INTER-ASIA ROUNDTABLE 2011

Recycling Cities
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RECYCLING CITIES

1 - 2 AUGUST 2011
ON THE COVER:
Photographs by
Tim Winter and Cindy Godden
Cities are at once generators of waste of various kinds and key sites for innovative practices of reuse and recycling through which waste products become revalued. The Inter-Asia Roundtable 2011 examined waste practices and products in urban Asia. The framing of the Roundtable included, but also extended beyond, conventional definitions of recycling (as making new products using materials from waste products). We applied ‘recycling cities’ to new uses of existing urban space and material fabric and also to ways in which urban models, ideas and cultural practices are reworked over time.

Held on 1-2 August, the two-day Roundtable was comprised of five panels, each consisting of two sessions (one revolving around a presentation by an invited speaker and comments from two discussants, and the other an open discussion). The three presentations on the first day zoomed in on the recycling of specific material products in Asian cities: (1) Plastics, (2) E-Waste, and (3) Water. On the second day, the remaining two presentations considered practices of urban recycling, focusing on: (4) Informal Recycling Practices and (5) Sustainable Urbanism. The excellent work of Jonathan Lee and other members of ARI’s Events Organization team are gratefully acknowledged.

This booklet includes the five papers, comments from two discussants on each of the papers and a summary of each of the five open discussion sessions.
# Table of Contents

PREFACE ................................................................................................................................................ III

RETHINKING RECYCLING: THE MATERIAL COMPLEXITIES OF PLASTICS WASTE IN HANOI
BY GAY HAWKINS ............................................................................................................................... 7
Discussant Notes by Tripta Chandola .......................................................................................... 25
Discussant Notes by Jamie Gillen ............................................................................................... 27
Roundtable on Dealing with Plastic Waste ............................................................................... 29

-CENTRICITY, PERIPHERY, BOUNDARY, AND EDGE: ASSEMBLING URBAN ORDERS FROM RUBBISH ELECTRONICS
BY JOSH LEPAWSKY AND MOSTAEM BILLAH ............................................................................. 35
Discussant Notes by Tong Xin ....................................................................................................... 68
Discussant Notes by Peter Marolt ................................................................................................. 70
Roundtable on Electronic Waste .................................................................................................... 74

RECYCLING PRACTICE: RAINWATER HARVESTING IN CHENNAI, INDIA AND THE POLITICS OF WATER PROVISION
BY EMILY POTTER ............................................................................................................................ 79
Discussant Notes by Mathew Gandy ............................................................................................ 96
Discussant Notes by Rita Padawangi ........................................................................................... 98
Roundtable on Recycling Water .................................................................................................... 101

WASTE PICKERS IN ASIA: CONTESTING VALUE AND VALUES
BY CINDY GODDEN .......................................................................................................................... 107
Discussant Notes by Bikramaditya Kumar Choudhary ............................................................... 146
Discussant Notes by Tim Bunnell ................................................................................................. 150
Roundtable on Informal Sector Recycling Practices .................................................................... 153
RECYCLED BUILDINGS: CHALLENGING SUSTAINABILITY IN AN ERA OF AIR-CONDITIONING
BY TIM WINTER .............................................................................................................159
Discussant Notes by Johannes Widodo ........................................................................183
Discussant Notes by Stephen Cairns ............................................................................188
Roundtable on Towards Sustainable Urbanism .........................................................193
CONCLUDING REMARKS ..........................................................................................199
PROGRAMME ...............................................................................................................202
CONTRIBUTORS .........................................................................................................208
LIST OF PARTICIPANTS ............................................................................................210
vi Recycling Cities
RETHINKING RECYCLING:  
THE MATERIAL COMPLEXITIES OF  
PLASTICS WASTE IN HANOI

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INTRODUCTION

Rapid industrialisation, urbanisation and economic restructuring in many Asian countries have generated phenomenal increases in industrial and domestic waste. As many reports note, poorly regulated economic development coupled with increased consumption have produced a crisis in waste disposal that existing formal and informal systems are struggling to handle. The Report of the 3R South Asia Expert Workshop (2006) hosted by the Asian Development Bank notes that: ‘most of the municipal solid waste (MSW) collected in the region is dumped on land in a more or less uncontrolled manner. Such inappropriate waste disposal creates serious environmental problems that affect the health of humans and animals and cause serious economic and other welfare losses.’ A key solution, according to this report, is the ‘3Rs concept’ (reduce, reuse and recycle) that, if implemented, ‘could be the missing piece in solving the Asian waste puzzle’ (p. 9).

Whether or not the promotion of a 3Rs strategy will be the ‘missing piece in solving the Asian waste puzzle’ is not my concern here. Like so many other official assessments, Asian Development Bank boosterism tends to deny the complex realities of diverse waste management processes that, not only have long histories in Asian countries, but also often involve multiple forms of reuse and recycling. What is my concern is the way the concept of recycling is mobilised; the way official waste discourses and policy can inhibit
understandings of exactly how recycling works as a heterogeneous urban, material and political practice.

In their critique of Dutch waste management discourses Joost van Loon and Ida Sabelis (1997) argue that across numerous policy fields recycling is constantly posed as the solution to growing amounts of waste. This framing of recycling represents it in linear terms: recycling is the point in a production cycle when waste becomes resource or when the product returns to raw material and is reinvented. The waste flow, inevitably visualised with arrows, moves in logic of continual deferral with recycling being the moment when final waste is averted. Recycling is also used to align economic imperatives with ecological ones in ubiquitous win-win scenarios. This connection between environment and market is also linear: as waste moves into market relations via recycling the beneficial flow on to the environment commences. For van Loon and Sabelis the linearity of flow metaphors reveals a technocratic and mechanistic logic that assumes that recycling is an always positive process. This linearity also privileges a temporal understanding of recycling: it is a process of transformation always moving forward into the future. Even when recycling is represented as a circular flow, such as in ‘closing the loop’ metaphors, the arrows always move in sequence one after the other. In the case of recycling cyclical time is completely compatible with linear time (van Loon and Sabelis, 1997, p. 295). Both these temporalities can be accommodated in articulations of technocratic waste management.

This critique of recycling is richly suggestive. Beyond the restricted understandings of temporality, van Loon and Sabelis show how simplistic many policy and NGO/governmental accounts of recycling are. How much they reduce the complexities of waste management to seemingly straightforward linear processes of economic and material transformation. Yet even the most cursory glance at recycling processes in action – anywhere – shows that this particular waste management activity is far from simple or linear. It involves multiple socio-material practices, temporalities, political relations and more. Consider, for example, the material presence of piles of waste matter in a landfill being picked over by waste pickers, this choreography of material and human relations gestures back to the multiple previous realities of the waste matter, and forward to speculative reincarnations of value. Then there are the diverse spatial and cultural connections that are made present when the bundle of donated western used clothes is dumped on the sorting floor of a textiles recycling facility in Bangladesh. Or what about the careful checking of the classificatory codes on plastic waste, as the Japanese housewife chooses the
correct bin for her rubbish and enacts a form of environmental citizenship. Is this PET, PVC or non-recyclable polystyrene?

In this tiny sample of recycling events complexity reigns, these are events where things are related but not necessarily in a coherent way, where differential times and spaces are made present *all at once*; where labour works hard to disassemble the object that took half a second to make in a machining factory and minutes of brute human force to crush; where discarded wasted stuff participates in recycling practices as an active presence. In each of these events recycling is being enacted and in these enactments various waste realities are being generated.

**RETHINKING RECYCLING**

Recognising recycling as complex and, in many cases, chaotic is an easy observation to make. My point is not to oppose the simplifications and reductionism of official waste policy with a banal or dismissive abstraction; ‘recycling is complex’. Rather is it to argue that a commitment to recognising complexity also involves a commitment to developing methods that can capture this. Of course, no knowledge practice can ever completely tame or contain the complex, multiple and shifting realities of recycling but they can respect them, they can work hard at attending to this – bearing in mind that all methods necessarily involve forms of simplification, exclusions and ordering. The issue is to be rigorously reflexive about this. As Law and Mol (2002) advise: ‘It becomes instead a matter of determining which simplification or simplifications we will attend to and create and, as we do this, of attending to what they foreground and draw our attention to, as well as what they relegate to the background’ (p. 11). In this approach simplicity is not the opposite of complexity, it is explicitly related to it. It is a strategic mode of ordering that draws attention to the contingencies of knowledge and their exclusions.

This methodological and epistemological framework is my starting point for rethinking recycling. In this paper I want to explore the complexities of plastics waste recycling in Vietnam using the example of Hanoi’s plastic craft villages. This focus on one material: plastic, and one location: craft villages on the edges of Hanoi, is deliberately specific and restricted. I am not using it as an illustrative example or as representative of a much larger phenomenon. I want to consider it as a phenomenon in its own right. This is not to say that lessons cannot be learnt from it or that it is not connected to other recycling sites and
practices. Rather, it is to insist that the specific and the concrete are where complexity is located (Law, 2004).

It is also to resist the urge in so much social analysis to scale up, to move from the example or illustration to the general theoretical principle or global reality. This is a hard move to resist especially when it comes to plastic. There has been so much press over the last few years about the global accumulation of plastics waste, about plastic soups and plastic gyres, about a world drowning in plastic that it is difficult to scale down and consider how plastics recycling in one urban location is organised. The mobilisation of scale via invocations of the global doesn’t just homogenise it also creates a hierarchy of order in which the bigger is always more significant and complex, and in which the local or the small is always defined by its relation to the global.

Rather than rethinking recycling via scalar models of ordering – from the local to the global, from plastics waste in Hanoi to widespread environmental accumulation, my aim here is to flatten things out. To stick to the detail and trace how plastics recycling is assembled in one place and the complex topology of associations it generates. This STS-inflected approach, well known and developed in geography and sociology, is now being extended with the elaborations of assemblage theory (cf DeLanda, Deleuze) and with attention to what Chunglin Kwa calls ‘baroque complexity’. For Kwa (2002) thinking of complexity as baroque means attending to the dynamics of details without recourse to any underlying sense of convergence or coherence. As he says:

By contrast the baroque looks down and, like Leibniz, observes the mundane crawling and swarming of matter ... the historic baroque insists on a strong phenomenological realness, a sensuous materiality. Second, this materiality is not confined to, or locked within, a simple individual but flows in many directions, blurring the distinction between the individual and the environment. And third, there is also the baroque inventiveness, the ability to produce lots of novel combinations. (2002, p. 26)

Kwa’s formulation is richly suggestive of how to rethink recycling. In developing this alternative conceptualisation of recycling three key issues and elements of my approach will be briefly elaborated before examining aspects of Hanoi’s plastic villages.

First, I want to take up Kwa’s call to pay attention to the phenomenological realness and sensuous materiality of waste, and to consider how it participates in processes of recycling. Unlike policy discourse which often categorises waste using very generic terms: solid, compostable, domestic, etc, I want to
rematerialise recycling and recognise the ways in which it is a process of materials handling and transformation in which waste is an active force. Not as inert matter in a process of transition and reinvention, thanks to human labour, but as material with vital capacities which are made present in recycling processes with varying effects.

Second, I want to consider recycling as a process that produces novel associations between humans, materials, politics, urban spaces and more; and how these associations become distinct assemblages, that is: horizontal networks of relations in which agency is distributed between all participants. This is not so say that all participants in an assemblage are equal but that in the shifting processes of assembling and associating agency is emergent rather than an expression of underlying structure. Unlike the ubiquitous flow metaphors that dominate most accounts of recycling, with their logic of linear and efficient cause and effect, theories of causation in relation to assemblages are militantly non-linear. As Bennett (2010) argues, assemblages generate multiple circuits of cause and effect that rebound on each other and that are often unpredictable. This does not mean that cause and effect are replaced by a seamless web of reciprocal actions, or endless process. Rather, that in tracking the dynamics of emergent causation it is crucial to ‘focus on the process as itself an actant, as itself in possession of degrees of agentic capacity’ (Bennett, 2010, p. 33). Emergent causality frames waste as material with contingent agency that is constituted in particular relations but that also shapes those relations with shifting degrees of power and effectivity.

Finally, I want to investigate how we might understand plastics recycling in Hanoi as a political process. While mainstream accounts of recycling generally frame it in economic and environmental terms, what would it mean to think about recycling as a political ecology in which various collectives are formed, interests represented and participations invited? And how does the ecology or ecosystem of recycling generate a more-than-human politics in which plastic waste has to be considered as provocative, as a ‘matter of concern’, something that forces thought and prompts various actions rather than the passive object of political deliberations and governmental administration (Hawkins, 2009).

These three conceptual propositions for rethinking recycling: to rematerialise the analysis; to shift from linearity to assemblage; and to investigate recycling as a political ecology, shape how plastics recycling in Hanoi will be examined. The following sections of the paper involve an investigation of aspects of the social and material organisation of recycling using these concepts. My aim here is not to simplify but to capture multiplicity and complexity via a close attention to detail.
Rematerialising Recycling: Plastics Accumulation in Vietnam

In order to understand the complexity of plastics recycling the first step is to track the growth of this material in Vietnam. If recycling emerges out of a long-term string of events, the accumulation of plastic in urban everyday life is an important historical development to track. In briefly mapping the social and economic life of plastic the aim is not to establish a logic of cause and effect, or accumulation and crisis. Rather, it is to document how a new material begins to make its presence felt, interferes with existing practices, and generates a range of new associations.

The plastic industry in Vietnam is around 50 years old. Initially production was relatively limited however, since around 1995 it has rapidly expanded and now represents an annual growth rate of around 30%. In comparison to neighbouring countries Vietnam’s plastic industry is still considered in its infancy. This assessment is based on per capita rates. In 1999 the amount of plastic produced in Vietnam was 9.4 kg per person whilst in Malaysia it was 49 kg, in Singapore 90 kg, Thailand 27 kg, and Indonesia 18 kg. These figures have changed over the last 10 years with significant industry development and flows of foreign and local capital investment especially in response to the reforms of Doi Moi. By 2005 the per capita figure was 25 kg and by 2010 40 kg (Runckel, 2006).

The plastic industry is dominated by small to medium scale businesses and is centred around Ho Chi Minh City. The vast majority of the plastic produced (90%) is for the domestic market. 55% of the industry output goes into packaging. In accessing raw materials Vietnam imports around 1.5 to 2 million tonnes of new resins annually, plus hundreds of ancillary chemicals and, increasingly, as raw materials become expensive, cheaper plastic scrap. These materials largely come from China, South Korea, Taiwan and Japan. The standard assessment of the plastics industry in Vietnam is that supply is unable to meet rapidly growing domestic demand and that there are opportunities for the development of the packaging sector, resin production and plastics reprocessing or recycling (Runckel, 2006).

This background paints a broad picture of the growing presence of plastics production in Vietnam and the ways in which it is connected to other patterns of economic and urban change. However, while there is no question that a rapidly growing plastics industry is a marker of economic development, this doesn’t capture how plastic materials, from bottles, to polystyrene food trays,
to plastic bags, have insinuated their way into daily life. In seeking to understand this aspect of plastic accumulation the challenge is to map how plastic objects have become incorporated into the material density of everyday life.

Considering the data above the issue of plastic packaging appears central. If 55% of plastic produced in Vietnam goes to making packaging how has this growth in a new material and a new market device – the plastic package in all its variety – generated new domestic practices and new waste forms? According to Cochoy’s study of the economic emergence and impacts of packaging: ‘packaging changes the product, the consumer and the producer all at once’ (2007, p. 120). But how does the growing presence of plastic packaging articulate these changes? And what of disposal – Cochoy makes no mention of this.

One of the problems in answering this question is that packaging is ubiquitous; it is a transitional material enrolled to extend shelf life, enable wider networks of distribution, facilitate branding and more, it is also very often a material that we see but don’t see. In seeking to understand how the emergence of plastic packaging has changed products, consumers, and production in Vietnam extensive ethnographic research would be required. In the absence of this I’m going to briefly focus on one particular plastic package – the PET bottle – that I have been researching over the last three years. The critical thing about the plastic bottle is that not only is it a transitional material, something that functions as an intermediary between the consumer and the product, it is also a disposable material, a single use item whose function is rapidly exhausted. In this way then, the afterlife of the bottle as imminent rubbish has to be aggressively disavowed. This is often achieved through marketing that focuses on the qualities of the product or through an emphasis on the consumer and the pleasures or health benefits of drinking. While the bottle is instrumental in all these actions, marketing constantly seeks to shift attention from its brute materiality, from its imminent destination as waste (Hawkins, 2011, p. 185). The afterlife of the disposable bottle has to be kept out of the market frame.

PET bottles have proliferated in Vietnam over the last 15 years with the rapid growth of the beverages industry. As the 2011 Business Monitor International Report into ‘Vietnam Food and Drink’ outlines:

Vietnam continues to be one of the most promising soft drinks markets in the region, attracting considerable investments from both Coca-Cola and PepsiCo … Economic growth, increasing urbanisation, external investments and
rising tourist numbers will serve to drive this growth ... There has also been a growth in bottled green tea, with the traditional beverage competing with bottled water and brands such as Pepsi. (2011, p. 33)

Plastic bottles, then, have not only changed the product making a traditional drink like green tea, for example, portable. They have also enabled what were small and underdeveloped markets in water and sweetened beverages to rapidly expand. They have also changed consumer practices, altering how and where drinking happens with the rise of mobile or convenience drinking that doesn’t involve sitting and sipping. In the case of bottled water there is no question that this market is also linked to the growth of tourism in Vietnam and the expectation/demand that tourists will be able to access safe water. As a new consumer presence or market tourists have prompted steadily growing demand for packaged water. Increasingly, however, more and more Vietnamese are also opting for bottled water as a way to manage poor water quality, or as a marker of aspirational consumption. This item is now considered a mainstream beverage in urban areas with around a third of residents in Hanoi and HCM using bottled water on a daily basis (Cohen, 2001, p. 46). Bottled water is also often used now as the welcome drink for guests or at meetings instead of green tea.

There is no question that, as packaging, plastic bottles have acted as market devices helping to articulate new economic actions (markets in new drinks, the growth of plastic bottle production plants) and new consumer and domestic practices (different ways to drink). The plastic bottle has been generative of a range of new habits; it has helped materialise significant changes in where, how and what people drink and it has insinuated its way into a range of everyday settings. As bottles have become ubiquitous they have acquired the capacity to generate effects, to prompt changes in the topologies of beverage markets and in the material cultures of daily life. This is emergent causation – the potent material presence of the plastic bottle as an actant, something that prompts actions, develops not in a linear or determinate fashion but in a dispersed and distributed way. Rather than explain the plastics waste ‘crisis’ in Vietnam as caused by growing accumulation of this material which then leads to a range of problematic effects on infrastructure, environments and more, the challenge is to understand how a material acquires agency: how it develops capacities to affect that reverberate across multiple sites from drinking habits to practices of disposal. Another key aspect of the disposable object is the way in which it has encouraged consumers to accept transience, to take up the habit of rapid and unreflective discarding that single use items demand.
My argument here is not that bottles self-organise or work alone. Rather, that in particular settings or assemblages their agency is enhanced. This is very clear in the operations of beverage markets where bottles in association with advertising, the commodity form, distribution networks, consumers and more, have helped articulate new markets and practices. It is also very clear in waste management where plastic bottles articulate a very different range of actions. The key issue is that plastic has multiple realities evident in its changing socio-material affordances as packaging and as waste. As a packaging material PET affords remarkable lightness, clarity, chemical stability and durability, hence its dominance in the beverages industry as a convenience container.

As rubbish this plastic object manifests a whole range of other affordances that are demanding and difficult to negotiate. In moving now to plastics recycling in Hanoi the aim is to track how waste plastic helps articulate actions and assemble a range of participants; how its affordances as discarded disposable matter generate very distinct recycling processes.

**ASSEMBLING RECYCLING**

Following Law (2010) my aim in this section is to develop an empirical ontology of plastics recycling in Hanoi. This means mapping the ‘choreography’ of recycling, the relations it weaves and the orderings and associations that are produced. If the outcome of this choreography is a ‘recycling assemblage’ the task is to investigate how this assemblage enacts various realities. While there is no doubt that recycling practices are productive, I want to resist the easy optimism of policy and waste theory that assumes that recycling is always already environmentally good. Instead, I want to investigate how Hanoi’s plastic villages are sites where a plurality of realities is produced: economic, environmental, political and more. These realities do not exist in an easy equality, some are suppressed and shadowy and some are unexpected, the issues are how are they enacted and how do they interact.

**COLLECTING**

The collection of recyclable waste in Hanoi is carried out by an informal waste recovery industry with a complex hierarchy. There are three types of waste collectors: dump pickers who collect at dump sites and sell on to junk shops; waste pickers who collect waste at central treatment sites in the city; and junk buyers who collect from households, offices and construction sites. Most of the
dump pickers and junk buyers are women with no other access to income. They generally work 10 hrs a day and walk around 15 to 20kms. Waste pickers at the sites are mainly children (80%). They are allowed into the central collection sites to sort out recyclables between 3 – 5 pm each day (ENTEC: Study of Empty Bottles in Hanoi, unpublished report, 2009). These groups collect anything recyclable, in the case of plastic this includes PET bottles, agricultural containers and rope, plastic bags, domestic packaging such as food containers, trays, wrapping, etc, plastic furniture and plastic household items.

This material is then sold to various waste intermediaries or ‘fixed location receivers’ as Mitchell (2009, p. 2635) calls them. These small businesses operate in a number of different sites in Hanoi. Those in the heart of the city are small and often operate on the sidewalk or in backyards. Their capacity to value add to the waste is limited and they mainly package it and on sell. Larger junk shops operate on the perimeters of Hanoi. Their primary function is to sort, wash and classify the waste that is bought from the collectors and then sell it to recyclers or export to China. These larger sites handle all sorts of materials from plastic to paper, steel and lead. In the case of plastics one of their key functions is to sort them into different types: high-density polyethylene (HDPE), low-density polyethylene (LDPE), PET, polyvinyl chloride (PVC), etc. Like elsewhere, plastics are a challenge for recycling because there are so many different varieties with different chemical and physical properties, different colours, melting points, etc, meaning that most plastics cannot be recycled together.

These two groups in the informal waste recovery sector, collectors and receivers or intermediaries, play a critical role in waste management in Hanoi. As many studies of waste pickers have shown they are maintaining urban environments and are at the front line of engaging with materials as they become waste. The labour of collecting, picking up and picking over is part of the process of enacting a waste reality for discarded plastic, and enacting an economic identity for the collectors. The dumped plastic and the waste picker are mutually constitutive. It’s a precarious relation enacted over and over but also subject to fluctuating amounts of waste being generated, competition, changes in urban form and regulation.

While it may seem that the discarded plastic materials in piles at the front of shops and homes, or dumped in landfill, are already waste, this practice of first stage disposal is only one of the many relations that the waste is and will be caught up in. As the activity of collecting shows, this practice activates new socio-material meanings for the waste that foreground its potential as exchangeable or recyclable. Awaiting collection, plastic material is about to be
caught up in a new and intricate choreography that will generate a multiplicity of other realities for it.

**CIRCULATION**

In getting to the actual practice of recycling plastics wastes have to be moved from the waste intermediaries to the plastic craft villages that surround Hanoi. These villages were traditionally the site of various craft production such as weaving, lacquer work or woodwork. With industrialisation these craft skills declined and often the residents shifted to making products for the industrialised economy. One of the new functions identified was recycling or managing the growing amounts of urban and industrial waste that Hanoi was producing. According to a study done by ENTEC (Vietnam Environment Technologies Corporation) and URENCO (Urban Environment Company), in the village of Tieu Khuc about 30 minutes drive from Hanoi there are 77 businesses and 300 people working in recycling in the area.

Many of these are household businesses that access plastic wastes in various ways. Most buy it from waste intermediaries but some get it direct from industry or corporations. For example, some hotels provide their own bottled water to guests and sell the empty PET bottles direct to the village without going through any process of collecting or waste intermediary storage. If the plastic waste is homogenous, as it is in this case, then there is no need for this intermediary function. If it’s not – if it’s mountains of crushed mixed PET bottles, or multiple types of bags – then the work of sorting and compacting that might take place in a Hanoi waste intermediary is important. Larger businesses that can afford to invest in equipment often have their own truck for pickup and delivery, smaller ones use delivery services (Pearse, 2008).

Getting plastics waste to the plastic craft villages is another intricate choreography that involves various forms of labour, networks of relations between the village businesses and waste intermediaries, modes of transport and negotiations of prices. There is also a lot of classification and ordering that goes into this circulation, the classification of the waste into different types of plastic, the ordering of transport systems that can accommodate massive loads. In these relations plastic is being enacted as a raw material, but its recent reality as discarded stuff is not entirely displaced. The practice of disposability, of chucking away after fleeting use, is still present – this rubbish reality is not entirely disconnected or eradicated. It’s present and potent in the crushed mountains of bottles and enormous bags of torn plastic film that gesture back to previous uses.
In this process of circulation, of connecting collected waste with recycling businesses, the web of practices involved seems to enact a textbook reality of recycling as straightforward transition and transformation. This seems like the economic efficiency of linear recycling at its best: moving material from waste to recycling facility to market. But this denies how much this recycling reality intersects with other realities that persist and interfere. Particularly, the plastic detritus of commodity cultures, the brute physicality of disposable packaging that has served its purpose. This temporal and material presence, the sense in which the fleeting functionality of the object remains evident, signals the ways in which recycling is never linear but always connected to the multiple other ontologies of the material it seeks to reconfigure. As Law (2010, p. 10) says ‘no individual practice enacts a single reality. Instead it is realities in plural that are being done’.

