilitates the memories and attachment with the materials, space and time. The owners of the property stated that 'that was the place we brought our two boys back after they were born and we had fantastic birthday parties and different moments there'. Thus, by harvesting materials and creating new products from the dismantled materials, their emotional attachment to the property was preserved.

The project has significant potential in regards to the circular economy as the project involved man power, creative design and recirculation of

resources within the product supply chain. However, the project would have been more successful if the existing economic system supported deconstruction activities by considering external costs including environmental pollution costs. The key challenges and barriers that can be faced for such projects are listed as follows:

- Finding appropriate volunteers; their available time and commitment in the deconstruction activities is crucial for the completion of such projects.
- Temporary storage of harvested materials was also an issue.
- Ensuring the resale value of new products is an important success factor.
- Commitment and strategic policy from the local authority on deconstruction would make a significant difference.

Therefore institutional and economic support is essential to promote the circular economy through the deconstruction of residential houses. This could be achieved by imposing landfill taxes, supporting local young people and organisations in the deconstruction process and by ensuring

a feasible market for the recycling materials as well as the products produced from recovered materials.

Conclusion

The study presented the deconstruction of a family house in Christchurch, New Zealand. The WHR project showed both the challenges and opportunities in deconstruction processes. Although the deconstruction process has considerable potential for material recovery and environmental benefits, the associated labour costs and resale value of the harvested items would significantly influence the viability of a deconstruction project. The deconstruction may not be completely economically viable under current market conditions, but considering the greater socio-economic aspects and overall environmental benefits in regards to energy savings and abatement of carbon reduction aligned with the national emission reduction targets, the deconstruction process could be an alternative to demolition and an innovative way of dismantling old houses in New Zealand. An alternative business approach involving local community and commitments from local authorities to ensure viable economic conditions could promote deconstruction activities. Since the housing and building industries significantly

contribute to energy consumption, GHG emission and waste generation, a systematic deconstruction process would reduce a massive environmental burden and promote greater sustainability worldwide.

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Design



DESIGN

Our consumption binds design and landfill together in a one-way relationship in which landfill is the silent partner. Much of the landfill waste in Aotearoa New Zealand stems from material that is designed without an environmentally responsible end-of-life solution. Designers, their clients, business, local and central government, and the purchasing public all play a role in what becomes waste.

Without adequate product stewardship, the company responsible for creating a product is not accountable for its full lifecycle, so that, as Richard Sennett wrote, 'The creator's works become the public's problem'.¹ And it is a big public problem, yet in Aotearoa it is not usually us, the public, who deal with our own waste. It is often hidden away out of sight in landfills run by waste management companies.

This is part of the broken loop: we do not have to take responsibility for what we throw away because someone else deals with our discards. It is the lack of accountability in consumption that keeps this long-term relationship between design and waste alive – a relationship that has materialism and disposability at its core, one that has eaten away at our

perception of the inherent value of the resources around us. As Jane Bennett writes, 'buying ever-increasing numbers of products purchased in ever-shorter cycles, is *antimateriality*. The sheer volume of commodities, and the hyperconsumptive necessity of junking them to make room for new ones, conceals the vitality of matter.'²

This *antimaterial* relationship disconnects us from the vitality of the earth's resources, even though we live in close proximity to them. Hyperconsumption and disposal involve a lack of material engagement, as well as a loss of material knowledge and intimacy with the resources around us. Design is partly culpable for this, as Mike Anusas and Tim Ingold suggest: 'mainstream practices of design in western industrialized societies aspire toward a logic of form that reduces our ability to perceive the depth and scope of our material involvement with the world around us . . . The effect is to trap humanity within a vicious circle of increasing environmental alienation . . . as a result, it becomes more difficult for people, rather than less, to follow the material traces and environmental consequences of their activity.'³

It is these material traces that communicate local distinctiveness, an

antithesis to the homogenised. Dr Amy Twigger Holroyd writes about this in her piece 'Finding distinctiveness in the dustbin: engendering a sense of place through waste'. Here she explores the way that locally distinctive waste-based artefacts hold material traces that can be harnessed to communicate provenance, which in turn can provoke awareness of the vital nature of the resource and the care of this. Dr Twigger Holroyd is part of a major research project, Design Routes, which explores 'how design can make a meaningful contribution in developing and revitalising culturally significant designs, products and practices to make them relevant to the needs of people today'.⁴

Design's potential for a positive contribution in this regard is echoed by Anusas and Ingold: 'The role of design in such practice is not merely to "add value" to products by enclosing them in outward forms that appeal to consumer sensibilities in a competitive market, but rather to address fundamental issues concerning the role of human practices in the constitution of environmental relations.'⁵

It was this positive potential of design that I was hoping to tap into when I developed the *Resource: Rise Again* project in 2015. At that time I was reeling with disbelief over

the discovery that our government does not collect data on commercial waste. In fact, according to WasteMINZ's National Waste Data Framework Project for the Ministry for the Environment, 'Only a small fraction of the waste data required for a complete waste account is currently available.'⁶ Again this presents an absence of accountability – disposal is hidden, even though this disposal occurs at considerable scale, given that commercial waste is estimated to produce a much larger volume than household waste.⁷

With this stream of waste from businesses to landfill in mind, *Resource: Rise Again* provided structure, support and funding to enable five design practitioners/teams to engage with commercial waste to produce new, high-quality design outcomes. It was thanks to Creative New Zealand and Auckland Council that this was possible. *Resource: Rise Again* was ambitious in its aim to research, understand and address some of the barriers that exist around the reuse of commercial waste. The teams involved were:

- Designtree Studio
- Clark Bardsley of Clark Bardsley Design & Andrew Mitchener of Mitchener Architecture & Design
- Ambrosia Crum



The Circular Network. Image by RSA Great Recovery and Innovate UK

- Dr Amabel Hunting, Diana Albarrán González & Anke Nienhuis, staff at Auckland University of Technology (AUT)
- Ash Holwell

The project was an exercise in generating and testing new ways to think about reuse of waste, sustainable design and how we relate to virgin material resources and those

already harvested. These teams put a huge number of hours into working through this challenging brief. The results of their work were incredibly varied, and the material and relational explorations achieved were significant. All teams involved would agree that, even at this investigative level and significantly reduced scale, it is an incredibly challenging process to reuse commercial waste.

Additionally, *Resource: Rise Again* affirmed that dealing with waste at a commercial scale through reuse is ethically delicate, complex and potentially flawed. The act of reusing a business's waste felt, in some ways, like we were doing the work for them, building them a logic to celebrate their wastefulness. If businesses are to stop externalising the wider costs of disposal, intervention by central government will be needed.

To really move towards a circular economy there needs to be significant investment in the full network of parties involved across sectors. This complex array of stakeholders is depicted on page 45 by The Circular Network, which was part of the RSA's The Great Recovery – 'a four year investigation, pulling apart manufacturing systems and products to scrutinise the impact of design and new possible routes to a more circular economy'.⁹ They recommend that 'Closer links with the design and material development sectors and resource management should be fostered through a programme of design residencies funded through business partnerships, waste trade organisations and government programmes.'

One designer and educator who has worked in partnership with various organisations, communities

and students, and has thoroughly explored the challenging environmental impacts of design practice throughout her career is Clare Brass. Her piece, 'Designing with values', discusses ways for design to address waste problems from her experienced perspective as the founder of the SustainRCA programme at the Royal College of Art in London, amongst other significant achievements. She describes a way that designers can evolve a values-based approach to their work so that the future of design is responsive to the societal and environmental challenges we face.

For Rekindle's part, the findings of *Resource: Rise Again* echo Clare Brass's sentiments. The project confirmed that, as challenging as it is, design training and practice needs to shift significantly to ensure it is contributing positively to our changing world. Those designers who are able to envision and make real something other than landfill should be given the challenge to do so. If we want designers to distinguish their products from those that end their life in landfill, mandatory product stewardship schemes seem essential.

The combination of stewardship and design holds much potential. If products were designed with their whole lifecycle in mind, and disposal was

less of a cheap and easy option, we would need to care for them. This interaction would reinstate a sense of materiality and foster greater awareness of the environmental consequences of our consumption. It would also catalyse a higher degree of resourcefulness in such skills as care, reuse and repair.

Resourcefulness offers a vital sense of purpose to us, in that each one of us has a role as caretaker, guardian or kaitiaki of the earth's resources. Our current degree of wastefulness means we miss out on this opportunity to care for the earth upon which we depend. What more essential role could we overlook?

Notes

1. R. Sennett, *The Craftsman* (New Haven: Yale University Press, 2008), 4.
2. J. Bennett, *Vibrant Matter: A Political Ecology of Things*, (Durham: Duke University Press, 2010), 5.
3. M. Anusas and T. Ingold, 'Designing Environmental Relations: From Opacity to Textility,' *Design Issues*, 29, no. 4 (2013): 58–69.
4. See page 71 of this book.
5. M. Anusas and T. Ingold, 'Designing Environmental Relations: From Opacity to Textility,' *Design Issues*, 29, no. 4 (2013): 58.
6. WasteMinz, 'Waste Data Needs – Survey Results and Analysis,' 2014, accessed January 24, 2018, <http://www.wasteminz.org.nz/wp-content/uploads/Milestone-One-report-waste-data-needs-analysis.pdf>, p. i.
7. Kees Hyink (Waste & Resources Manager, Ministry for the Environment) email message to author, July 5, 2016.
8. RSA, 'Designing for a Circular Economy: Lessons from The Great Recovery 2012 – 2016,' 2016, accessed January 24, 2018, <https://www.thersa.org/globalassets/pdfs/reports/the-great-recovery---designing-for-a-circular-economy.pdf>, p.2.

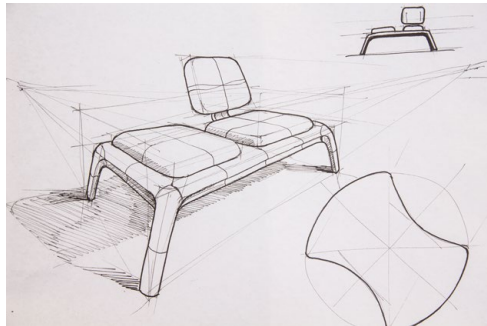
Resource: Rise Again – *the designers' work*

The *Resource: Rise Again* project investigated responses to waste from the business sector, which currently goes to landfill in unchecked quantities. The five teams involved in *Resource: Rise Again* undertook months of work to produce a large body of research and a number of design outcomes, some of which are pictured here. The rest of the research and design outcomes can be found on the Rekindle website in full. We are pleased to present a summary of their huge body of work, and hope that it may influence design in the future.

Designtree

The research carried out by Designtree was immense – an in-depth analysis of more than a dozen commercial waste streams – and demonstrated a great deal of attention to detail. Their thoughtful selection of office furniture and timber waste aimed at addressing the need for a circular economy office. Designtree’s work within *Resource: Rise*

Again would serve well as a model for collaboration between commercial producers of waste and designers. The Designtree team included Rebecca Asquith as senior designer, Tim Wigmore as project coordinator and designer, Louis Rose, design intern, and Daniel Ojeda, design research assistant.



Above: Sketch of concepts.

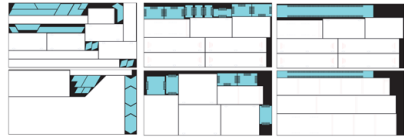
Below: The designed outcome of stacked light, bench seat and desk.

Images by Designtree LTD

Clark Bardsley and Andrew Mitchener

Clark Bardsley of Clark Bardsley Design and Andrew Mitchener of Mitchener Architecture & Design undertook extensive materials research that led them to focus on composite panel waste, which is a commonly found, high-volume waste stream from the construction industry. Their aim was to propose design solutions that are embedded in a broader strategy for dealing with this type of

waste; their design work demonstrated that producers of composite panel off-cuts can reduce the amount of waste they send to landfill by engaging with the design community through their digital tooling. Clark and Andrew developed designs that nest into the off-cuts from a sheet of material before the sheet is cut. This work has been supported through collaboration with Cutshop®.



Left: A stack of finger-jointed crates with mallet.

Right above: The nesting design diagram.

Right below: A wall panel.

Images by Cornelius Geraets

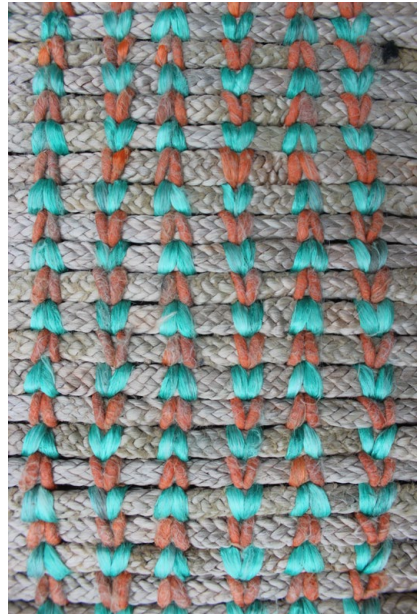
This work has been supported by:



Ambrosia Crum

Ambrosia's research 'specifically explored techniques used in traditional Māori weaving to advise a design process inclusive of modern technologies, contemporary materials and an interpretation of a sustainable future.' In order to use these crafts to inform design, she believes that 'we must first gain an understanding of what they are, what they mean to people, how they developed and how they are relevant to us today.'

Her work was made of a waste product from the Ports of Auckland: an ultra-high-molecular-weight polyethylene, a synthetic fibre called Dyneema®, which is used in ropes, fishing nets, air-cargo nets, bullet-proof vests and helmets, seismic ropes, apparel and many other developing products.



Left: Kākahu – woven from waste rope from Ports of Auckland by Ambrosia Crum.
Right: Contemplation Mat – woven from waste rope from Ports of Auckland by Ambrosia Crum.
Images by Ambrosia Crum

AUT School of Art & Design staff

This team of design educators – Dr Amabel Hunting, Diana Albarrán González & Anke Nienhuis – from Auckland University of Technology decided to focus on the reuse of Kevlar sails, which are predominately used in competitive sailing. These high-value, high-tech racing sails are regularly discarded after being

used in just one or two competitions for competitive reasons. The team was initially introduced to these sails by Cam Malcolm from Explore Group Limited and they have repurposed this material by transforming it into beautiful, ready-to-assemble light shades.



Navigator cluster.
Image by AUT

Ash Holwell

For *Resource: Rise Again* Ash worked with various waste streams from his home town of Whangarei: paper, sand-blasting garnet and waste furniture. His work focused on the large

industrial waste stream of garnet/ almandine sand. Through high temperature kiln firing he turned this undervalued material into glass, which is a world-first.



Above: Waste garnet sand.

Left: Garnet glaze fresh from the kiln.

Right: Finished garnet-glazed vessel.

Images by Ash Holwell

Designing with values

Clare Brass

Clare Brass is the director of Department 22, offering circular economy innovation consultancy and training in pursuit of a better twenty-second century. With a design background, she has expertise in turning environmental issues into entrepreneurial solutions. She was head of sustainability at the Design Council before setting up SEED Foundation, working on user-centred environmental challenges such as food, water and waste. She set up SustainRCA at the Royal College of Art, bringing together business sustainability challenges with creative talent. She is a mentor for the Ellen MacArthur Foundation and has helped countless businesses, enterprises and start-ups apply design innovation, sustainability and circular economy thinking to their work.

I am not the first designer to point out that design is a profession built on the creation of waste. According to Jonathan Chapman, professor and researcher at Brighton University, 98 per cent of the products we buy will be disposed of within six months.¹ But this is just the tip of the landfill site: most of the waste happens at source, with 40 tonnes of waste produced for every tonne of product. Statistically, says Chapman, this is equal to an efficiency of around 1 per cent. Clearly this is a model with no future. Furthermore, our consumerist lifestyles and obsession with growth-based political goals are inextricably linked to the extraction of non-renewable resources and the burning of fossil fuels that release increasing amounts of CO₂ into the atmosphere. Everything we produce,

everything we eat, burns fossil fuel. As we plunge ahead beyond the recommended 350ppm of CO₂ in the atmosphere, the threat of irreversible climate change looms ever closer.

