Avoiding and reusing waste

Session 1

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Garbage Banks as a platform for community-based waste management in urban coastal communities: A case study of Luar Batang, Jakarta, Indonesia

John DEVLIN

Zero Waste SA Research Centre for Sustainable Design and Behaviour, University of South Australia

Community based approaches to waste management in Jakarta, Indonesia

Uncontrolled waste flows lead to damaging marine pollution and hinder resourcefulness. These flows often originate from underserved coastal communities in developing megacities. This paper uses a case study of Luar Batang in Jakarta to describe some of the conditions that cause uncontrolled waste flows. Garbage banks are suggested as a platform for community-based management that can be implemented with or without government assistance. The paper makes four recommendations how to improve upon the existing fledgling network. These include collected information through an online data base, educating the community and decision-making stakeholders about the garbage banks, integrating Extended Producer Responsibility into the garbage bank program, and developing an open source start-up kit that will assist communities to develop their own local garbage bank. Garbage banks are presented as an approach that can compliment existing and proposed formal waste sector responses such as waste to energy in order to improve recycling rates and create green jobs.

Keywords: Community-based recycling; waste collection; garbage bank; Jakarta; informal waste sector
Introduction

Researchers recently estimated that coastal communities discard approximately 8 million tonnes of plastic waste into marine environments annually, a figure which could double by 2025 if solid waste management systems (SWMS) are not improved (Jambeck et al. 2015). Marine pollution arises from a complex set of social and technical problems but at a material level is a direct result of uncontrolled waste flows, indicating the presence of a poor quality waste management system.

Global environmental phenomena, such as marine pollution, connects people together in an unfortunate chain of cause and effect meaning waste management problems in geographically distant locations still make an impact far, wide and well into the future. For example, decomposing trash in the ocean contaminates the entire food chain (Kershaw et al. 1989) and the continental-sized accumulations of suspended plastics could have been recycled to offset demand for the damaging exploitation of virgin natural resources. Cleaning pollution from open ocean is difficult and expensive meaning the best prevention strategy is to redesign aspects of waste management in areas where uncontrolled flows begin.

Jambeck et al. (2015) found China and Indonesia the two worse offenders of marine pollution from waste, with Vietnam, Philippines and Thailand also significant polluters. These regional neighbours face similar challenges balancing growth and sustainability against a backdrop of recent rapid industrialisation and urban development, each of these countries have sprawling mega-cities that have struggled to keep up with population growth (Li 2003). Environmental, economic and political pressure on government and industry leadership to make urban systems cleaner and more resourceful has made waste management an important part of urban planning (Nur et al. 2001). However, it appears many governments seem unsure about the best approach to take.

This paper will argue for the support and implementation of community based approaches to waste management, in particular garbage banks, to compliment the existing and proposed SWMS in Jakarta, Indonesia. I use the example of Luar Batang, a low income area in North Jakarta, as a case study to discuss why this approach is appropriate for these types of situation. Following the discussion I will make some recommendations about how to develop the garbage bank programme further.

Discussion

Jakarta is projected to become the largest urban agglomeration in the world by 2030, with an expected population of over 30 million people (Oxford Economics 2014). This population growth presents governments, and the community, with several challenges in terms of being able to fund and deliver an adequate level of service for its citizens. Delivering services in Jakarta is hindered by the underlying problems in infrastructure and institutions. Some of these are highlighted in the case study discussed in this paper.

Indonesia, like many countries, has an unequal society in terms of income, education and access to the democratic and decision-making processes. In Jakarta, the uneven development of space remains as a legacy from the colonial era when the areas occupied by the local population were consistently neglected for improvements (Abeyasekere 1987). Then, as now, these problems do not remain contained to the low income areas and begin to effect quality of life throughout the urban system. For example, under investment in waste management has exacerbated problems of disease, flooding, litter and pollution.
Luar Batang is a kampung adjacent to Sunda Kelapa, a port that is one of the oldest parts of Jakarta (Subroto). Kampungs are urban villages and whilst there are a mix of income levels to be found within these organically developed spaces they are mainly home for low income families and often newly arrived or temporary rural migrants (Winayanti and Lang 2004). Luar Batang is nicknamed Kampung Aquarium because of its close proximity to the coast and its propensity to flood. Traditionally this was a fishing and trading community but this lifestyle has become harder to maintain in face of diminishing stocks of marine life and competition from industrial scale fishing fleets.

![Kampung Architecture](image)

**Figure 1: Kampung architecture**

The existence of kampungs located in densely populated Jakarta is under constant threat of redevelopment as many of these communities are situated in prime real estate locations (Budiarto). Efforts to relocate these groups have not always been successfully planned or carried out, often diminishing vital social capital by dispersing residents away from their familiar places of work, worship and recreation (Silver 2007). The continued lack of investment in basic infrastructure and unacceptable provision of services is seen by some people as a deliberate attempt to make relocation a more desirable option. Therefore, part of making kampung life more viable is developing appropriate waste management strategies that can be operated independently of government provision.
As in other developing economic conditions there is a mix of formal and informal sector approaches in Jakarta, this is true for waste management (Aye and Widjaya 2006). Collection from home to transfer station is the realm of the informal sector and this has caused many problems in terms of delivering a consistent service and providing safe, reliable conditions for the workers themselves (Binion and Gutberlet 2013). Householders pay local waste collectors to have their rubbish removed, this is usually organised via a neighbourhood group. This system works with some success in areas of middle and high incomes with “richer” waste (Do Carmo and Puppim de Oliveira 2010), but in areas where the families live on small financial margins there is often a gap in service and ability to pay. In addition to an inability to pay for the service many parts of the kampung are only accessible by foot making waste collection difficult, even for human powered carts.
Nonetheless waste continues to be created and has to be managed in some other way. This is where uncontrolled waste flows emerge, through dumping into waterways, green spaces and other "unclaimed" spaces, or urban sinks (Lynch 1990). People on any income level create waste but the impact of this wasting varies considerably depending on the circumstances in which it takes place. Even though a kampung resident may be a relatively "low consumer" a lack of waste collection means that all their waste can become pollution, whereas a high consumer is a better developed waste management system may have less negative impact overall.