**DISASSEMBLY**

The key task of the informal recycling businesses is to render the waste materially transformed in ways that make it suitable for remanufacture. This involves the enactment of distinct socio-material techniques for creating different materials and value. Of course value is being generated in the practices of collecting, salvage, storage and distributing, as are various material transformations, but in the plastics villages the material transformation has to work very hard to displace waste, to render waste stuff ‘formless in order to be reformed’ (Gabrys, 2011, p. 138). According to Gabrys the idea that waste can be recycled without remainder is a myth. ‘Remainder acquires a duration and delay, circulates through spaces, and undergoes material deformation and transformation but, it persists nonetheless in one form or another … recycling, in this sense, is never complete and always generates more waste (2011, p. 138).

Disassembly involves an enormous variety of practices. We’ve seen the choreography of collection but in the plastic villages this choreography is extended and intimate. It involves working with the brute materiality of the waste matter in order to make aspects of it available for reconstruction and revaluing. In these practices the very affordances that make the bottle, for example, convenient and mobile, now become brute physical recalcitrance that demands a range of human actions to transform. To disassemble a PET bottle takes significant human labour – this is a remarkably tough material designed to be unbreakable. Removing the labels that were stuck on in a microsecond by machine, sorting lids, cutting off the top of the bottle where the different PVC
plastic of the lid leaves a lip, rinsing, crushing, melting, shredding. To get to plastic pellets or a reusable material is to wrestle with the presence of the bottle as a resistant physical thing with a potential for value that is difficult to realise. The bottle and other waste might seem passive and inert in this process but my argument is that this plastic waste is active and elusive. What makes recycling such a labour intensive practice (and therefore concentrated where labour is cheap) is the demands the material makes on the human, the ways in which it refuses to cooperate in processes of recommodification. The material recalcitrance of some plastics (definitely not all) prompts a range of different reactions; in the process of recycling the power of this plastic to demand certain technical and human actions is significant.

This part of the recycling assemblage is not the point at which final waste is averted – this is a filthy, polluting, multiplicity of practices that are intricately connected to and affected by the diverse flows of waste materials in and distribution and export out – most often of pellets and chips to China for various plastics production. While there is no question that ‘new’ materials are being produced, and that the economic capacities of discarded plastic are being made present, this recycling reality is not the only one that is being enacted. It is also a waste creating reality evident in the materials that cannot be transformed and are dumped, in the flows of polluted water and plastic sludge, toxic fumes being released and inhaled, and plastic chips that blow away. These polluting and occupationally hazardous effects are another reality that is being enacted; they persist because of poor environmental and OHS regulations and enforcement in Hanoi especially in the informal and household sector.

Equally potent is the economic reality that is being enacted. In the plastics villages of Hanoi we see how entrepreneurial household businesses make the most of the market opportunity that growing amounts of urban and other waste are generating. There are many successful businesses in the plastic waste villages and relatively affluent homes where numerous employees are working. However, the idea that recycling creates a market for waste – so favoured by policy – has to be contested. This assumes that markets are expressions of underlying economic or macro-social structure. My contention is that this recycling market should be seen as a ‘co-ordinating device’, that is: a distinct assemblage for the calculation of value and the distribution of waste and raw materials.

Following Callon (1999), the plastic craft villages organise relations between humans and non-humans (the material of the product, technologies, techniques) and everything involved in this arrangement becomes a calculating agent to differing degrees. The key point is that in market assemblages agency
is not a privileged human possession, nor is calculation simply about humans negotiating competing interests or extracting value. Agency is distributed and the differing calculative capacity of participants emerges as an outcome of putting things into market relations and creating a ‘space of calculability’ (Callon, 1999, p. 191). What we see in this space is how much the plastic resists making itself available to new economic calculations – how much the disposable commodity or packaging, so cheap to produce and so fleetingly in use – relishes the state of waste and endless persistence. This is temporal and material resistance and complexity.

Recycling plastic is far from straightforward or linear, as the plastic villages of Hanoi show it is a network of contingent and precarious relations, choreography, ordering, and practices that enact various realities. The management of waste through market forms is one of these but it is shadowed by other realities of hazards to humans and environments that are also being enacted. According to Law (2010, p. 11) these shadowy or collateral realities have important ‘stealth effects’. Attending to these stealth effects is a critical element in rethinking recycling.

**Plastic Waste as Political Matter**

In this final section I want to consider how plastic waste can be understood as ‘political matter’ (Braun and Whatmore, 2010). By this I don’t mean how waste becomes the passive object of political deliberations and administration rather, how it might participate in the formation of matters of concern, how it might prompt political actions and participation. Recent work in political theory (cf Bennett, 2010, Hawkins, 2009, Braun and Whatmore, 2010, Stengers, 2005) has generated a lively and very important debate about politics as more-than-human. I don’t have the space to outline the contours of this debate here, except to say that central to this project is a challenge to the humanist assumptions of political analysis via an examination of the material force and vitality of matter. If matter is vibrant, or intrinsically lively and energetic, how might it participate in political processes? What happens to concepts of agency, responsibility, interests and publics if we acknowledge the force of things; a force that is not simply mechanistic but is, instead, the ability of all things (natural, technological, synthetic) ‘to exceed their status as objects and manifest traces of independence and aliveness, constituting an outside of experience’ (Bennett, 2010, p. xvi). These are singularly important questions, not simply because the call of the outside is an insistent challenge to human
centredness, but because political thinking urgently needs to expand its notion of collectives and interests if it is to make any kind of difference to the contemporary condition.

In thinking about how waste matter and recycling processes inaugurate a more-than-human politics the first thing to note is that there are multiple ways in which these politics can be enacted. As I have argued elsewhere (Hawkins, 2006), the development of large-scale governmental household recycling programmes in the US, Australia and Europe during the 1970s prompted a new set of interactions between householders, their waste, garbage bins, political authorities, resource recovery industries and more. In the household these new interactions, sorting and separating recyclables from the mainstream waste collection and putting them in special bins, became one of the key sites where householders felt implicated in ‘the environment’; where minor everyday actions became framed as civic and political gestures in the name of the planet. ‘Do the Right Thing’ campaigns (often prefigured by the anti litter movements of the 60s) remain one of the most important developments in the enactment of environmental citizenship and awareness in these populations. This is not to say that these effects were universal, simply to argue that in forcing householders to handle their waste differently waste matter became a potent participant and intermediary in the formation of new ethics and identities – prompting what I call ‘techniques of conscience’ and new collectives such as the ‘environmentally aware’ (Hawkins, 2009).

What then of places where recycling is not governmentalised, where it is not the focus of mass education campaigns about the state of the environment, or a technique of population reform and civic engagement? As we have seen in Hanoi recycling is organised via informal and entrepreneurial networks with very uneven levels of public infrastructure, regulation and policy. In looking closely at the dynamics of the plastics waste villages a very different more-than-human politics is being enacted. The first element of this political process is that as increasing amounts of waste become visible in the urban form, through litter, poor collection, growing amounts of pollution etc, waste materials began to make their presence felt and prompt various socio-technical controversies and matters of concern. Events like the 3R South Asia Expert Workshop set up to address ‘the waste crisis’ are evidence of this. However, beyond the discourses of NGOs, development banks and government calling for changed policy and action, what we might call ‘official’ political responses, there exists another political reality that is profoundly different.

In this other political reality a range of participants and interested parties gather around waste. This includes all those shop owners and householders
who carefully sort and pack their waste on the street ready for collection by waste pickers, the junkshops where it is stored and classified, the plastic villages where it is disassembled, and the myriad technical and material intermediaries in between. All these human and nonhuman participants are concerned about waste but their concerns vary according to how they relate to the waste, according to the ways in which waste comes to participate in their everyday realities. Different wastes generate different concerns: is waste a problem of maintaining household hygiene, a source of precarious economic survival, a potential commodity? What links these participants is not a concern with the state of an abstracted environment or nature but shifting forms of self-interest: how does an intimacy with the nonhuman stuff of waste enable or prevent human flourishing. In this way, then, waste reveals itself as thoroughly implicated in human sociality. Its nonhuman force is central to the constitution of human interests. In this more philosophical way of thinking about political process waste is not simply ‘out there’ threatening environmental or economic survival, it is more akin to what Bennett calls ‘unruly relatives to whom you are inextricably bound’ (2010, p. 116). And in these binds waste demands careful collaboration or the cultivation of practices that seek to co-operate with its vital materiality.

The machinery of official politics remains central to managing waste in Hanoi better, especially in ways that consider the interests of those most exploited and at harm in existing processes. But it should not blind us to the other political realities that exist in amongst all this; the more-than-human politics of human waste relations as complex intermingling, and the ongoing generation of multiple forms of co-operation.

CONCLUSION

This paper has sought to rethink recycling by paying attention to its non-linear complexities and suggesting three conceptual shifts. First, to rematerialise the analysis by recognising the ways in which the matter of waste is an active participant. Second, to investigate recycling as an assemblage in which various realities are enacted some of which are expected and others unexpected and shadowy. Finally, to extend thinking about waste politics to the more-than-human, for in this shift recycling in Hanoi’s plastic villages becomes an example of intricate collaboration and choreography not just disposal and material transformation.
REFERENCES


I am going to make a few points about Prof. Hawkin's paper and draw some of these within the context of my research. The paper makes an important point about the whole process, the politics and rhetoric around recycling being bureaucratized and the complicity of the policymakers and the NGO wallahs in sustaining this narrative. In my reckoning, recycling in itself denotes a culmination of sorts, and a process. However making recycling itself the start-and-end point detracts attention from a very crucial question by any stretch, especially in the context we’re talking about in places like Vietnam, China or India, and that is the production and politics of waste and who is wasting. I think concentrating on the politics of waste, wasting, who’s wasting, adds layers to this discussion of recycling, and also allows it to be situated in the specific social, cultural and political context.

Of course the politics of waste and its production are suggestive of neoliberal economic developments, and enough has been said about that. But it is also significantly associated with what you have referred to briefly in the paper as the new urban aspirational middle class identities. The use of plastic bottles or water bottles is not only making a lifestyle choice but establishes standards and creates distance with those who cannot afford the same. These brief and seemingly innocent shifts in lifestyle practices systematically sustain new practices of urban exclusion and othering; the institution of a moral order being a significant one of these. The paper refers to such issues within the framing of 'environmental citizenship', which perhaps can be stretched as an idea of aesthetics of citizenship. It is important to think about the underlying morality of these processes because in these places, the kind of moral order which executed the recycling practices in the ’60s in developed countries is being replicated by certain sections.
Here I shall briefly bring in the practices in India just to reiterate the point that these localised processes and practices, while very strongly grounded, have a resonance and perhaps overlapping, intersecting parallels that can be drawn for a much more informed strategy. The use of plastic bottles and bin bags has come to assume a fairly ubiquitous character in middle class Indian families. This section of the society aspires to ‘clean’ cities and duly do their part in the cleaning of cities. But this clean aspiration is not only limited to the membership of the save-the-nature, environmental club itself. This desire for cleanliness has manifested, in the last decade or so, amongst the middle classes in reluctance to directly engage with people who are ‘dirty’ – those who are involved in the process of recycling, the garbage collectors amongst others. As a result, an army of intermediaries who are not-so-dirty has emerged, and they negotiate the terms of engagement (or cleanliness) between the ‘clean’ middle-classes and ‘dirty’ garbage collectors. In India, the situation is further complicated because of the caste issue. Traditionally it is the lowest of the caste who are responsible for the cleaning. And now, because of global recycling processes, associated labour has to renegotiate class, caste and gender politics.

In the Indian context these middle-class aspirations have found resonance and support in state initiated campaigns such as ‘Clean Delhi, Green Delhi’. It is because of these kinds of campaigns that I raised the point about morality and how the processes of recycling are organised around these discourses. Merely concentrating on recycling takes attention away from the fact that the waste – around which the entire industry of recycling is organised – is being produced by a very small section of society, the burden of which has to be borne by the majority. Also recycling has assumed the status of a noble moral enterprise, especially within the context of ‘developed’ countries, where it is an instituted practice in which citizens are proactively involved and take responsibility.

These framings allow us to very conveniently shift attention from the highly oppressive practices of, say, plastics, even e-waste, especially in countries like India and China. The photographs presented during the talk highlight some of these politics. However, in reading the paper, the specificities and the sensuousness of, for instance, the class character in this waste and recycling does not emerge significantly. Also a discussion on the renegotiating and reframing of the urban and rural which is happening within these discourses, as in the case of Vietnam, would have made for a stronger argument.

Nevertheless, in my opinion, it is a very significant, stimulating work which opens spaces, methodologically and theoretically, to reflect upon the processes and politics of recycling and waste.
DISCUSSANT NOTES

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I have three points that I want to make, one on the theory of the paper, the second on the geography of the paper, and the third on the Vietnamese case study. I regret that I’m not a scholar of waste, but I would like to think I’m a Vietnam scholar. As to the theory, I think this paper is an interesting exercise in the sort of classic actor-network theory and non-representational theory debates that have been going on, but I think your paper does take it a step or two further in adding the whole idea of complexity while keeping classic terms like ‘assemblage’ and ‘circulation’ but adding to them. I like how you problematised the idea of circulation and kept things “local” by investigating Hanoi. I think that is certainly one of the facets that is attractive and I would encourage you to stick with that as your theoretical framework. The paper is well organised too, thank you for that. As for the case study of PET bottles, you’re right about the bottles being all over Vietnam. Their consumption and the use is something that needs to have some attention paid to it. The marriage of the theory and the case study is good.

Secondly, on to the geography of the paper. Hanoi is a very interesting place and as many in this room know, Hanoi has a long entrepreneurial spirit in terms of different sections and different streets in the city dedicated to the sale and refinement of a variety of different types of products and services. Gay shows that that’s the case for Hanoi as far as recycling is concerned as well. There’s a bicycle street, there’s a motor street, there’s a handbag street, and each petty trader works together and in competition with one another to make sure that their sector of the economy, their street “niche”, is strong. The streets are even named after the industries. And so I think it’s worthwhile for you to further problematise the idea of the Hanoi village and Hanoi neighbourhoods being distinguished by their niche in the economy. Hanoi’s a huge city, why is the plastic industry where it is? Why are these gatherers, why are these
workers, these producers, these recycling efforts located where they are? I’m sure there are strong family ties involved in the plastics neighbourhood that serves as your case study. It would be interesting to make your point about complexity and make your point about the local industry being so important and therefore discouraging the broader comparative analysis that you state you don’t want to spend too much time on.

And so, third, to the Vietnam case study, my final point. You write in the paper, the quote: “the afterlife of the disposable bottle has to be kept out of the market frame.” And I would say that you are right that for many middle and upper-class Americans, for Western people the disposable bottle is kept out of the market frame. The product is consumed and then discarded. For many middle and upper-class Vietnamese, that’s also the case, but that’s a very small segment of society. Therefore, I think that your comment with regard to Vietnamese bottled water consumers and recyclers deserves some refinement because although the afterlife of the disposable bottle is often kept out of the formal market frame, for the informal frame, the market is in the picture as you identify in your case study. Water bottle recycling is an important informal economic activity for traders in your case study as people dabble in recycling as either a small part of their income streams or as their full-time ‘job’ in the informal economy.

Another point to think about as you consider consumption and water bottle recycling in Vietnam is how it compares to the West. In the United States, like Australia and Singapore, people consume more now because they feel comforted by the fact that their bottle is recyclable. We consume more because we can tell a story about who we want to be to our audience of other consumers; the story is often that we are refined and smart and eco-friendly. These narratives are not a part of the discursive fabric for the budding middle class in Vietnam in my opinion. The types of conspicuous consumption which occur in Vietnam are conspicuous for how much is consumed but also for how much is discarded and thrown out. It is a sign of wealth in Vietnam to consume and throw out more, as opposed to the trend coming out of the West that it is okay to consume more as long as the product you are consuming is good for you and the product’s afterlife can be used in productive and eco-friendly ways. So I think that there is something more at play than an increase in the amount of bottles being consumed and recycled that says something about Vietnamese consumption. How do people, especially Vietnamese consumers that aspire to be middle class or are middle and upper-class Vietnamese, how do their types of consumption and waste practices demonstrate that being wasteful is a marker of social status?
ROUNDTABLE ON DEALING WITH PLASTIC WASTE

Chaired by Dr. Lai Choo Malone-Lee [Director, Centre for Sustainable Asian Cities, School of Design and Environment, NUS]

The session began with Prof Hawkins’ responses to the points raised by the discussants. Prof Hawkins acknowledged the possibility of carrying out a sort of moral analysis of an aspirational middle class that is engaged in excessive, growing patterns of consumption, but also argued that such approaches have their limitations. In particular, the ubiquity of plastic (especially in packaging) means that it is extremely difficult to simply say that only the middle class is using it. As such, it is too simplistic to have a political analysis that says it’s just the middle class that is engaged with plastic. Prof Hawkins went on to note a hierarchy of bottled waters in Vietnam, including very cheap bottled waters that are produced for the non-middle class, for poor people. In other words, different plastics are being produced for different constituencies, and plastic is spreading widely throughout various domestic practices. Nonetheless, Prof Hawkins acknowledged that excessive amounts of plastic are being used by particular classes, including in the case of the Indian middle class.

Prof Hawkins acknowledged that it is important to consider recycling as something that is engaged with as an environmental issue as well as in terms of ‘precarious economic survival’. There are some classes that are more open to an environmental message because of the way in which it helps them constitute a class identity and status that says “I’m environmentally aware”. This applies in developed counties too where (as noted by Dr Gillen) people can consume and think “fine, I can buy this because it can be recycled”. Thus recyclable items are now being used to extend markets.

Prof Hawkins also acknowledged Dr Gillen’s point about the actual location of the recycling as a “shocking silence” in her paper. She described the way in which Hanoi is spatially organised around different materials with a metal street, bicycle street and so on. Villages on the outskirts of Hanoi have long been engaged in producing trades and materials for the city. Now many of them
have converted to managing a new sort of material – waste from the city – on the rural-urban fringe.

Finally, Prof Hawkins noted that cultures of disposability have to be learnt. In cultures where scarcity reigns, very little is thrown away. In developed countries, the habit of disposability begins around the turn of the twentieth century, when things that are disposable start to get made. Disposability, the short life of materials, the sense that you have a transient relationship with them, is a ‘complex ontology’ that has to be acquired. This is absolutely central to developing plastic cultures or cultures based on transient materials and it is absolutely central to the phenomenal increase in volumes of waste more generally.

The ensuing open discussion is summarised as follows:

- In response to a question from a member of the public concerning the economic “calculability” of plastic production and recycling, Prof Hawkins sketched the wider history of polyethylene terephthalate (PET) which was discovered or invented in the laboratory of DuPont at the end of the 1970s. Up until then, the most common materials in the beverage industry were aluminium cans and glass, but there was a constant pressure to find the right plastic with which to containerise drinks. PET was that plastic because it was incredibly durable, had immense translucency and clarity so it looked like glass and it was, obviously, unbreakable and extremely light. PET packaging also enabled mobile drinking, thus changing consumer practices and in turn generating bigger markets for drinking. That is what has driven the rise of the PET bottle and why it is now the dominant material in the beverage industries. Prof Hawkins also noted that while glass and tin cans can be recycled into the same material, PET cannot and can only be down-cycled, so every bottle that one uses is using a new bit of petrochemical by-product. The beverage industry has been forced to face the afterlife of the plastic bottle and the issue of the calculability of recycling has now entered into marketing. But the reality is that most bottles are not recycled and (again unlike glass and tin), there is little commitment to Extended Producer Responsibility schemes (where the producer of the package is responsible for picking it up).

- It was noted that in the kind of sites considered by Prof Hawkins in her paper, recycling is being organised not so much around the invocation of an environmental responsibility or a commitment to protect and care for an abstracted nature, but rather around a very different sort of bio-political relationship. This centres upon the question: how can I deal with waste in
Recycling Cities

my life in a way that allows me to maintain my identity as a human and survive? Prof Hawkins noted that no one in her study is really acting in the interest of the environment or life in a biophysical sense. For Dr Chandola, this raised the question of how to balance wider celebration of recycling practices with the fact that often they only take place because living conditions are so poor.

- Dr Choudhary raised the fundamental question of why bottled water is needed in the first place. In the case of his home city of Varanasi, the answer is that sources of surface water that are supposed to be for drinking are completely polluted, especially through industrial waste. Others noted that similar anxieties around potable, reliable water exist in other parts of Asia. Nonetheless it is important to give close attention to the specificity of individual urban and national contexts.

- Prof Hawkins noted that at the heart of many of the issues raised are water politics (which are also addressed by Dr Potter in the third set of sessions). Prof Hawkins’ own approach is one which takes seriously how bottles are interfering in water politics, or how the bottle itself is ‘becoming a crucial participant in the organisation of potable water’. Following this kind of approach, while there may be different bottles for different social classes, the bottle is more than a passive expression of class distinction. Rather, it is helping to enact and produce and construct class distinctions. What emerges across different contexts in Asia and elsewhere are varied ways in which failed or inadequate public provision generate new improvised, contingent arrangements in which bottles are crucial and increasingly dominant participants.

- One member of the public raised the issue of alternatives to the plastic bottle and the possibilities for bottles that disintegrate over time, in the way that some plastic bags do. It was noted in response that there are now some very effective activism and campaigns against the bottled water industry, especially in the West. Often these campaigns mobilize images of animals choking on plastic. Prof Hawkins expressed scepticism about technological solutions. There are possibilities for bio-plastics which are supposed to be degradable, but these use enormous amounts of plant resources. Prof Hawkins places more hope in public education and campaigns against bottled water, noting that these have led to declining markets in some contexts. She also believes that more attention should be devoted to the (re)introduction of safe, accessible water in public spaces as a means of undermining the need for bottled water. The challenge here is growing individualisation of responsibility for water provision which has
been associated with a ‘roll back’ of forms of public provision. Kerala is often cited as a case of emergent activism, but more attention needs to be given to similar cases (or their absence) in other parts of Asia.

- Ms. Cindy Godden noted the contrast between the sophisticated technology in the Evian factory visited by Prof Hawkins on the one hand, and the much simpler processes involved in Vietnamese plastics recycling villages on the other. This raises the question of the extent to which it is possible to develop technologies of recycling further. Prof Hawkins responded by noting that while ‘stretch-blow’ machines for moulding pellets of PET into bottles are cheap and easy-to-use technology, “I don’t think that any amount of technology would do the same thing in reverse”. It is the very toughness and durability of plastic bottles – part of their attraction in the first place – that makes them incredibly recalcitrant in the recycling process. The first stage of recycling is crushing, and technology to do this was found in the Vietnamese villages, but the subsequent process of smashing the plastic and reducing it to pellets is difficult. While technological advances may make the process easier, it is likely to also remain dependent upon an immense amount of human labour.

- In response to a question from a member of the public about the lives and identities of the people in the plastics villages, Prof Hawkins noted that she was only able to visit houses and businesses which had good relations with the Hanoi urban waste authority (who arranged for her visit). The people spoken to expressed pride in their households and a level of affluence enabled by the recycling activities, although concern was expressed about environmental hazards of melting plastic and inhalation of toxic fumes. There is need for further, ethnographic investigation of the villages and the diversity of lives and experiences within them.

- The relationship between the environmental and economic implications of plastic recycling was also noted as an important avenue for further research. The market is extremely volatile. However, there does seem to be a very high demand for the materials, whether for export to China (where plastic is used to make polar fleece or carpets) or for the local production of items such as plastic furniture. More generally, the fact that there are few visible signs of litter in Hanoi may be precisely because of the existence of a vigorous and active economy circulating around waste. This has environmental benefit in terms of managing the accumulation of plastics waste, but recycling practices also release what Prof Hawkins termed “the toxic realities of plastic”.
Dr Chang Jiat-Hwee asked about the connection between the production of plastics and crude oil processing, and in particular what a period of post-peak oil production may mean for the future of plastic. Prof Hawkins noted that plastic took off as a product at the same time as the oil economy took off, after World War II. In other words, there is a deep and fundamental link between oil economies and plastic disposable cultures. Plastic items are here to stay for the foreseeable future. It is worth considering how they may be re-used – Prof Hawkins noted forms of design that make use of plastic bottles filled with sand – as well as how they can be recycled into a raw material.