Why then would a person who idolises nature, abhors waste and avoids needless consumption enter into a profession where success depends on stimulating consumption and producing waste? And once inside this profession, what could a designer do in order to escape being a cog in this wheel?

These are questions that plagued me throughout my early career as a designer. When I graduated in 1985, the words of Victor Papanek were already ringing in my ears. Design, he stated in his book *Design for the Real World*,

is probably the most damaging profession in the world, as it encourages people to 'buy things they don't need, with money they don't have, to impress others who don't care'.² And yet I set out to seek fame and fortune in Milan, the design Mecca of the twentieth century. The reason, I came to understand, was to do with the way we are funnelled into careers based on our skills rather than our values.

According to the Public Interest Research Centre, all humans share the same package of consistently occurring human values and whatever our culture, nationality, profession or background, we generally tend towards intrinsic values – those that focus on more inherently rewarding pursuits and lead us to show care for the world around us (as opposed to extrinsic values, which tend to be centred on external approval or rewards). But each of us places more importance on certain values rather than others. In *The Common Cause Handbook*,³ the authors explain how values work, and how they guide our behaviour, shape our characters, and influence our life choices and actions. As it turns out, the more you do things that reflect your values, the more those values are reinforced, and the more you are driven to engage in those activities.

What happens to our values over time? I think that our contemporary educational systems invariably drive you to make career choices based on your skills rather than your values. Your core values get put aside. You have one set of values at home, and follow a completely different set at work.

So that's how it happened that I became a product designer and my own personal values were left to run on a parallel track. From a very early age I had a passionate hate for waste. Spending a good deal of my childhood in the countryside, I loved nature and was horrified by the notion that human carelessness might blight its beauty. But I was good at art and making, so I ended up at art school where I discovered design: a logical progression that posed a fork in the road for my values. I moved to Milan and became an intrinsic part of what Jonathon Porritt calls the 'Hedonic Treadmill'.⁴ I was good at what I did, but I was always more than a little uncomfortable with it. My job (and my success) depended on my ability to help my clients generate revenue by encouraging people to buy aesthetically pleasing things that would soon end up in the bin.

If your values are strong enough, this is bound to cause an internal conflict.

So early on I made a series of professional attempts to address my discomfort. Having explored and briefly developed ways in which I could reduce the negative impact of my profession, I began to look for ways in which I could use my design skills to directly address societal and environmental issues – in other words to *create* sustainability. The kind of work I explored and the issues I addressed – such as designing ways of enabling people to use water more responsibly, or working with former drug addicts to help them develop design skills on a pathway to becoming future craft makers – opened up a fascinating and meaningful world that largely allowed me to work without the constraints of clients. But it was one that was largely subsidised by my ongoing design work – doing a lot of bad in order to be able to do a little bit of good, rather like having my very own corporate social responsibility department in my tiny Milan studio.

I took a Masters in creative business. I needed to prove that it was possible to use my design skills and generate revenue by designing solutions to societal and environmental problems. Sustainability issues are always hugely complex, and the skills of a designer, I came to understand, are not enough on their own. In light of this, I worked with a fellow student,

an engineer, for my final project. Our research revealed that the Milan city council received the most complaints about an environmental problem – dog shit. If you could make money out of dog shit, we reasoned, you could make money out of most other environmental problems!

The resulting project showed every sign of becoming a successful business: it was the highest appraised final project of our cohort and we were offered funding from an incubator. Turning down that opportunity was difficult, but I had proved the point and I knew I needed to focus on more pressing environmental challenges. I also recognised the importance of being able to interact fluidly between business, government and people, a point highlighted in a report by the UK government's Sustainable Development Commission in 2006, 'I will if you will'.⁵ The report highlights the 'gridlock of change' when each of these stakeholders does not perceive any action from one of the others. Since working with public institutions in Italy was proving difficult, I closed my studio and moved to the UK with an ambition to change the way design was taught, to encourage circular (instead of linear) thinking and to nurture a focus on systems rather than products.

I set up SEED Foundation – Social and Environmental Enterprise and Design. Our first piece of research, for the UK government’s Department of Environment, Food and Rural Affairs (Defra), looked at the issue of food waste. At around 7 million tonnes per year, food waste represents up to 40 per cent of total household waste.⁶ ⁷ Much of this is food that could still have been eaten, costing the average household about £60 per month in binned groceries. If you add up the various costs associated with collecting and processing this waste, its estimated value runs into billions of pounds. It largely ends up in landfill, where it contributes to the generation of methane, a greenhouse gas many times more powerful than CO₂. In fact, around 5 per cent of UK greenhouse gas emissions (GGE) come from landfill sites.⁸ This is quite a significant figure. Our research project proposed to divert this waste from landfill and allow it to compost naturally, in aerobic and much less damaging conditions, and allow the local people to perceive some of its value, both in practical and monetary terms.

Partly due to European legislation such as the Landfill Allowance Trading Scheme (LATS), which was introduced in 2007 and created strict targets for biodegradable tonnages as well as financial penalties and

incentives to enforce compliance, local authorities in London are getting better at collecting separated household recycling, with food waste collection systems working effectively for most single dwelling homes. Between 2007 and 2012 avoidable food waste has reduced by 21 per cent, over 1 million tonnes.⁹ But collections from front doors in blocks of flats and other high-density urban dwellings are often too time consuming, costly and, potentially, unsafe or unhygienic.¹⁰ In these areas, particularly in London’s housing estates (government subsidised housing where the city’s most disadvantaged people live), communal food waste containers are provided at central recycling points but are barely used. Waste handlers will not empty containers that are only partially full, with a resulting build-up of decomposing, stinking and fly-infested food waste. Opening the lid of one of those bins to dispose of your food waste is an unattractive experience to say the least, and so the problem is self-perpetuating. This is just one of the barriers to effective food-waste recycling.

Yet when we visited some of these dense inner-city environments, it became apparent that there was an abundance of public space in the form of terraces, rooftops and communal gardens, spaces that offered

an opportunity to create communal food-growing areas.

The FoodLoop project set out to apply service design methods to understand and overcome the barriers to food waste separation and collections in inner-city estates. It began as a government-funded research project, in collaboration with the London Borough of Camden, which provided the project with a location where we could observe peoples' perceptions, create some new ideas for food-waste services and test them out. The Maiden Lane Estate in Kings Cross is a 1970s housing estate, located slightly north of the new Kings Cross development, in central London. Hailed in its heyday as an architectural masterpiece, it gradually fell into disrepair, and became one of the most difficult estates in the borough. 'If you can get people recycling their food waste on Maiden Lane,' they said to us at council, 'you can probably do it anywhere!'

The central question of the project was quite simple: if the connection between food waste and food growing was made explicit, and the value of food waste could be kept local and bring tangible benefits, would people be more likely to separate and recycle their food waste? We began working on the project in 2008, initially

recruiting participants to a design workshop to talk about the issue and to begin co-designing the best way to run a new local service. Of the fifteen or so participants in the workshop, many went on to become key players in a new food waste collection and composting enterprise that was co-designed with the community. A Rocket composter, an industrial aerobic digestion machine, was installed in a disused basement area in the heart of the estate, and through the scheme, residents were provided with a caddy and liners for free. The estate was divided up in to different sections, each led by a different resident collecting from their immediate neighbours on a different day. With the help of local volunteers, food waste was composted on site and the resulting compost filtered and bagged up into a powerful soil improver that was sold through local garden centres under the brand BoostaPlant, helping to fund the project. At the same time a community allotment was established on the rooftop of the estate's community centre, allowing the fertiliser to be deployed directly on site. Any leftover product was offered to those residents participating in the food waste scheme to use in their own gardens.

The co-design approach of the project required the core design team

to learn to work with a truly disparate group of people; an array of other professionals was involved in its development, including social scientists, engineers and business experts. Furthermore, the team had to work closely with both the service users – residents of the housing estate – and those responsible for local policy and waste management.

At around the time this project was kicking off, I began working with the Royal College of Art where I later set up SustainRCA, an independent research unit that aimed to encourage and support students from across the college to take on societal and environmental challenges in their work. The best examples of sustainability thinking were showcased in an annual show, the SustainRCA Show & Awards. The scope and variety of projects I supported were enormous, but it was clear that applying design and innovation thinking to global challenges offered an exciting and entrepreneurial way forward for design. It quickly became clear that many other designers shared my own preoccupation with waste, which has been a consistent and recurring theme over the years. Fortunately, with the advent of new platforms such as Kickstarter and Indiegogo, the start-up world has really exploded over the last decade, providing opportunities for many of

my graduating students to take their ideas successfully forward to provide impact in the real world.

The challenges for designers are two-fold: on the one hand there are values, which need to be brought into the heart of the design process. On the other, there is the challenge of thinking entrepreneurially, which enables you as a designer to escape the traditional client/designer relationship (where the client always has the last word) and develop solutions that go right to the heart of the issue you wish to address.

From a values perspective, if you are designer driven by your values, how do you go about working in this way? It is a bit of a shift from the product and material-focused approach to design, which is based generally on form and function, to understanding and leveraging your values, and using them to develop projects that are based on these values. Designing with values means going beyond the design of an object, and considering the systems that surround any particular product or service. How does the product or service communicate those values to the end user, enabling people to change the way they do everyday things? By searching across other disciplines, I found a number of useful tools and methods to work

more effectively with my values and embed them into the design process. These tools became landmarks in transferring some of these ideas to my students through my teaching activities.

The first step is to understand exactly what drives you, since you are likely to care more about working on projects that are based on your strongest values, and as a result they will be more successful. A simple values tool is *The Common Cause Handbook* mentioned earlier, which asks you to think about what kind of an ideal world you would like to live in and to select from sixty words associated with values the five that resonate with you most. Once complete it should be easier to identify which societal and/or environmental challenges are most attuned to your values. You might, for example, look at the United Nation's seventeen Millennium Development Goals, or choose from the twelve global and interconnected environmental issues that Jared Diamond identifies in his book *Collapse: How Societies Choose to Fail or Succeed*.

Having selected one issue, it is important to then map out visually everything you can find out about that issue, and pick a sub-set of it in order to create a successful response

to it. Such a visual and systemic approach also means developing a better understanding of the connections between various issues, thus enabling a project to touch on more than one issue. A useful way of finding a good business case is to quantify what you have learned and to look for the area where there may be an entrepreneurial direction: where is the biggest problem? And from a design perspective, since some opportunities may be addressed more appropriately through policy or finance solutions, where is the biggest *design* opportunity? From here, rather than trying to 'solve' a problem, the goal is to imagine a different future for that particular issue, and to design towards it. This means that instead of trying to make the problem slightly less bad, you should aspire to changing its very nature to have positive societal and environmental impact.

The notion of 'business', on the other hand, can be quite alien to a designer. The best approach, I have found, is not to get caught up in the business language or processes but to focus on the practicalities of the implementation of an idea. It is generally less daunting to think about this in terms of simple common sense: what do you need to do in order to make it actually work in the real world? When

deciding the shape of a business idea, one of the best ways to understand exactly where the business opportunities might lie is a simple question: who owns the pain? And consequently, where is the biggest opportunity? By researching and mapping out the different stakeholders involved in any particular issue, it is valuable to mark out the flows of resources around the system, and to understand who is 'paying the price' of a particular problem. How much would this 'pain-holder' be prepared to pay in order to get rid of that particular problem? Therein, often, lies the business opportunity.

Within the design community, it is not surprising that waste features strongly as a starting point for many projects, since designers are acutely and increasingly aware of the impact of their professional decisions on the physical landscape. As a result, there is a myriad of entrepreneurial solutions emerging from design schools such as the RCA, which address issues connected with waste. The key is to understand the systems around a particular issue, and redesign those systems to work in new, beneficial ways. So instead of taking waste as a focus point, we should be focusing on how to create circular loops and regenerative systems where materials that are no longer needed become

'nutrients' for new cycles. These may be either technical (inorganic materials that can be endlessly recycled without losing material properties), or biological (organic materials that can be used to enhance the quality of the soil).

An example of where this has been done really successfully is a business set up by Virginia Gardiner in 2010 called Loowatt. It began as an idea for a product during her MA programme in Innovation Design Engineering at the Royal College of Art, when a quantitative investigation about waste led her to find out more about our most abundant and universal form of waste – that produced by every person every day of their lives: human waste. What began as a waterless toilet, made from bedding waste from the Royal Cavalry Stable in Hyde Park, evolved into an exploration of what it means to turn waste into a commodity. By focusing on the cultural as well as the physical systems surrounding the matter of human waste, a business enterprise was created, which aims to provide a multitude of benefits to people and the environment. In our 'flush and forget' mentality, it seems normal for us to eliminate the contents of the toilet completely from our memory and experience as quickly as possible by using vast quantities of fresh



Virginia Gardiner's waterless toilet system, Loowatt. Image by Loowatt Ltd

water to do so. In fact, in the developed world, roughly a third of water consumed goes down the toilet. However, across the world, 2.6 billion people – 40 per cent of the global population – do not have a toilet of any kind.

Virginia set out to create technologies and business models that enable safe, sustainable and profitable waste treatment: a waterless toilet system that would allow developing populations to leapfrog our current wasteful water-based one. In this new system, human waste is collected and composted in an anaerobic digester

(a sealed, oxygen-free environment where methane can be harvested) and turned into a commodity. The methane is a valuable fuel that when combusted turns back into CO₂ and H₂O; the composted human waste is an excellent fertiliser that can provide valuable nutrients to the soil. A pilot project was set up in Madagascar's capital city Antananarivo in 2011 with the help of a \$2m grant from the Bill & Melinda Gates Foundation. The Loowatt Energy System now provides a clean and hygienic toilet experience for countless residents in the poorest neighbourhoods of the city, sealing the waste within

a carbon-rich compostable liner that enhances methane production in the digester. The energy generated from this process is sold for a variety of applications including mobile phone charging and heating water.

A recent agreement with the local waste utility means that over 100 households in Antananarivo now benefit from a waterless toilet installed in their own homes. In further developments, Loowatt began a project in 2016 sponsored by the Humanitarian Innovation Fund (HIF) to adapt the toilet and system solutions for the emergency relief sector. The company is also now offering waterless toilets at festivals and events in the UK and beyond, with positive feedback from festival-goers who describe it as a 'festival-changing experience'.

In another example of values-driven design, textiles graduate Carmen Hijosa sought to address the toxic processes that lie in the origins of leather. She had been a successful designer in the accessories industry, where she learned about the waste involved in the primary raw materials she was designing with. She abandoned her career to find out more about what went on behind the scenes of the fashion world, and to see how she could use her design

skills differently. Her findings, which are still current, were not encouraging: the leather industry is thriving, with demand outstripping supply, and in spite of some advances in more sustainable leather production methods, these remain niche. In the mainstream, tanning remains one of the most polluting industries in the world, with high concentrations of chromium – a powerful carcinogen – sulphides and other hazardous by-products of the process frequently released into waterways. In countries such as Bangladesh, India and China, where environmental protection standards are less stringent, this is leading to severe pollution issues with disastrous consequences on nature and human health.

During a trip to the Philippines in the late 90s to develop the leather industry, she stumbled across pineapple fibres as a raw material in textile production and set about creating a new, sustainable alternative to leather. Although her initial intention was not to start a new manufacturing company, the results of her research naturally led to the understanding that this was the best way to bring about the best possible positive impact. In 2013, she set up Ananas Anam, a business-to-business social enterprise supplying Piñatex™ (a viable, cradle-to-cradle leather substitute) to



Above: The raw material, pineapple leaf fibre, involved in creating Piñatex™ products.

Image by Baby Blanco

Below: Example of products developed for various companies using Piñatex™.

Image by Claire Mueller

brands specialised in footwear, fashion accessories and furnishing.