Figure 4: Urban sinks gather litter

In Luar Batang, a father and two sons have been collecting waste for several years. I had the opportunity to talk to them, with the help of a translator, to try and understand some of the problems they face and motivations behind entering this line of work. As to be expected the main motivation was to produce a steady income but they also expressed that as local residents they wanted the area to be cleaner and more healthy. They told me that they had made efforts to educate the local population to encourage them not to dump the waste over the walkways and into the waters below. My impression was that these people were quite well respected in their community but they said the problem was that people on the other side or downstream of the river kept throwing waste into the water which eventually ran into their area and the community became demotivated. Perhaps most disappointing was their account of having the recyclable material they had sorted stolen from the place they had it stored. As informal waste collectors this could have represented several days or weeks hard work and they were without any recourse for compensation. Both these stories highlight some of the issues with reliance on informal sector to achieve an essential service, see (Parizeau 2015) for a more detailed discussion regarding assets as vulnerabilities for informal recyclers.
Beyond the collection of the waste, the quality of the waste material itself is also something of a problem. If we look at the characteristics of the waste from kampungs we see a prevalence of packaging from single portions of everyday consumer goods such as shampoos, snacks, beverages, and baby products. This is presumably because of the false economy of poverty compels the residents to purchase small quantities of consumables, thereby causing more waste than necessary in both material and financial terms. This low quality waste is further devalued by the use of single bin/bag that mixes wet and dry elements.
The government of Jakarta has acknowledged that waste management is an important component of their sustainable development and are making efforts to divert material away from the uncontrolled dump of Bantar Gebang as part of reducing greenhouse gas emissions (Barton, Issaias, and Stentiford 2008). However, through conversation with people in positions of authority and as indicated by media reports it appears most likely that the government is tendering for the implementation of waste to energy technologies. Whilst this may reduce the reliance on the landfill experience from other developing countries suggests that this may only create another set of problems. Moving from a SWMS that relies heavily on informal sector activity to a privatised formal system has serious potential to create conflict between these two groups. If vulnerable informal sector waste workers are denied access to the waste there is a real danger that this livelihood will be lost and the people involved will be compelled to seek income in some other, which may or may not be beneficial to wider society (D. J. Gutberlet 2012).
There is a growing body of research that argues for the integration of informal and formal waste sectors to complement and balance out the strengths and weaknesses of each approach (Medina 2010). An important part of this integration are community based approaches to waste management. Community based approaches can be a relatively low cost way of improving recycling rates and delivering multiple benefits beyond the material. However, implementing any new scheme that requires people to change their behaviour can be challenging. Three significant factors that facilitate effective recycling have been identified (Timlett and Williams 2011), these are infrastructure, service, and behaviour. Their study concluded that behaviour-centric approaches have limited effectiveness without appropriate hard and soft systems in place. This is a view that was also echoed by expert participants at the Indonesian Solid Waste Association (INSWA) who lamented the near success of a composting project that fell apart due to disillusionment after residents realised their separated waste were often mingled again once they had been collected. These results suggest that a successful community based waste management project must be designed and implemented as a holistic package, with the involvement of all stakeholders.

Garbage banks, or bank sampah, as they are called in Jakarta have the potential to be developed into such a holistic package as they can provide communities with the infrastructure, incentives, and information required to engage them in new patterns of waste management (Purba, Meidiana, and Adrianto 2014). A garbage bank functions slightly similarly to how we might imagine a savings account to work. Depositors take their clean, unwanted material to the garbage bank and get a credit in their account depending on the quantity and quality of the waste, and the demand for the material at the time. The garbage bank can act on behalf of its members to obtain much better prices than if the individual sought to sell the same items at a scrap dealer.

![Stored recyclables](image)

**Figure 9: Stored recyclables**

An exciting aspect of garbage banks is that credit and interest needn’t be paid out in cash. Credit paid out in public transport fares, mobile phone credit, health expenses, pensions, and higher education fees could be much more useful for all concerned. Combining sensible recycling laws and deposits for water bottles, which acts like the credit in the garbage bank, reluctant recyclers could be converted into diligent recyclers (Viscusi et al. 2013). Beyond merely financial gains garbage banks can provide a platform to give people lots of reasons to take their waste and packaging to the correct place. Recycling should be an easy, rewarding experience, and
opportunity to either converse with neighbours at a leisurely pace, or also convenient enough to quickly deposit the accumulated material if in a hurry. The associations people have with garbage might make people think these areas are dirty or smelly, but on the contrary one garbage bank I visited in central Jakarta had provided pleasant seating areas, flowers, and shade in its immediate vicinity which attracted many people who enjoyed relaxing there.

From data provided by INSWA there were 24 garbage banks in Jakarta as of 2013, a number that has probably grown and indeed the same document reports garbage banks throughout the archipelago (INSWA 2013). This encouraging trend suggests that garbage banks have local support and the potential to provide a platform for a community-based collection system. With the development of such a system waste collectors like those I spoke to in Luar Batang would have a place to take separated recyclable material, and not worry about storing or getting a fair price for the material. Perhaps then informal waste collectors can act as conduits for the community, being supported and legitimised by the garbage bank. Therefore, to maximise this opportunity there are four recommendations that I would like to present here based on my research findings.

Firstly, whilst the current growth of garbage banks is an encouraging sign the current data-entry system is paper based. This means that there is a missed opportunity to collect data about how much and what kinds of waste are being produced in various areas. The government needs quality data in order to make appropriate decisions about where, when and what kind of services are needed. Therefore, a nationwide data base should be produced that allows data to be collected from all garbage banks. Ideally this nationwide, connected database would also allow garbage bank members to deposit waste at any garbage bank or designated place. This is advantageous because ultimately the garbage bank network would be most effective if they were established not just within communities for householders but also in places of work and schools, universities, hospitals, and other public buildings.

Secondly, linked to the collection of data of waste characteristics, Extended Producer Responsibility (EPR) should be integrated into the garbage bank program. EPR is considered a key component in improving waste management and overall resourcefulness in the urban context. The major producers of the packaging mentioned
above are important stakeholders and contributors to uncontrolled waste flows. A cohesive garbage bank network will provide an opportunity for the producers to be responsible for the management of the objects they design and manufacture. To their credit Unilever are involved in the bank sampah scheme, by providing start-up funds and information packs, however based on my observations their ongoing involvement seems quite limited and it does not appear to have changed the delivery of their products to a more sustainable design.