Discussion of what Dr Jeffrey Chan referred to as the “cognitive framing of waste” centred upon how ‘waste’ itself is not an essential category. As Prof Hawkins put it, “things have to be enacted as waste”, nothing is intrinsically waste. There are many ways in which plastic ‘waste’ has been used creatively and productively, from a range of aesthetic/artistic projects to dwellings in slums (noted by Dr Chandola) that are built from plastic detritus.
It would be easy to represent the urban geographies of e-waste as declensionist. This is the common approach, the dominant storyline (Hajer 1995). The words, numbers, and images would fit smoothly with environmental apocalypse and dystopic mega-urbanism (Roy 2011): There is an “e-waste crisis” (Basel Action Network 2011, 2). 20 – 50 million tonnes of electronics disposed of annually (Arensman 2000; Schwarzner, De Bono, and Peduzzi 2005); 50 – 80 per cent dumped in Third World in cities like Guiyu (Basel Action Network 2002a), like Mumbai (Toxic Link India 2007), like Accra (Greenpeace International 2009). We could slot in the images to show you how we are “exporting harm” (Basel Action Network 2002b) to digital dumps (Basel Action Network 2005; Greenpeace International 2008). We could wield these representations as so many hammers of critique. Use them to smash the idol of the information economy, to punch holes through the veil of “frictionless capitalism” (Gates 1999). We could. And if we did we would discover what we knew was behind the veil all along: the really black world of “eviscerating urbanism” (Gidwani and Reddy 2011, 16), exploitation, destruction, and death; the capitalism of anti-capitalists, ready-made.
Figure 1. E-waste ‘Burn site’ at Agbogbloshie in Accra, Ghana (left) and Child Working in E-waste Dismantling Business in Dhaka, Bangladesh (right). Source: photographs by the authors.
We could, on the other hand, represent the urban geographies of e-waste as ascensionist. This would be less common, but no less easy. We could use words, numbers, and images to wield our hammers of critique differently: our cast-off electronics are bridges across the digital divide. They mean technological upgrading and skill enhancement; the spirit of enterprise amidst adversity. They mean profits of 200 per cent or more. Rubbish electronics workers as little entrepreneurial heroes. We could do that, too. And if we did we would discover, again, what we knew was there behind the adversity all along: the really white world of “slumdog urbanism” (Roy 2011), yes dirty and gritty, but ultimately redemptive, enterprising, bootstrapping, and that struggle for a better life; the capitalism of pro-capitalists, ready-made.
38 Recycling Cities
With these two critiques, these two hammers, we could “debunk, reveal, and unveil” (Latour 2010, 475) the urban geographies of e-waste, but only by missing their more-than-urban geographies and by sharing the same conceit: that of being in possession of privileged access to the really real behind the façade of representations, black or white. The two critiques shatter the fetish they don’t believe in – capitalism-as-saviour/beast – by wielding the mirror object they do believe in, capitalism-as-beast/saviour. Neither critique can fail to be wrong (Latour 2004, 241). And this is why, in this essay, we want to try something different than critique. We want to try to stitch together, to reassemble, to compose. And to do that, we need to risk starting somewhere other than the place of critique. Somewhere greyer than the blackness of eviction/destruction/death or the whiteness of legality/approval/safety (Yiftachel 2009). Somewhere more undecidable (Roy 2011). A place from which we risk getting it wrong, rather than always right. Somewhere in the middle of things. In medias res (Latour 2005).
Dhaka In Medias Res

The building in Dhaka we step into is unfinished. From the second floor up concrete and brick steadily give way to rebar and bamboo. The only light is the sun angling through windows-to-be and a bare bulb in a back-room storage area. All around us are bales of circuit boards, dusty, chipped, and tied with twine; stack after stack. We are served tea and sweets while we talk with Mr. Shazil. Mr. Shazil is an importer/exporter of rubbish electronics, a specialist focused on motherboards and chipsets. When he sources domestically, he uses a coterie of boys, 15 or 20, who scour the city for their chance at Mr. Shazil’s flat rate of BDT 120 (about $1.85) per kilogram. He’ll bulk up his stock for six or seven months and then ship a container, eight or nine tonnes worth of these rubbish electronics, to a Singapore-based smelter. Buying at US$ 1.85 per kilo, Mr. Shazil sells at US$ 6. The Singaporean company smelts the boards for precious metals, especially gold. Here was a poor country exporting e-waste for processing to a rich country. Not what we expected.

We had flown to Dhaka to track what we thought was e-waste, but we couldn’t find any (Lepawsky and Mather 2011). We found used printers. Old monitors (tons and tons of them). Hard-drives from the US embassy and Exxon. Old silicon chips, motherboards, and piles of circuitry. Amidst all this stuff we could hardly find any waste. Almost everything had value. Every object. Every component. Every material. They were all being bought and sold, assembled, disassembled, and reassembled. The material assemblages of people, places, and things proliferated. They also dwindled into their constituent materials – plastics, glass, metals. Plastic printer chasses were smashed by hand and hammer, but not because these were garbage. The plastic shards were collected, sorted, baled, and hefted down the street. Then they were sold. Money changed hands. Materials moved. All those bags of plastic shards were washed, then sorted by hand into categories of colour and hardness. They were washed again in a machine like an industrial dough mixer. Then they were ground into chunks, melted, extruded like gooey spaghetti while a man sliced off the noodles of plastic coming out of the machine to cool in water. Then the grinding happened. Out came the pellets. Not done yet. Some of this was bagged and sold to the plastic wholesalers down the street. The rest went right next door to a hot plastic press, manned by a single male worker, churning out CD and DVD cases, one by one, dozen after dozen. Some of these cases sold domestically; others were exported. To China. To India. Where were we? What were we witnessing? What we do know is that we were not where we expected to be. We expected we would end up in dumpsites, in piles of waste. Instead,
we wound up in production sites. We hadn’t followed things consumed, used up, and ejected from the global economy – we were right in the middle of it.

Our own research practices (e.g., the formulation of research questions) had been partly responsible for formatting the ontological status of the things we wanted to follow in highly particular, partial, and situated ways (i.e., as ‘waste’). Like all good researchers, we read the literature and it told us e-waste is the end-point in a linear chain of production, consumption, and disposal that ends in ‘Third World’ dumpsites. These were worldings (Spivak 1985; Haraway 2008; Tsing 2005; see also Roy 2011). As such we had been expecting to find ‘waste’. We defined our thing to follow in advance (e-waste), went to its origins and traced it along its chains to its assumed future. But that future rarely happened. Rather than finding ‘waste’, we kept finding ‘value’. In following ‘e-waste’ qua waste, we were bringing its reality as waste into existence, performing it (Barnes 2008). Yet, the reality we presupposed kept failing (we kept finding ‘value’, not ‘waste’) (Law 2010). We realised that rather than following things assumed to have an essential ontology as this or that type of thing, we needed to think in terms of distributed and transitory ontologies that are effects of intermingled material affordances and practices. The ontological action includes those people and things that we follow, but also ourselves as researchers, for example, in terms of how we formulate research questions, in other words, our epistemologies (see Çalışkan and Callon 2009, 2010; Latour 2005; Law 2008).

In this essay we situate our work on e-waste within the debates and discussions on ‘metrocentricity’ and ‘subaltern urbanism’. Metrocentricity is Bunnell and Maringanti’s (2010) term to describe a variety of tendencies in Anglophone urban studies such as an emphasis on prominent financial centres, particularly in English speaking countries; the examination of linkages between these centres and other cities only to the extent that the latter refer back to the former. These biases have been highlighted by others (e.g., Robinson 2002, 2011) and indeed acknowledged, at least partially, by those to whom such criticism has been directed (e.g., Smith 2003). But Bunnell and Maringanti (2010) push the debate further by making a convincing argument about the performativity of urban studies, perhaps particularly, but not exclusively in its Anglophone variety. That is, they draw attention to some of the ways that the actual practices of urban studies, its pedagogy and methodology, play an important role in generating the very phenomenon it purports to only study. Ananya Roy suggests ‘subaltern urbanism’ as an intervention into the metrocentricity of urban studies. For Roy, subaltern urbanism is an urban study which writes, “Against apocalyptic and dystopian narratives of the megacity”
(Roy 2011, 226). It is thus an important intervention because “it seeks to confer recognition on the spaces of poverty and forms of popular agency that often remain invisible and neglected in the archives and annals of urban theory” (Roy 2011, 224). But she also warns us to question the limits of subaltern urbanism. She notes that among other problems it may slip too easily into a celebration of subalterity as a redemptive Other to another problematic figuration, that of the dystopic ‘megacity’ as metonym for the Global South. Roy (2011) discusses four possible breaks from the limits of subaltern urbanism – peripheries, urban informality, zones of exception, and grey spaces – to which we would like to suggest a fifth: boundaries and edges.

Using our work on e-waste, we suggest that searching for boundaries and edges may offer an alternative way of doing urban research, one which might enable research on cities not as a priori, but as “spaces that are continually created through our own practices of connecting, travelling and representing” (Bunnell and Maringanti 2010, 419). They have an affinity with what Roy describes as peripheries, yet differ in what we think are some important ways. Peripheries, in Roy’s discussion, are “disseminated over urban territories”, but their promise inheres in their “ability to transcend territorial location” (2011, 232, emphasis added). Our use of boundaries and edges is even more equivocal about space ready-made. Not only is it the making of space that is important, but so is the proposition that we cannot know in advance of analysis what the geographical is made up of. What and who make it needs to be posed as a question. Space, rather than a premise, is a query; a matter of concern rather than a matter of fact (Latour 2005). Boundaries and edges are not pre-defined. Boundaries and edges are the results of relations. As such they are to be explained and what explain them are actions that order. Stated as generally as possible, boundaries and edges are effects of ordering relations. We cannot know in advance where (or if) we will find them, but they emerge at performed sites (Schatzki 2002) where practices and the affordances of objects and materials mingle. When searching for boundaries and edges we can follow actions, but in advance of analysis we need to remain “as undecided as possible on which elements will be tied together, on when they will start to have a common fate, on which interests will eventually win over which” (Latour 1987, 175). If the action ceases, so do the boundaries and edges. If the action is rearranged, so are the boundaries and edges. They are constituted in action. The action includes the knowledge practices of the researcher(s) i.e., the theoretical and methodological practices involved in defining research questions. Boundaries and edges are sites of transformation and, as such, sites-
in-the-making not sites ready-made. Boundary and edge making is order making, not mess making.

Our argument about boundaries and edges draws on a broader conversation about materiality and performativity occurring in the science and technology studies literature (e.g., Çalışkan and Callon 2009, 2010; MacKenzie 2006; Law 2008; Latour 2005) and some geographers’ engagements with it (e.g., Barnes 2008; Bingham 1996; Gregson, Crang, Ahamed, Akhter, et al. 2010; Gregson and Crang 2010; Gregson 2011). At its most general, the conversation proposes that what things are and how they are arranged (i.e., ontologies) are inseparable from how we go about knowing about them (i.e., epistemologies). Hence, the nexus between ontology and epistemology is an effect of relational practices that are material and meaningful or ‘material-semiotic’ (Law 2007). To ground our more theoretical claims, in the rest of the essay we detail some examples of the travels of ‘e-waste’ derived from ethnographic fieldwork in distant, but connected, cities.

**URBAN ENCLAVES OF FIRE BECOME INDUSTRIAL WASTE PRODUCERS**

Urban enclaves of finance, insurance, and real estate, the FIRE economy, are typically the qualifiers of global cities in the information age. Nodes in networks. The world in the wires (Kitchin 1998), burning bright FIREs.
Gregson and Crang (2010, 1031) tell us “... not just that materiality matters to the development of waste scholarship but that a focus on industrial waste matters to the development of work on materiality.” So why would we look here, in the FIRE? Consider. FIRE used to look like this:

![Figure 4. Frankfurt am Main, Börse, c. 1988. Source: German Federal Archive 1988](image)

Now it looks like this:

![Figure 5. Deutsche Börse, c. 2008. Source: Unattributed 2008](image)
And sometimes (more often these days?), like this:

![Image of a trading floor, Amsterdam c. 2009.](source: VDMR 2009)

Underwriting the knowledge economy of the urban enclaves of high finance is all this stubbornly material stuff. Monitors, cell phones (did you see the size of the one in Figure 4?!), hard drives, servers, keyboards. No one really knows how much is out there. One guess puts the combined disposal of “end of life electronics” from the industrial, commercial, and institutional (IC&I) sector in Canada and US at more than 1 million tonnes in 2005 (PHA Consulting Associates 2008, 2-7). Much is made of the contribution of FIRE enclaves to global economic networks, but what of their rubbed electronics? Where does all that stuff, the ever increasing detritus of the ‘information economy’, go?

In Singapore one electronics processor told us that data held on end-of-life FIRE electronics are so sensitive firms would rather be 100 per cent safe with their disposal than leave any chance of sensitive information leaking out. As a result, even though there are many ways of safely sanitising IT assets, significant numbers (he wouldn’t tell us how many) of hard disks and servers end up being incinerated. Not frictionless at all; the digital world has a carbon footprint. There’s lots of friction (Tsing 2005) in FIRE. This is why it is important to unbracket the practices. Don’t just follow things, follow the action. To think ‘industrial waste’ is to invoke chemical spills, mine tailings, metallic manufacturing remainders from stampings and castings. Hazards. But what of the toxic substances of computers (e.g., Bi et al. 2007; K. Chan 2008; A. O. W.
Leung et al. 2010; Liulin et al. 2011)? Of cell phones (e.g., Nnorom and Osibanjo 2009a, 2009b)? These tokens of the urban enclaves of high finance?

Electronics. Rubbish. For Thompson (1979), rubbish is not synonymous with waste or garbage, but instead a material-semiotic holding category that objects may move into and out of (see also Appadurai 1986; Kopytoff 1986). A grey zone. Districts of corporate and financial headquarters become the realm of industrial waste production via their turnover of electronic equipment. High-finance, insurance and real-estate firms also generate huge amounts of information and provide services for millions of people. As a consequence there are terabytes of information stored on computer systems that are often scheduled for replacement every few years. Informed materials. For Bensaude-Vincent and Stengers (1996, 206), “... one develops an ‘informed material’ in the sense that the material structure becomes richer and richer in information.” This is another waste management problem, these informed materials, one overlooked with too strict a focus on materiality. This is another reason why we must follow the action, not just things coming apart. A nexus of materiality and information. A boundary. An edge.

PERI-URBAN INDUSTRIAL ZONES BECOME MANAGERS OF BRANDS, LEGAL LIABILITY, AND CORPORATE PUBLIC RELATIONS

We are driving the long ribbons of high-way that thread the Greater Golden Horseshoe, an urban agglomeration of over 8 million people, nearly a quarter of Canada’s entire population. We’ve just left an industrial scale recycling facility on the outer edges of Toronto and are en route to an interview at another. As we drive we are reconstructing the interview and tour we had of the facility with our audio recorder running. Always record. In the midst, we realise something: despite what we just saw, all the heavy machinery at the previous facility, despite all the noise, despite the safety gear, the helmets, the goggles, the gloves, and despite the thousands of tons of metals, plastics, and glass that flow in and out of that facility daily, what we heard is that the company derives its profit from the information economy, not the industrial economy. Let us explain.

The firm – let’s call it X – processes hundreds of tons of rubbish electronics per day.
They run three shifts, 24 hours a day, five days a week. Sorting, primary
shredding, secondary shredding, automatic sorting, screening, sifting, eddy
current and magnetic separation. Multistep refinement. The sorting pulls out
hazards: CRT glass full of lead is channelled for smelting more than a thousand
kilometres away in New Brunswick. Mercury bulbs to another firm in Ontario.
Ink and toner left in copiers and printers. They’re pulled out and sent to New
York where they are fuel for energy plants. Did you know ink has such a high
BTU value it can be used as fuel in power plants? Batteries are really nasty and
complicated. You have to separate the lead acid, the nickel hydride, the lithium
ion. X partly solved the problem with an industrial chocolate making machine. It
encases each rubbish cell phone battery individually in a plastic sheath. Stops
the contacts of loose batteries sparking a charge off each other if they happen
to touch. If you’re not careful, they explode.

Primary shredding. Destruction of the new (retail overstock and returns)
and the old (working but not wanted, not working and not wanted). Whole
photocopiers dropped into steel teeth. The sound is fantastic. Out come two-
foot square hunks of former information economy.

Figure 7. Electronics recycling facility, southern Ontario c. 2009.
Source: photograph by the authors.
Now along a conveyor belt, feeding into secondary shredding. Secondary chops it all up. Soccer ball sized. All those former electronics drop into the super granulator. Granulate, separate, divide and multiply: (Desktops + laptops + cell phones + monitor cases + photocopiers + faxes) / (sorting + shredding + screening + separating + sifting) = plastics, aluminium, steel, copper, dust. Screened, sifted, and separated, wholes become multiples.

And multiplicity proliferates just as all this ‘stuff’ reaches what Sam, the manager we were interviewing, calls its “final resting place”. When we ask what he means by that Sam explains, “to us [company X], ‘final resting place’ means the material [formerly e-waste] has reached commodity grade status, which means it can be sold on the open market”. Now, note this paradox. What Sam describes as final is, simultaneously, a dissolution of certainty about endpoints and a profusion of potentiality, of ongoingness. Plastics, aluminum, steel, copper and, yes, even dust (a source of metals such as lead, gold, silver, and platinum) are ready to be sold on to the planet’s manufacturing industries that use them to produce things. And yet, despite processing thousands of tons of electronics a day into commodity grade material, it is not this heavy industrial work from which X earns its profits.

Here’s Sam again: “The commodities market is a fool’s game.” Too volatile. Too uncertain. That’s how he describes it. It’s not where sustainable profit comes from. Indeed, at the time of the interview, scrap material prices were plummeting (Levin 2009; Richtel and Galbraith 2008) and the Great Recession had only just been named. But X – and we would learn later at the next firm we were en route to – weren’t worried. They’d made their profit before a single ounce of processed e-waste had left their facilities. It works like this: you, that is, a sales rep from X, calls up banks, retailers, law firms, hospitals – anyone with lots of IT equipment with lots of data on it. And then the sales rep asks them: who in your organisation goes down if one of your hard drives ends up in an exposé about companies dumping waste in Third World countries (e.g., CBS 2009; Klein 2009; Höges 2009) or in a news story about losing customers’ credit card numbers, their social insurance numbers, patients’ health histories, or clients’ legal records (e.g., CBC News 2009)? It’s a brisk business for X’s sales department. But what it means is this: these electronics recycling firms, these huge industrial scale operations processing thousands of tons of rubbish electronics each day, actually make their money by producing pieces of paper: certificates of secure data destruction. For a little more money, they’ll also produce a video for you showing your specific machines falling into the shredders and coming out as bits and pieces too small to be read by even the best data pirates. These huge industrial-scale recycling operations make their
profit from producing information about the destruction of information. They are their customers’ brand managers, their litigation mitigators, their public relations consultants.

Here then, the linkage between the urban and the peri-urban is relational in that finance, insurance, real estate and government rely on these peri-urban firms to manage flows of problematic materials. On the other hand, processing firms in peri-urban areas rely on a constant supply of materials in order to sustain themselves. This relationship then materialises corporate identities, as firms in the urban core have an interest in being seen as good corporate citizens who do not pollute and manage their waste in appropriate ways. In contrast, e-waste processors market themselves as offering what Sam called “an insurance policy”. They are brand protectors who offer firms in the urban core a type of insurance against negative publicity related to wasting practices deemed inappropriate.

**DUMP SITES BECOME PRODUCTION SITES**

In the streets of Dhaka we kept following the things we could recognise as used and discarded electronics. We crossed the Buriganga River and found the metal from circuit boards being transformed into gold and silver bars, into household hardware. We watched them get disassembled and reassembled into refurbished machines. Watched them get disassembled by hand into components and materials. Assemblages. We kept following.

We’re standing in the threshold of a tin-roofed shack with a floor area roughly 10 square metres. Before our eyes adjust to the dark interior, we can smell the airborne plastic polymers emitted from heating circuit boards over open flame. When our eyes do adjust, the scene is reminiscent of the e-waste storyline that NGOs and media had taught us to expect: two women squat on a dirt floor, tongs in hand, heating circuit boards over propane fuelled flames. Every 30 or 40 seconds, one of the women moves the board she is working with to a large wok-shaped pan and, the board still in the tongs, taps it several times into the pan. Bits of metal tinkle and glitter as they settle into the pan and the board is returned to the flame. This will go on until the more stubborn pieces have to be physically removed with pliers. Watching, I’m thinking *what are we breathing? What are they breathing?* Against an exterior wall of the shack there are sacks broken open and spilling electronic detritus. Exposed to the sky, they are soaked from recent rainfall and from them a small watercourse choked with vegetation and cloudy with discharge snakes into the main channel of the
Buriganga River. *What’s in that water?* And just then our guide, the proprietor of this dismantling enterprise, gestures to another shack less than three meters away. A few words are exchanged with one of the men inside, and we are invited in. There a man working a lathe and three other men are busy over a small furnace in the ground glowing red with heat, into which they are adding metal scraps, and out of which they draw molten metal. There’s a metal tang in the air here, too.

As we stand there, one of the men is selecting from their stock of metal scraps, sourced in part from the women in the shack we had been standing in just a few moments ago. Among his selections for this round in the furnace: parts of an aluminium frame from a desktop computer tower and a belt buckle that I can read branded as ‘Tommy Hilfiger’. Into the hole they go. In that heat, two of globalisation’s pattern industries, garments and electronics, melt into each other.

When the molten metal is drawn out, it is poured into a small mould. There the metal cools and, upon reopening the mould, it is cast into the altogether different sector of decorative home hardware. The ornate gate lock, is one of four styles (including ‘antique’) developed by the workers in this tiny shack, that is, in this production facility. The hardware is sold in Dhaka and Japan. The precious metal bars are brought back over the river. They get sold to wholesalers, to jewellery makers. From there the jewellery makers in Old Dhaka churn out ornate gold and silver jewellery. Sold in Bangladesh. Exported to Singapore. To India. For weddings. For status. For love. For profit. Here we were again in the middle of it all.

**Cities off the Map Become Urban Innovation Systems**

It is a scorchingly hot day in July, as we stand at the entrance of a store-front rubbish electronics dismantling enterprise in Dhaka. All around us are the clanking metal sounds of micro-manufacturing, the smell of open sewers, and bright sunlight cut by the narrow alleyways. The workers at this small space, perhaps 10.5 meters square, have just received a shipment of old cathode-ray tube (CRT) monitors. Over the next few hours, the owner, Mr. Sajib, two male technicians, a woman, and a young boy will divide up the labour of testing and sorting these monitors into those that can be reused whole and those to be dismantled into their components (e.g., picture tubes, controller boards, capacitors) and constituent materials (e.g., plastics, metals, and glass). We ask the owner about how well his business is doing. To demonstrate, he tells the
boy to fetch him one of the monitors from the pile. It is an ancient black-and-white 14-inch Compaq. The two technicians then begin dismantling the monitor into its useable components and constituent materials. Over the next couple of hours, the parts and materials are sold off to buyers who stop by the store. The broken picture tube goes for BDT 6.00 (about US 1 cent). The circuit boards bring BDT 100.00 (US $1.53). The copper coil, BDT 580.00 (US $8.92). On this goes until what was a whole monitor has been moved along into conduits (Gregson, Crewe, and Metcalfe 2005; Gregson, Metcalfe, and Crewe 2007) that will bring these components and materials back into production somewhere in the maze of other workshops nearby. It cost Mr. Sajib BDT 175.00 (about US$ 2.69) to purchase the monitor. Adding up the prices received for its components and materials, then deducting his labour costs, Mr. Sajib recoups a profit of more than 230 per cent.

Mr. Sajib’s business is among the myriad of small firms comprising a cluster, a learning and innovation system, of rubbish electronics resellers, refurbishers, repairers, and dismantlers in Dhaka, this city off the map (Robinson 2002). Importers bring rubbish electronics to Dhaka from more than a dozen countries, mostly from Asia, but North America and Europe are sources, too (Lepawsky and Billah Forthcoming; see also Lepawsky and McNabb 2010). There are five or six large importers of rubbish electronics on Elephant Road. Approximately 1500 smaller related enterprises congregate around them, double what we found the year before. Elephant Road and Gulisthan are where to go if you’re looking for an affordable Windows PCs. Motijheel is for Apple (see Figure 8).

The sector is intensely specialized. Firms and myriad linkages to other sectors, providing labour, providing material inputs into other production industries. Plastics, metals, and glass. From rubbish electronics and other tailings of the urban mine (Jung 2009; Peters 2011; Yamasue 2009). Moved to Lalbagh and Kotwali. In Lalbagh they mix into the material streams of other scrap sectors and are returned to the production of household goods and sundries (e.g., plastic containers, cutlery, and cooking implements). The plastics manufacturers of Lalbagh, some licensed/formal, some neither, draw their material inputs from the city’s rubbish. They have their own copyright and intellectual property protection system enforced through their trade association (Kulke and Staffeld 2009). Dealers of rubbish supplying the cluster advance loans to the ferrywallas and tokais that pick through the city’s cast-offs, tying them to a dealer’s shop. Debt serfdom. Poverty capital (Roy 2011). Mining the city and the “fortune at the bottom of the pyramid” (Roy 2011, 229 citing Prahalad). Materials circulate, but so do people, so does knowledge. The rubbish electronics cluster as learning and innovation system. Refurbishers,
remanufacturers, and repair operations rely on skilled labour to return rubbish electronics to working order or transform them into different products. Though highly skilled, our interviews indicate that few technicians (less than five per cent) have any formal training or qualifications. Often they began as young boys working for refurbisher and repair operations as ‘shop boys’ employed to help manage routine office functions such as customer calls and orders as well as tasks such as serving tea. Over several years, these shop boys learn their skills through apprentice-like arrangements with more experienced technicians in the shop. In many cases, the proprietor of the operation himself began as a shop boy and became a technician, later launching his own business.

Dhaka – this globally ordinary city-off the map (Robinson 2002) – buzzes clustering, learning, and innovation. Proliferating. Realised through the conjuncture of spent things with particular capacities to re-imagine and rework them (Lepawsky and Billah Forthcoming). In the action we find many of the characteristics important in the Globalization and World Cities (GaWC) programme: upgrading, skill and knowledge transfer, innovation and creativity, even patenting and intellectual property protection (see Kulke and Staffeld 2009). In this sense, our work on rubbish electronics in Dhaka echoes the cautionary refrain to beware of mistaking urban theories derived from studying the specificities of the global cities of the North/West as theories of The City per se (e.g., Bunnell and Maringanti 2010; Robinson 2002; Roy 2011).