Piñatex™ is a non-woven material made from the fibres of pineapple leaves – an agricultural by-product found in abundance across pineapple-producing regions. Rather than focusing on ways to make leather less environmentally damaging, Piñatex challenges the very need for it. By doing so, it bypasses the associated resource use and pollution, from feed and pastureland to water, fossil fuels and toxic chemicals. One acre of a pineapple plantation can sustain the growth of 20,000 fruits every fifteen months, making it one of the most productive tropical fruits in the world.

Pineapple farmers can extract the fibres simply and mechanically on the plantation, without the need for additional water or fertiliser. After fibres are extracted, the remaining biomass can be further converted into organic fertiliser or biogas, bringing additional income streams, otherwise unrealised, to local pineapple farming communities. Once de-gummed, the fibres become soft to the touch. They are then industrially processed into a non-woven mesh textile before finishing. At each stage, washing, dyeing and resin finishing take place in a bath, helping to save water and other resources, while enzymes that

remove the gum help minimise effluent. While Piñatex™ was first developed in the Philippines, the vision is for production to be implemented wherever pineapple is cultivated – from Brazil, Colombia and Costa Rica to South Africa and Taiwan. The creation of a polycentric production network can help radically reduce emissions from shipping. By working with established independent farmers and co-operatives, Piñatex™ provides new income opportunities, which stimulate local economies.

I use a third example to illustrate some of the shortcomings and difficulties that might be faced by designers attempting a values-based approach to entrepreneurial thinking. A group of graduates in 2011 took forward an idea that tackles one of the most wasteful and environmentally impactful habits of our time: meat-eating. With growing global populations, increased meat consumption across the world puts pressures on our eco-systems. The livestock industry uses 70 per cent of agricultural land and accounts for 20 per cent of greenhouse gas emissions through feed production, machinery and animal digestive gas. Furthermore, most conventional livestock eat the same crops as people, driving up the prices of staple foods.¹¹ Insects could provide a viable

alternative: they produce nine times the amount of protein for the same amount of food, and they can be fed on by-products of the agricultural industry that is not currently consumed by humans. Insect farming is also considerably less wasteful in terms of energy use – the embodied energy of insect meat is 7 mega joules per portion as compared to 46 mega joules per portion of beef – and in terms of space 5m² per 100 kg for insects compared to 50m² per 100 kg for conventional livestock. Furthermore insects are a well-rounded source of nutrients, being high in proteins, low in fat and a good source of minerals and fatty acids like Omega 3.

The designers' response to this challenge was Ento, a roadmap for introducing edible insects to the Western diet, a cultural leap that could be achieved through a sequence of products and services aimed at steadily building acceptance.

Through their research, the designers became increasingly convinced of the imperative to introduce insects as a staple source of protein to the Western world. The real challenge, they reasoned, was twofold: to change the hearts and culture of a people, and to create the infrastructure that would allow this transition to take place over time. Drawing a parallel with the

meteoric rise in popularity of sushi (containing raw fish), which until not long ago was regarded by the majority as mildly disgusting and is now available in every UK lunchtime fridge counter, they understood that this transition takes time and careful crafting. Their vision included a viable answer to one of humanity's biggest pending crises – food – and a visual roadmap towards this future, allowing time for small adjustments to take place and for trends to set in and new habits to become commonplace. A vision of insects as a staple food that seems, from today's Western vantage point, logical but unattractive and unattainable became imaginable through their careful and incremental transformation of the cultural/societal norm.

Ento was a brilliant plan, and had all the ingredients of being a successful enterprise. The group went on to set up Ento as a business, and began to implement the first phases of the plan. However, in spite of the enthusiasm, talent and planning that went into the project, it failed to attract sufficient and appropriate funding that would support it over the lengthy time frame of its development. It also failed because it looked quite far into the future, which is perhaps typical of a good design project, and subsequently ended up being slightly

ahead of its time. For example, although there is a EU team currently working on the legislation around eating insects, there is, as yet, no legal framework, leaving Ento exposed to legal action should a customer become ill after eating their products. Setting up the supply chain also proved to be another difficulty, with no current suppliers able to provide a regular flow of fresh insect meat to the restaurants they envisaged, which would ensure the all-important quality of taste.

To conclude, the potential growth in design-led enterprises that will work together to change the world for the better, driven by people who are values-led, is exponential. There is a plethora of new entrepreneurial businesses across the world led by values-driven business leaders, which are taking on global challenges such as waste and making a difference. A growing palette of tools and methods, such as values maps and business development tools are driving designers to work in new ways, to think in systems and to consider setting up their own enterprises instead of just designing more products. Since I began working in design education I have seen a monumental shift in attitudes in society, with a greater general awareness of the impact of human activity on the environment

and a better understanding of the need to protect our biosphere in order to improve our own, as well as other species', chances of survival. The landscape for investment is also changing, with crowdfunding platforms making it possible to raise investment from many individual small donors, and a growing number of foundations and 'impact' investors interested in supporting self-sustaining businesses that aim to address societal and environmental challenges. This, together with enormous developments in digital technology, is in turn helping create a new generation of values-driven businesses that will, one by one, create a more considered and less wasteful world.

It is certainly not an easy path, with designers having to draw on all their skills, learn new and more holistic skills, and develop more multi-disciplinary ways of working. There are many obstacles to be overcome, but I am convinced that this is the direction for the designers of the future.

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*Finding distinctiveness in the
dustbin: engendering a sense of
place through waste*

Dr Amy Twigger Holroyd

Before joining Nottingham Trent University in 2016 as a senior lecturer in Design, Culture and Context, Amy Twigger Holroyd was a postdoctoral research fellow on the Design Routes research project at the University of Leeds. Since 2004, she has explored the emerging field of fashion and sustainability through her 'craft fashion' knitwear label, Keep & Share. Her doctoral research at Birmingham Institute of Art & Design focused on amateur knitting as a strategy for sustainability, and informed her monograph, Folk Fashion: Understanding Homemade Clothes (I.B.Tauris, 2017). Amy wishes to thank her Design Routes research collaborators: Professor Martyn Evans (Manchester Metropolitan University), Professor Tom Cassidy (University of Leeds), Professor Stuart Walker (Lancaster University) and Dr Jeyon Jung (Lancaster University).

When we divert waste from landfill, we seek to regain the practical value of the materials we reuse. Yet waste material often carries another type of value, which is easy to overlook: it can provide an important sense of place. In this essay, I will draw upon a major collaborative research project, Design Routes, to discuss the ways in which designers can embed a sense of place in product narratives through the use of local materials and, more specifically, local waste materials.

Revitalising culturally significant products

The Design Routes research is exploring how design can make a meaningful contribution in developing and revitalising culturally significant

designs, products and practices to make them relevant to the needs of people today. Culturally significant products are tangible, durable and portable artefacts that are linked to particular places, employ traditional making processes or are embedded in local ways of life. Their cultural significance is derived from social, historical and aesthetic characteristics valued by a particular community over time.

Today, for a variety of reasons, many of these designs, products and practices are in decline. Yet, across the globe, countless initiatives are seeking to revitalise them. I use the term 'revitalisation' to describe any initiative that brings new life to a culturally significant design, product

or practice, while aiming to retain (or even enhance) the values associated with it. Designers are frequently involved in these initiatives, often playing a key role in shaping the interaction between tradition and innovation.

A central element of the research is the development of an accessible framework, built around a taxonomy of revitalisation strategies, to support key stakeholders engaged in revitalisation. The taxonomy has been developed through analysis of over 400 examples of revitalisation, examining the relationship of these examples to the traditions upon which they build. The strategies identified are organised into eight clusters. The clusters address diverse areas of interest in terms of revitalisation, from sustaining traditional practices through design to initiatives focusing on promotion, skills and enterprise.

One cluster, 'Value of Place', places a spotlight on place and provenance in product narratives. The strategies in this cluster are: *introduce traditional making practice in new place*; *reintroduce lost making practice in relevant historical location*; and *utilise local materials*. The final strategy will be the focus of this essay.

Provenance, terroir and local distinctiveness

Before looking at waste materials, I will begin by thinking about naturally occurring materials and the ways in which they can offer a connection with particular places.

The rush floor matting made by Felicity Irons and her company, Rush Matters, provides a useful first example. Each summer Irons harvests an incredible 3000 bolts of rush from rivers in the English counties of Bedfordshire, Cambridgeshire and Northamptonshire. She then uses the material to produce floor mats, runners and fitted carpets, plaiting the rush into lengths three inches wide and sewing them together with jute twine. These products offer a clear connection with the specific locations in which the rush flourishes, and a readily apparent sense of provenance. Most commonly used with reference to food and works of art, provenance means the place in which something originates, and/or the record of ownership of an item that proves its authenticity.¹ In terms of culturally significant products, provenance can be translated as the story of an item's making.

The rush matting also illustrates another key concept in terms of

products and place: terroir. Conventionally used with reference to wine, terroir denotes 'The complete natural environment in which a particular wine is produced, including factors such as the soil, topography, and climate'.² This specific environment gives the wine its characteristic taste and flavour. The same concept can be applied to other crops – including those, like rush, which are used to make durable objects rather than consumables. The terroir of rush is not limited to the place in which it is grown. The rush, once harvested, must be left out to dry, and the weather conditions during this process affect its colour. 'Prolonged sun gently bleaches to warm honey tones. During windy weather the colours have a more vivid green/blue hue'.³

A different version of provenance and terroir comes into play when material from a very specific source – one with its own historical significance – is used to make a product. British maker Eleanor Lakelin, for example, produces a range of wooden vessels made from the remains of a cedar tree planted by the Duke of Wellington in 1827 at Kingston Lacy, a stately home in Dorset. Similarly, leatherworker Athene English produces a range of wallets using Russian reindeer leather that formed part of the cargo of

a ship sunk in 1786. The 'Stradivarius of leathers' was discovered and salvaged over 200 years later.⁴ Its unique characteristics derive from both the way it was originally produced and the conditions during the time it was submerged.

In some cases, the materials available in a specific location shape the objects that are made there. A prime example is the Orkney chair, a vernacular design created from driftwood and straw with a long curved back to provide protection from draughts. As Bernard D. Cotton explains, the distinctive design of the chair derives from the resources available on the remote Orkney Islands:

On the largely treeless Northern Isles, where wood was harvested as 'found' timber, often on the foreshore, or purchased as an expensive import, straw became an important and effective alternative material from which to make many items for which sawn wood or wicker might otherwise have been used. The straw of the indigenous black oats was used, and the locally grown bent or marram grass was twisted to form a strong cord.⁵

Variation in local materials can lead, then, to variation in local products

and consequently a sense of what British organisation Common Ground describes as 'local distinctiveness'. As founders Sue Clifford and Angela King explain:

Everywhere is somewhere. What makes each place unique is the conspiracy of nature and culture; the accumulation of story upon history upon natural history. . . . The unusual, the special, the idiosyncratic or the rare may be important factors in giving a place a sense of itself – the fortifications, the football team, the fritillaries, the fair. But identity is not bound up only in the symbolism of features and festivals. It is the commonplace that defines – the locally abundant plans, the specific wall-building methods, the accents and dialects – the context that exerts the binding force.⁶

Why is local distinctiveness important? Clifford and King write compellingly of the ways in which a locally distinctive culture contributes to a sense of identity and connection with those around us. This is valuable – research by the New Economics Foundation has investigated qualities which are essential for wellbeing, and identified the importance of a sense of relatedness to other.⁷

Local distinctiveness can be seen as a counterforce to the homogenisation frequently associated with globalisation. Author Paul Kingsnorth describes this homogenisation: 'In each case, something distinctive has been replaced by something bland; something organic by something manufactured; something definably local with something emptily placeless; something human scale with something impersonal'.⁸ Dissatisfaction with this homogenisation is far from rare. Craft writer Grant Gibson describes a number of factors – including a suspicion of big brands and environmental concerns – that have 'persuaded a certain type of (generally wealthy and middle class) consumer to think about provenance'.⁹ Charles Heying, an academic who studies artisan economies, agrees that a contemporary desire for the 'back story' of provenance is leading people to rediscover the importance of place and local knowledge.¹⁰

For an object to offer a sense of place, the 'back story' must be readily apparent. In some cases, the material itself may indicate this story. The variable colouring of the rush matting, for example, carries the implicit suggestion of natural forces. Yet in many cases the detail of an item's making will be hidden, and must be drawn out through effective

communication. As such, this approach of using local materials connects with another cluster in the taxonomy of revitalisation strategies: 'Promotion'. Within this cluster are a series of strategies which enable designers and makers to tell compelling stories – whether through text, image and film; effective branding and advertising; or face-to-face events.

Waste materials

Having established the concepts of provenance, terroir and local distinctiveness in relation to naturally occurring materials, I would now like to turn my attention to waste. Could the detritus of domestic and industrial life provide the same connection with place as materials that have grown in the soil, water and air of a particular location?

Let us first consider provenance: the story of an item's making. I would argue that in this respect the use of waste materials has the potential to enhance a sense of provenance, in that it provides additional chapters in a product's story. This is perhaps especially the case for products made using waste from a very specific source. A small batch of Orkney chairs were made in 1889 using ancient oak beams removed from the roof of the cathedral in the largest town on the

islands.¹¹ The maker, David Munro Kirkness, gave detailed attribution on a label attached to each chair, indicating the high status of this 'special' material.

A similar approach can be seen in the products made by Rekindle using wood from demolished houses in Christchurch. This wood has two layers of meaning in terms of provenance. Firstly, much of it is indigenous rimu and kauri timber logged in the early twentieth century, of a quality that is no longer available due to sustainable forestry practices in place today. Secondly, the material is emotionally significant to the inhabitants of the city, and – more specifically – the owners of the damaged homes.¹²

The use of emotionally significant waste is common in terms of textiles, especially clothing. As sociologist Tim Dant explains, clothes are the objects which play the most intimate and constant role in our individual and social lives.¹³ Quilts have long been made from damaged cast-off garments, with the fragments of recognisable fabric scraps allowing the associated memories to live on. Contemporary designers have developed new concepts along similar lines. The 'Rag Chair' made by Dutch designer Tejo Remy, for example, is made from piles of discarded clothes

held together with black metal straps. Swedish designer Josefin Landälv has created a weave structure that transforms textile waste into a new durable fabric, inspired by the traditional technique of rep weaving.

Can the concept of terroir translate to waste? The work of British designer Will Shannon suggests that this may be the case. Shannon produces Heath Robinson-esque installations that function as prototypes of localised production set-ups. Several of these concepts are based on the use of local waste. For example:

Autonomous Workplace No 004: Mobile Chipboard Factory is . . . a mobile production line, which creates new products from unwanted furniture wherever it sets down. The furniture is put through a shredder making it into rough saw dust that is then mixed together with a 'syrup' to create a papier maché type material. Moulded into the desired shape it then dries into a hard and durable product.¹⁴

At first glance, 'unwanted furniture' may appear to be a homogenous and ubiquitous category. Yet it is possible that the composition of this discarded material – its age, colour, size and so on – would vary from place to place. The 'syrup' produced by

the Mobile Chipboard Factory could, therefore, show subtle variations according to location. This idea prompts me to wonder whether the waste that is abundant in each place could tell us a lot about life in that particular location and thereby represent a type of terroir.

Of course, I am in danger here of becoming overly romantic. Much of the waste material generated today is associated with the 'emptily placeless' material culture of industrial production. While post-consumer waste would arguably bear the evidence of the cultural practices of a particular community, pre-consumer waste is more likely to be interchangeable: eerily consistent from London to Lagos, and lacking in the compelling back story necessary to build a sense of provenance. Realistically, it is difficult to argue that such material offers any inherent sense of local distinctiveness. Yet the work of Gente de Fibra, a craft cooperative from the town of Maria da Fé in Brazil, demonstrates that generic waste can be fashioned into distinctive items that are strongly linked to the places in which they are made. The artisans produce products made from cardboard – a local waste material – combined with banana tree fibre. In this case a type of waste that we might struggle to see as locally distinctive is

given a stronger sense of provenance by being used in conjunction with a naturally occurring local material and local craft skills.