Thirdly, whilst almost everyone I spoke to is aware of the waste problem, it is hard to escape floods and litter, but what is needed now is an effort to also educate people about the relatively easy steps they can implement to willingly participate in the effort to reduce the waste and pollution. These are simple behaviour changes like using two bins (organic and "clean other") to separate material with the aim to make life easier for the collectors or recyclers. Given the inter- and intra-household dynamics this effort has to appeal to different types of actor. Middle- and high-income householders must give permission and instruct their maids and helpers to change their behaviour. Householders need to be encouraged to use the power they have within their homes to direct their waste to the garbage bank even though the financial benefit to them personally is minimal. The education campaign also needs to be aimed at decision makers within the government and leaders within the community so that community based approaches receive adequate support.

Finally, I recommend the development of a professionally produced, "open-source" resource kit that interested people can read and use to develop a garbage bank in their own neighbourhoods or places of work/education. This can include ideas about fund raising, community engagement, education, signage, infrastructure provision, problem solving, and so on.

Conclusions

Uncontrolled waste flows are responsible for damaging and costly marine pollution and hinder efforts to reclaim and recycle valuable material. Research suggests that the main origin of these flows are underserved low income coastal communities in developing countries. The case study described here exhibits many of the problematic characteristics that create the problems. The Jakarta government appears to be moving towards a waste to energy type solution, however it is recommended here that community based approaches should be used to compliment this formal sector approach in order to improve recycling rates and create green jobs.

In Jakarta, we have places in the city inhabited by under-served communities who through economic conditions are compelled to purchase products that are not easily recycled or collected. These products become uncontrolled waste flows that pollute due to poorly developed and supported waste management approaches. In this case study I highlighted some of the difficulties informal waste workers have collecting waste, these include an uncooperative, demotivated community and vulnerable storage of their collected assets.

Garbage banks and waste to energy infrastructure do not need to be seen as either/or approaches. With support of government, industry and community groups community based approaches to waste management can become an important tool in integrating informal and formal sectors, thereby producing a cleaner and more resourceful urban habitat. I have suggested here that expanding the garbage bank network will be facilitated through the development of an online data entry and membership system.
and an open source resource kit for people interested in starting their own garbage bank. I also suggest that the garbage bank network provides an opportunity to integrate with an EPR scheme that can help keep the producers of waste accountable for their products.

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ReDress: Reducing Textile waste through Component Reuse

Kim FRASER

Auckland University of Technology, New Zealand

Textile products are everywhere, from covering our bodies to populating our homes and workplaces. Is it unsurprising then that millions of tons of textiles are ending up in waste? This paper critically reflects on a 2009 Refashion case study. It discusses the current process of reuse in the fashion industry, drawing attention to the further potential of design for reuse.

Reusing and remaking used clothing was a long-standing practice that began as a way of extending the life of valuable resources. This sensitivity and respect for textile products changed in the 20th century with the growth of mass produced clothing and low cost off-shore manufacturing. Buyers, exploiting the low cost, capitalised on their economic strength, through larger orders in excess of their needs. This overproduction and excess stock directly fed the habits of a consumerist society demanding more for less. Current patterns of fashion consumerism have resulted in overproduction and overconsumption. This coupled with lower quality product and fast changing trends, has stimulated a ‘throwaway’ culture. Equally the inferior quality of mass produced clothing has limited its desire as a reuse option. The ubiquity of textile is its downfall, this devaluation has permeated all textile product and consequently millions of tons of textiles are consigned to landfill globally.

Refashion is an intervention in the 'take, make, waste' lifecycle of a garment. It is a slow growing, upcycling movement that reuses discarded clothing to produce new items for return to the fashion stream. This paper examines the perceived barriers of the Refashion process that currently limits the scale of the manufacturing operation. Findings in the Refashion case study support the feasibility of the process as a manufacturing method. Therefore the potential for Refashion, if it were more commonly practiced, is to divert large volumes of textile waste from landfill and reduce the demand on the environment: Refashion reuses the textile, maintains the original value added and delivers a new fashion item without the environmental problems required by virgin textile. This paper specifically focuses on component reuse: as a way of extending the life of the textile prior to recycling the fibre; and elucidates the process. The author identifies the benefits of a component reuse process built into the lifecycle of a fashion product and highlights the need for fashion designers and manufacturers to design for reuse.

Keywords: Refashion, Textile Waste, Fast Fashion, Component Reuse, Sustainability
The Textile Context

Accelerating consumerism in the fashion industry results in overproduction, overconsumption and waste. This combined with contemporary fashion's constant 'engagement with the new', makes premature product replacement imminent (Farrer and Fraser 2011). The fast changing trends have led to the morally questionable practice of disposing of garments that have only been 'worn' a few times (Birtwistle and Moore 2007). Lack of awareness and confusion as to the intrinsic value of textiles is emphasised in this 'throwaway' culture. This paper provides an overview of the traditions of reuse and secondary system within clothing textiles, together with our changing values through industrialisation. The author discusses the perceived barriers to reuse in the fashion industry through examination of a recent study. The process of component reuse (Fraser 2011), as a way for reducing textile waste through Refashion, is scrutinized and strategies for successful implementation are identified.

The Long Tradition of Reuse

Reusing and remaking used clothing is a long-standing practice that began as a way of making the most of valuable resources. Prior to the industrial revolution, creating textiles was a labour intensive process that required specialist knowledge and technique: textiles were both treasured and inherited. Patchwork quilts for example, provided an esteemed avenue for recycling precious fabrics that would be passed through generations. This perceived value in clothing textiles can be traced as late as the 18th and 19th centuries when, Ginsburg (1980) asserted, the frequent loss and theft of clothes and textiles as reported within court cases and newspapers was confirmation of their value. Second-hand clothes were vitally important in providing "relatively cheap and respectable clothing" to the working classes (Worth 2007, 18). Similarly outgrown clothes were passed down and adults’ garments cut down and remade for children or renovated for reuse.

With industrialisation textiles became abundant and the Shoddy industry developed to meet the demands of yarn supply. This recycling process recovered shoddy fibre from rags which was then spun into yarn and re-used by local mills in 'shoddy' cloths. At the same time ready-made clothing was evolving, and according to Worth (2007, 18) the shoddy cloth became the "staple of the growing ready-to-wear clothing industry". However although readily affordable, ready-made clothing became synonymous with poor quality, deemed inferior through the use of lesser quality fabric combined with a poor 'fit'. This perception thus endorsed the reusing of quality used clothing and emphasized the regard held by textile. Hence during times when textile was considered a valuable resource, we developed enduring habits that prolonged its usefulness.