**Waste Is Rekindled As Value And Accumulated As Poison**

Accra, Ghana. A city approaching four million people (Grant and Yankson 2003). Destination for northern migrants pushed by inter-tribal conflict in the north, declining access to and productivity of farmland; pulled by the lure of opportunities for waged labour in the city (Oberhauser and Yeboah 2011). We’re standing in an ash blackened field. Agbogbloshie. Young men and boys are torching piles of wire using foam insulation as fuel. They want the copper from the wires, but not the plastic sheathing them. The flames are low. It’s hard to keep the wires burning because their plastic coatings are doped with brominated flame retardants, BFRs. Expecting a chemical smell, it is less than we imagined. The BFRs have names like polybrominated diphenyl ethers (PBDE) and hexabromocyclododecanes (HBCDD). The field is saturated with heavy metals, too. Lead. Mercury. Cadmium. Today, the winds trend south-southwest carrying the smoke from the wire fires over nearby vegetable gardens. See the
rows of green and brown furrows in the background? They’ll feed the poor(er). See the cows and goats corralled here? They’ll feed the rich(er).

The copper and other metals – like aluminium, steel, and iron – that get recovered here will be moved along to domestic industry, like the foundries and factories in Tema, Accra’s planned industrial twin-cum-Greater Accra Metropolitan Area. GAMA. We visited a steel foundry there. It uses an induction furnace to melt scrap metal sourced from Agbogbloshie and Ghana’s other sites of ridding.

Figure 8. Dhaka, Bangladesh.
Source: University of Dhaka Department of Geography and Natural Resources
Figure 9. Agbogbloshie burn field, 2011.
Source: photographs by the authors.
Induction. That means electricity. That means Akosombo Dam on the Volta River. Finished in 1965, the dam created the world’s largest anthropogenic body of water, Lake Volta, at 8,503 km² (wikipedia.org 2011). Did you know that’s more than eight times bigger than the lake behind the Three Gorges Dam? For the Akosombo Dam 80,000 people were forced to relocate. Disease vectors multiplied. 3 per cent of Ghana was submerged. Water transportation options increased. So did some forms of fishing (Gyau-Boakye 2001). Boundaries and
edges proliferate. Back into steel foundries the metals go, manufacturing rebar for the domestic construction industry. Building GAMA from scrap (see Gregson 2011). Circuit boards and other precious metal bearing rubbish electronics come to Tema, too. They go to the free zone. Once there, Indian-based firms will shred them and export to India for processing. Extracting the gold, the silver. This is ‘south-south trade’; West Africa to South Asia. One so-called ‘developing’ country exporting to another, richer, so-called ‘developing’ country. This is not the usual ENGO e-waste storyline.

Back at Agbogbloshie, near the burn site, you will also find the dismantlers hammering apart all kinds of metal bearing things: auto-parts, mining equipment, washing machines. And along with the dismantlers are the tinkerers. The repairmen. The assemblers and builders. The women hawking food and water. Similar, but not identical, to Dhaka. Right in the middle of Agbogbloshie you can order a custom configured PC, built from rubbish electronic parts sourced from the digitising city (do you know how to do that?). Or just along the nearby road, you can pick up grills, shelving, furniture, washbasins, and bins built by the micro-manufacturers at Agbogbloshie from former cars, trucks, backhoes, what have you. Disassembling and reassembling. Material affordances and the creative capacities to re-imagine and re-work them. Risky conditions. Access to livelihoods. Exploitative labour practices. Access to technology. Toxic body loadings. Upgrading of technical skill and knowhow. Heavy metals leaching into soil and water. The extension of useful life of electronics. Airborne fallout of carcinogens. Material reuse. Transformation. Materiality. Boundaries and edges.

You can’t escape materiality. Remember the Golden Horseshoe? Sending its CRTs to New Brunswick (Industry Canada 2010)? That was a hint. Digitising cities lead elsewhere when e-waste is our vehicle. Like to Belledune, New Brunswick (population: 1,711). Like to Horne, Quebec (population: 39,324). Like to Trail, British Columbia (population: 7,237). To three of Canada’s major smelters that process rubbish electronics as part of their feedstock. To the primary sector. Digital economy meets industrial economy. Metropolis meets resource periphery. And what results from that intercourse? At Belledune one of the results is “[d]ispersion of smelter effluents and atmospheric emissions” of arsenic, cadmium, copper, mercury, lead and zinc into Chaleur Bay (Parsons and Cranston 2006, 259). At Horne one of the results is aeolian deposition of metal bearing dust from smelter emissions (Zdanowicz, Banic, Paktunc, and Kliza-Petelle 2006). That means cadmium, copper, lead, and zinc among other metals becoming humus, becoming soil. In 2001 the Horne smelter emitted 65 metric tonnes of lead (down from 1700 tonnes in 1974!) and 2.5 tonnes of
cadmium (down from 110 tonnes in 1974!) (Savard, Bonham-Carter, and Banic 2006, 101). In Trail, “fugitive dust” (Goodarzi, Sanei, Garrett, Labonte, et al. 2006, 253) from the Teck-Cominco smelter also results in the deposition of arsenic, cadmium, copper, mercury, lead, and zinc. Metals become “residential soil remediation” and encouragements to children to “wash their hands after playing outside to reduce lead exposure” (British Columbia Ministry of Environment 2009, 2-3). The boundaries and edges proliferate.

Figure 11. Residential Soil Remediation (left) and Children Encouraged to Wash Hands after Playing Outside, Trail BC (right).
Source: (British Columbia Ministry of Environment 2009, 2-3).
CONCLUSION

In this essay we used rubbish electronics as a vehicle to explore cities. The intent was to experiment with performing theoretical and methodological interventions in the debates and discussions about metrocentricity and subaltern urbanism through composition. In doing so, we composed cities in different synopses. But have we merely assembled a ‘mess’? No. We offered boundaries and edges instead. Boundaries and edges are effects of ordering relations. Thinking and working in terms of boundaries and edges offered us a way to follow the action, wherever it might lead, yet also make organised sense of the more-than-urban geographies of e-waste. We were able, without presupposing in advance where we would stop, to follow actions until the things they enact are enacted as something else (Mol 2002); where, say, hard drives and servers became unrecognisable as electronics but which were now, say, copper ingots or gold bars or certificates of secure data destruction or smelter stack exhaust. These moments of transformation, the sites where they occur, and our research about them constitute some of the boundaries and edges of e-waste’s more-than-urban-geographies. Boundaries and edges are not simply phenomena out there in the world, but are material relational effects of the intermingling of people (including us as practicing researchers), places, and things as well as how we go about knowing about their dispositions. By following the action we can recognise boundaries and edges as effects or achievements or arrival points at those sites – multiple, distributed, uneven, but nevertheless associated – where transformation is occurring, where things are becoming something else in action. Where, for example, at multiple, distributed, uneven, and associated sites gold circuitry is becoming gold bars or gold bars were becoming cash ... or jewellery ... or gifts ... or love. Where, for example, (and again at multiple, distributed, uneven, and associated sites), lead soldered circuit boards or plastic covered wires were becoming fumes and scrap metal ... becoming air-borne, water-borne, and blood-borne toxins ... becoming ornate gate locks and household implements.

Thinking and doing research in terms of boundaries and edges has important implications. First, boundaries and edges offer us one way to account for the performativity of our own research practices. The ontological action includes those people and things that we follow, but also ourselves as researchers, for example, in terms of how we formulate research questions and do methodologies, in other words, how we do our epistemologies (cf. Çalışkan and Callon 2009, 2010; Law 2008). We can’t know in advance of study when or where (or even if) we will find boundaries or edges, but by following the action
we can recognise them at those multiple, distributed, uneven, but nevertheless associated sites where transformation is occurring, where things formatted one way are becoming something else in action. Second, boundaries and edges offer us ways to plausibly bound our studies. Where we recognise transformations we will know, retrospectively, how we had been performing that which we claimed to be studying (e.g., by posing a research question about it, by doing fieldwork, by sifting through archives). When and where that which we asked a question about becomes something else, our research can plausibly stop. But, third, boundaries and edges also offer us ways to keep going, to keep following the action of ordering without presupposing inherent order in advance of analysis. Finding the boundaries and edges allows new rounds of research to emerge.

In this essay we have come to urban studies using rubbish electronics as our vehicle of exploration. By thinking and working with boundaries and edges we have composed different synopses of cities: urban enclaves of the FIRE economy became industrial waste producers; peri-urban industrial zones became managers of brands, legal liability, and corporate public relations; dump sites became production sites; cities off the map became urban innovation systems; and waste was rekindled as value and accumulated as poison. These are compositions, urban orders assembled from rubbish electronics and our research on their geographies. In mapping those geographies we have travelled to multiple cities in Asia, North America, and Africa. Yet we have done so without recourse to analytical categories like North/South, First World/Third World, core/periphery, global/local or their cognates. Our approach, while experimental, has not been about international comparativism (Robinson 2011), but about assembling and composing (Latour 2005; Latour and Hermat 2006). It is for these reasons that we think that working with boundaries and edges actually does something different from Bunnell and Maringanti’s (2010) cautions against metrocentricity, Roy’s (2011) four alternatives to subaltern urbanism, and from critique. As brominated flame retardants become air-, water-, and blood-borne toxins, what relevance do questions about metrocentricity have? Or as heavy metals settle on children in Trail, BC, but not for the same reasons that they do so on children in Agbogbloshie, Ghana, what relevance do questions about subaltern urbanism have? One thing boundaries and edges allow us to do is to keep following the action and make our research practices relevant to different, yet associated, sites. Rather than vanishing points or that “to which we must constantly refer, but that which can never be reached” (Roy 2011, 235 citing Mouffe), boundaries and edges offer us arrival points. In lieu of infinite regress, they
offer us ways to keep going without presupposing inherent directionality (Lepawsky and Mather 2011). Yet, boundaries and edges are synopses, not totalities; they are partial and situated as any knowledge must be. They are compositions, not critiques. Too often critique is synonymous with debunking. It relies on a gesture of unmasking in which the real (as it is claimed by the critic) is revealed behind the fetish of the mere believer. Yet, if one of the general lessons of critical social science over the last 20 years is that all knowledge – whether it is generated by anthropologists, biologists, chemists, computer scientists, engineers, geographers, historians, mathematicians, sociologists (the list could go on) – is partial and situated (i.e., constructed) then critique is no longer enough if it understands its main duty as drawing back the curtain of the fetish from the real. Critique performing such pretensions forgets its own lessons. If everything is constructed, then it is not enough to perform an analysis whose ultimate gesture is, in effect, to say, ‘See! It (Capitalism, Science, Technology, Power ... The City) is constructed!’ Yes, they are constructed. But so is all of our knowledge about them, including our critiques of them. So constructedness does not differentiate our critique from their fetish. We need different moves. Boundaries and edges are a possibility. Rather than critique, they help us to compose. Rather than testing the reality of a proposition (e.g., capitalism is a beast/capitalism is a saviour) on the grounds of whether it meets the criteria of fact (not constructed, therefore true) or fetish (constructed, therefore false), we can gather to ask an entirely different question: since everything is constructed, how well or badly constructed is that which interests us (Latour 2004, 2010)? Constructing urban worlds collects us together in ways that pose urgent questions. What is the urban made up of? What sort of urban worlds do we want? How can we coexist? What grouping(s) are we part of? How do we compose urban worlds that we want? No one yet knows the answers to these questions and finding answers to them is more than mere academic exercise.
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Thank you, Josh, for the wonderful presentation. I’d like to give my comments to three points. First, about the methodology, especially with regards to my own research experience; second, the theory in which you situated your research work; and finally, the actual orientation of this research. First, I think this is very interesting work and reminds me of my own fieldwork on e-waste recycling in coastal China about ten years ago, especially struggling with a research question, which is, by nature, dictated by the negative publicity surrounding high-tech waste exports to developing Asia. The issue became less clear-cut as we interacted with more and more people along this post-end of life production. It emerged that there are two sides of the story, or what Josh calls the ‘black world view’ and ‘white world view’. Both are real and surreal. I think only people who go along this way can find meanings about it. However, from the methodology, I think the way in which the author presented his story is most impressive to me. As Josh said, his work stitches all these places with thick descriptions of the scene, where the author observed and did interviews. All these different places along the production chains constitute a new map of e-waste recycling, from the global urban centre in which IT users concentrate, through the formal recycling companies that are in peri-urban industrial areas, and to the dumpsite in developing areas. We thus find complex interactions, in terms of both material flows and social connections across all the places, which went beyond the simplified picture given by either the black world view or the white world view. I think this is very innovative in the ways that it constructs how we see the problem of e-waste from a geographic viewpoint.

Secondly, it’s also impressive to me that this paper tries to situate the transnational flow of e-waste into the theoretical debate on subaltern urbanism, which I am not so familiar with. Even you just said that this seems like a stretch. But I find that you were actually successful in joining it together in this paper and it also led me to read some other very interesting papers about this theoretical debate. You suggested that boundaries and edges are an important
issue that is complementary to current debates in subaltern urbanism. In my reading, I found that it was quite important because the boundaries and edges you pointed out actually show the limits of the solutions based on the zones of exceptions, one of the ideas provided in subaltern urbanism literature regarding the practice in China. When we try to solve the problems of e-waste, we actually use the very strategy of zones of exceptions again. Unlike in India, where there is mostly a reliance on bottom-up local entrepreneurship, China is trying to actively build a new form of recycling system for e-waste, trying to learn from the world’s best practices, especially those OECD countries since 2002. Many things happened since then, but the main strategy is one based on zones of exceptions. We have built several demonstration areas, including industrial parks for e-waste recycling. Through defining special areas, we concentrated those recycling activities for import, export of recyclable goods to reduce the environmental problems under the monitoring of the government. But we met the problem raised in your paper that the boundaries and edges are so difficult to define.

So this brings me to the third and final point that is related to the actual orientation of your work, and what I really expected to see from your work. Could you clarify further about what you mean by the ‘boundaries and edges’ in the e-waste recycling chain? Can you identify the boundaries and edges and geography of e-waste in topological terms? Or is it a case of your concept of boundaries and edges actually transcending territorial conceptions? So could you please you explain the relations among all the different dimensions of this concept, from technological to political, social, and ideological meanings? I think that it could help us to understand how we can improve the situation by identifying the boundaries and edges in all these things.
Thank you for lending me your ears for the next 15 minutes. When I was asked to be the discussant I had to think hard about what I could possibly contribute to the discussion. I was trained in urban and political geography, but my own work has mostly been on the Chinese Internet, where I have been following the action of people that are changing Chinese society, by expressing their thoughts, and by actions that up until very recently had no place in ‘official’ and state-sanctioned narratives. Also, I’m no expert on Ghana and Bangladesh. I’ve never even been to any of these two countries. Then I read the paper, and I realised something that made me feel much better, which is that I am an ‘expert’ on e-waste, or ‘rubbish electronics’ – by producing it. In fact, I have probably bought, built, rebuilt, sold, or discarded more computers and computer accessories than most people in this room. I guess it would be fair to say that I am a ‘practitioner of e-waste production, consumption, and disposal’. As such, I am uniquely qualified to discuss the topic at hand.

It turns out Josh’s is a wonderful paper, filled with thoughts and ideas, inspiring, full of possibilities. In other words, this is not your usual academic paper. I apologise in advance for going off on a tangent – but I take being a discussant to mean, rather than ‘critique’, making explicit the thoughts that are triggered, however unrelated they may appear.

Now, let me recap very briefly what this paper/presentation is not. What Josh and co. have not done is tell a narrative of decline, as you pointed out. He has not set out to persuade us that the First World, again and always, is exploiting and doing harm to the poorer places on this planet. I’m not saying this doesn’t happen, just that the paper was not structured to deepen our beliefs that it does. Josh also hasn’t given us a narrative of progress. Rendering e-waste workers as “entrepreneurial heroes” who are resiliently, redemptively struggling for a better life. This of course may be happening as well, but it was
not the paper’s main argument. In fact, as Josh has pointed out, he has gone to considerable lengths to avoid analytical drawers and dichotomist categories.

So, now, what did the paper do? Josh et al have left behind the world we—as people and as academics—are so familiar with: the world in which it is easy to judge whether something is good or bad, whether something is worthy of pursuit or not. He has reminded us that all knowledge about the world is partial, situated, and constructed. That when we try to describe ‘moments of transformation’, prejudices about people’s dispositions are just as harmful as presupposing an inherent order or direction, or assuming specific theoretical frameworks, or limiting our analysis to particular spatial scales, in advance of analysis. So, looking at rubbish electronics as a vehicle with which we explore cities allows us to look at processes related to e-waste by ‘following the action’ without superimposing some form of inherent directionality. I have found, since I can think, that all social transformation is incited by human action, by often surprising human interactions and by often intentional, sometimes unintentional human practices that shift a culture’s experience and a culture’s basis for reality. Intensely aware that I am the only thing that stands between all of you and lunch, I will limit my remaining comments to two points. One is academic-theoretical and one is non-academic and practical. In fact, to remain in the spirit of Josh’s experimentalism, I’m going to combine the two points into one, and talk about the dialogical relationship between theory and practice.

So, what normally happens, and this may be known by the academics here, in a scholarly paper is that a scholar suggests a hypothesis that is rooted in some form of theory, followed then by a section or segment of practice, often based on “fieldwork”, then a discussion and conclusion. Then, in order to get the paper published, you would cite other scholars that ‘belong to’ an existing body of literature that ‘speaks to’ and ‘supports’ your own work and argument. Often these scholars form informal or formalised “research clusters.” The publication derives from there. Now, as Josh has reminded us: If we indeed do live in a world in which all knowledge is partial and situated, then the crucial questions we should pose are: How badly or how well constructed is that which interests us? Who is doing the constructing, and why? When we talk about human geography, about urban geography, what constitutes the urban? What sort of urban world do we want? How do we get from here to there? Do we get there by applying given theories, filling them with ‘data’, and publishing our work by pressing it into sociological or theoretical abstractions that often dovetail with the desires and requirements of technocratic power? Maybe. But there is another approach: Looking at daily practices, daily life, looking at the emplaced, embodied, affective, experiential qualities, trying to locate and
describe deeper underlying processes and phenomena that get lost in those abstractions but that hold important lessons about what is possible. In other words, the texture of social change is contained in what we call ‘everyday life’—and if we want to perceive it, we need to allow for possibilities, for the existence and significance of actual phenomena or processes that undergird continual and conscious social transformations.

Therefore, I would argue that scholarly critique and the production of academic knowledge can never be a purely intellectual process. I think you mention in your conclusion that the unity of the abstract and the concrete requires us to describe the synchronicity between the intellectual process and the actual socio-historical process as it is embedded in the ‘base-line’ of everyday life.

Now, we ought to remind ourselves that we are all schooled in abstractions. Intellectual processes are often about simplifying the complexities into manageable bits and bytes. In so-called ‘institutes of education’, we often learn how to find similarities and differences, mostly then to create some kind of higher order that encompasses these similarities and differences. The problem with this is that abstractions tend to facilitate a sense of crisis. We look at e-waste, we may think, or politicians or others may want to make us believe, that the West uses poor countries as dumping sites. We may think, how long until people there will stop putting up with these practices, will finally demand for democracy, transparency, accountability? We may think, when will ‘the poor’ realise that they create and perpetuate the global crisis until they become like us. Some of us may be immune to such short cuts of thinking, but these or other simplifications do have the tendency to seep back into our consciousness in one way or another.

If, however, we allow for specificities to enter our picture, if we, as Josh et al did, ‘follow the action’ on the ground, then we learn about the importance of human agency and aspirations. We learn about who is responsible for, and who might be able to facilitate change to, the status quo. We learn about unbounded, relational, networked and networking geographies that help us to transcend limiting understandings of what constitutes the ‘urban’. We learn about the importance of moral engagement and institutional critique. In short, we learn about possibilities. About the creative capacity to adapt and change. We learn about actual efforts to refashion urban landscapes and urban networks, and about the importance of “boundaries and edges” for these efforts and for our understanding of these processes.
As Josh points out, the processes he is identifying are characterised by ceaseless interaction and continual change, by “multiplicity proliferating,” and that understanding the sources for sustainable profit requires us to question the pervasiveness of traditional commodity chains and commodities markets. E-waste is not the end product, sustainable profit comes from other processes that have nothing to do with ‘stuff,’ but that has to do with offering alternative added-value services, such as offering to delete sensitive data from hard drives, that’s very interesting.

So to conclude, I think Josh’s paper is a reminder, for me it has been a reminder, that elusive and hard-to-measure concepts such as performativity, and that so-called ‘grounded theory’ approaches are just as, maybe even more rigorous than relying exclusively on the analysis of quantifiable ‘data’. In fact, I would even argue, and this may show my bias of looking at the Chinese-language Internet for too long, that ‘following the action’ on the ground, seeing how people express themselves, and talking to people about why they are doing what they are doing, is the only way for observers to grasp what is going on. Once we caught a glimpse of what these people do and why, of where and why they intermingle and interact, then we can step back and revisit and adjust our research practices and our theoretical underpinnings. The process of depicting the boundaries and edges of e-waste geographies therefore goes way beyond epistemological issues and helps us to understand our own distributed and transitory ontological selves, and how these selves interfere with our understandings. Eventually we realise, all over again, that practice is particularistic, and that ‘following the action’ is crucial for drawing our mental maps and for imagining new conceptual categories. And we do realise that theory is general, and as such is hugely deterministic in what we can observe or what we are able to observe. We realise that looking at how practice and theory mutually inform each other is not an added value, but a crucial prerequisite to a well-rounded way of seeing the world.

Thank you, Josh, for sharing these insights with us, and for reminding me, or us, of the importance of borders and edges for our conceptualisations, and that urban geographies are never only urban, always more-than-urban.
RounDTABLE ON  
ELECTRONIC WASTE

Chaired by Dr C. P. Pow [Asst. Prof., Department of Geography, NUS]

The session’s open discussion is summarised as follows. Please refer to point 5 below for Prof Lepawsky’s brief response to the discussants’ comments.

- In response to a question by Dr Tripta Chandola about the role of academics in negotiating academic interventions and the balance between the academic and activist stance, Prof Lepawsky acknowledged that the role of academics is something we all struggle with and ultimately end up taking sides. Speaking specifically to his project, he found that academics involved in issues around e-waste tend to favour the dominant storyline that is so well constructed by environmental NGOs. Sharing his experiences as member of a technical advisory committee for one of the competing certification systems for responsible electronics recycling, Prof Lepawsky mentions that part of the reason he decided to be on the committee was, that he gets to see environmental governance from the inside, by actually getting to participate in it. From this engagement he learned that the way in which academics engage depends in part on their research interests and research questions. While he doubts that his role on the advisory committee is going to make a difference, he has come to believe that there are ways to engage, and that one of the reasons this idea of composition, assembly and stitching is useful is that it helps us get beyond that continued myth of objective academic knowledge. Dr Chandola then raised a second question pertaining to agency, suggesting that one of the ways how to investigate agency might be to track shifting positionalities of various actors over time, by investigating to what extent agents actively contribute to shifting the networks they are part of, thus complicating the aspect of agency. Evoking the Japanese electronics sector and bicycle industry in Taiwan as providing evidence of industrial upgrading, Prof Lepawsky responded that there is clear evidence that agency and positionality can change over time. In the case of rubbish electronics in Bangladesh, one can see pickers moving up and becoming refurbishers, which points to an interesting process of craft knowledge,
apprenticeship-like relationships where agents might start off as kids in these businesses serving tea and over time, literally learn their craft from someone older than them in the business, and then later in their lives, spin off and open their own business. In fact, a lot of the refurbishers, resellers and repairers his team has talked with in Dhaka had done just that.

- In response to a question from a member of the public about the co-existence of issues of financial insurance, real estate, health and safety, Prof Lepawsky responded by pointing out that products refurbished in Dhaka are often favoured by buyers because they knew the manufacturing quality of them is higher than much of the so-called ‘new equipment’ that is being sold in a place like Bangladesh, manufactured in China. He argued that it is not possible to make a clear divide that would separate, or bring together these issues, and that one of the traps of focusing on recycling is that you neglect manufacturing, in particular of electronics for so-called ‘first-world markets.’ Prof Lepawsky mentions another interesting aspect of this issue of pricing and valuation: that there is a strong push for what has been called “extended producer responsibility”, but that this is in actuality often creating more consumer responsibility—which is certainly not affecting the bottom line of manufacturers nor does it lead to changes in design, in the way that legislation is often talked about.