Conclusion

In this essay I have discussed the potential ways in which waste materials, when reused to create new products, can contribute to a sense of place. I have argued that notions of provenance, terroir and local distinctiveness, more usually connected with natural materials, also have relevance to waste.

Many waste materials are rich in provenance; tales of their previous lives can add interest, variety and complexity to the narrative of any newly created item. Yet great effort is required to maintain and pass on these narratives. Provenance will always be precariously contingent on the care demonstrated by the custodians of waste materials. In some cases the unique characteristics of waste arising in a particular place can be seen as a type of terroir, reflecting the practices of making and use taking place there. Other cast-off materials are much more generic; in this situation, effort is needed to develop cultural significance through combination with more locally rooted materials or the use of locally distinctive making skills.

Taking a step back, we might consider how these ideas could shape future practice. Should we seek to extend the practices of reuse described here? The initiatives discussed clearly have merit, encouraging resourcefulness and maintaining or even enhancing the value of waste materials. On the other hand, the impact of these activities on the industrial system is surely minimal. Initiatives that convert waste into locally distinctive products are typically craft-based, and the economics of craft are such that only a small proportion of any industrial waste product could ever be reused. In fact, such initiatives run the risk of disguising the need for more comprehensive solutions by inadvertently offering a façade of responsibility to waste-generating industries. As Simon Fairlie argues, 'Recycling offers business an environmental excuse for instant obsolescence'.¹⁵

On the other hand, locally distinctive waste-based artefacts could have the power to influence change by challenging our attitudes and preconceptions. They show that cultural significance can arise in the most unlikely of settings, encouraging us to reframe our ideas about value in terms of materials. They remind us that materials – whether virgin or reused – come with a back story, a

story that ought to be recognised, interrogated and celebrated. Furthermore, they remind us that materials have a future, potentially lasting far beyond the time that they are in our possession. Perhaps the stories of waste-based provenance and terroir related here would most productively be used as parables: stories with the potential to provoke thoughtful reflection. If people were to recognise and value the unique narratives underpinning the objects that pass through their hands every day – and their own responsibility in caring for those objects into the future – then perhaps behaviours with regard to waste, in all sectors of society, may start to change.

Notes

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Resourcefulness



RESOURCEFULNESS

In 2015, after completing Whole House Reuse, I thought long and hard about whether I would create another project aimed at addressing waste and why, and I came to the conclusion that it was essential to focus on wastefulness because it represents an absence of resourcefulness. This in turn indicated a bigger problem, one often overlooked yet fundamental to both human and planet – the absence of a healthy relationship with the earth. I came to see waste not just as a waste of the earth's resources, but also as a waste of our own resourcefulness. I felt drawn to gaining a much clearer definition of the antithesis to waste; I needed to know 'what causes health (salutogenesis) not what are the reasons for disease (pathogenesis):'¹

The definition I came to is that resourcefulness is creating what we need from what we have, which emphasises the symbiotic relationship of our inner resources and the material/planetary resources around us. The human and non-human are in intimate proximity, as Jane Bennett writes in *Vibrant Matter*: 'admit that the environment is actually inside human bodies and minds, and then proceed politically, technologically, scientifically, in everyday life . . . Give

up the futile attempt to disentangle the human from the nonhuman.'² Resourcefulness reveals that our interactions with the world around us are fundamental to our wellbeing.

Now three years later, the notion of resourcefulness as a healthy state has become central to my work. Rekindle's mission is to continue to create opportunities for resourcefulness. Our work nowadays focuses on resourceful skills, those that enable us to make what we need from the resources around us. We work to build evidence that these skills are essential to the wellbeing of both people and planet.

Seeking to understand resourcefulness continues as a compelling journey, one which brought this journal to fruition. What began as an instinctual and personal response to wastefulness developed with the realisation that there are numerous academics who focus on resourcefulness from differing viewpoints and disciplines, as you can see in table 1 on page 82.

It is Professor T. Hayward's definition, which recognises the 'inner' and 'outward' elements of resourcefulness, especially in relation to our environmental impact, that I see as being crucial. The benefit of resourcefulness is limited if it is only a

Table 1
Selected definitions of resourcefulness

Author, date	Discipline	Definition
D. Meichenbaum, 1977	Psychology	'Learned resourcefulness involves certain attitudes that help an individual to effectively cope with external stressors, as well as to achieve control over problematic and stressful life events.' ³
M. Rosenbaum, & Y. Jaffe, 1983	Psychology	'An acquired repertoire of behavioral and cognitive skills with which the person is able to regulate internal events such as emotions and cognitions that might otherwise interfere with the smooth execution of a target behavior.' ⁴
N. Joubert N & J. Raeburn, 1998	Health promotion	'When one comes to "how to do it" [mental health promotion], there are just two key aspects as well . . . namely resourcefulness (which relates to resilience) and resourcing (which relates to supportive environments). We call this the resourcefulness/resourcing approach. Resourcefulness applies both to individuals and to community. It relates to the assumption that everyone (or virtually everyone) already has the requisite capacity inside them to be resilient. This capacity simply has to be awakened, nurtured, facilitated, supported, or otherwise allowed to operate by means of an appropriate environment. This is where the term "resourcing" applies. The assumption is that provided people have access to an array of relevant, usable, motivating and supportive resources, suited to their needs, wishes, tastes, culture, stage in life, education, state of health, etc, then they individually or collectively are the best arbiters of what they want from life, and are also the best people to be in control of what is required to bring about those ends.' ⁵
World Health Organization, 2005	Health promotion	'As stated almost 20 years ago in the Ottawa Charter, what is needed in order to better address the health, and mental health, of entire populations is actions that primarily focus on creating supportive environments and fostering individuals' resourcefulness and capacity to take control and make healthy choices.' ⁶

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| T. Hayward, 2006 | Political theory | ‘Resourcefulness is an “inner” quality whose “outward” manifestation is particularly relevant in an ecological context. If a major vice of environmentally harmful practices is the profligate use of resources, and rendering into ‘mere resources’ items which should be considered to be of inherent value, then the countervailing virtue can be characterised as “resourcefulness”. Resourcefulness involves the development and exercise of human capacities, and thus fulfils part of the substance of a good human life; it also eases pressure on finite natural phenomena that are needed as resources in (roughly) inverse proportion to resourcefulness.’ ⁷ |
| M. Celinski, 2011 | Psychology | ‘both a personality trait and a process for actualization in a goal-oriented activity that is guided by mastery and self-efficacy; it is associated with confidence in utilization of internal and external abilities, knowledge, emotions, skills and sources of support to manifest ideas and values, and to achieve specific goals (manageability) which inevitably leads to transformation over time.’ ⁸ |
| D. MacKinnon & K. D. Derickson, 2013 | Human geography | ‘resourcefulness is meant to problematize both the uneven distribution of material resources and the associated inability of disadvantaged groups and communities to access the levers of social change. In this sense, a politics of resourcefulness attempts to engage with injustice in terms of both redistribution and recognition towards a vision of resourceful communities, cities and regions. Resourcefulness, as we conceive of it, is better understood as a process, rather than as a clearly identifiable condition amenable to empirical measurement or quantification. As a relational concept, resourcefulness cannot be understood as something communities possess to varying degrees. It is the act of fostering resourcefulness, not measuring it or achieving it, that should motivate policy and activism.’ ⁹ |
| K. D. Derickson, 2016 | Human geography | ‘The objective of a politics of resourcefulness is to produce social relations and associated knowledge that can cultivate and proliferate the capacity of what I call historically marginalized communities . . . to meaningfully participate in shaping socio-natural futures.’ ¹⁰ |

therapeutic aspiration for the individual because this neglects the broader context of the individual's functioning, such as within a community or environmental system.

Although the field of psychology has focused on resourcefulness for more than 40 years, there is still a need to explore resourcefulness as a health-giving relationship between humans and the earth. To overlook the earth's need for us to act as ecological¹¹ or green citizens¹² is erroneous given current realities and the need for 'fundamental systemic adaptation'.¹³

Resourcefulness has a much broader potential impact, which is discussed in 'Toward an interim politics of resourcefulness for the Anthropocene' by Derickson and MacKinnon. They 'offered resourcefulness as a conceptual frame with multiple dimensions as a way of fostering the capacity of historically marginalized communities to conceive of and engender alternative environmental futures'.¹⁴ This quote refers to the potential of resourcefulness to serve as a tool in our adaptation to the material and environmental challenges we face. Perhaps it is time, as Carr and Gibson argue, that our current 'ecological crisis demands more, rather than less, attention to materials and

making processes that constitute our world – in ways that build upon but push beyond existing political-economic frames'.¹⁵ We are delighted to publish their work 'Rethinking materials and skills for volatile futures', thanks to the generosity of the journal *Progress in Human Geography*, where their research into the role of making was originally published.

Society's current focus on Gross Domestic Product (GDP) is discussed by Kim Paton, Director of Objectspace, Aotearoa New Zealand's leading gallery dedicated to the fields of design, craft and architecture, in her piece 'Values of production'. She argues that the reliance on GDP as the primary measure of progress is a cause of neglect of other measures of progress. She discusses the tension between market forces, consumer choices, handmade objects and waste in an industrialised world.

To look beyond our current political-economic frameworks, we must be able to evidence the constituents of wellbeing and demonstrate the fundamental role resourcefulness plays in relation to agency. As Natalie Engelbrecht says, 'Even with the motivation to improve one's life (responsibility) and feeling one can do so (agency), resourcefulness to acquire the tools to create the change are required'.¹⁶

In *Wellbeing Economics* Paul Dalziel and Caroline Saunders suggest that:

In a wellbeing state, agency is conceived as lying primarily with the country's citizens. Citizens are daily making time-use choices they judge will contribute to leading the kinds of lives they have reason to value. The role of other institutions, including central government and the public service, is to add value to those choices, especially by aiming to expand the capabilities of persons to enhance their own wellbeing. This focus on the agency of citizens maintains a place for central government initiatives; indeed a shift towards a wellbeing state does not require or even imply a smaller public sector.¹⁷

Wellbeing is a measure that the New Zealand Treasury's Living Standards Framework is charged with enabling, and 'it includes a broad range of material and non-material factors which impact on well-being (such as trust, education, health and environmental quality)'.¹⁸

The Living Standards Framework (LSF) 'draws on OECD analysis of wider indicators of wellbeing. The LSF is based on four capitals that organise indicators of

sustainable intergenerational wellbeing'.¹⁹ We need to build the evidence base for resourcefulness in order to demonstrate its benefit to wellbeing via all four types of capital – natural, social, human and financial/physical capital.

Aotearoa New Zealand is fortunate to be the home of Māori, who have long-standing resourceful traditions. Through her PhD, Dr Benita Wakefield and her tuakana Miriama Kahu explored ways to apply mātauranga (traditional knowledge) for environmental health outcomes. Their work acknowledges the importance of connection and intimacy with place, and the practices involved in fulfilling the role of kaitiaki or guardian. We are grateful to be able to publish an interview with Dr Wakefield, where we discuss examples of how a healthy relationship with the whenua or land is fundamental to wellbeing, and how a community can collaborate to regenerate this wellbeing.

It is in the deep connection between people and place, between our inner resources and the material resources around us, that we will grow as resourceful people, communities and societies. This journal brings various disciplines together in the hope of fostering a broader, more potent resourcefulness that offers genuine

solutions to the complex challenges we face. To do this we must bring our attention to our intimate and inextricable relationship with earth, as this wise whakataukī says: Ko au ko te taiao, ko te taiao ko au. I am the natural world, the natural world is me.

Notes

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Resourceful Ōtautahi

Rekindle workshops

Skills that enable resourcefulness are found in many forms. Rekindle's Resourceful Ōtautahi initiative began in October 2016 and focuses on craft as a set of skills that enables people to make what they need from the resources available locally. To date the Resourceful Ōtautahi workshops have focused on abundant local resources including felled trees that would otherwise be chipped, and tī kōuka/cabbage tree leaves that are often disposed of to landfill. Utilising craft traditions like greenwood-working and weaving allows us to harness the inherent value in these resources, and to learn a lot, work together and find shared purpose along the way.



Above left: 110-year-old ash trees, which were felled in Hagley Park, being delivered for furniture-making, instead of becoming woodchip, 2017.

Above right: Steve Brailsford & Richard Hare discussing the potential of these trees for wood-working, 2017.

Below left: Steve Brailsford & Richard Hare studying the grain of the Hagley Park ash as it is milled, 2017.

Below right: The process of splitting/cleaving logs, part of the greenwood-working tradition, 2017.



Above left: Some of the team involved in establishing the Rekindle greenwood-working workshop, 2017.

Above right: Team appreciating the Hagley Park ash after steam-bending, 2017.

Below left: One part of the greenwood furniture commission for the Christchurch Arts Centre, made with Hagley Park ash, 2017.

Below right: One of the resourceful skills groups in our workshop, 2017.



Above left: Greenwood stool with Hagley Park ash & elm,
one of the Rekindle workshops, 2017.

Above right: Making string with tī kōuka/cabbage tree leaves, 2016.

Below left: Greenwood spoon-carving, one of the Rekindle workshops, 2016.

Below right: Basket made from tī kōuka/cabbage tree leaves, another of our workshops, 2016.

Values of production

Kim Paton

Kim Paton is the director of Objectspace in Auckland, the only public gallery in New Zealand dedicated to craft, design and architecture. She studied in fine art and business management, and has previously held academic positions at Massey University (Wellington) and Wintec School of Media Arts (Hamilton) where she was appointed head of research. She has curated and written extensively on craft and contemporary art, and is co-author of the book Contemporary Jewellery in Context, published by Arnoldsche Art Publishers and released in July 2017.

It is easy to overstate the simplicity of the idea that our consumer behaviour has the power to affect change, that allocating our personal resources is an easy embodiment of self-determination and freedom of choice. It is an idea that is marketed to us daily by retailers, who advertise where, and from what, something is made, and under what conditions it is produced.

Sometimes the decision before us is obvious. In the case of free-range and caged eggs at the supermarket, the trade-off is easy to understand: like-for-like products presented side by side on the shelf. One choice offers the promise of animal welfare, the other offers greater affordability.

Other decisions are more complicated. How do we compare the environmental impact of one material with another? What is the difference between labour conditions in a clothing factory in China compared to one in

Bangladesh? What is the actual environmental benefit when we opt for the additional charge to offset carbon with a purchase? What influence does the wider economic system have on advancing consumer choices that broadly benefit Gross Domestic Product (the measure of all goods and services bought and sold nationally within a set timeframe) while neglecting environmental impacts and other social values?

Theories of consumer choice, competitive free markets and the benefits of trade underpin neoliberal economics. Broad beliefs that open, international markets are beneficial to economic growth and welfare have promoted an economic system almost entirely reliant on the production and trade of 'things' as a key instrument to its success. The theory of consumer choice illustrates influences on the demand side of the supply-and-demand curve. Observing

the economic principle that people face trade-offs, we can see that an individual's preferences are constrained by their financial resources. Given these constraints, the consumer does the best they can to achieve the highest level of satisfaction in the act of consumption.

In the introduction to the 1981 book *Craft New Zealand: The art of the craftsman*, potter Doreen Blumhardt describes generations of New Zealanders, since the early 1900s, who had grown up 'lacking discrimination' as consumers, subject to cheap goods produced in factories in Britain. Blumhardt notes the impact of the dehumanising trends of industrialisation in a 'hedonistic society', indifferent to craftsmen and the work they produced.¹ Even though craft offered particularity, longevity and skilfully handmade products – an alternative choice to the mass-made, generic and soon-to-be-obsolete goods – it could not escape the forces of the market, nor those involved in the production of goods. This is perhaps still its greatest challenge today.