OverConsumption and Devaluation of Textile

Textile products are now everywhere, from covering our bodies to populating our homes and workplaces. But following 250 years of industrialisation the perceived value of textile has drastically changed. Take patchwork for example, whereby economising became associated with the practice and relegated it to the resourcefulness of the less affluent and therefore socially undesirable. This attitude arose in the 20th Century when business focused on maximising profit through increasing production and reducing costs. The availability of mass produced clothing escalated with the advent of low cost off-shore manufacturing. Buyers exploiting the low cost capitalised on their economic...
strength through larger orders in excess of their needs (Farrer and Fraser 2011). The ubiquity of textile was its downfall, this devaluation has permeated all textile product. When Fast Fashion\(^2\) developed in the globalised 90’s, widespread overconsumption was already the norm. New high-end trends are delivered into store in short regular intervals, at the cheapest possible price-point. This constant newness expands the consumer’s wardrobe until, logically, removing the ‘old’ is necessary. But the quality of this mass produced clothing has further deteriorated (in terms of fabric quality and fit) and consequently reuse of these garments is now an unlikely option (Fraser 2013). Textile Impact

Mass consumption of mass-produced clothing at very low cost provides the consumer with a false understanding of the labour involved (Fraser 2013). Consequently, without a better understanding of further recycling options, ‘throwaway’ fashion now consigns millions of tons of clothing to landfill. Although the percentage of textile waste by comparison to total waste is small (approx 4% in most countries), textile products present particular environmental hazards for landfill that has an adverse effect on humans: pooling water stagnates, decaying fibre produce toxic gases and leachate which contaminates groundwater sources (Birtwistle and Moore 2007; WasteOnline 2004). Paradoxically the process required to produce virgin fibres is generally considered more alarming. For example the two most prolific fibres in common use are cotton and polyester. Every kilogram of cotton fibre requires 20,000 litres of water\(^3\) and it requires a kilogram of hazardous pesticide (per hectare) to reach successful harvest. Similarly hazardous for the environment, virgin polyester is extracted from non-renewable crude oil through chemical reaction\(^4\). If we were to consider that all fibre comes at a cost to people and the environment, then all reclaimed fibre reduces the need for this cost and therefore has value. There is no doubt that reuse and recycling of textiles would reduce the environmental burden (Oakdene Hollins 2006; Fletcher 2008).

At first glance textile ‘recycling’ appears to offer a commercial alternative for dealing with textile waste, because it produces a ‘bulk product’. Unfortunately the process is now considered a downcycling process that produces an inferior and less expensive cloth. According to Oakdene Hollins (2006) this is due to the heterogeneous mixture of different fibre types and colours extracted from the original discard source. Together with this, recycling reduces the garment to its elemental value of fibre, destroying the value added through developing the yarn, weaving/knitting the textile and any intricate construction detail. The author posits that textile recycling should be considered the last step in the lifecycle of a textile product (Finn and Fraser 2013).

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\(^2\) Fast Fashion delivers a cheaper source of trend clothing on the high street (Barnes and Lea-Greenwood 2006).

\(^3\) http://www.worldwildlife.org/industries/cotton

\(^4\) http://www.chemguide.co.uk/organicprops/esters/polyesters.html
The 2009 case study: ReDress - ReFashion as a solution for clothing (un)sustainability, explored the possibilities of Refashion as a solution to wasteful fashion consumption in New Zealand. This paper critically reflects on the aspects of reuse within the case study, specifically looking at extending the life of the textile component prior to recycling the fibre. The project facilitated the remanufacture of discarded items of clothing that still had structural textile integrity, into ‘new’ standardised ready-to-wear garments (refer Figure 1). The purpose of the original case was to investigate the barriers for larger scale production of refashioned product, through remanufacturing multiples of the ReDress prototype from discarded men’s trousers.

![Figure 1: ReDress x 5 on rack (Fraser 2010)](image1)

![Figure 2: Refashion as an Intervention in the Lifecycle of a Garment - adapted by Kim Fraser 2015](image2)
Refashion is an intervention in the 'take, make, waste' lifecycle of a garment (refer Figure 2). It is a slow growing, upcycling movement that reuses the textile, maintains the original value added and delivers a new fashion item without the environmental problems required by virgin textile. However there remains a question around commercialisation and scale of production. Through examining the process required for manufacturing multiples of the ReDress prototype, it became apparent that perceived barriers for the Refashion process primarily concern the input stock. This is not a new revelation, the ReFashion process is generally perceived as a one-off domestic mode. The perceived singular nature is the critical issue because the business model for fashion has a commercial reliance upon multiplicity of product (bulk product). The singularity arises due to the diverse nature of stock within the secondary industry: input stock is irregular and quantities are unpredictable.

**Men's Dress Trouser**

Primarily men’s dress trousers were selected to test the process of refashioning multiples because they met the criteria of being an appropriate input stock: consistency of style; perceived quality of ‘textile’; semi-standard shape; similar construction across brands; and limited variation in colour. Beneficially men's dress trousers also featured high quality tailored details that could be reused (fly, pockets, waistband). Additionally the availability of large quantities of trouser within the secondary system, satisfied the ‘bulk’ requirement to manufacture ‘multiples’ and potentially commercialise the process. The trouser stock was sourced from several second-hand clothing vendors around New Zealand. Poor quality textile was considered a significant impediment to the success of the refashioned product, accordingly trousers were selected because of their perceived ‘textile’ quality.

**Disassembly**

The difficulty of disassembling a garment to produce an homogeneous product for further use is considered a barrier to effective recycling (SATCol 2007). The ReDress case trialed a variety of approaches to the disassembly process. In traditional Remanufacture a blanket approach to disassembly is used, whereby the original discarded product is broken up into its individual components, then (exactly) like components are grouped as ‘stock’ items, bundled and stored. This works in cases where specific componentry/units have a limited variety within the ‘usual’ componentry (eg vehicles, lawn mowers, computers). However in the case of clothing, the immense variation of style/product (fibre, textile, texture, colour, pattern, gender, style, size, shape, combined with continual variations in design and construction detailing: collars, cuffs, plackets, linings, facings, fastenings etc) decreases the likelihood of gathering random discards together that have exactly the same components. The ReDress case revealed that to facilitate productivity and maximize the input stock, complete disassembly of clothing stock was impractical until specified.