- Prof Hawkins then picked up on Prof Lepawsky’s point about critique and academic knowledge practices both involving a political and ethical set of issues and raising very complex questions for the academic researcher. With regard to Prof Lepawsky’s use of the concepts of boundaries and edges, Prof Hawkins asks a crucial question: What does an academic researcher do who wants to offer an analysis but not necessarily one which will provide critique, who wants to actually just get in the middle of things and see what questions are being pushed at you? Prof Lepawsky starts his answer by acknowledging that the idea of ‘boundaries and edges’ is still in formation for him, but that part of what it is meant to capture is some of that undecideability, including the impossibility to know in advance if and where to find them. In an attempt to clarify the concepts, he elaborates that he is thinking of boundaries as sites where things ‘cross over, but are not stopping’, where ‘ongoingness’ becomes obvious. Edges on the other hand, while not entirely different from boundaries, are sites where things might be ‘sliding adjacent to one another’, where there’s contact, where there’s association but perhaps because of the way you’re asking questions, you don’t see transformation. You can see contact, you can see adjacency but you don’t recognise action carrying across.
A member of the audience commented that boundaries and edges seem resonant of post-colonial theory, wondering whether they were helpful in terms of realising theoretical and political motivations. He evoked Jan Gehl’s work on ‘soft’ edges as the sorts of spaces where things brush up against each other and have possibilities, as opposed to ‘hard’ edges where there is no bleeding into the other. Prof Lepawsky explained that one of the reasons why he started thinking about boundaries and edges is because his own work is heavily influenced by science and technology studies, especially Latour’s versions of actor-network theory, and that when one is doing research in that vein, you are constantly confronted with the question of “where do you stop?” since everything can be connected. It was after thinking about his work in conjunction with Koray Çalışkan (on market threads and the international cotton trade) and with Michel Callon on the performativity of economics as an intellectual discipline, playing a performative role in what we typically think of as the economy and trying to look for ways to account for our own role as researchers or academics in producing the very phenomena that we claim to only study. Prof Lepawsky found boundaries and edges when he was looking for non-arbitrary concepts that go beyond “here’s where I stop and don’t go any further,” and the concepts both help him to avoid inserting a cut that clearly delineates his research and to think about what comes next.

Dr CP Pow then asks Prof Lepawsky for responses to the discussants and their comments. After thanking the two respondents for their deep engagement with his paper, Prof Lepawsky picked up on the issue that was brought up by Dr Marolt about human agency. He stated that from a science and technology studies’ point of view, he is very interested in raising the question of what is acting when we are acting, as a question as opposed to a presupposed “it’s human agency.” He suggests that the point is to take agency as a matter of concern rather than as a matter of fact, and to consider how agency is distributed across humans and non-humans. He finds himself in agreement with Latour, that the question of agency should be turned into a research question as opposed to a presupposed distribution between the human and the non-human.

Dr Marolt, stating that he would rather leave the argument about the existence of non-human agency or responsibility for another discussion, then raised the question to what extent ‘the state’ figures in Prof. Lepawsky’s research and analysis, and in what ways state actors are involved in contestations and negotiations on different spatial scales. Prof Lepawsky responds that indeed the role of the state can be seen as highly
diverse, and that state-driven interventions in the design and manufacturing are often related to national legislation mandating what can and cannot go into newly-manufactured electronics.

- Dr Tong Xin then returns to the issue of producer and consumer responsibility, noting that she has found the concepts of boundaries and edges to be helpful for identifying new frontiers of research, particularly as producers shape our behaviour during the whole life cycle of a product, including production, consumption and disposal; indeed, she has shifted her own research focus from the recycling sector to producers. Prof Lepawsky reiterates that in advocating the notion of boundaries and edges, he cautions against trying to define boundaries and edges in advance. No matter what research question we ask, and whether we realise it or not, we start generating boundaries and edges performatively. The way we frame the research question inevitably plays a role in performing the very thing we claim to only study.

- Prof Tim Bunnell raised the interesting question to what extent the kinds of flows that Prof Lepawsky is dealing with can be seen as being ‘inter-Asia’, and what is the significance of Asia in terms of rubbish electronics globally? Prof Lepawsky, referring to earlier work mapping the flows of waste batteries and electrical accumulators, noted that interestingly (and not in line with the NGO story line, which is that first-world countries are dumping e-waste in third-world countries), the vast majority of the trade within most regions, including Asia, is within the region, and not between regions. Citing fieldwork in Bangladesh, where the team interviewed e-waste processors at various points in the commodity chain about where they received their shipments from, the team found that Asia dominates. Prof Bunnell then asked for elaboration on how that multi-sited, collaborative research project is proceeding, presuming that part of the benefit of this collaboration is that it involves scholars who are not only sharing some of the same theoretical interests but also have important area studies knowledge, particular language skills, cultural competencies, and abilities to operate in specific sites. Prof Lepawsky confirms that it would be impossible for him to do the kind of work that he managed to do without working with graduate students or collaborators in those countries.

- It was noted that countries involved in waste processing, such as China, South Korea, Singapore and Taiwan, are also manufacturers of electronic products. The question was raised to what extent this might be interpreted as these countries exporting manufacturing waste. Prof Lepawsky points out that the data pertains to the number of shipments only, and the
content could therefore be everything from scrap circuit boards to working monitors. During his Singapore-based investigations, Mr Creighton Connolly, one of his graduate students, has found that Singapore is exporting consumer waste rather than manufacturing waste, particularly business and household used electronics, and that products manufactured in Singapore that are not functional are usually disposed of within the country.

- Prof Tim Winter shared his observation that a lot of the research methods used in Prof Lepawsky’s work seems to come out of straight social sciences. He asked whether there might be electronic methods of tagging or surveillance, using RFID or GPS technologies, that could be implemented which could get towards some of these boundaries, and whether there are any ethical questions involved particularly assuming that objects have agency and that this agency changes over the life of these things. Prof Lepawsky agrees that there are indeed ethical issues involved, some of them related directly to research ethics and others to the politics of production and consumption and disposal. He suggests that there are ways of getting a sense of where e-waste is going (other than by conducting field-based research), for example by tapping into information available on all kinds of websites devoted to trading used electronics.

- Lastly, Dr Choudhary returns again to the concepts of boundary and edge, asking whether Prof Lepawsky is reworking existing uses of the terms or has found it necessary to reconceptualise them to fit processes of e-waste processing. Prof Lepawsky replied that he thinks of boundary and edge more in terms of reconceptualising the concepts along Latourian questions about what the geographical is made up of, in the process trying to defer, for as long as possible, presupposing an answer to that. While he is aware that the terms have been used extensively in various literatures, his own research has been about following the things and action until they transformed into something else, and retrospectively seeing what is relevant and where there is a boundary and an edge, rather than arbitrarily denoting a-priori boundaries and edges in accordance with presuppositions and biases about what we intend to get out of the analysis.
INTRODUCTION

This paper belongs to a larger project concerning the social, material and political life of bottled water in an international context. While bottled water has become infamous for the vast amounts of plastic waste its consumption generates, I leave it to my project collaborator, Gay Hawkins, to discuss the waste-life of bottled water. Instead, I will address the theme of this roundtable via a focus on that other highly charged component of the bottled water product: the water in the bottle itself. The contemporary politicisation of water is as ubiquitous as bottled water, and the two are closely connected. The question of ‘water futures’, and the threat of looming ‘water wars’ as water availability and quality diminishes across the globe, are discourses that frequently mark political debate over environmental practice, community sustainability and economic development, particularly in the Global South. The ‘human right to water’ has become a focus for scholars and activists critical of dominant water cultures under regimes of modernisation and neo-liberal capitalism. These actors variously oppose the privatisation and corporatisation of water sources and water’s provision which, in multiple arrangements and in various degrees, has become a feature of global water practice.
This is some of the background to this paper that I will go onto elaborate. The other is much more localised, and concerns the current water scenario in the Indian city of Chennai, in the state of Tamil Nadu. This brings us into the fabric of the city, of which water is an intimate part. Here, the apocalyptic-style predictions of some water commentators would seem to be realised. Widespread water scarcity and the resulting proliferation of rogue water markets throughout Chennai has rendered the water problem here highly visible and contested. Bottled, or containerised, water in a range of forms has become a normalised source of water for many of Chennai’s residents, heralding, for some, an inequitable water future in which free, or publically provided water, is no longer guaranteed.

In the midst of this, however, advocates of rainwater harvesting, a traditional water practice once common throughout India, are reviving its associated knowledge and material infrastructure as an alternative response to Chennai’s current water woes. Rainwater harvesting is a recycled water practice: as its implementation remakes and recasts the city’s surfaces and structures, it also returns forgotten and marginalised knowledge and ontology to everyday human relations with water. The water reality enacted by practices of harvesting contests that produced by commoditised water, which attempts to discipline and pacify this substance. In the process of recycling subaltern water knowledge, the agency of water is also revived. At the same time, however, the reintroduction of rainwater harvesting to Chennai’s water culture suggests no straightforward contrast with marketised practices. While some of its proponents and other commentators generally critical of neo-liberal water regimes look to the communally-based nature of rainwater harvesting as a counter point to water as commodity, rainwater harvesting troubles a dichotomy between the market and the commons upon which so much contemporary water politics relies. Even while it initiates a range of renovated human/water relations that may promise a more sustainable future, it affords no easy solution to the messy water arrangements of a large Indian city like Chennai, leading this paper to ultimately reflect on what it is to ‘recycle’ water practice.

**CHENNAI AND THE ARRIVAL OF WATER FUTURES**

Chennai would seem to realise the worst fears of those concerned for global water futures. Chronic water shortages mark the norm in this city, with the business of water – in many different arrangements of trade – booming as a
result. With no major rivers flowing through its environs, Chennai traditionally relies on its annual monsoons (from mid-October to mid-December) to supply its potable water. Rain distribution is uneven across India, and the Western Ghats in the south of the country mark the border between the water-rich state of Kerala, and the dryer Tamil Nadu which sits in the rain-shadow of the Ghats. Although its rainfall average of 1400mm per annum is above the national average, periods of drought, or poor monsoons, are not infrequent in Tamil Nadu, and a booming population (an estimated 8.2 in its greater area, making Chennai India’s fourth largest city) has added pressure to water supply. However, the most significant factor, by far, in the increasing situation of water scarcity in Chennai is the widespread exploitation of groundwater sources. This is not a problem particular to Chennai, with Tamil Nadu relying on groundwater for 96 per cent of its consumable water, and India as a whole drawing on groundwater for 80 per cent of domestic supply. Only one third of groundwater across the country is considered secure (Suresh and Prabhu 2007).

India is renowned for its large-scale infrastructural water projects under a program of environmental modernisation which gained steam throughout the twentieth century. This so-called ‘green revolution’ sought to address the country’s seemingly endemic crises in food and water provision through state irrigation works supported by institutions such as the World Bank. These schemes, employing dams and systems of constructed canals to store, divert and carry water over vast distances, were implemented alongside a development discourse of optimising human life through efficient and sufficient food and water distributions, and reoriented water management away from community-level, localised practices. For their proponents, these schemes have proved vital to India’s economic growth, turning once-arid environments into economically viable centres, while their detractors point to the social inequities and environmental damage that have followed in their wake. What is generally agreed upon, however, is the failure of this infrastructure to adequately secure water across India. Currently more than 700 million Indians have substandard sanitation, while it is estimated that 2.1 million Indian children under five die from drinking polluted water each year (Barlow 2007).

From the 1970s onward, investment in large-scale projects was wound back, with a much more haphazard system of groundwater exploitation, by both government and private entities, arising in its stead. The widespread sinking of tubewells, long stainless steel pipes which draw water up from the ground via electric pump, enabled land owners to directly extract groundwater, and initiated a proliferation of informal water markets around the country. More than 20 million tubewells have now been installed throughout India, with
50 per cent of agricultural land irrigated through these means. Activist Maude Barlow reports that a further million tubewells are being installed each year. While the World Bank claims that this ‘groundwater revolution’ has ‘brought immense benefits to India’ in terms of irrigation, rural development and concomitant poverty alleviation, it also admits its inherent limitations (Briscoe 2005). The turn to groundwater as the predominant source of consumable water has proved devastating to the country’s aquifers and perpetuated or even worsened some social inequities. Approximately 15 per cent of India’s aquifers are in a critical condition and this number is expected to rise to 60 per cent within 25 years.

In Tamil Nadu and its capital, the situation is even worse. Despite its level of seasonal rainfall, the state has a per capita availability of fresh water of 830 cubic metres, significantly lower than the national average (1200 cubic metres), and rendering it ‘water scarce’ according to international measures (below 1000 cubic metres). Over one third of Tamil Nadu’s groundwater sources are overexploited, while others are at critical or semi-critical levels (Suresh and Prabhu 2007). Chennai also turned to groundwater sources in the 1970s, with the state-owned Metro Water, responsible for providing water to the city’s domestic and commercial dwellings, starting to draw water from aquifers across the greater city and its outer perimeter after the surface water in local reservoirs, known as erys, ran low. Yet the increased extraction of groundwater sources has seen tapped water quality and availability throughout Chennai plummet. It is estimated that the city’s aquifers are currently at 20 per cent capacity. Metro Water can fully service just one quarter of total demand, and recent studies indicate that 31 per cent of households in Chennai have no secure access to drinking water (Anand 2001). These are generally the poor and marginalised, including Dalits (untouchables), tribal communities and slum dwellers (Suresh and Prabhu 2007). Many areas of Chennai receive no piped water at all, while others receive piped water on alternate days only. What piped water there is frequently brackish and good for cooking only, a result of over-extraction and in some instances, the presence of residue from chemical fertilisers. Once reliable borewells are drying up across the city.

The 1987 Madras Metropolitan Area Groundwater Regulation Act was introduced to monitor the extraction of groundwater via a permit system; this was followed in 2003 by the Groundwater Development and Management Ordinance with similar purpose. In practice, however, the monitoring of groundwater use is lax and violators are rarely punished (Kamat 2002). This set of circumstances has seen the business of ground water extraction and sale boom in Chennai over the last 15 years, and the sight of water tankers on the
city streets is now a common one. 1300 private tanker trucks reportedly service the city’s residential and commercial districts; a portion is hired out by Metro Water which imports water to communal wells where piped water is unavailable. Areas inaccessible to these trucks cannot receive any water at all. These public supply efforts are thus frequently insufficient, making room for an explosion in private water provision. Chennai residents pay hundreds of millions of rupees each year for billions of litres of containerised water to supplement Metro Water’s inadequate supply. This water is generally sold in ‘pots’, or 20 litre plastic bottles. At a cost of 30 rupees/20 L, this mode of water provision is expensive, but is now routine for most middle class residents who commonly purchase refills of their 20L bottles 2-3 times per week. Slum dwellers and less wealthy Indians must rely on poor quality well water accessed through public street taps.

The depletion of aquifers across Chennai means that the tankers are now travelling further afield to source groundwater for sale to consumers. Water is routinely sourced from areas 40 kilometres outside the city. It is estimated that 50 crores (or 500 million rupees) worth of water per month is brought into Chennai from rural provinces, and with the increasing distances travelled, the price of water rises (Srinivasan nd). For the water dealers, the practice is so lucrative that oil tankers have been arriving from other states to join the water sale and transportation industry. Agricultural land has become a prime source of this water; selling groundwater is more lucrative for farmers than it is used to produce crops. Yet the consequences of this are intensified urbanisation and population displacement. When wells became overdrawn and unusable, agricultural workers are forced to move to the city, often joining the growing population of slum residents. Reports circulate of agricultural land, drained of its water, being bought up cheaply by real estate developers. Other stories have emerged of tankers full of Metro Water being hijacked by ‘gangsters’, who, in complicity with local police, steal the water and force local communities to pay through this syndicate (‘OMR residents face acute water shortage’). There are similar reports of Metro Water representatives demanding money for ‘releasing water’ to particular suburbs over others (‘Chennai’s water woes’), and of tanker drivers who refuse to service certain areas on certain days for lack of convenience (‘Water lorries play truant’).

What Briscoe refers to as a ‘hidden groundwater economy’ (2005: 12) is, in fact, the predominant face of water access in contemporary Chennai. The everyday nature of informal, sometimes illegal, water markets in this city has, at its heart, the normalisation of containerised water as a public water source. There are currently 200 legal and 400 illegal bottlers of water across the city,
comprising half of the total containerised water industry of India – an industry growing at the staggering rate of 40 per cent per annum. While the single-serve 600 ml water bottle is less frequently purchased than the 20L domestic-size serve, these markets are interlinked by the infrastructure behind them (the water lorries and bottling plants) and the water in each container, which is sourced from the same aquifers. Extracted and transported from its source, disciplined and enclosed, the water in these bottles is rendered a passive material, servicing the needs of a population but extracted from its own ‘natural logic’ (Ghosh and Muecke 2006), the hydraulic system that traditionally ensures water’s recharge.

**The Right To Water In The City**

With almost half of the developing world expected to live in cities by 2015 (and currently more than half the world’s population are urban), the city is a prime focus of global water politics. The UN predicts that over half of urban populations in the Global South will live in slums by 2030, with no access to water or sanitation services (Barlow 2007). For many water activists and commentators, these rapidly urbanising populations are emblematic of unsustainable water cultures which expose the failure, and flawed premise, of marketised systems of water provision. At the same time, the cities of the Global South are often seen to exemplify the failure of states to adequately sustain their populations. The escalating resource demands of Asia’s and the sub-continent’s booming metropolises have created an opportunity for corporate and other private actors to enter the water provision scene, leveraging off the limits of existing infrastructure and the opportunities and need for new means of water delivery. As one water-seller in Chennai frames the situation, ‘the government is not able to give water to everybody so we supply those who are willing to pay’ (Srinivasan nd).

Privatised networks of water provision, especially high-cost containerised water, stratify the population between those who can afford safe potable water and those who cannot. With rural displacements, the numbers of urban poor are increasing in these cities. It is estimated that 22 per cent of available water in Asian cities is sub-standard, while 42 per cent of potable piped water is estimated as lost in these cities due to evaporation, leaking pipes, and other decrepit infrastructure. This has led Clarke and King of environmental group *Earthscan* to refer to urban areas as ‘the world’s most life-threatening environments’. They explain: ‘The high concentration of people, coupled with
inadequate sanitation, provides a perfect breeding ground for infectious
diseases. And how much worse would conditions be if water supplies were to
run out?’ (Clarke and King 2004) These inequities, emergent from urban
contexts, recall David Harvey’s elaboration of ‘the right to the city’, and the
contravention of these rights for many urban poor. Diverse geographies of
water access, determined by localised consequences of groundwater
exploitation and the uneven distributions of piped and trucked water, produce
diverse biopolitical and material realities for Chennai’s population.

In Harvey’s terms, the right to the city means the *common* right to ‘change
ourselves by changing the city’: it refers to the capacity to collectively shape the
‘processes of urbanisation’ in which the city’s inhabitants are enrolled (‘The
Right to the City’). Harvey describes aspects of urban design that alienate this
right for many inhabitants of the contemporary city, including gentrification, the
acquisition of slum territory for elite private developments, and the
concentration of political power in determining urban development – all
human-centred concerns. But what are also of critical significance are the more
than human impacts of urban design. For the natural logic of water is not just
disciplined by the practices of enclosure involved in its containerisation and
trade, but also by the concreted and hard-edged surfaces of the city landscape
which allow vast amounts of rainwater to run-off as storm water into the sea.
These materials are complicit in the depletion of Chennai’s groundwater, as is
the neglect and dismantling of a long practiced system of groundwater recharge
built into the earlier fabric of this city.

Prior to public supply systems implemented under colonisation, traditional
urban water practice in Tamil Nadu, as in much of India, involved the
‘harvesting’, collection and storage of rainwater that would feed into
groundwater recharge through an intricate system of tanks and ponds. While
rural surface water was stored in reservoirs known as etsy in Tamil Nadu, urban
areas employed a network of collection points usually attached to places of
public gathering, such as temples, indicating their original logic as common
water sources. These collection points remain integrated into the city’s existing
architecture and urban design. Yet rainwater harvesting is a necessarily
decentralised practice. As Agarwal reminds us, the provision of water by the
state is a relatively recent phenomenon: ‘150 years ago no government
anywhere in the world provided water’ (Agarwal 2001: 2). Traditional water
practices thus relied on the collaborations of local communities with the water
system and a range of technologies, materials and practices.
Water activist discourse has focused on the abstraction of water provision from local milieux, calling for a return of water management to the community level. Such an act, it is commonly argued, democratises water in line with the claims of a ‘human right’ to water. Prominent Indian activists such as Vandana Shiva, Medha Petka and Arundhati Roy have critiqued and mobilised resistance to the country’s industrialised and increasingly marketised water economies through such a rights discourse that connects with global efforts to legislate for and/or socially enshrine access to water as a human right. NGOs have led the way here, with states themselves reticent to recognise such rights constitutionally. South Africa is currently the only country whose constitution grants its people the right to water. In 2002 the United Nations identified water as a basic human right, and a ‘prerequisite for the realization of other human rights’ (‘The Right to Water). On the back of this, a plethora of activist groups composed charters and manifestos that called on communities to affirm their own commitment to ‘water justice’. The Blue Planet Project, for example, founded by Maude Barlow, authored a pledge ‘offered as a tool for a common call to protect water as something we all share’. ‘Increasingly’, the document begins, ‘we are realising that economic globalisation is at its heart a threat to the global commons, those things that we all depend on and share together: water, air, our own genetic code’. The ‘pledge’ then outlines a series of proclamations and commitments relating to water’s intrinsic worth as a substance that sustains life, community and culture, and that must therefore be managed as a public, rather than a private, good.

This appeal to water as part of a global commons is one that has gained particular currency amongst water activists and scholars. Karen Bakker explains that ‘the commons view of water asserts its unique qualities: water as a flow resource essential for life and eco-system health; non-substitutable and tightly bound to communities and ecosystems through the hydrological cycle’. ‘From this perspective’, she continues, ‘[the] collective management [of water] by communities is not only preferable but also necessary’ (Bakker 2007: 441). Water ‘commoning movements’ that pursue the democratisation of water through anti-market agitation and the return of decentralised, community-level water management are increasingly prominent in India. These movements generally focus upon restoring traditional water practices that rely on local expertise, collective responsibility and low-tech strategies of ensuring groundwater health: key amongst these are cultures of rainwater harvesting.
THE RETURN OF RAINWATER HARVESTING

Despite its long tradition throughout India, rainwater harvesting fell out of favour amidst the push for environmental modernisation. Its micro-level focus, decentralised nature, and lack of technological complexity saw it relegated by the move to capital-intensive, large-scale water projects. Communities disconnected from the required knowledge and interest in maintaining water harvesting systems. As a consequence, silting, lack of maintenance, and rubbish pollution have seen tank and common well infrastructure fall into disrepair. In a sustainable mode of practice, wells do not just perform an extractive function – they also participate in recharge, drawing surface water back into underground systems. But as wells become dry, they are abandoned and filled in with dirt or rubbish, further diminishing the capacity of rainwater to be harvested.

To harvest water means to prevent it from simply running-off and disappearing into stormwater channels where (in the case of coastal cities, like Chennai) it flows out to sea. Rainwater harvesting employs a range of mechanisms of capture, all of which enable water to continue its participation in the hydrological cycle. Its techniques include direct harvesting of the drop through collecting water in rooftop tanks, or courtyard wells, and directing monsoon run-off into common ponds or tanks. By passing through natural filtration systems of earth, sand and grit, the water is purified and made highly potable. There are thousands of wells, ponds and tanks throughout Chennai that can be reincorporated into rainwater harvesting systems. Infrastructural requirements are negligible and space needs are minimal. Only a small amount of land is needed to capture a significant volume of rain (500 metres of land to one million litres of water). There is strong evidence to show that small, village-scale harvesting programmes yield significantly more water than medium to large-sized dams in which water has to run over a larger area to be collected, making it vulnerable to loss through ground depressions and evaporation. ‘In a drought-prone area where water is scarce, 10 tiny dams with a catchment of 1 hectare each will collect much more water than one larger dam with a catchment of 10 hectares’ (Agarwal 2001: 10).

A renewed interest in rainwater harvesting has arisen in response to Chennai’s water shortages. This involves a revival of knowledge and the re-education of community, and the recycling of existing, neglected harvesting infrastructure across the city, as well as the implementation of new devices, such as technologies, materials and policies. In recent years, Chennai residents have mobilised to restore the many polluted temple tanks across the city, clearing away rubbish and implementing ‘bioremediation’ treatments that
destroy water and soil contaminants via micro-organisms (‘Temple Tanks’). Landscapes surrounding these tanks are being redesigned to enable water infiltration – mud roads are replacing concrete, and car parking and retail development is being prevented within a certain radius of the temple. Apartment buildings are another key site for reinvesting in rainwater harvesting. Rooftop or terrace collection diverts rain from these surfaces into gutters and down-pipes to storage tanks. Traditional means of filtering are still used in modern harvesting systems – layers of fibre, coarse sand and gravel that remove dirt and grit from rainwater.

The government of Tamil Nadu has been active in returning rainwater harvesting to mainstream practice after regulating for the mandatory inclusion of water capture devices in newly constructed residential and commercial buildings over three storeys high in 2002. A host of problems have attended this, poor construction and poor regulation amongst them. Several years after the initiative was implemented, it was estimated that two thirds of the buildings granted planning permits under this new rainwater harvesting framework had not installed any harvesting systems, and in one third of cases where systems had been installed, they had been done so incorrectly (Vaidyanathan and Saravanan 2001: 13). However community organisations and apartment owner associations are also active in returning rainwater harvesting to mainstream practice. In particular, while the government focuses (theoretically) on new construction, there is a significant movement to retrofit existing buildings and to return common wells to health.