Critics of the consumer choice theory highlight its propensity to assume that an insatiable desire for consumption is normal behaviour,² as well as its failure to address the changing nature of what motivates

the production of goods in contemporary culture, which economists Philip B. Smith and Manfred Max-Neef describe as the 'inversion of production and wants'. For the greater part of the twentieth century, goods and services were produced to satisfy consumer needs and, to a lesser degree, wants. Today production drives consumer wants:

The mouths of economists, but also all manner of other pundits, are today full of necessity to increase productivity, so as to increase production, in a society drowning in things that are not needed and could not be sold were it not for the ever-present influence of advertising.³

Economist Richard Denniss describes this shift as the construction of scarcity. Counter to the long-held position that price is the most powerful lever of supply and demand, recent cultural change has normalised wasteful consumption in large part due to widespread advertising and the uptake of luxury goods. Human desire, and the myriad nuanced ways these desires are inflamed through marketing, has become a major force on demand.

The singular use of GDP as the measure of economic growth, despite sustained and decades-old opposition to

its shortcomings, further illustrates our obsessions with the buying and selling of stuff. This statistical measure, which estimates the value of all goods and services a country produces within a defined time period, is used more than any other indicator by governments to communicate to the general public changes to economic growth.⁴ GDP is estimated by adding together the value of all goods and services produced in an economy. It incorporates everything we spend money on regardless of whether the impacts are positive or negative. It includes goods bought and sold in the retail sector, the extraction and sale of natural resources and the cost of civic infrastructure. Similarly, it includes the cost of traffic accidents, environmental disasters, and the thousands of tonnes of food and material goods purchased and then sent to landfill every year.

In a 2016 article in the *New York Times* Denniss describes the recent decision by the Australian government to allow a private company to open the largest ever coal mine in the country to illustrate the political power governments exercise in the argument for improving GDP. Burning coal is the largest single source of greenhouse-gas emissions in the world, and the particles released from its combustion are a major source of air pollution. The folly of

this scale of investment in a non-renewable resource despite increasing international efforts to reduce coal mining is difficult to comprehend. The environmental harm and impact on human health are undisputed, yet the creation of jobs and short-term increase in exports will have a positive impact on Australia's GDP.⁵

GDP doesn't include the value of household work or volunteering, or services extracted from the natural environment for free – the sale of natural resources such as timber, coal or oil are included, while the degraded state the environment might be left in is not. Changes to the economy and the way goods are bought and sold further problematise GDP's usefulness as a tool. It may tell us how much of something was bought and sold but not who it benefits (consumption could be concentrated in the top one percent of earners, for example), or how it effects employment. Increasing automation and online sales may increase productivity and economic growth but they could also have a negative impact on employment. Denniss suggests GDP cannot provide a meaningful measure of progress, rather it is an indicator of activity, good or bad:

The problem isn't that we measure GDP. The problem is the way that

GDP is used in political debate. Collecting data on production, consumption and investment is a great idea, but determining the success of a country by reference to GDP is like judging the success of your kid's birthday party by measuring how much you spent on the catering.⁶

Within what is now a mainstream and accepted culture of consumerism, it is arguable that craft's perceived position and value within a contemporary society could be measured by its impact on the market.

Craft New Zealand, the book discussed earlier co-authored by Doreen Blumhardt, is a celebration of craft's increasing popularity in the second half of the twentieth century. It was a time preceded by the influence of refugees from Germany, Holland and Scandinavian countries, many of whom were designers, architects and artists, and brought with them experience of the Bauhaus philosophy. Numbers of craftspeople increased at this time, and a proliferation of craft shops opened throughout New Zealand selling only handmade goods.

The richly illustrated book features sculptural work, functional

homeware, theatrical props, book binding and interior design side by side. It is a summary of practice not necessarily dissimilar to craft practice today, yet the book describes an optimism and possibility for craft's future: contributing to modern urban life and equally to a successful economy offering consumers alternatives to machine produced imported goods. Blumhardt champions a craft that is integrated into every area of life.

In the groundswell of the studio craft movement it is not difficult to imagine Blumhardt and others of the time foreseeing a trajectory for craft that kept moving in the same upward direction. Yet its popularity continues to fluctuate in no small part due to its difficult proximity to the market. In the expanse of options from every corner of the world available to consumers, in every price category imaginable, craft's point of difference has always been the same - buy handmade, buy local, support the artisan. Its reasoning holds up today as it did 40 years ago, but its plea can seem quaint and idealistic when we consider Dennis's view that wasteful consumption is now a cultural norm.

In the last decade craft has experienced a rise in popularity again. Craft objects, particularly homewares, are prominent in design stores, and these

have shed the worn out 'Buy New Zealand Made' campaign in favour of a share in the luxury market for the conscious consumer. Writing on basket maker Ruth Castle in 2015 (who also featured in *Craft New Zealand*), art historian Damian Skinner notes that 'since 2012 Castle's work has sold not through any of the remaining craft galleries that are the legacy of the 1970s and 1980s' but through an interior design store in Auckland catering 'to people who appreciate beautiful, often handmade objects designed to be used, and which defy the obsolescence of most consumer goods through their quality and longevity.'⁷

While craft continues to evolve, its demonstrable commitment to responsible resource use abides today. With the rise in craft's popularity within the conscious consumer movement, and as a response to wasteful practices, Rekindle's 2016 project *Resource Rise Again* was created to engage professional craft and design practitioners to develop new work in response to wasted resources in their locality. The brief required that participants work through a rigorous process of engagement and investigation with new materials, as well as design and craft skills and other making technologies. At each stage of the development and production cycle participants were required to establish working methodologies that

would sustain their project long-term and achieve the objectives of the wider framework: to draw on craft practices that could contribute new solutions for the waste material, to establish meaningful relationships with waste producers, and to consider alternative approaches to employing labour.

In selecting five design teams comprising of professional designers, architects, academics and craftspeople, the project demonstrated not only ambitions to draw on the symbiotic relationship that already exists between creative making practices and resourcefulness, but to also engage more aggressively with developing a product that could be viably introduced into the commercial market.

In early 2017 practitioners presented their varied findings from the first fifteen months of research and testing. Their outcomes demonstrated the extraordinary challenges of this kind of brief, particularly when the scrutiny of the entire production cycle is kept in close view. Dr Amabel Hunting, Diana Albarran Gonzalez and Anke Nienhuis worked with sail cloth from the sailing industry, ultimately designing a series of light shades. The lights are thoughtfully designed and make good use of the cloth's translucent properties. More striking though is the design team's description and documentation

of working with the raw material. With each sail reaching more than 10 metres in length, it was heavy and cumbersome to transport and move around. Details that could easily be overlooked early on, such as how to clean and cut the material challenged the design process, ultimately impacting on the choices available to the designers in seeking a viable outcome.

The most refined of the projects, *Split*, designed by industrial designer Clark Bardsley in collaboration with architect Andrew Mitchener, utilised excess waste from the commercial CNC cutting of MDF laminates. They produced a series of wall tiles and hanging panels for architectural and acoustic surface specification rendered in hues of bright blue (or any colour a client might specify) and able to be configured in any number of compositional designs. The accompanying working drawings illustrate the designers' reconfiguration of the cutting files for MDF sheets moving through the CNC machine, populating the gaps and unused spaces with new shapes and forms.

Designer Ash Holwell investigated outcomes for garnet sand used for sandblasting in the painting industry. Taking a raw material with less obvious appeal, Holwell experimented with ways to improve the reuse

capacity of the sand, removing grit and unwanted particles that accumulate with blasting, thus increasing the working lifespan of the material.

Arriving at a solution that appears deceptively simple to achieve, Holwell, like the other four design teams, required more time and investment to comprehensively illustrate an analysis of what would be required to see the project implemented on scale throughout the industry, and what the true implications on technologies and labour times would be.

Denniss suggests that we have arrived at a threshold of materialism where we cease to recognise and value the life span of a thing, where disposability is determined by the changes in preference and taste of the user rather than the objective usability that remains within a product. It is no surprise that *Resource: Rise Again* might look to the waste product in an effort to offer an alternative to accepted norms of consumption, which have driven the enormous growth in the production and disposal of the stuff we use in daily life.

The mixed outcomes of the project illustrate the challenges ahead; the circuitous path to changing consumer behaviour is, in the short-term at least, the offer of more choices. This

returns us to the aisle at the supermarket and the free-range eggs. It's taken more than three decades for free-range eggs to assume a competitive position alongside their caged counterparts. Producing a worthy product or process is one small part of a very large system. Consumer goods with environmental and ethical attributes appear in almost every retail market from fashion and food production to construction, and their most potent challenge is to tackle what craft has never possessed on its own: the scale and suitable business model to achieve popularity in the mainstream, the ability to create goods and services that offer true benefits and are widely affordable, accessible and desirable to people across the spectrum of household incomes.

Resource: Rise Again occupies a place in this territory. Arguably the project's most striking and still-to-be-tested innovation is to situate the maker and the handmade in an uncomfortable position. To require them to seek out mechanisms to operate within a commercial market, to collaborate with an unlikely material producer, and to learn from what consumer behaviour is telling us about our now distant relationship to the material properties of the things we use and consume in daily life. It takes the spirit of Blumhardt's vision for craft as a proponent of things that prioritise longevity, quality and usefulness and demands we imagine them rendered in large scale and in clear view.

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*Rethinking materials and skills
for volatile futures*

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Making is fundamental to our being – as humans we make bodies, homes, identities and memories every day. As a society we make landscapes, cities, decisions and structures for governing. And in daily work, the stuff that surrounds us is made. Successive decades' focus on financialization, digital technologies and the 'knowledge' economy has nevertheless muted discussions of the ways the material world is produced.¹ And yet of course, across the world, millions are still occupied making material objects. Meanwhile the rise of 3D printing and smart robotics, increasingly complex commodity chains, and shifting labour processes all suggest a radically reconfigured world in which the things around us come to be via challenging methods and routes.² Such shifts in the sites, means and methods of production

alone demand intense scrutiny. In this article, we seek to shift the focus even further, onto the making that produces the physical world around us, suggesting new – and urgent – research agendas, for geographers concerned with making amidst increasingly volatile environmental futures. Our argument is that ecological crisis demands more, rather than less, attention to materials and making processes that constitute our world – in ways that build upon but push beyond existing political-economic frames.

A focus here on making as a cultural and economic process is a deliberate attempt to reframe some of the more orthodox thinking about economy and society – where the presumption has been that a broad shift in the character of the contemporary

economy has both euthanized manufacture in the Global North, and excised material production from tasks of design, intellectual property and marketing.³ That shift arguably first emerged with the demise of the guild system, where early industrialists argued that innovation was being constrained by the dominance of carefully guarded oral and haptic methods of skills transfer – and thus separated intellectual functions from material production, social and spatially.⁴ It gathered pace in post-war industrialized countries where capitalists, in efforts to fragment and extract maximum value from labour, re-organized modes of production – and the shop floor – to separate ‘mind’ tasks (design, finance) from ‘body’ tasks (assembly, manual fabrication).⁵ In time the embodied tasks of manual labour were typecast as repetitive and even demeaning, while the mind tasks became associated with higher levels of education, skill, economic value and intellectual satisfaction.

Beyond such generalizations, the relationship between manufacturing and other fragments of capital has become even more complex and often confrontational.⁶ In the Global North, twenty-first century financialization processes have either stopped the making, or placed it elsewhere. So persistent is the binary of ‘old’

and ‘new’ economy,⁷ and associated dialogue around shifting to a post-industrial future, that making has arguably entered a realm of shame. Depictions of this popular narrative arc draw variously on images of the maligned cities of the US rust belt⁸ or scenes of despondent manufacturing workers filmed leaving their workplaces after the announcement of yet another factory closure. The implicit suggestion is that material knowledge and work is increasingly peripheral to the formal economy. Places with strong industrial histories see manufacture as a burden of the past to be jettisoned through place marketing campaigns or creativity strategies – or they are simply blamed for their perceived ‘failure.’⁹ Meanwhile changes to city morphology and increasingly complex and opaque international commodity chains results in production, once visible in the built fabric of cities and towns, becoming ‘black-boxed’ or moving away entirely.

Yet, material production remains persistently central to human life. Making material things continues to drive global resource extraction and export, processing, manufacturing, logistics and container shipping,¹⁰ and remains a fundamental component in the labour process that shapes the material sites and relations

between capitalists and workers.¹¹ Material things are central to what many think about as 'quality of life' (furnishing people with comfortable homes, clothes and personal goods). For those in dire socio-economic circumstances, material products – food, shelter, clothing, medicines – remain the scarce means to survival. Counter to discourses of 'resource triumphalism' (the idea of humans transcending the limits of natural resources), are physical making and the moving around of finished goods fuels resource- and carbon-intensive transformation of the biophysical world.¹² We would argue that rather than becoming increasingly marginalized and redundant, the ability to work with materials, and to make, repair or repurpose physical things are vital skills, for a future where such resources become increasingly limited, and extreme events related to a shifting climate are more common.

Against the *mise-en-scène* of industrial decline in the Global North, an almost counter-cultural renaissance in small-scale making has emerged, often within industrial cities and regions where manufacturing and urban industrial heritage confers authenticity.¹³ In this world, re-connections are being forged with themes such as quality, providence, craft, ethics, tacit design knowledge,

haptic skill and the value of physical labour.¹⁴ There are many geographically situated contributions to these studies. They include an examination of worker agency, practices of repair, intersections between craft and the creativity discourse, expertise and gender, and scrutiny of the role of craft enterprises and contemporary guilds in producing the region.¹⁵ We share such interests, but here also seek to transcend a historically recurring binary, where small-scale 'craft' traditions (cast in the mould of pre-Fordist artisanal production) are pitted against large-scale 'manufacturing'. Rather, as we argue below, across the full spectrum of 'making cultures' are suggestions of sensibilities and dispositions that are centred on a deep and considered relationship with materials.

In the remainder of this paper, we aim to build a case for a sustained, reflexive and critical approach to geographies of making across three analytical perspectives. First, we define the contours of a necessary shift beyond the binary of small-scale 'craft' and large-scale 'manufacturing' to a focus on making (as disposition and practice across and within both scales and modes of production). Second, we trace a path through a diverse literature that explores connections people have forged with

materials through processes of making. This trajectory aims to pull together a collection of thoughts from an epistemic community whose perspectives bring together the vitality and capacity of the material world, with legacies of human skill and creativity. Third, we negotiate the fraught relationship that has emerged between industrial cultures of making and climate change. This, we argue, has been narrated into an un-productive (and ultimately false) counter-position in which industrial workers are positioned as part of the problem, rather than part of a solution. We conclude by suggesting that questions of making are much broader than either a craft revival, or economic geographies of manufacturing, and are necessarily deeply entwined with ontological and political debates of what kind of society we wish to become, how we might make and re-make amidst environmental crisis, and thus how humans relate to, transform and are transformed by the wider material world. Makers – within and across craft and large-scale manufacturing – must secure a key voice in these debates.

From manufacture versus craft, to cultures of making

Let us be clear at the outset what this paper is not seeking to achieve:

it is not intended as an appraisal of craft modes of production. Nor is it a review of the shifting economic geography of industrial manufacturing.¹⁶ Rather we focus quite explicitly on *making*, and potential future research agendas within the context of urgent ecological change. The semantic and ontological shift from manufacturing or craft, towards making, is an attempt to reframe debate about 'economy';¹⁷ and to capture the need to move onwards from the modern capitalist paradigm of profit-driven, high throughput production of physical things, towards other ways to furnish humans with material comforts.