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5 The term remanufacturing has been used to describe a disassembly/reassembly process adopted by several industries—more commonly associated with machinery and electrical appliances; http://www.reman.org/AboutReman_main.htm
Size Limitations

The resulting refashion design is also limited by the restriction of working within the shape of the components formed during first life construction. Historically large garments lend more readily to refashioning into ‘smaller’ garments for example children's clothes (refer Figure 3), the two dimensional area of the available cloth (input stock) is directly related to the size of the upcycled product. That is larger panel sizes offer more scope to be ReFashioned. Even disregarding that menswear garments tend to have larger panels than womenswear, the ‘usable piece size’ in men's trousers are somewhat limiting as evidenced in Figure 4.

Figure 3: Child's dress recut from adult garment (Resek 1955, 172)

Figure 4: ReDress pattern layout on disassembled trouser (Fraser 2009)
Whilst all men’s trouser do not each have exactly the same 2D area dimensions they are generally a predictable shape. For example men’s dress trouser are constructed from 4 main pattern shapes: two front panels and two back panels. The ‘back’ is usually larger than the front through the seat area and the ‘front’ will be shorter in the crutch area. At the same time trouser styles will tend to vary in leg width, which will effect the refashion style. The ReDress case identified that although there is an expected direct relationship with size of original trouser to the smaller refashioned output, pattern placement for ReFashion is much more complex. Expert consideration must be given to the diversity of the original stock’s panel size limitations. Exact placement of pattern pieces must consider the original ‘grain’ and can also be affected by the position of existing ‘details’.

Component Reuse

A key discovery in the ReDress project was that partial disassembly can provide larger panels for re-cutting. This reinforced the notion that disassembly requirements may be specific to each refashioned style and the timing for disassembly is therefore determined by the specifications of the style. The author identified component reuse as the best terminology to describe the ReFashion process (Fraser 2011). The sizing restriction that necessitates re-cutting down to smaller garments is a perceived barrier for ReFashion. However through recognising the disassembly limitation alongside the re-cutting down restriction, a key difference was identified in the approaches; from the cutting process of the original trouser; to the approach in cutting the ReDress prototype.

Trouser: The pattern pieces are laid onto the textile within the length and selvedge boundaries. The garment panels are cut away from this allowance. This is a reductive approach: garment panels are cut away from the source.

ReDress Prototype: partially disassembled garment panels are maintained at a maximum surface size and built up where necessary. This is an Additive approach: garment panels are built up to accommodate the pattern, much like patchwork. For example in Figure 5 the long circular skirts of 1950’s were cut from standard width fabrics with a small join at the selvedges to supply the extra length.
The key finding was that component reuse for Refashion utilises both an additive and reductive approach. Partial disassembly affords the opportunity to use the additive approach. This approach advantageously allows for refined details, designed and constructed within the original manufacture, to be included in this new Refashion garment.

Planned Variations of style

Cutting ReFashion pattern shapes from disassembled garment panels also differs from conventional cutting in that cutting 1 pair (the same shape mirrored) may not be possible. Panels within the original garment may retain a ‘memory’ of a previous body and become misshapen: consequently the distorted panel no longer mirrors the other side. Similarly positioning of targeted refined details will differ across input stock. During the development of the ‘T’ series prototype the only way to fit the new pattern piece on the disassembled panels was to disregard the wisdom of the field and adjust the direction to a diagonal grain. This caused a change to the angle of the pocket placement (refer Figure 6) and the ‘Y’ series was created. Highlighting the need for planned variations of style which can be adapted to best fit on the diverse dimensions of the disassembled panels - or ‘planned variations of style’ to allow for inconsistency in first life stock.

Figure 5: 1950’s Full Circular Skirt Pattern (Resek 1955, 36)

Figure 6: Plan for variations of style (Fraser 2009)
Quality of the Textile

All parts of a garment can be reused, if it is reclaimed before it reaches landfill. While there are a number of style factors that affect the reusability of an unwanted garment, the most prominent factor is the quality of the textile. If the textile has deteriorated the garment is no longer wearable and the textile is no longer useable. However it is still possible for the fibre within the textile to be recovered. Table 1 identifies the most probable lifecycle path for unwanted garments by their general condition in terms of the quality of textile, style and fit.

Table 1: General conditions for garment reuse (Fraser 2015)

<table>
<thead>
<tr>
<th>Lifecycle</th>
<th>Condition of textile</th>
<th>Style / fit</th>
<th>Reused as:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reuse</td>
<td>Good quality textile in good condition</td>
<td>Generally classic style - not trend driven, usually well made, good fit</td>
<td>Garment - as is to be re-worn</td>
</tr>
<tr>
<td>Component Reuse</td>
<td>Satisfactory to good quality textile over majority of garment</td>
<td>May be trend driven style, may require repairs, may be poor fitting style.</td>
<td>Textile - partial deconstruction of garment</td>
</tr>
<tr>
<td>Recycle</td>
<td>Poor quality textile, may be: shabby, pilled, matted, faded, holey, torn, stained, thread-bare</td>
<td>May be trend driven style, may require repairs, may be poor fitting style.</td>
<td>Fibre - elemental or total deconstruction of garment</td>
</tr>
</tbody>
</table>

The foundation for a reuse step already exists in the lifecycle of a garment. In New Zealand there are plentiful opportunities to donate unwanted clothing through a well established secondary system: reputable charity shops that accept clothing donations; vast network of clothing banks throughout even the smallest of rural communities; trustworthy online sales through TradeMe®; and good consignment opportunities through established recycle boutiques.

In 2012 Fletcher and Grose highlighted the need for garments to be made to the highest quality possible to ensure they hold their value and can be resold and reused. An unexpected finding from the ReDress case concerned the high percentage of mass produced brands in the main trouser stock sourced through the secondary system in New Zealand. But more significant, in terms of Refashion and Reuse, was the poor quality of the textile within the main trouser stock. The pervasion in New Zealand of low grade mass produced stock is a significant threat for reuse: shabby stock is less likely to be sold for the purpose of wearing; and poor quality textile is no longer useful for component reuse. Downcycling becomes the only intervention available before landfill disposal.

Producer Responsibility

In a recent study of post-retail responsibility of garments, Kant Hvass (2014) discussed the responsibility of the producer through industry driven post-retail initiatives. In New Zealand carpet industry was one of the first industries in New Zealand to introduce a Product Stewardship Scheme as a method for diverting the large volumes of used carpet from landfill disposal. In 2012 Cavalier Bremworth launched a carpet recycling scheme in New Zealand, using wool carpet to produce a new nonwoven needle
punched carpet underlay made from 100% recycled wool\(^6\). The company offers commercial projects an end-of-life take-back for wool carpet and they have linked with The Waste Exchange\(^7\) and Textile Products in Auckland, to encourage residential carpet recycling. The intention is to reduce unwanted residential carpet from being disposed of in landfill and provide a targeted collection point for similar product stock to accumulate as input stock. However the provision of access to links does not guarantee that the consumer will follow this intervention.