Dr Sekar Raghavan is an active figure in the advocacy of rainwater harvesting in Chennai. He is the director of the Rain Centre in Mandavelipakkam District, a model house fitted out with rainwater harvesting technologies that acts as a hub of community education for water literacy. The Centre is a key initiative of the Akash Ganga Trust, founded in 2001 by volunteers with the intention to promote rainwater harvesting in the city. The Rain Centre is open to all Chennai residents and other visitors; it welcomes its guests to tour the rainwater systems in action at the house, and also runs seminars for school groups and the general public, as well as for specific interest groups such as builders and plumbers who install rainwater harvesting systems. The Centre collates statistics on rainfall and groundwater levels in Chennai, and provides information on maintaining residential wells and maximising water purity. It is promoted as ‘a museum and a laboratory rolled into one’ (http://raincentre.net/). According to Dr Raghavan, the Centre’s activities have connected with other rainwater harvesting communities around the world, and Dr Raghavan has travelled to Colombo, Sri Lanka to advise local authorities on
instituting mandatory rainwater harvesting schemes and community education programs. He also advised the Tamil Nadu government on the introduction of compulsory rainwater harvesting measures in this state too.

In his own community, Dr Raghavan has led the retrofitting of his apartment building in the coastal suburb of Besant Nagar. The apartment complex has several open wells connected to two borewells. The open wells began to dry up in 1999 and the borewells turned brackish and unpotable. While most of his neighbours began purchasing containerised water, Dr Raghavan successfully lobbied for raindrop collection devices and filtering systems to be installed on the roof of the building and in its paved courtyard and drive way. Within four years of the system’s installation, the wells attached to the apartment building had risen to three-quarters full. Says Dr Raghavan, ‘those wells had been dry for almost five years... I never dreamt that my well would come back alive but it did’ (Interview). He also reports success stories from other parts of the city: ‘One resident informed me that his well, which had remained dry for almost 35 years, came back alive’ (Padre 2007). The coastal situation of Chennai means that apartment complexes near the sea offer good sandy soil for water filtering. The average rise in the water table in areas that implement rainwater harvesting is more than two metres each year; according to Dr Raghavan, harvesting practice can elicit 120 litres of potable water per person, per day.

**What Does It Mean To Recycle Water Practice?**

Dr Raghavan’s water pedagogy emphasises the personal responsibility of residents to maintain wells and to ensure self-sufficiency. He wants to liberate people from their ‘addiction’ to containerised water, and return to a low-tech time of local resource management (Interview). While all 140 families living in his apartment complex are using well water, only thirty per cent currently draw drinking water from the wells. The majority continue to purchase containerised water. This, he contends, is due to habit rather than the quality of the well water, or the capacity of rainwater harvesting to deliver sufficient potable resources. The reclamation of water provision by ‘the people’ is a discourse frequently attached to the return of rainwater harvesting practice. It compliments a rights discourse and the increasing prominence of ‘commoning movements’ that situate community at the heart of water practice. As Shiva writes of these movements: by ‘reclaiming water from corporations and the market... [citizens] have illustrated that privatisation is not inevitable and that
the corporate takeover of vital resources can be prevented by people’s
democratic will’ (2008: 103). ‘Democracy’, she contends, ‘is... the power of
people to shape their destiny, determine how their thirst is quenched, how
their food is produced and distributed... We can work with the water cycle to
reclaim water abundance’ (xv).

The problem with the idea of a return to a pre-modern time of water
management, of course, is that rainwater harvesting systems, and more broadly
strategies to reclaim a water commons, do not take place outside of
contemporary political and economic systems. Within the local arrangements of
materials, technologies and citizens that rainwater harvesting entails, are a
wealth of other devices and actors representing multiple state, non-state and
market interests. Despite its decentralised nature, rainwater harvesting, and the
water commons that it enacts, is not purely ‘of the people’. Legislation,
hierarchies of governance, NGOs, technicians and masons are just some of the
actors and devices at work in the revival of rainwater harvesting systems in
Chennai. The technical knowledge and funds required to adequately restore
temple tanks, for example, has led to a recent partnership between the Chennai
Metropolitan Water Supply and Sewerage Board and the Hindu Religious and
Charitable Endowments Board: “Many NGOs are approaching us for help to
clean temple tanks,” said a senior CMWSSB official’ (Narayanan 2011).
Development organisations with global interests, such as the Dutch-based RAIN
(Rainwater Harvesting Implementation Network), have connected with local
rainwater harvesting efforts, and promote micro-credit schemes to enable
communities to purchase the latest and most efficient harvesting technologies
(Nijhof et al 2010).

Commercial enterprises selling rainwater harvesting equipment and other
water savings technologies are demonstrating that the interests of ‘life’ are not
just the terrain of anti-market activists. Assisted by an auditing infrastructure of
accreditation and certification, these industries – several of which share the
name of the philanthropic trust associated with the Chennai Rain Centre (the
name means ‘river from the sky’) – also invest in a discourse of human
empowerment, community development and water security. The mission
statement of Akash Ganga, a company that produces ‘atmospheric moisture
extractors’ (which convert humidity into potable water) includes the aims to
‘create the basis for a healthy human race’, and to ‘free humanity from
dependence on unpredictable and shrinking water resources’. The ‘social
innovation’ company, Akash Ganga, provides rainwater harvesting systems to
communities via ‘public-private-community’ partnerships: under this model, a
certain percentage of harvesting water feeds a common pool – beyond this, any
‘excess’ water is available for sale. Akash Ganga refers to this as the conversion of ‘cultural traditions and social bonds into “social capital”’: ‘we do not view traditions... as anchors that keep a society tied to the past. Instead, we view them as asset[s] that can be economised for cost savings or transformed into revenue stream’.

These examples suggest the point made so well by Karen Bakker that the cause of a human right to water does not necessarily conflict with privatisation or market practice. As Bakker demonstrates, institutions of ‘the market’ – bottled water manufacturers included – frequently justify their activities in the provision of water through the frame of ‘rights’. ‘Companies continue to insist that water is a human right,’ she writes, ‘which they are both competent and willing to supply, if risk-returns are acceptable’ (Bakker 2007: 440). Further to this, she argues, the concept of human rights, wielded in opposition to privatisation, is inherently problematic as both stem from a liberal tradition of property rights, making it difficult to oppose one with the other. The concept of the commons, on the other hand, has a different and more productive genealogy for a movement seeking alternatives to privatised water (ibid. 2007: 439).

But the commons is always being constituted: water’s fluid nature means that its ‘return’ to the common pool is always open to co-option and compromise. Recharged aquifers provide bounty for water traders as much as for community and Chennai residents have reported water sellers moving into areas restored by communal recharge practices and extracting this water for sale. Moreover corporations themselves have become involved in sponsoring, and educating communities in, rainwater harvesting practice. A striking example of this is the Hindustan Coca Cola company who has invested significant efforts in rainwater harvesting projects across India in recent years. A string of bad publicity – in which most famously HCCC’s Plachimada bottling factory, in the state of Kerala, was closed down by court order after local groundwater levels and quality plummeted – and a resulting public backlash clearly inform HCCC’s investment in community rainwater harvesting projects. As a corporate social responsibility strategy its ambitions seem transparent. ‘The Coca-Cola company exists to benefit and refresh everyone it touches’, announces a press release. ‘Coke is going straight to the people that make its money and helping them directly with they need most: education and structures that harvest rainwater in more self-reliant and sustainable ways’ (‘Coke Rainwater Harvesting in India’). However, as a strategy that does actually participate in the provision of water to populations, it also highlights the diffusion of biopolitical claims and
interests that attend the matter of water access, and the entanglement of markets and commons.

When the very corporations that water activists oppose laud the merits of recycling water knowledge, where does this leave the possibilities of rainwater harvesting to challenge the exploitative and unsustainable culture of groundwater extraction in the rapidly developing cities (and regions) of the Global South? As HCCC says, ‘rainwater harvesting in India is a way of seeking out cultural identity; how many companies can say they help people get back to their roots?’ While there may be no pure ‘commons’ that sits outside the market, the practice of rainwater harvesting and the revival of this knowledge in the context of the normalisation of the container – or bottle – as the source of potable water, suggests a particular sense of communality that promises more sustaining water futures. ‘Working with the water cycle’, as Shiva (2002) suggests, means acknowledging a water community that is more-than-human.

Rainwater harvesting relies upon collaborations of water, humans and a range of materials: sand, pipes, and holding structures. It enacts community in the sense proposed by Roberto Esposito, as ‘foreground[ing] the co-constitutive dynamics of living’ (2008: 159). Dr Raghavan’s evocative reference to wells returning to life suggests the ideals of a water democracy in which the life of humans and the life of water (as well as other non-humans) is accounted for (Shiva and Opel 2008: 502). It also suggests the potential for a more-than-human politics of water wherein water is credited with agency in the processes of its provision and consumption, and as an active force in the world. What the return of rainwater harvesting to Chennai means, then, is the return of a different water reality – a revivified water ontology that sees water participate in the constitution of urban ecology and its socio-political and material forms. It also means that, in terms of a water rights discourse, the rights of water itself start to matter. When Harvey (2008) speaks of ‘the right to the city’ as the right to change the city, water’s own capacity to give shape to the city’s design, its infrastructure and its communities, asks to be recognised, too.

Where rainwater harvesting differs from other, marketised, practices of water provision is in its refusal to pacify water (for it needs water to assert its own logic), and its emphasis on collaborative, more-than-human networks. The water reality that rainwater harvesting enacts puts the disciplining nature of containerised water into relief. Still caught up in market relations, the renewed practice of rainwater harvesting and the revival of its associated knowledge, technologies and materials do not offer an ideal return to tradition, unsullied by capitalist forces. Recycled practice, like recycled materials, involves a shift in value - its ‘renegotiation and transformation’ (Hawkins 2006: 93) – as networks
of materials, technologies and subjects initiate new socio-political, economic and cultural arrangements and challenges. With its capacity to bring ‘back alive’ the beleaguered aquifers and wells of Chennai, rainwater harvesting recognises the ‘life’ of water that the bottle works so hard to repress. This life is entangled with our own, but it is also other. It is ‘the precariousness of life itself’, in Judith Butler’s terms: a challenge to ontological certainty that interrogates the constitution of human-ness amidst our cultural drive for ecological mastery, in productive and necessary ways (Butler 2009: 134).
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I would like to present a few comments in relation to Emily’s paper and raise certain themes or questions. I think there’s an interesting point raised in the paper about rights to water and regimes of modernisation and one thing that I would like to explore a little bit more is what relations exist between modernity and modernisation. In some of the work on urban infrastructure networks we talk about a “modern infrastructural ideal”, for example, Stephen Graham’s work touches on this. I’m wondering about the idea of a periodicity in urban infrastructure networks and the history of urban technology and how this translates between different cities or different specific contexts. The second point I would raise concerns rainwater harvesting itself. It would be interesting to develop a more differentiated conception of what rainwater harvesting is. In a sense, rainwater harvesting is a medley of many different practices, architectural elements, cultural forms and so on, and I think it could be very useful to elaborate on what this is exactly that we’re looking at.

Another point, and I think it relates to my earlier question about modernity and modernisation, concerns Indian modernisation in particular and how different elements come together. For example, in terms of the post-colonial state, engineering played a very significant role and I think sometimes the dominant discourses of engineering and the supply-side aspects of Indian water provision aren’t focused on enough in the contemporary debates. And to some degree, it’s questionable whether the “municipal engineering ethos” has completely failed in an Indian context because if we look at other cities like Mumbai, which I’m a bit more familiar with, you have an extraordinary infrastructure network that has been built up over a hundred and fifty years and particularly from the 1930s and 1940s onwards, and it is really in itself a remarkable engineering achievement even if it can’t keep pace with the demographic dynamics of Indian urbanisation.
There is interesting debate about rights to the city and following on from that, rights to water, and various elaborations of the Lefebvrian notion of “the right to the city” by David Harvey and other scholars. I think when we move to the rights of water itself, we move beyond that neo-Marxian frame and other questions come into play, I’d also raise a question that in terms of the rights of the city and rights to water about the tension between inhabitants and citizens. Particularly in the context of urbanisation in the global south, I think there’s a lot to be done in terms of trying to explore relationships between different notions of citizenship and environmental service provision and environmental conditions themselves, particularly in marginal settlements or slum areas.

Another thing that strikes me, particularly from your paper in relation to Chennai, is the specifics of the hydrological dynamics of this region and I think sometimes in the environmental literature, these factors are overgeneralised and we need to look more carefully at the particular geohistorical or biophysical context of particular places, regions, cities, localities. Another point that I thought linked in some way tangentially to the idea of the rights of water itself is when you credit water with agency but I wonder what that means exactly, particularly in terms of rainwater harvesting. How does this focus on agency illuminate the domestication, appropriation or utilisation of water? What does this expanded conception of agency tell us that is theoretically significant?

Towards the end of the paper you introduce, in an interesting way, the work of Roberto Esposito and the notion of foregrounding, and that raised questions about the biopolitics of water in Chennai. I wonder whether there again, there is scope to develop neo-Foucauldian aspects of the co-evolution of social and technical systems, and develop a more broad-based understanding of the biopolitics of water within the Indian city.

Another interesting point in terms of the idea of rainwater harvesting being incorporated into contemporary environmental or cultural discourses is this sense of some kind of link between the pre-modern or pre-colonial and contemporary environmental discourse, and I think that this has very specific ideological connotations in an Indian context. And then my final point, coming back to Chennai again, is that it would be very useful to know more about the politics of the city. Karen Bakker and other scholars talk about the hydro-social context but what is the specific hydro-social context of Chennai itself, for example, in relation to the Dravidian dynamics of local politics where caste, class, gender and regional chauvinism play their role in terms of infrastructure politics just as they play out in other Indian cities such as Mumbai with the Shiv Sena movement?
The paper “Recycling Practice: Rainwater Harvesting in Chennai, India and the Politics of Water Provision” by Emily Potter pointed to a major but often overlooked problem that plagues most cities in Asia: the reliable and equitable provision of potable water. It is a fact that when the city cannot provide adequate water supply services for its inhabitants, the citizens will find their own ways to obtain water. In fact, the access to potable drinking water in rural areas is usually more challenging than in urban areas. Nevertheless, urban areas have their specific issues, such as what Emily had pointed out in her paper: they often have networks of pipes that may not function optimally because of technical, political, and social issues. What is termed as technical loss of water through the network may be issues related to technical capacities and technologies, but in cities of developing countries with poor piped water service such as Chennai the water loss due to ‘illegal connections’ or illegal tapping of water from the piped network is the most difficult to tackle. Often times, these illegal connections were not individual, but entangled within the socio-economic and political setting of the urban communities. The water from the network is sold to the communities at a considerably higher price. Or, the inhabitants may choose to build their own well – this is not limited only to private households but also applies to business establishments that are capable of digging deep wells to extract more groundwater. This causes groundwater depletion problems and land subsidence in many cities.

The debate between water as a human right against water service privatisation has been around for quite some time and became heated during the times when multilateral funding agencies such as the World Bank and the ADB were promoting private sector participation in various levels of water management as a precondition of their water-related loans. Here, the paper presented Karen Bakker’s argument that the human right to water does not
necessarily conflict with privatisation or market practice. In the referred paper, Bakker argued for the concept of the ‘commons’ that is more ‘promising’ to find workable alternatives to privatised water. It is interesting to see rainwater harvesting as a ‘commoning movement’ that has democratising qualities. Here, the ‘recycling’ of water from the rain is conducted in a community-based setting. (Just a small note, when we talk about water ‘recycling’ in Singapore, we think about recycling wastewater, and rainwater harvesting is not considered recycling water.) That aside, this paper presents the rainwater harvesting movement in Chennai as a challenge to corporations and the market that are selling water in containers. That is because rainwater harvesting was consciously done at a communal level and not on the individual household level.

The next question to be asked is, therefore: is rainwater harvesting itself a democratising tool? In the context of Singapore, for example, rainwater harvesting is done by the city-state and individual buildings and households are not allowed to harvest rainwater by themselves. All the rainwater is supposed to be flowing to the drains and canals that would lead them to the reservoirs. I would also think that it is important to understand the community settings in Chennai and what kind of contexts would allow them to do rainwater harvesting communally. In my experience in Jakarta, for example, poor communities also harvest rainwater but they mostly do it per individual household, not on the community level. Similarly, to what extent can private markets benefit from rainwater harvesting practices? The paper mentioned the market of rainwater harvesting equipments and water savings technologies, which emerged from the drive to harvest rainwater.

I would also like to hear more about the debate between water privatisation and human rights from the Chennai case. Bakker was quoted as saying that privatisation and market practice does not conflict with human right to water. It is engaging to find Harvey’s ‘rights to the city’ in the paper alongside Karen Bakker’s privatisation against the human rights of water and how that kind of argument becomes unproductive. It is a good storyline to tell in the theoretical part and teasing out differences between Harvey’s approach and also Karen Bakker’s approach to this. Harvey would have a much more critical view towards privatisation of water and also the participation of the markets, the private sector in water, especially when you mention the selling of those rainwater harvesting equipments and that would also lead to some more questions like: can it actually be done at a very communal level? Some of these purification tools are pretty easy to make and accessible, are there are cases where communities built these tools together or share them.
It would be interesting to hear whether Harvey’s argument to criticise the market altogether be relevant at this point. It is a fact that the risk-returns are the main concern of the private sector. Although it may not directly violate human rights, it does have a different priority in the practice. Moreover, the issue of privatising water services vs. commodification of water is understandable in terms of concept, but in practice it is difficult to separate, because service is usually measured by the amount of water provided to the people. Therefore, when we have these commercial enterprises selling rainwater harvesting equipment, what impact will that have on the commons? Is everyone happy with the ‘public-private-community’ arrangement, or are there any different stories among different communities? Some of the purification tools are pretty easy to make and accessible. Are there cases where communities build these tools together or share them?

The final question would be – while this case happens in a dire situation where water provision is insufficient, can rainwater harvesting also be practised in other places to relieve burdens on the network? Can water/rainwater be community-building proxies? What does it require?
The session began with Dr Emily Potter responding to points raised by the discussants. Dr Potter acknowledged that in the case of Chennai the Indian state is still strongly involved in water provision through the use of tanker trucks, pipes to deliver the water, in the advocacy of rainwater harvesting, and so on. However, she maintained that it is never simply a case of ‘the state versus corporations’ or ‘the state versus the people’ because they are all entangled and one story cannot be told without bringing in other actors and institutions. Dr. Potter went on to note that the geo-hydrological specificities of Chennai are important to bear in mind because often these specificities tell a very different story to what one might imagine one would find.

The ensuing open discussion is summarised as follows:

- Dr Miller asked about the travel of water harvesting technologies from Chennai to other parts of the world and vice versa. She raised the example of Chungungo in Chile, where an indigenous water catchment system called ‘cloud catchers’ might be replicated in coastal Chennai, where rainwater and groundwater are both scarce. Dr Potter was not familiar with any comparable technologies in Chennai, but did hear about a machine that extracts water from the humidity in the air that has become a relatively successful industry in Chennai. But when she looked at some of the advertising for this industry of water-from-humidity extractors, they were also engaged in discourses of life and human health and wellbeing, which seemed to reinforce Karen Bakker’s point that the human right to water does not stand opposed to privatisation.

- Mr Raymond Kwok continued the discussion about privatisation by asking whether water is a state asset or does it belong to everybody? He noted that in Singapore in particular, every single drop of water actually belongs to the Singapore government. If you get a bucket and try to go outside and collect it, you’re breaking the law. Dr Potter confirmed that in India surface water belongs to the state and groundwater belongs to whoever owns the
land above it and this has enabled the proliferation of markets in private water through groundwater provision.

- Dr Tripta Chandola cautioned that in the Indian case, where she has conducted extensive research, the whole idea of commons and traditional knowledge is a territory that needs to be trodden very carefully, because the whole idea of commons in India is very problematic. She asked whether there were ever any real commons, or is it an elitist Brahmanical construct? In a way, this whole idea of traditional knowledges and practices recreates those traditional hierarchies. Dr Potter confirmed that she did not want to idealise the commons at all and argued that he paper definitely avoided this because the idea that there is some kind of pure commons is a damaging notion and doesn’t help us actually get to any different place of water practice.

- Mr Raymond Kwok asked about the costs involved in approaching recycling practices given that when more players became involved in the recycling process recycled goods became more costly for the consumer. Dr Potter confirmed that containerised water is expensive in relative terms and no doubt it’s because of these systems that contribute to its production and delivery.

- Prof Hawkins introduced the issue of framing recycling within an alternative political analytical discourse, noting that both she and Dr Potter sought in their work to frame political analysis in ways that perhaps don’t mobilise class and gender and the structural logics of them as being central political forces that are in play here. She defended recent work on more-than-human politics as an engagement between philosophy and STS that’s just seeking to say that we don’t look enough, in political theory, at how political identities and political processes are actively materialised. In saying that material things from sewers to taps to containers to labels on bottles are all ‘recyclable’ helps to materialise various sorts of political identities to generate collectives. Politics is a thoroughly material practice and that has been ignored too long in political theory. And there’s been a certain reluctance in STS to really wrestle with difficult political questions. But the key point, according to Prof Hawkins, is trying to examine how are politics enacted and how are different sorts of political relations and processes being enacted. In some of those enactments, the corporation is absolutely central, in others, it’s the state, in others, it is the bottle itself.
Prof Hawkins elaborated on the theme of rainwater harvesting by noting that Singapore, as a state, is engaged in rainwater harvesting and it is enacting an idea that the state is going to organise and provide water as a public good and this is the state’s responsibility. So water and the way in which it’s being harvested there and who’s doing it, the sociotechnical practices, are generating a certain notion of state responsibility and citizenship. In Indonesia, it’s an individual thing where you just put a pipe down and you are enacting self-interest, and water is helping to articulate that individualised, highly privatised, property-driven notion of identity. In Chennai, you’ve got a really different network of relationships where there is an attempt to mobilise emotional community, or commons, and Dr Potter mapped out how complicated that process is.

Prof Lepawsky commented that the enactment and generation of citizenship is arguably impossible without the non-human because social relations cannot persist without the non-human, so one has to then grapple with non-human agency. Prof Lepawsky argued that if we divorce agency from intentionality, then it becomes easier to think about how non-human agency works for political formation and identity formation, whether it is gender or whether it is class, or they would no longer be being enacted. So in order for social relations that we perhaps sometimes take for granted as ‘existing out there’, from an understanding of them as enacted, as generated, you cannot help but grapple with the non-human.

Prof Duara asked about the relationship between the various agencies involved in rainwater harvesting networks and the Indian state. Dr Potter explained that she particularly looked at the Rain Centre in Chennai, which receives government funding, although it operates as a community organisation, so it also receives community donations of time and money. It also advises the government on its own rainwater harvesting strategies, in the Chennai government, Tamil Nadu government, but it also acts as an advisory body for governments and communities elsewhere. So it’s a tangled mess really. It relies on state patronage and it also seeks to educate the state, but it also distances itself from the state to the extent that it points the finger at public water supply and says it’s inadequate and we have to take matters into our own hands. At a grassroots level, the retrofitting of apartments is purely the initiative of apartment dwellers themselves. So an apartment, a representative group of the own occupiers of the building make the decision to install rainwater harvesting systems and oversee their installation and commonly pay for them, and the maintenance would then need to be managed by this board of occupiers.
for the future of the building. In terms of new building installation, which is a government mandatory requirement now, that would be overseen by the Chennai Water Maintenance and Drainage Supply Board, but that has been subject to criticism for failing to see through installation of projects and not having adequate ongoing regulation of these systems.

- Dr Jiat-Hwee Chang raised the issue of the decentralisation of rainwater harvesting and water service providers as a form of state withdrawal from centralised water provision and making individual communities more responsible for collecting their own water. He pointed out that similar practices seem to be evident in, for example, energy provision, rather than providing a grid that ensures that every citizen can connect to the grid. And solar panels, which are totally decentralised and don’t need to connect to the grid. Dr Potter agreed that the situation in Chennai is frequently interpreted as the withdrawal of the state, but she did not feel the situation there was so straightforward because the state is still very much involved in the rainwater harvesting scheme as well as in schemes that are community-enacted through state sponsorship. Despite the investment in rainwater harvesting infrastructure in new developments, a lot of the state-provided programmes are in accordance with the environmental modernisation image of India and the big scale infrastructural programmes that divert water or extract dirt.

- Prof Hawkins noted that in Australia the state infrastructure is quite effective in providing water to cities. The Australian government also owns and regulates groundwater catchment areas to protect them in the interest of population management and biopolitics. However, with the rise of the drought and very specific discourses of scarcity in Australia, like discourses of scarcity situated everywhere, more people are deciding to find their own ways to deal with water scarcity. For example, there is a form of rainwater harvesting in Australia which is the proliferation of water tanks on homes. People are just buying water tanks and attaching them to their roof systems and capturing their own water. The state is actually giving subsidies to people to do that, in the same sense that the state is subsidising people to put solar panels on their house. So this is not necessarily an example of retreat of the state. It’s about the proliferation of alternative household systems which are still connected to the state, like with solar panels. But the problem with the kind of improvised domestic systems that some Australians are developing in their own household is that a lot of households are now developing their own greywater systems of recycling their washing machine water, which creates significant
problems for the state. Some of that water is getting back into the main system and they can’t release what’s coming back into the system. And so, the kind of proliferation of improvised hybridised informal domestic systems is actually making trouble for quite efficient and effective state systems.