Prior to exploring geographies of making, it is nevertheless important to acknowledge complementary advances in the respective literatures on craft and manufacturing. Research on craft has explored dynamic (new) relationships between individualized and collectivized forms of production and consumption. Crafting often reconnects 'mind' and 'body' in the sites and processes of production, therefore potentially reconstituting labour process in ways that ascribe agency to workers. In multiple spaces of craft making (at home, in collectives, in community maker spaces) researchers have documented possibilities for makers to resist norms of gender and neoliberal

entrepreneurial subjectivities – findings ways and spaces for ethical practice to predominate.¹⁸ Across the commercial/noncapitalist divide, maker cultures celebrate forms of proximate sociality (being strongly network-based, and emphasizing ‘community’) and forge closer connections between producers and consumers.¹⁹ Craft makers appreciate provenance of input materials, and emphasise the value of human skill embodied in high quality things made to last, intended as ‘heirlooms’.²⁰ Greater degrees of material self-sufficiency stemming from craft practice and DIY culture also promotes autonomy outside of conventional governance modes,²¹ and thus informs localized responses to climate change framed around resource preservation and stewardship.

Nevertheless, where crafting and hand-making cultures grow beyond immediate use value, towards a commercial imperative, ‘pleasure and self-fulfillment are often exchanged for what might otherwise be felt to be unstable, precarious, and even exploitive work’.²² Where profit motive reigns, the result is less a radical restructuring of the workplace and more a reconstitution of petite bourgeois modes of production. While crafting cultures provide genuine alternatives to high-throughput

commodity production and consumption, associated discourses of ‘handmade’, ‘crafted’ and ‘bespoke’ have all too easily become appropriated as marketing buzzwords by companies selling conventional products (from soft drinks to sneakers), which are made in conventional ways that do nothing to challenge the status quo. Meanwhile categories of artisanal expertise are situated and gendered in ways that reproduce lingering hierarchical legacies.²³ Such tensions and contradictions have endured through several cycles of revival since the emergence of the Arts and Crafts movement over a century ago.²⁴ Then a radical emancipatory response to the alienation of factory labour, craft production was deftly relegated to leisure time and its objects rendered a source of elite consumption, when it became clear that the structural conditions that divided the affluent from the poor were insurmountable.

We also acknowledge the importance of critiques of the political economy of manufacturing within the capitalist space economy. In this regard, like Cook (2004), we are inspired by David Harvey’s²⁵ call for radical geographers to ‘get behind the veil, the fetishism of the market’, to ‘make powerful, important, disturbing connections between Western consumers and

the distant strangers whose [making] contributions to their lives were invisible, unnoticed, and largely unappreciated'.²⁶ The things we make and use in life are core to this. Accompanying political economy, our agenda is to suggest existential reassessment of how we could approach making differently, incorporating anthropological and cultural perspectives on a broader set of material practices amidst volatility.²⁷ In other words, within a moment of profound material crisis (and emboldened by the notion of Anthropocene), we wish to look beyond existing modes of industrial production, towards opportunities to revisit fundamental questions of how humans manipulate materials, compose objects and construct economies and societies around material things – as well as how this might be done differently.

Within the traditional manufacturing sector the mood is becoming more open to such debates. A half-century of international economic restructuring has seen manufacturing subject to, amongst other things: the removal of tariff protection; offshoring and subcontracting of production in ever more diverse countries in search of cheap labour for exploitation; replacement of highly skilled labour with mechanized equipment; re-scaling of state-capital-labour relations, and

sharper divisions between design/knowledge/managerial control and manual/repetitive tasks undertaken by exploited (frequently female) labour.²⁸ A high-throughput model, premised on financialisation, subcontracting, economies of scale, offshoring, mass marketing, ever-increasing consumption, disposability and cultures of rapid replacement, has successfully furnished consumers in the Global North with endless cheap products (with no real clue as to their provenance), and it remains the default for global manufacturing capital.

Yet all of this is looking more and more like a historically contingent phase in the *longue durée* of capitalism²⁹ – a relatively brief period since World War II in which the promotion of manufacturing and mass consumption served governmental rationalities of prosperity and compliance.³⁰ There is a degree of re-shoring and revival in industrial heartlands.³¹ Moreover, a growing sense of looming ecological and economic crisis is premised on recognition that the modernist model cannot be sustained, or will collapse regardless under the weight of climate-induced economic crisis.³² Making is inextricably tied to these debates in terms of embodied energy and emissions in physical production of things. There is increasing recognition of the need for both producers

and consumers to act as stewards for materials and finished physical commodities.³³ Belatedly, stronger regulation is catching up with whole-of-life management of materials to minimise waste, and auditing techniques are revealing the fuller contours of emissions linked to physical production of goods in offshore locations for rich consuming nations.³⁴ Although there are no clear theories (yet) for how capitalist nation-states might be transformed as a consequence of planetary climate change,³⁵ it is impossible to imagine the long-term viability (in either economic or environmental terms) of complete offshoring and endless, unregulated high-throughput production.

Moreover, precipitating a conceptual shift from manufacture to making have been transformations in manufacturing itself. The idea of manufacture as a discrete, stable and segmented component of the contemporary economy no longer stacks up against increased complexity, dependence on massive and sophisticated circuits of resource extraction, logistics management and financial capital.³⁶ Some forms of material manufacture are now governed by the logics of design and advanced materials engineering rather than cheap mass production – reconnecting ‘manual’ with ‘mind’ tasks

and personal relationships between makers and purchasers. Complex subcontracting arrangements (not just for low-cost assembly, but for prototyping and resource recovery and recycling), the rise of additive manufacturing, and increasingly blurry boundaries between design, services, place marketing and making have all fragmented and challenged traditional notions of factory production.³⁷ In his best-selling 2012 book *Makers* Chris Anderson describes the many ‘advantages’ that the touted ‘new industrial revolution’ promises for industries like car production, including a democratization of design and production processes through open source models.³⁸ New designs can be brought to market through such democratized and distributed maker-models ‘faster, cheaper and better than the conventional way of small teams working behind closed doors’. But for all the enthusiastic emphasis on innovation, prototyping and new production models, assembly line production still persists for a huge range of consumer goods, albeit often further from view of those who purchase them. Pursuing geographies of making therefore enables consideration of diverse forms of manufacturing at a range of scales, but does not limit analysis to a singular industrial process or sector.

Moreover, making pays attention to the lives of materials that transcend their configuration as things or objects at a singular point in time.³⁹ The specificities of commodity form and biography, as well as details of assembling and manipulating materials, deeply shape the labour process, but also extend 'upstream' and 'downstream' beyond manufacture to shape particular geographies of material resource entanglements as well as spatially variegated consumption cultures.⁴⁰ And, as the cases of food processing, plastic packaging, coal and oil demonstrate, what exactly constitutes 'manufacturing', and how this relates to routes of extraction, processing, mobility and consumption, has become much more open-ended, semantically, ethically and ontologically.⁴¹ Meanwhile new reconfigurations of business activity in repair and maintenance, resource recovery and waste management have blurred boundaries between manufacture and green services.

Making as the central practice under investigation provides a more multi-valent point of entry. Unlike both craft and manufacturing that come with their own baggage, 'making' almost defies precise definition. One starting point is the composition and/or manipulation of materials that brings into being new or revised objects. Focusing

on making means being able to consider who is doing the making, as well as materials, their skilled manipulation, circulation, redeployment, and their agency, in the same breath across a much wider set of spaces and circumstances. Heterogeneous cultures and sites of making emerge into clearer view, including industrial modernists, but also antimodernist vernacular and noncapitalist making; domestic craft production; creative material manufacture, and high-tech fetishists – as well as cultures of thrift and scavenging; maintenance and repair; and recycling.⁴² Making also broadens the scope of inquiry beyond the archetypal craft or industrial worker in the Global North, to acknowledge the plethora of extraordinary creative practices being performed by those outside the west, either in waged work, or from sheer necessity, without a hint of counter-cultural aesthetics or nostalgia. For instance, making encompasses the ingenuity of fluid, locally situated and adapted technologies, and disassembly of things as they flow 'down the value chain' from the affluent to be appropriated elsewhere, making objects of profound use value from otherwise 'worthless' things.⁴³ The palette of diversity signals the kind of broader debate – with all its political-economic, philosophical and cultural dimensions – that we wish to promote.

The social life of making

Making speaks in vivid dialogue with two associated themes: material and skill. Normative ideas about how making proceeds tend to focus on bringing skill to bear on material. For Tim Ingold, this represents a problematic hylomorphic model, where making is the imposition of pre-conceived form – *morph* onto matter – *hyle*. In this model, an artefact is simply the materialization of a thought that pre-dates it.⁴⁴ Further, the matter from which things are made is rendered neutral and pliable, inanimate, and somewhat homogeneous. Yet matter, as Jane Bennett has persuasively argued, is clearly none of these things.⁴⁵ Rather, matter and materials are lively and require attention. Materials continue to thwart in unpredictable ways: decaying and breaking down, or wearing or breaking under force. Re-interpreted in this context, making becomes an informed study in compromise, with the skill of the maker a mediating factor, and decay a force for a ‘collaborative interpretative ethic’ beyond entropy.⁴⁶ For Ingold, attending to the process of making opens up prospects for following the lead of the material, where the properties of the materials themselves shape the direction in which making proceeds.⁴⁷ Increased familiarity with

materials results in a more flexible understanding of its bounded form and porosity of surface.⁴⁸ A maker following this path performs a series of negotiations and concessions with the material, working within a realm of possibilities that are afforded by its particular properties. Those possessing the skills and inclination to repair, re-use and recycle the materials around them would likely regard this approach as a given.

Following materials in this way calls for a more productive view of the concepts of failure, error and adjustment, where these are considered vital to the process of making, rather than obstacles to be overcome. Under such conditions, making becomes a process of iteration, and a maker works with this iteration prolifically. When the material pushes back, resisting the way it is being handled, a maker tries a different way. The material offers no reflection on ability in this moment; it is just an efficient way of working. Conceiving of making in this way compels renewed respect for the liveliness materials bring to the process.⁴⁹ Making becomes a material conversation – a physical provocation and a response, iterated over and again, working with the material to understand its capacities, analyse error and make adjustment.

Ingold further extends this thinking by drawing a distinction between material iteration and itineration. The latter, he proposes, allows for 'continual correction, in response to an ongoing perceptual monitoring of the task as it unfolds'.⁵⁰ Here space is made for improvisation in the face of changing context, acknowledging that things do not come into being in a physical or temporal vacuum. More simply, 'makers work in a world that does not stand still'.⁵¹ In such contexts, 'creativity' involves not merely a spark of innovation or the execution of artistic inspiration, but the capacity to respond to unfolding iterations with materials, to use slowly accrued haptic knowledge to manipulate processes on the fly, and to judge how to counteract error and seize opportunities as they evolve. Such conceptions of creativity encompass 'expert' making (as governed within guild and formal apprenticeship systems), but also unheralded acts of adjustment with routine production, and diverse and prosaic forms of material manipulation and repurposing among the poor (for lively examples, see www.mkshft.org).⁵²

Iteration (or itineration) also gives scope to re-think how the idea of reinvention is applied to things in everyday life, and implications for the way things are made. In the

hylomorphic model, once making is complete, the 'ontological labour' has long been done and is not revisited. Something new has been brought into existence and the world is re-ordered around it. But in conceiving a world where both materials and the processes of making are given more emphasis, iteration becomes a way of working the potential for mixing, blending or combining matter that already exists in new combinations.⁵³ The capacities of materials to be re-deployed, and of humans to perform the requisite labour, become more explicit. An assemblage of old and new materials, methods and techniques can be productively drawn together. Those who prefer to work with their hands would appear to sit comfortably within this world.

Collecting is an example of a pre-emptive activity that people who are skilled with their hands commonly share. In an extended ethnography of skilled tradespeople working in steel production,⁵⁴ participants talked about saving encountered materials, knowing that one day they would find a use. Practices of collecting were revealed in sheds full of discarded motors, pulley systems, garden pots, broken chairs and assorted sheets of steel, timber and plastics. These items would normally be considered rubbish, but to those who have the

skills to resurrect them – cutting, folding, welding, connecting – they are only ever temporarily resting, waiting for a use to arise.

Collecting assists us to see potential in situating everyday things within the kinetic world that Heidegger describes in the 1939 essay, 'On the essence and concept of *Phūsis* in Aristotle's *Physics B I*'. The things that are made (as an outcome of *techné*) are easily taken for granted because they are 'finished', and thus it is easier to dispose of them, rather than to repair or remake them.⁵⁵ At pains to distinguish between these 'made' things and *phūysical* things (which reside in the natural world), Heidegger draws on Aristotle's term *entelecheia* to describe the way a *phūysical* thing is always evolving or moving, yet always remains itself.⁵⁶ A tree for example never stops becoming (growing), yet it is always a tree. Such *phūysical* things (like trees) have not 'made' themselves, nor have they been made, they just are. But their mov- edness contrasts with the perception of 'finishedness' (and stability) that accompanies artefacts brought into being through making.

The distinction becomes important when we consider how the process of making draws on materials of the *phūysical* world. A table – to use

Heidegger's own example – is made from the timber of the tree, but only becomes recognizably a table when it is completed, 'wherein the generating of the table – the movement – comes to an *end*'.⁵⁷ Heidegger described this 'made' world of everyday things as ready-to-hand (*Zuhandenheit*), where the focus is on the performance of an action, rather than the things themselves, which become invisible. Everyday life is enacted through these invisible things whose becoming has 'ended'. Further, consumers increasingly distanced from the sites and methods of making tend to forget their becoming or their making – of course until they fail. The 'invisibility' of the (finished) world-at-hand, conspires with a growing inability and disinterest in how things are made (and consequently how they are repaired). It thus becomes easier for affluent consumers to leave in their wake a trail of broken, empty, forgotten things while continuing to seek out more. Tonkinwise argues that by attending to the remaking of things – and to the retrieval and repair of things that already exist (like the collectors in the example above) – an opportunity exists to sustain what is made through its 'changing ways of being'.⁵⁸

Unfortunately, contemporary design has taken making in other directions.

As Anusas and Ingold point out, the formal language of design has notably shifted to a space dominated by the smooth and opaque surface.⁵⁹ Such impenetrable surfaces make it easy to forget that the materials from which it was made are kinetic, that it is their will to decay or change state. Hitchings argues a similar line from a different perspective: that materials can only ever be partially harnessed or 'cultured' – 'sooner or later their individual physical propensities are sure to come to the fore.'⁶⁰

Here, instructive insights can be gleaned from maker cultures where skill, knowledge relation and lived experience derived from working with organic material resources are unique. As the traditional practice of Hawaiian wood crafting literally testifies, makers see canoes in trees, for example.⁶¹ Further, among makers *techné* is as much sustained through embodied and emotional relations with the material world, as through accumulation of rational manipulations. The visualisation of potential in materials, and the gathering of this information through haptic relations is part of the making process – implicating the *phū*sical world more directly in the things around us.

It is useful at this point to consider how a revaluation of making might

be expanded to blur boundaries with other material interventions, such as repair and maintenance. Within building construction, for instance, the term 'make good' is often notated on architectural drawings, to indicate to the builder where 'patching' or repair is required, usually to an older section of a building, so that it is functional and in keeping with its surroundings. In this context 'make good' is as much a smoothing of surfaces and a continuity of function, as it is restoration to a prior state. The builder does not distinguish between making and repair, but simply 'bring[s] together what is needed to re-make whatever is at hand'.⁶² Such instincts to repair are quintessentially human: we feel compelled to repair not only the things around us, but also our bodies, souls and relationships.⁶³ 'Making good' – is about maintaining continuity with the past, in the face of efforts to rupture that continuity. As Graham and Thrift suggest, whereas we pay most attention to the need for repair after catastrophic or spectacular failure, repair is a remorseless and necessary process that keeps society ticking over.⁶⁴

A concern with continuity highlights another related practice that further confounds simplistic interpretations of making. Maintenance anticipates and negotiates the need to

repair. Ingold draws on the evocative thoughts of architect Alvaro Siza to convey how the making of a building does not stop when the building work is (temporarily) finished, but rather only really begins upon occupation, when the work commences of maintaining the building's integrity against an onslaught of wilfully destructive elements – insects, rodents, fungal infestations, corrosion, damp, harsh sun, water, wind.⁶⁵ The work of maintaining is central to many cultures of making – and is often included as a calculated phase of artisanal apprenticeship training in order to condition perseverance and establish authority. Indeed, in Marxian terms, the labour time devoted to maintenance, repair, and fixing likely exceeds that for the making of the thing itself. Swanton illuminates the rhythms of breakdowns and scheduled maintenance processes that accompany 'the stuttering business of making steel', a consistently invisible, yet critical element.⁶⁶ Elsewhere the block-check routine performed in a multi-story housing estate illustrates how the high-rise building is a living structure, where inspectors perform a cycle of on-going problem-solving in maintaining and securing the building in the face of myriad disturbances.⁶⁷ Such examples point to the resourcefulness that is critical to maintenance work, where human

labour and ingenuity with materials are requisites of continuity in all kinds of contexts.