Kant Hvass (2014) confirms a store/brand\(^8\) targeted approach, or in-store take-back scheme, makes it easier for the individual consumer to return no longer required garments. At the same time a targeted collection point provides some assurance regarding quantity and quality of garment input stock for the purposes of upcycling. Simultaneously a wider uptake of in-store take-back schemes may help to re-establish producer awareness of value and develop a more custodial relationship with garment products.

**Conclusion**

Garment reuse and component reuse both extend the life of the textile and they reduce the occurrence of textile waste in landfill. At the same time they replace the need for the production of virgin textile and therefore reduce the demand on the environment. Therefore the potential for Refashion, if it were more commonly practiced, is to divert large volumes of textile waste from landfill and reduce the demand on the environment.

The success of the refashioned product is largely dependent on the quality of the original discard garment (Fraser 2009). The ReDress case study highlights the benefits of a component reuse process built into the lifecycle of a fashion product. Trend based designs have a short life expectation. The lifecycle of a fast fashion or mass produced garment must become a consideration during the design process to enable reuse of the textile, if the style will likely no longer be reusable. Component reuse, as a way of extending the life of the textile and the inherent value of the laborious details, can only take place if the quality of textile is considered during the design process. Unfortunately while designers may have integrity and their design intention is to use a quality/durable textile, this may be subverted by those managing production to reduce costs. The author posits that both designers and manufacturers need to be aware of designing for reuse and these principles must be reinforced at the time of manufacture.

**References**


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\(^6\) [http://www.cavbrem.co.nz/environment/carpet-recycling.aspx](http://www.cavbrem.co.nz/environment/carpet-recycling.aspx)

\(^7\) [http://www.nothrow.co.nz/](http://www.nothrow.co.nz/)

\(^8\) for example Patagoni, Marks and Spencer, Levis and H&M (as at [http://www.conecomm.com/hm-product-take-back-clothing](http://www.conecomm.com/hm-product-take-back-clothing))


Kim Fraser is a Senior Lecturer and researcher in Design at AUT University. Her fashion design research is practice-led and focuses on sustainable design in relation to addressing post consumer textiles waste. She has presented her research at international conferences and has organized sustainable fashion workshops, seminars and events.
Spill-Over Effects for a Ship Shape Society: Earthship Ironbank as Cultural Catalyst?

Keri CHIVERALLS¹ and Martin FRENEY²

University of South Australia, Australia

¹School of Natural and Built Environments and ²School of Art, Architecture and Design

‘Earthship Ironbank’ is the first council approved building of its type in Australia, a ‘sustainable’ building project utilising ‘waste’ materials (primarily car tyres), ‘natural’ materials (primarily earth and straw), and other conventional materials, to create a living laboratory and bed and breakfast on Martin Freney’s property in Ironbank in the Adelaide Hills. Approximately 60 people, including Keri Chiveralls (as ethnographer and participant observer), participated in the workshop components of this project during the Easter and summer workshops of 2014, mainly for a period of between one and five weeks, many of them camping on site, learning new skills, meeting new people and sharing ideas. This paper considers the significance of the workshops as a form of cultural ‘catalyst’, enabling engagement in information exchange and social networking (both physical and virtual) that profoundly influenced the lives of participants following the workshops and potentially supported the development of an ‘ecological habitus’.

The paper outlines an agenda for future research to critically interrogate these ideas. The researchers are developing an online survey to enable participants to reflect on the significance of the workshops and whether they felt the experience led to transformations in their knowledge, beliefs, relationships and everyday practices following the workshops. In particular, the researchers are interested to examine the ‘spill-over’ effects associated with the workshops, by asking participants about their interests, networks, activities and behaviours before and after the workshops, and comparing and contrasting the survey results with ethnographic data.

Keywords: Natural/alternative/sustainable building, permaculture, waste, spill-over effects, ecological habitus
Introduction

This paper outlines a research agenda for inquiry into how a series of workshops run at ‘Earthship Ironbank’ influenced the lives of those who participated. Drawing on previous anthropological research in the permaculture movement (Haluza-DeLay and Berezan 2013), the paper considers the significance of the workshops as a form of cultural ‘catalyst’ (Walter 2012). The researchers hypothesise that participation in the workshops enabled processes of information exchange and social networking (both physical and virtual) that potentially fostered transformations in the everyday practices of participants beyond the workshops and provided support for the development of the ‘ecological habitus’ (Haluza-DeLay 2008; Bourdieu 1990; 1998). In particular, the researchers are designing a survey which seeks to identify the ‘spill-over’ effects (Hondo and Baba 2010) associated with the workshops, by asking participants what interests, behaviours and activities they were involved with before and after the workshops and enabling participants to reflect on whether they felt the experience led to transformations in their knowledge, beliefs, relationships and everyday practices. The results of the survey will be compared and contrasted with ethnographic data obtained through participant observation, in order to help address some of the issues associated with survey research on social behavior (Bryman 2012), and provide a more critical interrogation of the cultural ‘catalyst’ concept, along with the significance of the workshops in terms of ‘broader socio-ecological transformation’ (Haluza-DeLay and Berezan 2013, 136).

Background: Earthship Ironbank

‘Earthships’ are designed and promoted as a kind of ‘radically sustainable building’ (Reynolds 1990, 1991) which provides comfort conditions year round, even in challenging climates (Freney, Soebarto and Williamson 2013a; 2013b; 2012; Freney 2008; 2009). They are described by creator Michael Reynolds as, ‘independent vessels – to sail on the seas of tomorrow’ (1990 cited in Freney 2009). According to the Garbage Warrior website (Open Eye Media, 2015), ‘Earthship Biotecture’, a portmanteau of ‘biology’ and ‘architecture’, refers to ‘the profession of designing buildings and environments with consideration for their sustainability’. ‘Earthship Biotecture’ employs six main ‘Earthship Design Principles’:

1. Passive design or ‘thermal/solar heating and cooling’ to ‘maintain comfortable temperatures in any climate’;
2. Renewable energy ‘through photovoltaic/wind power systems’;
3. Onsite sewage treatment which ‘prevents pollution of aquifers’ and uses grey water to flush toilets;
4. Building with ‘natural and recycled materials’ including materials often considered as ‘waste’;
5. Water ‘harvesting’ through the use of rain water which is recycled/reused ‘four times’;
6. ‘Food production’ using waste water for irrigation and a planter system which can be used to grow food on-site, year round, with zero food miles (Earthship Biotecture 2015).