- Dr Miller asked about how mosquitoes and waterborne diseases factor into the politics of human health and mortality in privatised water collection methods, and specifically in rainwater harvesting. Prof Gandy pointed to a situation in Lagos, Nigeria, where the politics of mosquitoes was complicated by the sheer diversity in species of mosquitoes and the different types of waterborne diseases associated with insect vectors and the co-evolutionary dynamics of human settlements, urban design and insects themselves and questions of resistance, both to the microorganisms that cause malaria or the diseases and the insects and so on. Prof Gandy noted that in terms of rainwater harvesting, if there was a proliferation of small-scale, very lightly regulated unknown different structures and processes of collecting and storing water in different receptacles across the city, this could be quite a significant question to address. In a different context, dengue fever, this relationship with construction sites and in periods of economic turbulence, so in the late 1990s, construction sites in cities like Jakarta suddenly became potentially lethal because of the standing water and so on and half-finished projects.

- Dr Tim Winter observed that the discussion had become light on the historicisation of some of the processes of water recycling. When we think about this provision by the state in Asia, there are some things to think about in that respect, such as how Wittfogel’s hydraulic civilisation thesis played out in the 1980s and 1990s in urban planning. Also, the ways in which Angkorean civilisation was read and the production of rice through the catchment of water fed directly into a master plan for Phnom Penh in the 1990s and the water planning and the belief that capturing, managing and the successful management of water was a basis of urban planning and the ways in which the state would manage that. The roles of state agencies in the management of sacred water spaces, temple water, etc, have played a particular role in this region for thinking about the way water’s managed and treated and understood and valued, which is distinct to some of the places we’ve been talking about.

- Prof Bunnell raised the issue of problematising notions of the city as an undifferentiated unit of analysis. It’s so well established in social sciences today that we should be wary of methodological nationalism, and
problematise territorial framings at the level of the nation-state. And of course there’s been a lot of work about rescaling analysis, especially down to the level of cities or city regions. But the extent to which when we talk about cities or city regions, we’re actually talking about particular sites, places or localities within those cities, which are sometimes but not always about the city as a whole. This raises the question of what extent Chennai is the meaningful unit of analysis or whether water harvesting would be better discussed in terms in particular sites for particular spatial-bounded communities at a level below the scale of the city. Dr Potter responded by stating that she was talking about both those things as the locations of certain practices can’t be taken as representative of the whole city and then there’s the city of Chennai in policy discourse or the environmental discourse or concern for global water futures.
WASTE PICKERS IN ASIA: CONTESTING VALUE AND VALUES

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INTRODUCTION

In this paper I argue that solid waste in Asia is at its most contested. As waste has shifted from a societal problem to an economic resource, informal waste pickers in Asian cities are being both positively and negatively affected. In the past three decades, solid waste has become more valuable fiscally than ever before for a number of reasons. Asians are producing more solid waste that also has higher surplus value. At the same time there is increased demand for solid waste due to technological and industrial innovations that continue to develop new ways of extracting this value. This increase in value has occurred alongside a slow but varied shift in state and citizen values about waste, particularly those values concerning responsibility and rights. There is immense pressure on local-level governments to create waste management systems that reduce risk to the environment and health of the population. At the same time the volume of solid waste is increasing cost for governments to manage it. This has prompted increased levels of privatisation in solid waste management that has in turn led to increased competition for waste. Waste-to-energy businesses have entered the arena as new players in the contest over waste, while long-term stalwarts of the informal waste economy have either risen to the challenge or have been wounded. In the past decade, tremendous progress has been made by waste pickers in securing access to waste and legitimizing their place within formal systems in areas such as Pune, India. This progress, however, has come at a time when their peers in other parts of Asia have become further disenfranchised by technological, political and economic change.
The body of this paper is divided into three parts: firstly I look at why waste is at its most contested today, secondly I introduce the old and new players within the waste economy, from the informal and formal sectors, and lastly I look at how these contests have been and are continuing to be played out in countries within Asia.

**COMPETITION OVER WASTE**

In this section, I outline the reasons for the increase in contestation over solid waste focussing specifically, though separately, on issues related to fiscal value and social and cultural values.

**FISCAL VALUE**

*Waste is variable and difficult to measure definitively*

Empirically there is a clear case to argue that solid waste has become a more fiscally valuable resource in Asia, however, it is difficult to measure definitively. It is not listed on the pre-existing commodity markets like other resources such as gold or copper, because it is not a single measurable element; instead it is made of many objects and things in varying quantities and states. These elements within the composition of waste are dependent on the ever-changing social relations that occur within a space, by a person, or a given time. This makes waste highly variable and difficult to measure in its entirety.

*Elements within the waste such as recyclables are increasing in fiscal value*

Once the waste is separated, we can look at the fiscal value of individual elements, such as recyclables. Markets for recyclable materials are not new. Taira Koji, who studied historical forms of poverty, writes that pickers in Tokyo have been foraging for used paper to sell to local paper manufacturers since the 12th century (Taira 1968:5). When the country was opened to international trade between 1868-1912, the paper manufacturers began producing Western paper and textiles and rags used within the production began to increase in value for the pickers (Taira 1968:5). There has been a steady increase in the value of recyclables over the past decade, however, during the recent global financial crisis in 2008, prices for recyclables dropped by more than one third.
Recycling Cities 109

Almost three years later, the graph shows that prices have risen and are now higher than the global economic downturn.¹

**INCREASE IN DEMAND AND EASE OF TRADE FLOWS ARE INCREASING PRICES FOR ELEMENTS**

This increase is due, in part, to an increase in demand for raw material for industrial production. It is also now easier for recycling traders to sell and transport commodities regionally and internationally. In 2004, The Taipei Times reported that more than a third of paper and plastic recyclables (700,000 tonnes a year) were being shipped from British businesses to China, as Chinese companies were paying higher prices. A recycling firm in the UK interviewed for the article said that Chinese firms cold-called his company three or four times every day and they were “neither fussy about the quality or level of contamination” of the paper and plastic recyclables (The Taipei Times 2004). It is unlikely that these Chinese companies would have cold-called British companies thirty years ago. It has become easier for companies to trade due to the accessibility of information and communication avenues. In a more recent article in The Wall Street Journal a senior executive of the Yunnan Copper group said high demand for scrap copper from Chinese companies would continue for another five years (Wall Street Journal 2011).

**TECHNOLOGY AND INDUSTRIAL INNOVATIONS ARE CREATING NEW MARKETS**

Technological advancements have not only made trading easier but also created new commodities. While composting has been a feature of many indigenous farming methods, industrial composting plants are increasingly being used in developing countries. By separating and diverting biodegradable waste matter there is a reduction of waste heading to landfills and the eventual product, often called compost or organic fertiliser, is a source of revenue. This new form of surplus value is also increasing in fiscal value. In a final example, technological innovations in the area of waste-to-energy projects have also opened up new markets where waste can have value.² This is particularly so, at

¹ Personal communication with information’s from my PhD fieldwork period in May 2011.

² In this field, engineers assess the potential output of electricity or heat from samples and averaging, using the term ‘calorific-value’.
this present time, as many of these projects are also being considered within
global carbon trading schemes.

THE TOTAL VOLUME OF WASTE IS INCREASING AS POPULATIONS IN URBAN
AREAS CONTINUE TO GROW

Those interested in the fiscal value of waste in Asia do not fear a shortage of
supply. Cities are growing and more waste is being produced than ever before,
therefore there is more money to be made from it. In a UN-Habitat report,
Human Settlements Officer, Bharat Dahiya wrote, “by 2020, of the 4.2 billion
urban population of the world, 2.2 billion will be in Asia. In other words, it is
estimated that between 2010 and 2020, a total 411 million people will be added
to Asian cities, or 60 per cent of the growth in the world’s urban population”
(Dahiya 2010). Studies show that we are producing increasing amounts of
waste. This growing volume of solid waste is in part a result of our growing
desire to consume. Critics of late-modernity (the end of the last century), argue
that our impulse to experience new things, coupled with our capacity to
endlessly discard is at the heart of consumer capitalism. The eminent cultural
theorist and urban geographer, David Harvey, described how this had created
‘throw away’ societies. We continually consume commodities quicker than ever
before amid a seeming overabundance of stuff. For instance, marketing
strategies create high velocity fashions and trends, the consequence of which is
the instant obsolescence of new things (Harvey 1990). Human geographer Tim
Edensor takes this point further by stating that consumer capitalism has
become particularly geared to produce surplus amounts of products that
encourage increased consumption (Edensor 2005:315). In addition, levels of
recyclables are increasing due to social norms regarding packaging, our need for
disposability and our inner desire for cleanliness. Our ‘throw away’ societies
then, create vast quantities of, as Edensor calls, ‘premature waste’ (Edensor

THE ELEMENTS WITHIN THE WASTE ARE DIFFERENT TOO

Finally, it seems that there is also more money to be made from a more diverse
range of elements within solid waste. As time has become more commodified,
products that represent efficiency have become highly valued. A by-product of
this need has been the continuous invention of new personal technologies
focused on added convenience such as smart phones and ‘companion’ laptop
computers. This has generated new elements within waste and the subsequent
rise of e-waste: electric and electronic waste. Up to 60 different elements can be found within complex electronics, some of which are scarce (rare metals) and others are hazardous (StEP 2011).

**SOCIAL AND CULTURAL VALUES**

While waste is increasing in value, we must also consider the negative aspects of waste, predominately how it is hazardous to health and the environment.

**AS WASTE POSES RISKS TO HUMAN HEALTH AND THE ENVIRONMENT GOVERNMENTS HAVE RESPONSIBILITY FOR IT**

In 1998, over two-thirds of human waste was being dumped into the environment with little treatment, posing serious environmental and health risks (Suez Lyonnaise des Eaux 1998 as cited in Medina 2010). Due to these risks, the management of waste has traditionally been the responsibility of governments, especially local-level governments, as it is in the interest of those residing in the area to minimise the risk associated with waste.

**GOVERNMENTS IN DEVELOPING COUNTRIES ARE HOWEVER LIMITED IN THEIR CAPACITY TO MANAGE**

The growing amount of waste generated in Asian cities, however, is putting a strain on local level governments. Generally systems have two parts; firstly collecting and transporting waste from the city and secondly processing and storing it. Expenditure on solid waste management can be as much as 40 per cent of the local-level government’s operating costs (Glawe et al. 2005). Costs for waste management in developed countries are often covered by local taxes, but this does not work in developing countries in Asia that have large informal economies and generally inefficient local-level governments (Medina 2010). To cover the costs, in some areas fee-based door-to-door collection services are operated in the cities, which means that household garbage is often only collected in wealthier neighbourhoods who can afford the fees, while residents of slums have to walk great distances to dispose of their waste themselves at communal dump sites.
Costs for managing waste are increasing too

There are other issues increasing the cost of waste management in Asian cities, such as the increasing price and reducing availability of land and the cost of transport. The combination of increased traffic congestion on roads and petrol prices results in higher costs to transport the garbage from a city’s streets to a landfill or dumpsite. Some local-level governments have had to adapt and apply creative solutions to cope. In Hong Kong, waste is shipped in containers during the night, and similarly in Metro Manila, the Carmona landfill only receives waste between 6pm and 6am to avoid the city’s heavily congested streets (Johannessen and Boyer 1999). As open dumpsites and landfills reach capacity, finding available land in close proximity to the city is becoming increasingly difficult and costly, particularly as the price of land has escalated near and within urban areas (residential land prices in Metro Manila have been increasing at over 6% per annum over the last decade [ColliersInternational 2010]).

There is international pressure on governments to develop best-practice solid waste management systems, but there are considerations regarding methods and technologies

As internationalised methods and ideologies of waste management are expounded as best-practice, local governments are under increasing pressure to not only collect waste but manage it in a way that minimises damage to the environment and minimises risks to the health and safety of local populations. Considered one of the better options for managing the volumes of waste generated within a city is transporting it to a sanitary landfill, which has been engineered to prevent leachates from polluting nearby water sources, minimise rodent contact and spread of disease and properly collect and control the release of methane to produce electricity. An even better model combines sanitary landfilling with the prior separation of all recyclables for trade in the recycling industry, as well as the separation of organic matter for composting to produce fertiliser and generate even more electricity. These systems, however, are costly and difficult to implement. In 2009, Poornima Chikarmane and Lakshmi Narayan found that in the Philippines, only 10 per cent of the open dumps had been replaced by sanitary landfilling because it costs 40 times more than open dumping (Chikarmane and Narayan 2009). While incineration is used as a method in some countries in Asia, such as Singapore, Medina (2010) writes
that it has been a mostly negative experience in developing countries in Asia, mostly because the moisture content of the waste is too high to maintain combustion. Attempts at incinerators in India, Philippines and Indonesia have had unsatisfactory results (Medina 2010). Advocacy groups, such as the Global Alliance for Incinerator Alternatives, also argue that incineration creates new dioxins that did not exist before and these dioxins are known to increase rates of cancer.  

**PRIVATE SECTOR INVOLVEMENT CAN MEAN BETTER SERVICES OR THE SELLING OF WASTE**

In situations where local-level governments are unable to raise the necessary funds to deliver adequate waste management services, the private sector is often approached. Involvement with private companies can come in two modes: government can privatise aspects of the waste management service (collection to dumping) or it can sell exclusive access to the actual waste. In the first mode private sector companies charge user-fees to recover costs of running the service. This has proven effective in areas where individuals, businesses and industry have strong values regarding environmental awareness and cleanliness and are therefore willing and able to pay for proper collection and disposal (Cointreau-Levine 1994). Secondly, as a consequence of the increased value of waste, governments can also sell the rights to the actual waste. In this mode, the focus is on waste as a commodity processed by private companies or community collectives to retrieve whatever fiscal value remains. So the distinction between these two modes of public-private interaction is broadly on one hand a service paid for by fees and on the other, a service paid for by extraction.

**WASTE IS VIEWED BOTH AS A PROBLEM AND A RESOURCE**

These two modes reflect the broad distinction I carry through this paper that of the division between perceptions of waste as problem and waste as resource. Here I now to turn to focus on the social issues surrounding waste as problem,

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3 The Global Alliance for Incinerator Alternatives have a number of publications available on their website which argue against the use of incineration as a method for waste disposal (http://www.no-burn.org/section.php?id=104, last accessed 27 June 2011)
and the particular place of waste pickers in this conundrum. As mentioned above, historically waste in cities has been regarded as a public sector issue, with responsibility placed on governments to protect citizens from the dangers of waste related hazards. Rights to the actual waste, however, constituted a grey area and were often not defined or officially established, primarily because waste was viewed as a problem, rather than a resource. Waste picking emerged when segments of the population, predominately the poor, realised the resource or re-use potential of elements within the waste. As ownership was not defined, waste picking became a livelihood for significantly large populations within local informal economies since the 1970s. Within many of the societies in which these populations exist however, picking objects and things from waste is generally regarded as socially, culturally and personally unacceptable.

**OUR FEELINGS ABOUT WASTE ARE MORE THAN ABOUT HYGIENE AND ARE RELATED TO OUR ATTEMPTS TO ORDER OUR ENVIRONMENT**

When we look at waste pickers climbing over and sorting through mountains of our garbage, it often evokes feelings of unease. The universal manner in which we often regard waste is related not only to social and personal fears concerning our health and hygiene, but also cultural norms about order in society. In 1966 renowned social anthropologist, Mary Douglas, captured how we process waste culturally in her seminal text *Purity and Danger*. In this book, Douglas uses the binary distinction between order and disorder, arguing that waste is a by-product of our attempts to order the environment. Unattended waste, she argued, is ‘essentially disorder’ and ‘matter out of place’ (Douglas 1966:2, 35). Through our desire to create order and stability in our environment, Douglas believes that we condemn disorder through recognising its negative potentiality: “It symbolises both danger and power” (Douglas 1966:94). In this recognition and ordering, our bodily reactions to waste become overstated and in turn, waste becomes symbolically and culturally taboo.
MODERN CITIES HAVE BECOME ORDERED

Taking our understanding of these cultural values further, sociologist and author of the book *A Crisis of Waste? Understanding the Rubbish Society*, Martin O’Brien contends that we try to be rid of waste quickly because we are afraid of what it will reveal to others. In our growing cities, this fear then contributes to the production of an extensive network of individuals and organisations that continually order, define and control waste (O’Brien 1999:263). Gay Hawkins separately points out the rise of modern cities and how ‘modern ways of being’ are commonly linked to notions of order, cleanliness and stability (Hawkins 2007:348). She notes: “The rise of the modern urban imaginary celebrated the tidy city, the clean and regulated city that linked a public aesthetic to political order and civic consciousness. Citizen cultures were neat cultures.” (Hawkins 2007:348) She argues that these ‘new urban identities’ aspire to be in a state of purity from waste and ‘undesirables’ – both of soiled things and soiled people. She observes that due to structural inequalities within the slum areas, lower class slum dwellers of these cities are unable to establish distance from their own waste, denying the ‘most basic sense of dignity and status’. The stigma is even greater for waste pickers.

WE HAVE BEGUN TO TREAT RECYCLABLES DIFFERENTLY

Our current acceptance of recyclables, however, is an indicator of how much our cultural values have changed about waste since the days of Douglas, especially in our consumption driven, ‘modern’ cities. While recyclables are a result of the end of consumption, they don’t always enter the waste stream. This is because they are clean, touchable and even store-able for a period of time. In developed countries in Asia, governments have codified source separation of recyclables as a common good, supported by values-laden promotional campaigns, services and infrastructure. Typically the promotion of recycling is framed in terms of environmental benefits, however, in other parts of Asia such as China, recycling has become valued as an important element of self-sustaining development. In other Asian cities, particularly in developing countries, households separate their recyclables to sell to informal buyers or recycling traders, treating it as a private good, a commodity.
OUR VALUES TOWARDS WASTE ARE CHANGING AS IT MOVES FROM A PROBLEM TO A RESOURCE

Our values concerning pollution and taboos place waste as a problem, while environmental concerns and the rising value of waste are placing it as a resource, waste no longer fits the binary distinction as proposed by Douglas (order versus disorder). Waste pickers are now competing with private sector companies, while still suffering socially from the ill effects of our cultural disaffection with our own waste. Furthermore, this is happening at a time of increasing global awareness of environmental issues such as the detrimental effects of climate change. This is making for an interesting contest over waste as a common good and waste as a commodity. In the next section I outline the players in the waste game.

PLAYERS IN THE WASTE CONTEST

In this section, I outline the various stakeholders that are directly contesting access to and use of waste in developing Asian cities today. Many of the players conduct their activities outside country’s formal sectors, beyond the reach of the state and any obligations this brings i.e. tax. While others such as private waste management companies, operate mostly within formal economies and therefore the protection of the state.

INFORMAL WASTE PLAYERS

THERE IS A LARGE POPULATION OF PEOPLE WHO CREATE A LIVELIHOOD FROM WASTE

The World Bank estimated in 2002 that two per cent of the population living in developing cities throughout the world depend on waste for their livelihood (Medina 2002:9). In Asia, most of these people work within informal economies in developing countries and are often called waste pickers or a colloquial equivalent, neak adjie in Cambodia, or tokai in Bangladesh. While most of the reclaimed objects from waste are sold as recycling, waste pickers also sell things for reuse in the local market or keep things they want to reuse themselves. They search through waste in public areas within the city, dumping sites and landfills and outside households, businesses and industries. These collected
materials are used by industries, often regionally or internationally, to produce new commodities such as automobiles, computers, building material, clothing and other products (Scheinberg and Anschütz 2006:259).

**Waste Picking Is a Diverse Practice**

Their working conditions and practices are both diverse and dynamic: waste pickers fish for waste in flooded rivers in Thailand, ‘Bomb harvesters’ in Vietnam risk life and limb digging for scrap metal left from the war (Medina 1997:7), a group of waste pickers in India use magnets to collect ferrous metal fillings and automobile parts that have fallen onto roads as trucks travel to and from industrial areas (Chikarmane and Narayan 2009). The introduction of garbage trucks in developing countries since the 1970’s has also created a new category of pickers called ‘jumpers’ or ‘divers’, who clamber into moving trucks to sift through the refuse before it reaches the dumpsite or landfill.

**Types of Informal Waste Pickers**

There are different types of waste pickers in Asia and researchers have generally categorised them according to where and how they create value from waste.

**Dump pickers** reclaim ‘free’ objects as the waste is unloaded by garbage trucks on city dumpsites or landfills. The recyclable or reusable material gathered is generally considered contaminated (affected by other materials such as organic waste) and of low quality and these pickers are paid the least according to price per kilogram. Buyers and traders are either located at the foot of the dump or buy from the pickers directly on the dump. Dump pickers typically squat or rent available land next to the dump and build houses using recovered materials. Furedy writes that dumpsites can have very different amounts of recyclable materials. “Indian, Nepalese, Bangladeshi, Pakistani and Chinese dumps, for instance, have minimal quantities of bottles, tins, plastics, rubber and the like compared with what is deposited at dumps in South Korea, the Philippines, Thailand and Malaysia” (Furedy 1990). Communities of dump pickers vary in size and generally pickers work individually or in family units selling to buyers with which they have pre-established relationships. Two research studies have shown that dump pickers respect unspoken rules and conduct themselves in an orderly and disciplined manner, with few displays of aggressive competition (Godden-Bryson 2011; Tever 1993 as cited in Samson 2010).
City pickers retrieve recyclables within waste from garbage bins, government receptacles or communal storage bins, residential or commercial containers, public spaces and in canals and rivers. In Pune, India, about 10,000 pickers walk the city streets picking up valuable litter and many target high-income residential areas, shopping and tourist areas as these are frequented by individuals who discard more valuable forms of waste (Medina 2005). City pickers often start early and walk long distances to and from their homes in outlying slum areas. On the Pasig River in Manila and on the Chao Phraya River in Bangkok, pickers use small boats to retrieve floating bottles and materials gathered on the banks that have been washed there during heavy rains (Medina 2005).

Waste collectors are informal garbage collection services operated by collectives or entrepreneurial individuals. In areas where local-level government waste services are unavailable, waste collectors use carts and tricycles to go from house to house to pick up the general garbage and sort through it to retrieve items they can sell or reuse. Sometimes these individuals are able to extract a fee from the household for the service, in other situations they make a living from the items of value contained within the garbage.

Itinerant buyers are waste pickers that walk the streets, usually with a cart of sorts, and buy recyclables directly from households and businesses. As it is separated at the source, the recyclable material is generally clean and considered of better quality than that found by other waste pickers. Although they buy the material, they are paid slightly more per kilogram or per piece by dealers than material collected from bins or on a dumpsite. In a study in the Philippines, itinerant buyers bought mainly from households (67 per cent) (SWMAP 2008). Domestic workers, who separate the recyclables in the home, gain a small bonus to their salary or the activity becomes a child’s chore and subsequent pocket money. In most cases, itinerant buyers borrow money each day to purchase materials and loan the cart from a trader on the agreement that the itinerant buyer will sell their collection at the end of the day to that same trader, often encompassing a patron-client relationship.

These categories are of course not fixed. In some cases, waste pickers overlap these categories; and itinerant buyers certainly rummage through bins as they buy from households. Even waste pickers have become speciality dealers (Chikarmane and Narayan 2009).
WASTE PICKERS EARN DIFFERENT AMOUNTS

Earnings of waste pickers vary across the different groups and are different between countries. Some studies show waste pickers earnings below unskilled workers in the same city, while others show waste pickers earning above minimum wages. It becomes a viable outlet from formal employment for those with few skills and connections that could lead to work (Medina 1997:5). I found that dump pickers in Phnom Penh earn more than unskilled formal workers in the many garment factories in the city. Medina also discovered that waste pickers on a Beijing dump earned three times the salary of university professors (Medina 2005).

CHARACTERISTICS OF WASTE PICKERS VARY WITHIN ASIA

In some countries, such as India, men outnumber women, while in others, such as Cambodia, both men and women work as waste pickers, itinerant buyers or traders in equal numbers. Most waste pickers in Asia are typically poor migrants from rural areas or begin as children born into waste picking families. Child labour is also problematic in the informal recycling sectors in developing countries. Waste picking occurs in cities with high unemployment levels for unskilled workers and or in countries without social welfare. In some countries in Asia, waste pickers are generally from one ethnic group or caste. The Harijans (Dalits) in India form the largest population of waste pickers and in Muslim countries such as Indonesia and Malaysia, non-Muslims are typical as contact with waste materials (especially faeces and urine) in Islam is considered impure (najes) (Blincow, Medina and Furedy as cited in Medina 2005). However for predominantly Theravada Buddhist countries such as Thailand and Cambodia there are no traditional caste groups or ethnic groups within the waste picking communities.

THERE ARE SIGNIFICANT RISKS TO THEIR HEALTH AND SAFETY

For the most part, the work is labour-intensive and unregulated, and poses significant risk to their health and safety. Dump pickers in particular face exposure to hazardous materials and risk biological and chemical contamination from material such as faeces, used syringes, insecticides and poisons. The always-present rats, flies and dogs are also vectors for spreading disease. At waste dumping sites, fires occur spontaneously due to humid conditions and
the presence of combustible methane gas. This results in high levels of smoke inhalation and occasional burns among pickers (Hunt 1996). Both city and dump pickers suffer from frequent cuts and open wounds caused by sharp objects. With regards to the Philippines, a study found that there were more than 35 diseases within waste picker communities (Adanas cited in Medina 2005). Other studies in Mexico and Egypt have shown a significantly reduced life expectancy and high levels of infant mortality (Castillo, Semb and Meyer as cited in Medina 2005).