And yet, specificities of product type form, design and production process constrain abilities to exercise such ingenuity. In the case of the so-called 'new industrial revolution', the argument is that the more software-driven a car is, and the more the physical car is conceived of as a kit of parts assembled by small collectives or even owners, opportunities to replace or upgrade components rather than the entire car become more readily available. But what happens to the broken or superseded part – or to the computer chip at the heart of the object's performance, once the software updates are no longer compatible? While a shift to swap-in, swap-out componentry changes the scale (replace the part not the car) and site (at home rather than a big factory) of intervention, such processes offer limited scope for variation or innovation, for improvisation or 'hacking'. A future where repair and maintenance become redundant in favour of replacement entirely misses the point.

The respect makers have for the vitality of materials offers instead a renewed opportunity to consider one of the critical challenges of climate change: doing more with less. While

environmental critics have been otherwise occupied with the mistakes of the modern paradigm and the surplus of stuff that has resulted, those who make things – and who have the skills to sustain the life of something, through repair and re-appropriation – have been overlooked. Across diverse maker cultures are people *already equipped* with the sensibilities and disposition to conceive of things-at-hand as only ever temporary gatherings of matter and idea, which can disperse and be reassembled elsewhere in new combinations. In the following section, we expand on why it is absolutely imperative that the experiences of those who make things become part of the debate on shifting to a less resource-intensive future.

Making room for making in responding to climate change

Debates about how to reframe ‘economy’ in light of more catastrophic futures have thus far seldom intersected with questions of making, especially within industrial cities and regions.⁶⁸ Our interest in this final section is to broker such a connection, and to expand on the locally situated ways in which people acculturated with making are equipped to plan for, adapt to, and negotiate the effects of a variable climate. In particular, we are interested in how

concepts and critiques of resourcefulness, resilience and everyday practice intersect with various scales of making, and what this means for a future where disruption to entrenched patterns of production and consumption appear inevitable.⁶⁹

The thoughts here have emerged from our current investigations into the fine-grain of a steel-making city.⁷⁰ Here, industrial modernists dominate making culture, but unlike crafting and other counter-cultural scenes, there is no cache attached to manual work. The normative characterization of industrial cities is one of carbon-intensive production, guzzling behemoths where workers are relentlessly enrolled in the production of ‘stuff’, placing grave strains on natural resources and energy infrastructure, within industries that are viewed as old-fashioned, dependent on coal or oil, or simply doomed.⁷¹ Yet beyond the dominant media and policy narrative of industrial decline, the manual workers, tradespeople and technicians that constitute the manufacturing workforce know how to make things – and how to fix them, often with expertise and ingenuity. As economic pressures have forced companies to re-examine their methods and markets, so too have employees professionalized ways to extend the life of materials. In an extended

ethnography, one interviewee, a mechanical engineer for more than 20 years, describes the culture of his workplace (a steelworks) in recent years, 'They've worked for a lean, mean company where they've learned to do things with little money and few people'. Creative frugality with materials is very much a part of the culture of industrial regions, but also maps onto notions of reducing resource intensity in light of climate change.

Such workers know intimately the properties of materials: how they can be assembled, how they can be taken apart and how they can be re-assembled in new configurations. This kind of skill with material embodies a spirited, thrifty and *creative* sense of encounter, which is not a recent development, but one with a long history stretching at least to 'mend and make do' campaigns during the Great Depression and World War II.⁷² In Australia, significant post-war migration from Mediterranean countries and Eastern Europe boosted populations in industrial cities. Strengers and Maller pointed to the themes of materiality, scarcity and diversity that characterize practices many such migrants brought to their new homes.⁷³ The availability of materials, a diversity of skills and personal biographies inherently built on dealing

with scarcity have contributed to an industrial maker culture where ingenious practices proliferate such as hoarding metals and components, lending power tools, hacking new objects and home improvements from found materials or those 'liberated' from the workplace. Examples range from the prosaic replacement of broken timber handles on garden tools with a welded steel rod, to sophisticated irrigation systems constructed entirely of surplus but valuable copper pipe sourced from workplace scrap. Such examples literally embody the type of small-scale sustainable practice that speaks to resourcefulness in everyday practice. And so ironically, an ability to cope with volatile futures may indeed lie in the fine grain of the very industrial cities and regions we seek to displace in normative discourses of climate-sensitive futures.

In a race to narrate a shift to the 'information age', subtler discussions have been neglected – regarding the cultural values that emerge in seemingly imperilled industrial places where physical materials are encountered in everyday work and life, and where things are made.⁷⁴ Re-engaging with such workers and practices illuminates an untapped reservoir of skill beyond 'craft', and outside of existing frames of climate change

adaptation (which tend to use bald demographic data to model static vulnerability to geophysical risks).⁷⁵ People who are skilled in dealing with the material world in the face of disruption offer a powerful challenge to the idea of the industrial city as terminally ill or lacking resilience, and a place whose whole economic and social structure lies in the path of the 'new' economy.

Yet this resource is clearly endangered. As the literature on craft repeatedly emphasizes, the ability to work with materials in skilled ways is under threat from automation, deskilling and labour precarity. It has been estimated that as many as 47 percent of all manual jobs are at risk of future computerization.⁷⁶ Counter to the hype of 3D printing, massive un/der-employment as a result of automation cannot be romanticized under any conditions. In the face of 'remorseless competition from factory production and its globalization', artisans 'need all the ingenuity they can muster'.⁷⁷ And it is concerning that diverse skills with materials are being lost at a time where climate change raises issues of technological and material uncertainty. Recent work on global environmental change has shifted its attention from the need to maintain gentle transition to instead comprehend radical

transformation.⁷⁸ This raises the questions of how to provide alternative means to sustenance and comfort that do not depend on resource abundance, and who is best placed to deal with material scarcity, should rationing and shared sacrifice become more widespread necessities.⁷⁹ Initiatives such as the Circular Economy, the field of industrial ecology and investigations into product stewardship offer a range of approaches. Further investigation into diverse cultures of making – within western industrial modernist maker culture, within prosaic collecting/remaking cultures across the Global South, within crafts such as woodworking, luthiery and cabinet-making that are grappling with new conditions of raw materials scarcity and tight regulation – is another important avenue. Manual skills and the re-use of materials can be guided in a productive response to climate change.

At the urban and regional scale in the Global North, the debate is also about what options are present for industrial cities, and what kinds of political interventions and transformations might be possible amidst – or beyond – the constraints and contradictions of capitalist societies.⁸⁰ Industrial cities and regions of the Global North might well become reconfigured laboratories for climate-induced

ingenuity, as anticipated (in often fraught ways) in Green Jobs discourse.⁸¹ Beyond waged labour, there is potential for industrial cities and regions to act as repositories of skill for other kinds of material repurposing, repairing cultures and enterprises with more overtly non- and anti-capitalist intentions.⁸² Such potential must nevertheless be gauged against the critical filters of class, gender and geography. Much rhetoric surrounds transitioning industrial regions and cities to the 'green economy', and to other types of work. Education, re-training and re-skilling are often cited as a panacea to industrial decline, requiring affected cities or regions to redirect working populations toward more 'in-demand' (and presumably less material) skills. But this approach fails to take into account the specific nature and value of industrial cultures.⁸³ It makes the assumption that places where things are made are rooted in the past and need to change, without recognizing that making cultures in industrial places have evolved over time, and continue to persist.

We thus seek to advocate for geographies of making to be more clearly pinned to a range of wider debates: on moral economy and ecological crisis, progressive manufacturing and innovation policy-making

driven by an ethic of care for the long-run viability of neighborhoods and communities,⁸⁴ the mundane and material ways in which economies are 'made',⁸⁵ emancipation of both domestic and waged labour,⁸⁶ and normative critique of the 'rightness'/'wrongness' of forms of production and commoditization.⁸⁷ There are existential questions for society and for the state, about a productive basis for society, who makes the things we need, whether via formal industrial organization and specialization or decentralized models of self-sufficiency. Geographers have for at least two decades been among the vanguard in commodity activism around labour conditions,⁸⁸ and more recently have used teaching initiatives, interactive and social media in order to track unethical geographies of making, connect consumers with producers, and raise public awareness of social and environmental impacts (see for example, Ian Cook and colleagues' *Follow The Things* project (<http://followthethings.com>)).⁸⁹ A focus on making provides a potential parallel means to connect the urgency of environmental crisis to critiques of production and consumption (and thence to material aspects of daily life) in ways that make practical sense to people. Ultimately, geographies of making invite debate on what kind of economy we want to become and

what kind of social roles we ascribe to manual skill. At stake are paid jobs, but also, individually and collectively, responsibilities to access, use and value material resources ethically.

Conclusion

Making is central to who we are as individuals – what we make as part of everyday practice forms our identities and place in the world. The mundane experience of making, and thus of labour, is 'resolutely political, a geographical imperative, and a critical means of operating a meaningful relationship with this material life'.⁹⁰ In an era whose economic geography is increasingly painted in the hues of financialisation – with an often peculiarly virtual feel (almost as if even the tangible products around us have been 3D-printed into existence by digital technologies) – it is salient to remember the massive extent to which workers in factories, workshops and in homes are still occupied making material things. All manner of deeply profound material knowledges, haptic practices and forms of manual work are still present at the heart of global economies. As Hudson has argued, 'knowledge of what it is materially possible to produce is a necessary pre-condition for consideration of alternative conceptions that challenge the hegemony

of capitalist material interests and imagine alternative ecologically sustainable and socially just visions of the economy'.⁹¹ Making is also central to our legacy as a society – materially, economically, ecologically, and socially. Generations to follow will be dealing with our made objects, buildings, and associated detritus just as we are dealing with the asbestos, lead and concrete cancer from things made in previous generations.

In this paper we have sought to open up for discussion geographies of making as a distinctive field of inquiry that links persistent questions of economic geography and labour process to a wider set of looming debates about our collective response to ecological volatility. Human geography is, we would argue, a fertile place for making such connections. One obvious but important conclusion is that the macro-structure of the economy clearly has to change, in ways that confront powerful financial interests.⁹² The black box production of stuff around us requires us to think of new things to make for evermore. That this cannot happen within a modern political economy leads us straight into our current trajectory: a crisis of profit-production-accumulation. We argue that focusing on making and its geographies at a range of scales – from the maker's

bodily interactions with materials to the industrial region, and beyond – provides a means to both debate and respond to this crisis.

If makers ought to be more clearly part of the debate, how exactly might this transpire? Part of the task is to find the conduits and infrastructures that can be cobbled together so that the voices of makers are more audible, and that others listen, and in so doing to ambitiously gather a collective commons around materials.⁹³ Collaboration and collective dispositions within both ‘mainstream’ and ‘alternative’ forms of manufacturing suggest this is possible.⁹⁴ Fresh views on ‘making’ and ‘manufacture’ will be needed to unlock ethico-political possibilities in the face of environmental-climate change crisis. We do not purport to have all the answers, but nevertheless we do suggest that renewed focus on labour process, skills and materials provides a constructive path forward.

To this end the proliferation of craft literature has focused important attention on the processes, materials and affect of making and the blurring of productive/domestic, sub/urban and private/public binaries.⁹⁵ Such contributions also draw attention to the endangered status of particular vernacular or professional skills or

ways of working with (and thinking about) materials, in the process offering an important historical framework for contemporary investigations into making. Like discussions of repair and remake cultures borne out of sheer necessity, they are also firmly rooted in context, often evocatively sketching out the relations between material and place.

But our point is not to suggest that craft-based modes of production, through their perceived smallness and localness, provide the preeminent alternative to manufacturing. That, as we argued at the outset, falsely reconstructs the modernist binaries of home and waged production, of artisanal pre-industrial trades against big manufacturing. For even within the industrial behemoth, exemplified in the massive complex of the steelworks, there are small-scale examples of making, repair and non-capitalist provisioning for surrounding households and communities. Meanwhile in the small-scale culture of domestic craft enterprise there is a rapidly expanding, fetishized and globally networked economy premised on continued consumption of stuff. Signals for a constructive path forward are indeed present in experimental alternatives opened up by small scale, noncapitalist and self-provisioning crafting, but

– and here is our key point – they are also present deep within the modernist manufacturing enterprise.

Pursuing an on-going dialogue around such signals across diverse cultures of making will thus require not only transcending old binaries, but also encouraging difficult conversations and more open listening across domains of professional and disciplinary expertise, in ways that invert expected flows of communication and critique: social scientists and humanities scholars listening to industrial designers and engineers (and vice-versa); office-bound professionals listening to factory workers, builders and repairers; women and men acknowledging diverse forms of work in making.⁹⁶ The challenge will be to break outside entrenched positions, and for researchers, to link careful analyses of microspaces and actors to broader debates about climate change, economic collapse and capacities to cope with and adjust to extremity. Making has a much broader context than either the manufacturing or craft sectors alone. Across diverse modes of production – craft-based, assembly line, maintenance, repair – are diverse skills and dispositions that open possibilities. In order to make this shift, we need to consider the micro-encounters of making, but also making as a whole

system, that includes consumption and consumers as central. Making is a critical and complex part of the discussion about how we connect the (over)-production of stuff with the climate change discourse, and how we comprehend alternatives within the exigencies of everyday life and work.

The big overarching questions persist – can we take profit out of the material process, and yet still provide means for workers to security of income and occupation? Powerful interests will see to it that profit remains a core presence – including interests in finance and property outside of production itself.⁹⁷ There is, we believe, hope in cultural initiatives built on the recognition that people can connect with making as grounded, social and geographical activity, and that people make sense of environmental uncertainty via their connections with material things.⁹⁸ We also need to acknowledge that making practices and cultures are themselves increasingly diverse, and have different things to offer. Potentially progressive dispositions and skills around making also persist *in* modernist manufacture, in huge, run-down, industrially scarred and polluted landscapes occupied by a purportedly redundant old-industrial workforce. Through drawing attention to this, we hope to go some way

towards reanimating a debate about combatting environmental crisis in new ways, from perhaps the most unexpected spaces.

And amidst all this is the sense that many things will remain the same. Societies will still need people working with their hands doing somewhat mundane yet skilled things: bricklaying, carpentry, hairdressing, cleaning, mending, and making clothes. Many such tasks cannot be automated. Other 'big' things – ships, bridges, buildings – will still need to be somehow made, in ways that necessitate large-scale production complexes.⁹⁹ Beyond a selection of digital technologies and techniques the material world has not so much been revolutionized, but has 'crept along', alongside the rise of technology from the mid-twentieth century – new products adding to the existing model rather than usurping it, while other forms of material innovation have simply stalled. The things invented in the modern period – cars, jets, fridges, washing machines – still proliferate. The question will be whether it is possible to find our way towards systems of provision for material goods that sustain livelihoods and quality of life while doing more with less. The high-throughput model of make-sell-dispose is a race to the bottom that will always

end badly. To echo a recent argument of Doreen Massey's, we have all the choice in the world in terms of products, but very little choice in terms of the kind of economy within which those things are made, accessed and used.¹⁰⁰ And certainly we have little time to change things radically. This makes the debate about how and why we make things all the more urgent.