‘Earthship Ironbank’ is the first council approved application of ‘Earthship Biotecture’ principles in Australia and is also endorsed by creator of ‘Earthship Biotecture’, Michael
Reynolds. This building project aims to utilize a combination of ‘waste’ materials (primarily car tyres) and ‘natural’ materials (primarily earth and straw) as well as conventional construction materials, and apply ‘Earthship Biotecture’ principles, to create an ‘Earthship’ that will function as a living laboratory and bed and breakfast accommodation on Martin Freney’s property in Ironbank in the Adelaide Hills. During the Easter and summer workshops of 2014, approximately 60 people (including Keri Chiveralls as ethnographer and participant observer) from around Australia and the world, travelled to Ironbank to participate in the workshops. The majority of participants were involved in the project for a period of one to five weeks, many of them camping on site, learning new skills, meeting new people and sharing ideas. While many applied for and paid to attend and be involved in the workshops, there were also other volunteers and visitors who were involved on a more sporadic basis, with some attending for a day or two at a time, along with a more experienced ‘crew’ who assisted with the running of the workshops.

**Earthship Ironbank and Permaculture**

Fieldwork and interviews conducted by Chiveralls at the workshops suggested that many workshop participants shared an interest in permaculture as well as ‘alternative’ and/or ‘natural’ building. Permaculture is an ‘ecological design system’ and ‘an international movement’ (Ferguson and Lovell 2013, 252). Australians Bill Mollison and David Holmgren first coined the term permaculture in the late 70s (Mollison and Holmgren 1978; Mollison 1979). The word permaculture originally referred to ‘permanent agriculture’, due to the initial focus on creating permanent (self-sustaining/sustainable) agricultural systems in response to the rapid spread of energy-intensive industrial agricultural methods (Ferguson and Lovell 2013). However, the term has since ‘evolved’ to stand for ‘permanent culture’, as the purview of permaculture has broadened to encompass multiple ‘domains’ (e.g. see Figure 1) of human existence which are considered to ‘require transformation to create a sustainable culture’ (Holmgren 2002, xix).

The three core ethics of permaculture (Holmgren 2002) are:

1. Care for the earth (earth care)
2. Care for the people (people care)
3. Set limits to production and consumption and redistribute surplus (fair share).

The permaculture ethics have informed the development of the twelve permaculture design principles (Holmgren 2002):

1. Observe and interact
2. Catch and store energy
3. Obtain a yield
4. Apply self-regulation and accept feedback
5. Use and value renewable resources and services
6. Produce no waste
7. Design from patterns to details
8. Integrate rather than segregate
9. Use small and slow solutions
10. Use and value diversity
11. Use edges and value the marginal
12. Creatively use and respond to change.

Of particular relevance to both this conference and the ‘Earthship Ironbank’ workshops, is the focus on ‘waste’ in permaculture, as illustrated by the expression ‘there is no such thing as waste’ (FVSS 2013) associated with principle number six, ‘produce no waste’ (Holmgren 2002). One of the most distinctive aspects of ‘Earthships’ is their focus on ‘building with waste’ (Hewitt and Telfer 2012, 39), although they also address the issue of ‘waste’ through off-grid energy, water and wastewater systems that encourage frugal use of these resources. The cultural significance of, and issues associated with, use of ‘waste products’ (e.g. old tyres) as construction materials at the workshops will be explored in more detail in forthcoming publications (Chiveralls 2015).

However, according to Holmgren (2002, xix), in addition to the ethics and principles, permaculture also operates across seven key domains. These domains are depicted in Figure 1, the ‘Permaculture Flower’, which represents the integrated nature of the ethics, principles and domains of permaculture, and contains a direct reference to ‘Biotechture’ above the ‘Built Environment’ petal (Holmgren 2013, 2). Participant observation at the ‘Earthship Ironbank’ workshops suggested that the topics associated with these seven domains were all areas of learning and discussion at the workshops, whether covered explicitly through workshop learning and participation, or indirectly through the informal discussions and social interactions that were an integral part of the workshops.

Figure 1: The Permaculture Flower (Holmgren 2013, 2)
Earthship Ironbank and Spill-Over

The concept of spill-over effects was originally discussed in relation to economic theory to explain that, unlike most resources, knowledge was both non-excludable and non-exhaustible and would often tend to ‘spill-over’ into other firms who had not paid for this knowledge (Arrow 1962). However, more recently, the concept has been applied in relation to environmental and social movements and studies of pro-environmental behavioural and cultural change (e.g. Meyer and Whittier 1994; Thørgerson and Crompton 2009). For example, Hondo and Baba (2010) conducted a study in Japan to explore whether the installation of photovoltaic (PV) panels increased (or decreased or no change) pro-environmental behaviour along with concern about a) global environmental issues, b) global energy issues, c) household energy consumption, d) local environmental issues and e) health and safety issues. They found that installation of PV panels led to increased knowledge about energy and environmental issues; communication (frequency of conversations) with family and friends about environmental behaviour and new relationships with other PV owners (Hodo and Baba 2010). While Hondo and Baba’s (2010) study was focused specifically on the effects of technology on motivating pro-environmental behavior change, the researchers also argue that the social domains of spill-over are often neglected.

The ‘Earthship Ironbank’ workshops involved hands-on experience with building techniques that involved ‘waste’, ‘natural’ and conventional materials, and also exposed participants to passive solar design principles and other sustainable design strategies, including integration of renewable energy, wastewater reuse and food production. However, it is important to acknowledge the temporary and transitory nature of involvement in the workshops, as unlike the PV installation discussed by Hondo and Baba (2010), the workshops did not provide the opportunity for participants to continue to interact with ‘Earthship’ technology on a daily basis following the workshops (unless they applied this knowledge to their own lives following the workshops), as is the case with the installation of solar panels in buildings of residence. Nevertheless, it is conceivable that the interaction with the practices and technologies embodying the ‘Earthship Design Principles’ throughout the workshops continued to stimulate practices commensurate with these principles (and by extension the ethics and principles of permaculture) in the lives of participants beyond the workshops. Supporting this theory, Haluza-DeLay & Berezan (2013, 142) argue that participants in permaculture workshops in Edmonton ‘continue to build a different awareness than the mainstream population’, and that the permaculture practices of participants ‘do, in some cases blend into other practices, such as alternative economies or public transit.’

Earthship Ironbank and the Ecological Habitus

Adopting Bourdieu’s (1990; 1998) concepts of ‘habitus’ and ‘practical reason’, Haluza-DeLay (2008, 214) argues that the development of an ‘ecological habitus’, ‘a practical logic of how to live well in this place, that is, in a socially and ecologically integrated manner’, would enable us to ‘live sustainably without trying’. However, Bourdieu’s concept of habitus is also inseparable from his concept of field, in which habitus can be understood as a ‘feel for the game’, and ‘the “fit” of a habitus to its social field as constitutive of the success of a person in navigating their social position’ (Haluza-DeLay and Berezan 2013, 140). Haluza-DeLay and Berezan (2013) suggest that there is a potential ‘mis-fit’ between the habitus developed in relation to the permaculture social field and that of the fields of everyday urban life:
A conclusion we could draw is that ecological awareness is likely to be marginalized, or will reconfigure itself towards the mainstream as it faces pressures from others to not subvert conventional social norms unless there is a social field in which such an orientation does fit (Haluza-DeLay and Berezan 2013, 140, emphasis added).

One of the most significant aspects of the ‘Earthship Ironbank’ workshops was the social interaction and cultural exchange that took place throughout them: from sharing meals, working side by side, and often sleeping side by side, through the quiet moments of reflection and discussion in the shade, to the creative explosions of celebration like the ‘Frock up Friday’ dress-up parties that often accompanied ‘beer o’clock’ drinks at the end of the workday. Such interactions facilitated learning and information exchange across many of the permaculture domains depicted in Figure 1, along with the development of social networks and connections, both geographical and virtual that continued long after the workshops were over. In their anthropological study of the emergence of a permaculture community in Edmonton, Alberta, Haluza-DeLay and Berezan (2013, 142) describe the permaculture community as a ‘learning community’ which leads to the development of an ‘ecological habitus’. They found that permaculture network participants ‘engage (in various ways) with relations in community’, both as a ‘community of interest’ in a broader sense but also through practice which ‘facilitates social networks and communities of geographical connections as well’ (Haluza-DeLay and Berezan 2013, 142). They describe these communities as a ‘source of social support’ for the ‘ecological habitus’ (ibid).

Future Research: Surveying Earthship Ironbank

Chiveralls and Freney are currently developing a survey to assess the ‘spill-over’ effects of the ‘Earthship Ironbank’ workshops for participants based around a combination of the ‘Earthship Design Principles’, the ‘Permaculture Design Principles’ and the domains depicted in the ‘Permaculture Flower’ (see Figure 1) (Earthship Biotecture, 2014; Holmgren, 2002; 2013). The survey will enable participants to reflect on the significance of the workshops and whether they felt the experience led to transformations in their knowledge, beliefs, relationships and everyday practices following the workshops. The survey will likely employ a combination of closed and open questions to capture any self-identified changes in interest and action in permaculture related activities prior to and following the workshops (Bryman 2012). The survey will assist the researchers in testing the significance of the workshops as a form of cultural ‘catalyst’ (Walter 2012), enabling a kind of information exchange and social networking (both physical and virtual) that profoundly influenced the lives and practices of participants following the workshops and potentially supported the development of an ‘ecological habitus’ (Haluza-DeLay 2008; Haluza-DeLay and Berezan 2013). The survey will be hosted by an online tool such as Survey Monkey and distributed amongst workshop participants, on receipt of ethics approval from the relevant University boards, via an email database that was collected during the workshops to facilitate information exchange following the workshops. In order to help address some of the issues associated with survey research on social behavior (see Bryman 2012, 270), the results of this research will be compared and contrasted with research results gathered via participant observation and ethnographic inquiry conducted onsite by Chiveralls (a trained cultural anthropologist) throughout the workshops and beyond.

The researchers hypothesise that it is likely that many of the participants in the workshops were already highly aware of and engaged in environmentally and socially conscious activities like permaculture prior to attending the workshop. Results of participant observation suggest that, like the permaculture workshops participants
discussed by Haluza-DeLay and Berezan (2013, 142), even those participants who ‘had no previous involvement in permaculture’, frequently remarked that ‘they had been searching for something like this for a long time’. However, the researchers propose that involvement in the workshops provided a temporary space in which the co-location of like-minded individuals for extended intensive periods working towards a common goal, facilitated the exchange of information and ideas, creating a ‘spill-over’, which potentially resulted in a speeding-up and intensification of action in these areas following the workshop. Supporting the cultural ‘catalyst’ hypothesis, Haluza-DeLay and Berezan (2013, 136) argue that the networks developed throughout the permaculture workshops were ‘key to diffusion of knowledge and innovation’ and that the Edmonton workshops may ‘become a stimulus for broader socioecological transformation’.

Conclusion

The ‘Earthship Ironbank’ workshops have provided Chiveralls and Freney with a unique opportunity to conduct research into the permaculture and ‘sustainable’, ‘natural’ or ‘alternative’ building movements. This paper has outlined a research agenda for inquiry into how the ‘Earthship Ironbank’ workshops have influenced the lives of those who participated. The researchers hypothesise that while many participants will already have been engaged with permaculture related activities prior to attending the workshops, the intensive period of activity and engagement marked by the workshops acted as a cultural ‘catalyst’ (Walter 2012), serving to speed-up and deepen levels of engagement and potentially providing social support for the development of an ‘ecological habitus’ (Haluza-DeLay 2008; Bourdieu 1990; 1998). The researchers are developing a survey to enable participants to reflect on the significance of the workshops and whether they felt the experience led to transformations in their knowledge, beliefs, relationships and everyday practices following the workshops. In particular, the survey will seek to identify the ‘spill-over’ effects (Hondo and Baba 2010) associated with the workshops by asking participants what behaviours and activities they were involved with before and after the workshops. Results from the survey will be considered in relation to ethnographic data gathered through fieldwork and participant observation, to critically examine the cultural ‘catalyst’ concept and interrogate the cultural significance of the workshops, in relation to the everyday practices and experiences of individual participants, along with broader social movements and transitions beyond sustainability.

References