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*Haumanu Taiao Ihumanea:
how knowledge can restore
the natural world*

Interview with
Dr Benita Wakefield

Benita worked in whānau, marae, hapū and iwi post-Treaty development for many years within Ngāi Tahu takiwa. She returned home to Ngāti Kahungunu iwi in 2009 to undertake postdoctoral study to improve the mauri of our fresh waterways within Tamatea, central Hawkes Bay. The focus was also to support marae and hapū development, building capacity and capability within environmental management (mātauranga Maori and freshwater) in preparation of Treaty settlement. Her specialist research areas of interest are environmental health, restoration and healing models that strengthen kaitiakitanga, whanaungatanga, tino-rangatiratanga and manamotuhake. She has spent the last five years developing healing models to strengthen mauriora and supporting whānau and hapū self-reliance and aspirations.

Ko o Matou Tumanako
 Te Tatou o te Matauranga
 O nga Whaarō
 Hei Here ai a Iwi Mana
 Ka Whakapuakina!
 [Our hopes are that the doors of
 knowledge
 and the doors of thought that have
 held our people and our authority
 captive
 will be opened!]¹

Māoritanga is rich with resourceful knowledge about Aotearoa New Zealand. This traditional knowledge or mātauranga describes the intimate details of healthy relationships between people and earth, and yet this knowledge is often marginalised by much of society. Miriama Kahu wrote 'Western Society misses out on a huge body of knowledge which is based in indigenous cultures and is unable to enhance the understanding of the knowledge it already has because it is seen through a very narrow window.'²

At such a critical time, we can no longer afford to overlook the interconnectedness of people and place as it has long been understood by Māori. We cannot uphold the

wellbeing of people and environment by viewing them in separation. So how can we widen our world view to more effectively address the serious environmental issues we face while also responding to our complex social problems?

Benita Wakefield has worked in this domain for some time. She has a degree in resource management and in 2008 completed her PhD, *Haumanu taiao ihumanea: collaborative study with Te Tai O Marokura Kaitiaki group*. This came about through her work in Kaikoura with the Ngāti Kuri hapū via Te Tai O Marokura, a hapū-based social and health provider established by Miriam Kahu. In conjunction with the Ministry of Health and other organisations, they worked on the development of a Kaupapa Māori Environmental Health programme – a means of restoring ‘the potency and health of the environment which, in turn, would improve the health of the people’.³

Within the programme a conceptual framework called Haumanu Taiao Ihumanea was developed. It sought to ‘incorporate cultural values within environmental health protection practices’⁴ by ‘applying the principles of whakapapa, turangawaewae, kaitiakitanga and manamotuhake’.⁵

Benita explored the framework through its application to case studies in the Kaikoura region in her thesis. While it was localised in its application, ‘The forward thinking and innovative utilization of traditional knowledge, approaches and practices to restore healthy environments, healthy people has sufficient merit to explore its universal application’.⁶ This framework, and the principles it upholds, has the potential to address wellbeing in many different contexts: place, people, waste minimisation, mental health, water quality, conservation, addiction, community-building, climate change and so on.

Juliet spoke with Benita about her journey with the use of mātauranga (traditional knowledge) in relation to environmental health, and how we might apply this vital knowledge in relation to the challenges we all face today.

Ngā mihi nui kia koe. My name is Benita Wakefield, and I hail from Ngāti Kahungunu, Ngāti Kere in Porongahau, Hawkes Bay, and on my Ngāi Tahu side from Ngāti Irakehu in Waiwera and Onuku.

Benita to begin with, can you tell me a bit about how your journey

started, how you came to understand the interconnectedness of environment and people, and how you first became interested in resource management?

It goes back to my father and his brothers. Dad had eight brothers and one sister, and they were people of the land, so they were all hunter-gatherers. Us kids had grown up with those values. When I was at university there was this whole change going on with the fish quota system. I did resource management so that I could understand the quota system, and then I could feed that information back to my father. That is how I got into it – I didn't have a great sense of passion for it, but I thought I may as well make use of some of the information that I was learning.

But labels and degrees aside, it was more about the influences we had growing up. We always had a garden and my mother was a weaver and she mostly used natural products to produce the dye. And my mother took great care with the waste products. I was taught to put the scraps back into the plant – that sort of thing. Those are the values I grew up with and those are the sorts of values that you pass on. In that context, environmental health is about the interrelationships – healthy people means a

healthy environment. It makes sense to me – in the PhD we were writing about stuff that we already knew from growing up.

This understanding that you had from a young age about the connections between people and environment forms the background, in a way, to the development of the environmental health framework you worked on. Could you talk about how that came about?

The framework was based a lot on our existing knowledge and we wanted to create a model that examined what environmental health really looks like. We worked to bring our core values into this model. I did quite a bit a research around all of that and then once I got to Kaikoura and started working with Miriama Kahu, we went straight into the whole kaupapa and it took about three or four months to develop a framework, called Hau-manu Taiao Ihumanea.

Overtime the framework grew, as anything does. It was explored and tested within a few case studies over the next eight years, and this was recorded in the PhD. It includes four health states, which describe: the taonga tuku iho (the treasures handed down); applying the principles of whakapapa, turangawaewae,

kaitiakitanga and manamotuhake (authority); assessing the changes when the optimal health state of taonga and people is disrupted or altered; and outlining the causes and effects, restorative actions and monitoring measures to restore potency and health of taonga and people.

We then applied this framework to the Kaikoura region to contextualise and localise Ngāti Kuri experiences and goals about sustainably managing taonga within the environment, and to enhance the quality and health of whānau and to advocate for the pursuit of manamotuhake. Succinctly, the framework provides a theoretical and practical analysis for how the Ngāti Kuri hapū could improve the potency of all living things. Traditional local knowledge is a vital component of this framework in the recovery and improved potency of people and their environment.

What was interesting or challenging for Te Tai O Marokura was to figure out a pathway forward with the environmental health kaupapa without encroaching on what the rūnanga had established, which was the resource management unit. A lot of that is compliance. We were able, if you like, to create a whole space around mātauranga (traditional knowledge) and what you do with it. We got the

process of reclaiming and recovery by looking at the application of that knowledge in a contemporary setting.

In your PhD you look at case studies to analyse the application of the key principles in today's world, and to test the ways of restoring balance between people and the natural world – indicated by the four health states you spoke of just before. The case studies involved the restoration of the Waikawau Lyell waterway; the restorative actions used to improve the health of mātaimai moana on the Kaikoura Peninsula and the rimurehia sea grass along the Kaikoura coastline. Could you talk about these?

We managed to get some funding from the Ministry for the Environment, so that became the springboard for a number of projects that grew over time. Part of that was the experiment we did with wanting to put a rāhui down (to improve the health of kaimoana). We were part of these case studies from the beginning and we did all the monitoring for some of these projects, so we were well placed to write about it – that's why they are such comprehensive case studies, because we were there from the start, doing it and being part of the whole experience.

These projects ended up in the PhD. Like Lyell Creek. It was only a small programme when it first started and it ended up having a number of volunteers over time, cleaning up Lyell Creek. And it was just incredible the way the landowners eventually came over and they put troughs in, fenced up – did all sorts of things. And then you’ve got ECan, who was monitoring all of that, and the dairy farmers pulled their heads in – they did have spillages going into the river, even then. Let’s just say ECan came down hard on them. It’s amazing when you’ve got ECan involved. They had a wonderful stream care team in there as well – we all worked well together in cleaning up Lyell Creek – there were a number of strategies that went into that and I loved being part of that project.

I really enjoyed the project we had with the pāua divers and the community we had around the rāhui too. It was an experiment because they were using a different act to enforce it – they used the Fisheries Act 1996 – we tested it and it was accepted by the minister. Then, of course, the rāhui went between the two wharves and even though it was only small, it was a success for the community because people who lived in that space were able to keep a watchful eye. I thought it was really successful

the way they were able to recover the pāua – along with other kaimoana.

There were other projects that we were experimenting with. The kelp – we came up with the pōhā idea for that, which was really just blowing it up to make it into a bag. It used to be used to preserve mutton birds – that’s the original material they used, so we tried using it as a transplant to help with a particular type of sea vegetation: rimurehia that used to be prolific along the coast. Then for various reasons – a lot of foot traffic, and cars driving up and down and all sorts of other activity – it was being killed off. But rimurehia is actually a well-known seagrass and wherever it grew, that’s where people used to go and gather kaimoana (it was an indicator of food). We had a look at how to transplant it and that became another case study that we used. This really showcased the application of mātauranga.

In more general terms, how do you take traditional knowledge and use it in a contemporary setting?

In Kaikoura it was very organic – it grew as a need from the community. It wasn’t something that was inflicted on somebody. Wherever you are, you’ve got to listen and hear the needs of the people. These projects

very much came from the community. A lot of our projects were about that, about getting whānau actively involved in how we did things and keeping them engaged.

What I find fascinating when you listen and hear other stories around mātauranga and the importance of being the repository, the holders of that knowledge, is that you lose it if you don't use it. And it is true. While I have heaps of admiration for people who have fantastic memories and can recite stuff, to me you never forget it if you use it. We took a very pragmatic approach to mātauranga, and as much as it is important to gather it, it's important to teach it, to share it with our young and make it fun.

There were really dedicated people in the team in Kaikoura, who all wanted to protect the environment. Using 'we' is important because there was 'we'. It's important to acknowledge that – the collective wellspring of knowledge. It certainly happened in the community, it wasn't just about mātauranga from Ngāti Kuri, it was also about working alongside some really key people in the community.

So localised knowledge of place, which deepens the understanding of the relationships between elements in a place, is key for

wellbeing. The purpose of your PhD was an investigation into how Ngāti Kuri sought to improve the potency of all living things – through strengthening relationships and connections to people and whenua. Could you talk about this?

One of the things that Miriama Kahu talked about a lot was how each element talks to each other. I really appreciated this, it is such a wise thing – how do the plants talk to the land, how do the birds talk to the plants? When one thing blossoms, what does that mean in terms of its indication for the sea? One of the more common ones is the kōwhai. When it blossoms early, it means that the kina is going to be in great abundance. You have those sorts of connections.

The Atua (gods) became such a major part of the thesis because we had such a love affair with Tangaroa (Atua of the sea and fish), and we really wanted to highlight why the Atua are so important today. They are more than just myths and stories. It is such an active way of expressing our values.

We talk about the totality of knowledge in relation to potency in the thesis. Why is potency such a powerful word? It is such a wonderful

word to use to describe the level of emotion that you feel. When you are potent, to me you are at optimum, everything is lining up. As Māori – no matter where you are from or wherever your roots are or your turangawaewae is – if you are standing in your place of belonging, how potent do you think you would be? You would be incredibly potent. Because of the connections that you have with the land, the understanding, the knowledge – all of that.

I guess for some people that is far too idealistic because we have far too many issues and social problems and I acknowledge that. However, when we talk about our values, you've got to have standards with those values regardless of what your living situation is or circumstances are. The values don't change.

Potency is also about embracing the fact that there are parts of our lives that have been affected by colonisation. Do we stop striving for excellence? No, we don't. Or optimal health? No, we don't. Potency represents all of these things to me.

But what happens if you feel disconnected from your sense of place – how do these values and connections remain relevant?

This is where whanaungatanga is so important. How we relate to our animals, our birds, nature, and to each other. You might bring in the Atua and talk about the wind, rain, the storms – the siblings of the Atua. When I work with people these days it is about those things: Where do you draw your strength? Where are you anchored? And that's how it's relevant. If people are disconnected from their homes, you build your own turangawaewae – there are so many things that you can celebrate. If you focus on the losses in your life, you'll keep falling over. Turn it around. What can you do to help you to anchor to where you are now? You can plant a tree, or carry out rituals or do things that are important to you. How do you claim that space? Tino rangatiratanga – how do you make it your own? And let it resonate with who you are?

With traditional knowledge, of course it's more potent when applied in that specific place but you will figure out ways of connecting to this. I think we owe it to our kids to become more creative in how we keep those connections. It may be – incredible as it sounds – through social media. That might be the way that you help and support. You are still fulfilling your role as a kaitiaki, you are just doing so on another level.

You went on to work in the Hawkes Bay region – how did the framework and application of these values work there?

The frameworks of the concepts became part of my post-doc so I was rigorously testing out the universal merits of the framework. I must say that the application of the framework, the application of mātauranga, was given more opportunity to gain momentum when I went to Hawkes Bay because in Kaikoura we were dealing with so many different issues and had only a three-year window to write a PhD. I would have liked us to have more time to really evolve and develop the ideas better.

However, a lot of the concepts had been thought out and it was easier to articulate these to a whole new group. One of the key tenants of the PhD is that it's about localising knowledge, so we changed the concepts that were developed for Kuri but were not necessarily relevant to Ngāti Kere. We changed the concepts but the principles and the organisation of the information – the mountain to the seas concepts – none of those changed because they were relevant. But certainly the stories and knowledge base were always localised to an area.

In the end, mātauranga takes new meaning and shape according to the environment and, of course, people's perception of that.

There is the holding of knowledge and then there is the doing of it. I guess that plays out in the role of actually being kaitiaki. For example, the transplanting of the seagrass. Being involved in that process and watching that happen, learning all the intimate information – that action part, that's the bit that I feel we benefit so much from. So how do you think that the opportunity to act as kaitiaki, with that specific local knowledge, could be encouraged more?

There are groups like Forest and Bird – you could join a group. You could be part of school projects if you've got kids. I really believe in riparian planting and for kids to go plant a tree, because they will be forever connected to that tree. You can build gardens, you can do other things. At a very simple level, you can make a difference.

To me it always comes back to the collective power or the collective wisdom of groups. I trust in that concept. It is finding the cause – it's up to you. In my work now as a healer, it comes back to your personal calling.

Are you the type of person that is going to make a difference at a micro or macro level? Whatever your pathway is, you be the best that you can at it. That's all you can be. Often people place a judgement on this asking 'Am I contributing enough?', and I would say 'Are you? Do you feel that you are? Then you must be'. That is what I am saying – being comfortable in your own skin, recognising who you are. It is you having a sense of accomplishment, a sense of worthiness, about who and what you are doing.

The kaitiaki role is such a special role because you are in a role of protection and that could take on many facets. And so how do you connect the dots with this and waste management? Because you, as a kaitiaki of this environment will recognise that something is amiss. That there is an unwellness aspect to this. If you have this awareness, you are likely to feel driven or have a compulsion to look at solutions towards what you can do.

This is when we talk about mauri and life force. Why is mauri so important? Because if you diminish the mauri of something you are basically diminishing the life force of something. This is where waste management fits – you are violating something that has already got its own mauri or sacredness, and this violation weakens the

life force. We do it in so many ways and we don't realise, because we are normalising that behaviour or mindset. And we are not appreciating the totality of that – of how one thing impacts another. With the framework Haumanu Taiao Ihumanea, the 'Inhumanea' part is really talking about the restorative balance – harmony and balance. That is so important between people and their environment.

It's about wairua. Wairua to me is about standing and appreciating the here and now, embracing it fully. As you become more sensitive, and as you grow in your perception of what that means, you start connecting at a very different level and you begin to have relationships at a different level, ones that you cannot see but you know exist because it feels right and you trust that.

Ultimately, it is about the action. Important as it is to conceptualise and get a greater understanding, at some point you have to act.

What would you say is the most vital aspect of the PhD now when you look back at this work?

The PhD was really a reflection of the values that were already instilled in the hapū, and the various actions that were taken showcased these values

in a contemporary context. One of the most important aspects of this was the interrelationship between Atua, whenua and tangata. The case studies showcased how the Atua influence our actions through the application of the knowledge and values that had been passed on. That always was a key principle of Miriama's: other things may change but the values themselves never do.

Notes

1. Tuakana Miriama Kahu and Teina Benita Wakefield, 'Haumanu Taiao Ihumanea: Collaborative Study with Te Tai O Marokura Kaitiaki Group' (PhD, Lincoln University, 2008), 241.

2. Ibid, 13.

3. Ibid, 129.

4. Ibid, 232.

5. Ibid.

6. Ibid, 240.

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