**Waste Pickers Do the Work Because of the Benefits It Affords Them**

City and dump pickers are, what I term, self-employed producers. Many pickers enjoy the freedom of not having a boss and being able to choose their working hours, especially those with young children. Due to their limited access to education and training, many find it difficult to secure work in the formal economy and they enjoy the money they can make from picking and the things they can find and use (Godden-Bryson 2011; Medina 2005).

**Formal Waste Sector**

**Recycling Traders Operate Within the Formal and Informal Economies**

Before I describe the formal waste players in Asia, a note about the use of the term. While definitions of the informal and formal economies have come to define not only businesses or enterprises levels of registration and legality, but also consider the working conditions for employees within these organisations. Within the recycling economy, many traders in Asia may be registered as a company, but utilise the services of family members or sub-contract to informal workers (Mueller as cited in Samson 2010). Poornima Chikarmane and Lakshmi Narayan argue that most of the recycling industry is within the informal economy and goes unrecognised compared to the visibility of regional trade in agricultural produce, textiles and timber. Materials which have long been recycled, such as paper, metal and cardboard, however, tend to be processed in more formalised environments, as opposed to plastics and electronic wastes which are newer entrants to the recycling economy and are processed and sorted in unregulated environments (Chikarmane and Narayan 2009). In order to highlight this, I categorised garbage workers and traders as “semi-formal”.
**TYPES OF SEMI-FORMAL AND FORMAL WASTE PLAYERS**

**Garbage workers** are a part of the formal economy earning a wage from the local-level government or private waste management company. However, they also collect recyclables from the garbage as they work. In many Asian countries, garbage workers who ride with trucks and empty household bins into the back separate the materials with value, usually only recyclables, during their shift. As the truck heads into the dumpsite, the collect crew sell the recyclables to a trader and divide the profits as an unofficial bonus to their salary (Godden-Bryson 2011; Medina 2005). In Bangkok, garbage workers were found spending 40 per cent of their work time looking for recyclables as they load bags and empty bins into the trucks (Cointreau-Levine 1994). In Metro Manila, garbage workers allow waste pickers to travel with the truck crews retrieving the recyclables and sharing the profits with the entire crew (Cointreau-Levine 1994).

Secondly, **traders**, which include junkshops, small recycling businesses, dealers, wholesalers and processors, buy materials from waste pickers and each other in a process of refining and consolidation for sale to local industries or for export to regional recycling markets. This segment is both formal and informal, and often symbolically is at the upper tiers in descriptions of the recycling industry in developing countries; for example Poornima Chikarmame and Lakshmi Narayan describe the sector’s structure as a pyramid with the city and dump pickers at the base, itinerant buyers slightly above them and above these the various levels of traders. Other authors describe the sector’s structure using metaphors such as chains or hierarchies. Where there is competition among traders, waste pickers can earn more money, than if traders are scarce or waste pickers are tied to selling to one dealer due to a patron-client relationship. In 1988, Cointreau-Levine said there were about 1,000 licensed junkshops in Bangkok (Cointreau-Levine 1994). Delhi is spatially divided into recycling quadrants. In the west is the main area for metal trading and processing, the northwest is plastics region, in the east are e-waste traders while finally in central Delhi are the older paper traders (Chikarmane and Narayan 2009).

**Private waste companies** are increasingly involved in waste management services within Asian cities as governments privatise. They may be involved in one or more of four components; collection, cleaning of streets and public areas, transport and/or disposal. Governments have different options for involving the private sector, as described by Sandra Cointreau-Levine. Firstly, they can award finite-term contracts to private companies to perform one or more of these services. Secondly, governments can award a concession
whereby the solid waste becomes owned by the private company, whom can extract value in numerous ways (separating, processing recyclables, producing composting, and converting the waste into energy, etc) often to offset and profit from significant investments in technology and infrastructure. Thirdly, they can award a finite-term zonal monopoly, or otherwise called a franchise, whereby the private company profits by collecting user-fees from households that are serviced. Governments often control the fees through regulation and collect a license fee (in addition to taxes) from the private company to cover monitoring costs. Finally, the government can create an open competition for garbage collection, recycling or disposal, freely allowing the private sector to compete for waste, set prices and entice customers (Cointreau-Levine 1994). Many of these awards grant the private company 25-30 year leases. Awarded companies consist of both large multinationals and smaller local companies. Solid waste management in America is highly competitive with more than 10,000 private companies involved in service provision. Sandra Cointreau-Levine argues that it is difficult to measure the level of competition in some countries in Asia, where local companies may register and bid under different names even though they are essentially owned and operated by the same individuals (Cointreau-Levine 1994).

**TYPES OF FORMAL WASTE STAKEHOLDERS**

The risks posed by waste to human health and the environment have traditionally meant that governments took responsibility for managing waste and creating systems that minimised exposure to risk. Throughout the world, including Asia, governments are contracting out aspects of the waste management system to private businesses, both locally and internationally owned. Multilateral agencies have also supported investments in waste management systems in Asia predominately over the last three decades. Those most active within the formal waste economy include:

Waste management departments within local-level governments are most often delegated the responsibility of managing waste in cities and urban areas. In Asian developing countries, these departments are generally under-funded and under-staffed, and have limited technical and authoritative capacity to be able to deliver best-practice waste management systems (Cointreau-Levine 1994).
Central governments generally develop nation-wide policies on the management of waste and action-plans on improving collection services and disposal, although for many countries within Asia, clear policies have yet to be developed, particularly concerning the legality of waste pickers. Malaysia is a good case-study example.

MULTILATERAL LENDING AND DONOR AGENCIES

In the late 1990s, the World Bank and other multilateral donor and lending agencies were actively pursuing investments in solid waste management in Asia and the Pacific, however China and Indonesia accounted for more than 60 per cent of the World Bank projects (Johannessen and Boyer 1999). These agencies also provided capacity building for government staff. Medina found that they encouraged the use of high-cost, high-tech equipment to local-level governments, however, staff found it difficult to maintain or repair them. In the 1990’s in Manila the Japanese Government donated 300 compactor trucks but two years later only 120 of them were still in operation (Medina 2007). Foundations are starting to invest in community-based waste management projects; The Bill & Melinda Gates and Caterpillar Foundations have begun working with waste pickers on large-scale investments in recycling processing machines in Bangalore (Peters 2011).

THE WINNERS AND LOSERS

In this section, I explore how contests over waste have been played out between workers and stakeholders within both formal and informal sectors in developing Asian cities over the last three decades. Across Asia, two opposing trends have emerged; informal waste players are demanding and securing their right to waste, or alternatively governments have contracted waste services to formal companies often to the detriment of existing informal waste players.
COMMUNITY-OWNED AND MANAGED WASTE

Early studies focused on micro-level contests within the informal sector. Informal waste workers have been the focus of academic study since the mid 1970’s. Early studies concentrated on socio-political structures and profiles of waste pickers within informal economic sectors and the contests over waste on a micro level, particularly client-patron relations between pickers and traders.

1980s – STUDIES ON ROLE OF INFORMAL ECONOMY

Moving into the 1980s, researchers interested in solid waste management began to study the role of the informal economy within these systems. Christine Furedy was a significant contributor to this research in Asia. Her earlier papers recognised the role of the informal sector in the effective re-use of solid waste, but noted the severe health and environmental problems associated with their activities (Furedy 1984). Despite the risks, Furedy advocated for a ‘socially responsible view of solid waste management’. She found that in many areas without social welfare, recycling and reusing things was a pattern of self-help in many cities. She argued that governments were ill informed about the breadth of recycling activities completed by the informal sector, mostly due, she argues because waste picking communities did not have a voice. Community organisations and aid groups were more focused on the pickers’ health and wellbeing, and their activities were directed at emergency assistance rather than advocating for their rights as productive workers.

1990s – PROJECTS EXPERIMENT WITH LEGITIMISING WASTE PICKERS

She later wrote about a rising international ‘environmental ethic’. While more developed countries were grappling with issues concerning ecological factors, she argued that waste management in Asian cities also had to consider how waste is “intimately linked with the lives of street dwellers and many other disadvantaged people” (Furedy 1990). In 1992 she was one of the first to

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publish research on the achievements and limitations of community-based waste management projects in Asia; specifically Bangalore, Manila, Madras, Jakarta and Kathmandu. At the time, community groups were experimenting with new approaches to waste management through which waste pickers became “legitimate waste collectors” within waste management systems, and in which social, economic and ecological goals could be relevant (Furedy 1992b). The projects included neighbourhood composting in Jakarta, street waste collection by the poor in Madras, and a community-government partnership in Metro Manila that formalised itinerant buyers by providing them with I.D. cards, equipment and a uniform (Furedy 1993). Although the need for waste collection services was for the poorer areas of the city, these programs often started in more affluent areas, as there was a greater abundance of recycling within the waste. Furedy was hopeful that these experiments could be “translated into practice on a larger-scale” and “form the basis for community action to ameliorate solid waste problems throughout the developing world” (Furedy 1992a). By 1997, Furedy argued that there was a movement or “world-wide philosophy” to minimise waste through the three R’s; reduce, re-use, recycle (Furedy 1997). She wrote: “These values are creating a basis for partnerships that will bring together representatives of government, communities, private firms, scholarly institutes and international agencies to address the crises of increasing refuse in the context of inadequate infrastructure. Effective partnerships are informed by both research and the experience from community-based initiatives” (Furedy 1997).

GROWTH IN NUMBER OF ORGANISATIONS FOCUSED ON COMMUNITY-BASED WASTE MANAGEMENT

Furedy has since retired, but during her academic career she was influential in advocating for waste pickers to be integrated within formal waste management systems in developing Asian cities and she regularly presented at key conferences and international meetings. Since this time there has been a significant growth in the number of organisations advocating and practicing community-based waste management, which not only assists in environmental
126 Recycling Cities

aims, but also encompasses social measures to improve the working conditions for waste pickers.5

1990s & 2000s – Researchers addressed new challenges and put a price on the work completed by informal waste workers

Other recent studies on waste pickers have addressed the impact of technological and regulatory developments within the waste economy (Frykman 2006; Medina 2002). These studies continue Furedy’s advocacy for waste pickers to be engaged as stakeholders within these new technology and increasingly regulated environments. This view is supported by other studies that have explored waste pickers’ vast economic and environmental contributions to Third World cities.6 Martin Medina, an active scholar and advocate of waste pickers throughout the world, reported in 2002 that in “Bangkok, Jakarta, Kanpur, Karachi and Manila, scavenging saves each city at least US$23 million a year in lower imports of raw materials, and reduced need for collection, transport and disposal equipment, personnel and facilities” (Medina 2002:13). In India, he estimates this figure to be much more, with more than 10,000 tonnes of reusable waste collected with a value more than $280 million a year (Kapur 2011). Medina argued that this provides both environmental benefits and economic benefits for local-level governments.

Successful community-based waste management across the world

The most active areas where waste pickers have been contesting their rights to waste are in Latin America and parts of North Africa. Many groups of waste pickers have formed cooperatives, micro-enterprises and created public-private partnerships with local governments to provide low-cost, low-tech waste management services. In Columbia an association of recyclers has petitioned for more than 15 years demanding dignified working conditions (Betancourt 2010).

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5 There is also a growing body of literature that assesses these community-based programs, predominately in Latin America where they are common, but also in India and the Philippines. (see, for example, Chikarmane and Narayan 2005; Dias 2000, 2007; Dias and Alves 2008; Gutberlet 2008; Waste Matters SNDT Women’s University and Chintan Environment Research and Action Group 2008).

In Cairo, the informal waste collectors, known as the Zabbaleen, had been collecting garbage from households for more than a century. The local-level government tried to privatise services in 1987, but was met with fierce resistance from waste pickers. The government modified their plans accommodating and supporting waste picker to formalise into a private company and become part of the system. In Brazil, waste pickers at one landfill were provided with picking belts and at another site given a safe space to work in. In these instances, these collectives paid each other equal amounts at the end of the week, often amount to three times that of the minimum wage (Johannessen and Boyer 1999). One of the Brazilian local-level governments played a key role in the formation of one of the stronger independent waste pickers groups in the region (Dias and Alves as cited in Samson 2010).

**NOT ALL PROJECTS WERE SUCCESSFUL**

Back in the 1980’s, Metro Manila authorities attempted to create a community-based recycling system called Pera Sa Basura (Cash for Trash), whereby eco-aides dressed in green with green carts were organised to collect garbage door-to-door and sell to new eco-centres set-up for the project. As they did not involve existing city pickers in the project, eco-aides competed with informal city pickers and many of the eco-aides started to sell to informal traders who paid higher prices (Chikarmane and Narayan 2009). Since this time, the Lindas Ganda program has re-established the eco-aides program, however allowing more flexibility in who they are able to sell to. Some of the new waste collection cooperatives established by NGOs in India also did not recruit waste pickers to undertake the work but instead involved youth living in slums, also with unsuccessful results (Anagal 2009; Chikarmane and Narayan 2009).

**CURRENT COMMUNITY-BASED WASTE MANAGEMENT IN ASIA**

In some areas of Asia, governments are working in partnerships with waste picking communities to deliver waste management services for residents. A review of literature on community delivered door-to-door waste collection services reveals there are programs in India, Bangladesh, Indonesia, Laos, Cambodia, Philippines and Nepal. In India, where there are an estimated 1.5 million people working in the informal waste economy, there are many such examples (KKPKP 2010; Peters 2011). In the southern city of Chennai, India’s fifth most populous city, NGOs have assisted waste pickers in establishing a formal waste collection service with the local-level government. They have been
given loans for carts and residents pay a fee for the service, while the waste pickers also get to recover recyclables within the garbage (Medina 2005). In Delhi, NGO Chintan, has assisted about 70 men in taking over the waste collection services at one of the railway stations. The men work on 11-20 trains each day and in the station premises collecting recyclables and other wastes that are picked up and taken to the dumpsite. A newspaper report stated that “sources said the men have also been frequently returning lost items, including bags, cellphones, etc, that they find in trains to their rightful owners” (Lalchandani 2010) In Mumbai, a small project has begun whereby women waste pickers supported by an NGO have made an arrangement with the local-level government whereby trucks from vegetable markets are diverted to a composting facility (Anagal 2009).

**CURRENT EFFORTS TO FORMALISE WASTE PICKERS IN ASIA**

There have also been efforts by labour unions to formalise waste pickers within waste management systems in developing countries. This has been evident in the Philippines and in India.

**CASE STUDY – PUNE, INDIA**

**STRONG UNION IN PUNE ADVOCATES FOR RIGHTS AND WELLBEING OF WASTE PICKERS**

Pune is India’s eighth largest city with a well-established manufacturing industry in glass and metal. While waste pickers have very low status within the city, they have received generous support of the state and local governments (Anagel 2009; Chikarmane and Narayan 2009). There is a strong waste pickers union, Kagad Kach Patra Kashtakari Pannchayat (KKPKP), in Pune, with over 6,000 members who are dump and city pickers, itinerant buyers, waste collectors and other informal recyclers. Apart from advocating for better working conditions for waste pickers, the union also responds to everyday issues and challenges. They mediate when issues arise with government officials and health service providers, offer educational incentives to encourage children...

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7 Information about KKPKP can be found on their website at http://www.wastepickerscollective.org/, last accessed 27 June 2011, as well as the work by Anagal (2009).
to attend school, support a credit cooperative, offer emergency relief funds for families, run a small recycling trading business which offers stable prices for members, organise social events and builds alliances with international organisations. They have advocated loudly on the cessation of child labour within the recycling industry by calling on the government to stop children from entering landfills and dumpsites, and request for safety equipment. They have also held mass wedding ceremonies for waste pickers to set an example against child marriage and ostentatious spending on ceremonies and dowry payments (Mira 2001). During an H1N1 outbreak, the union called on local residents to hand out bars of soap to waste pickers so they could wash their hands frequently, thereby reducing their risks (Sawant 2009). In a landmark decision to formally acknowledge and support the contributions of the waste pickers to the city, in 2002, the Pune local-level government was the first and only to pay for health insurance for registered union members.

**A Waste Collection Cooperative Was Formed In 2007**

In 2007, the union helped to start SWaCH Co-op that operates a door-to-door waste collection service for 220,000 homes. The service employs 300 waste pickers and residents in the ward to separate their waste into organic and inorganic matter. The waste pickers collect both types of waste, composting the organic waste, retrieving the recyclables with the remainder sent to the landfill/dumpsite. The mix of waste pickers, local-level government support and community participation makes this small project work successfully. They also operate four recycling trader cooperatives for waste pickers to sell their collections at fair and just prices (Anagal 2009).

**Market-Driven Waste**

*The private sector is involved in waste management systems throughout Asia in a variety of ways and began at different times*

For the many issues raised above, governments have and are increasingly franchising door-to-door garbage collection to either local or multinational companies, leasing equipment and operators to work on landfills and dumpsites or granting concessions to build-operate-transfer projects that use waste-to-energy technology and/or concessions to mine for valuables within the waste. Competition is fiercest among recycling companies that vie to extract value and profits from waste generated in growing cities. Within the literature on solid
waste management systems in Asia, it seems that developed countries in Asia, such as Japan, Hong Kong, South Korea and Singapore began involving the private sector within solid waste management systems in cities earlier than in developing countries. Most developing cities in Asia, however, now involve private firms in one or more aspects of the waste management system. Waste management is now mostly privatised in Malaysia and has been centralised within the national government. This reflects recognition of waste as resource.

**CIVIL ENGINEERS IN MULTILATERAL AGENCIES WERE INFLUENTIAL IN ADVOCATING FOR PRIVATE SECTOR INVOLVEMENT**

Just as Furedy was influential in highlighting the role of the informal economy within waste management systems, her counterpart was an American civil engineer, Sandra Cointreau-Levine, who worked within the US Government and World Bank on waste related projects in a career that spanned four decades. She worked in over 50 developing countries throughout the world assessing solid waste management systems for the applicability of private sector involvement and investment projects. She was a cautious advocate of privatisation, documenting many of the successful projects in Asia.

**WHEN PRIVATE SECTOR INVOLVEMENT BEGAN IN DEVELOPING COUNTRIES IN THE 1980S AND 1990S THEY PROVED EFFICIENT AND COST EFFECTIVE**

In 1980s and 1990s developing cities in Asia began involving private companies within solid waste management services or commercialising government departments into a semi-private entities, such as in Bandung and Medan in Indonesia and Ho Chi Minh City in Vietnam. Cointreau-Levine and other scholars' assessments showed an improvement in efficiency in collection services. In 1987 Bangkok contracted solid waste management service in three districts and found the costs were less per tonne of waste collected and residents were satisfied with the level of service (Cointreau-Levine 1994). In Kuala Lumpur, in the 1990s Cointreau-Levine found that private firms were more efficient that public services, as private trucks could collect 8.5 tonnes per vehicle, whereas the public services only collected 5.7 tonnes (Cointreau-Levine 1994). Arnold van de Klundert also found that these services were more cost effective, with a 23 per cent savings after tax (Klundert 1995). Governments not only involve the private sector in door-to-door collection services. In Medan, Indonesia, (1989) the government awarded two franchises to firms to mine
Compost from the dumpsite, sharing their profits with the local-level government (Cointreau-Levine 1994).

**Other studies show low service and unintended negative outcomes for workers and working-class women**

More recent studies of privatisation highlight shortcomings of services within developing countries. In a report conducted in Phnom Penh after the city’s waste collection service was franchised, the researchers found that overall performance was “still low” and littering remained “very high” (Kum et al. 2004). In South Africa, Samson (2003) found that the quality of waste collection services dropped when local local-level governments privatised collection services. Workers were paid less and worked harder and there was a difference in the level of service between wealthy and working-class areas. Samson found that due to the gender division of labour in the home, black working-class women in turn needed to perform extra housework due to the bad service (Samson 2003). In Delhi, private company waste workers are also upset that they have not been given contracts, I.D. cards, nor safety equipment (Langer 2011).

**Privatisation is having a negative effect on waste pickers**

Research demonstrates that privatisation often leads to modernisation of waste management systems and both hindering the work of those within the informal waste economies in Asia. Scheinberg and Anschütz point out that in many cases their conditions are deteriorating (Scheinberg and Anschütz 2006:257). As Poornima Chikarmane and Lakshmi Narayan write about cities in India, Philippines and Thailand, garbage workers have “displaced waste pickers or relegated them to dumpsite collection. Squabbles between the waste pickers and the collection crew are also fairly common” (Chikarmane and Narayan 2009).

**Governments face pressure to regulate, ban or criminalise waste picking**

Increased involvement by private sector and multilateral agencies has increased pressure on governments to create policies and regulations regarding waste. Those on the side of waste pickers believe regulation is an excuse for states to criminalise waste picking. Lending agencies, such as the World Bank and ADB,
often recommend waste picking be banned at landfills and dumpsites (Chikarmane and Narayan 2009; Johannessen and Boyer 1999; Medina 2010). Medina notes that the waste management policies affecting waste picking are commonly a form of repression; waste picking is viewed as “inhuman, a symbol of backwardness, or a source of embarrassment and shame for the city or country” (Medina 1997). In the United Arab Emirates, South and East Asian labourers are being targeted by an “anti-scavenger taskforce” in an effort to stop bin divers. The taskforce has erected signs in six different languages to place on bins and affluent residents have been called upon to report incidences of waste picking to the taskforce (Meehan 2011).

**ALTERNATIVELY GOVERNMENTS NEGLECT AND IGNORE WASTE PICKERS**

Alternatively governments simply neglect and ignore waste pickers neither providing support nor prosecution. Sicular questioned the motives of governments that have historically exploited the work of waste pickers, benefiting from their activities but offering little social support or equipment to reduce health risks.

**OWNERSHIP OF WASTE BECOMES CONTESTED**

Waste picker advocacy groups believe that governments are increasingly involved in limiting access to what was once common property, often under the guise of managing waste and beautifying the city. This is having a significant impact on waste pickers throughout Asia. In Delhi, residents used to be able to drop their waste into containers owned by the government. Where previously waste pickers had free access to collect recycling from within these containers, after the government awarded contracts to companies, in many instances the waste pickers now pay for access to these bins to the private company (Chikarmane and Narayan 2009). Ownership of waste becomes contested and street pickers collecting from bins are viewed as bordering on criminal activity by city authorities and residents (Furedy 1990). In other situations of privatisation, formal ownership of waste matter is “sold” to private companies who in turn gain privileged access to this resource (O’Brien 1999).
CASE STUDY – PHNOM PENH, CAMBODIA

NEW LANDFILL IN PHNOM PENH WAS BUILT TO REPLACE AN OPEN DUMPSITE IN THE CAPITAL

Local-level government self-funded an upgrade from an open dumpsite to a landfill. In recent years Cambodia’s waste management systems have undergone modernisation processes funded by international donors and local revenues. This is particularly so in Phnom Penh. Up until mid-2009, waste was transported to an open dumpsite located in the urban area of Stung Meanchey. The open dumpsite had been in operation for almost 40 years and consisted of three large hills of accumulated waste. The dumpsite had reached capacity in 2000 and the Japanese government’s aid agency, JICA, offered to support the development of a new facility. After JICA conducted a lengthy study of waste generation and appropriate technology for the capital, the agency withdrew their support when the local-level government was unable or unwilling to renegotiate its pre-existing franchise with a local waste collection firm. The local-level government engineered a new landfill predominately from the sale of the earth excavated at the new site, 10 kilometres away from Stung Meanchey, which opened in 2009.

WASTE PICKERS AT THE OLD DUMP WERE REGULARLY SEEN AS REPRESENTATIONS OF POVERTY

There was a large community of waste pickers, about 500 in total, who had collected on the Stung Meanchey open dumpsite for more than two decades. They were regularly in the news media as symbols of the country’s poverty and used to encapsulate the woes of the developing world. In a New York Times article, the lead sentence described the Stung Meanchey dump as one of the saddest sights in the city and an aid worker is quoted saying, “this is the closest thing to hell on earth I’ve ever seen” (Barboza 2003). Even US Senator John McCain’s wife visited the Stung Meanchey dump. An NGO worker said, “She even hugged some of them regardless of their dirty clothes” (Associated Press 2008). Tourists and development volunteers visited the dumpsite every day, many of whom handed out money or returned with gifts of food, clothing and

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8 Research completed in 2008-2009 for my PhD thesis with the Australian National University.
Others found avenues to support the many aid-groups that had been set-up, mostly by foreigners, to provide emergency aid and education programs for children. This was despite my own study discovering that they often earned more that of those working in the unskilled formal employment sector in the city.  

**WASTE PICKERS GIVEN UNOFFICIAL ACCESS TO NEW LANDFILL BUT RESTRICTED TO TRADE TO A MONOPOLY**  

Prior to the opening of the new landfill and the closure of the Stung Meanchey dumpsite, government officials repeatedly said they would not allow waste pickers onto the new landfill, further adding that they planned to build a fence around the site. On the first day that the garbage trucks began to be diverted to the new landfill, roughly 20 waste pickers courageously made their way to the landfill and began collecting. There was no fence and no security there to tell them not to collect. By the second day there were more than 80 waste pickers. Within the first week, the site had a guard, whose role was to stop tourists, visitors and NGO workers from entering the site. The waste pickers were allowed entry by the guard, but were forced to sell the objects they retrieved to one trader. This trader paid lower prices than what they had made previously. Unofficially, local-level government workers had created a monopoly on the site, and were gaining financially from the deal with the trader at the expense and exploitation of the waste pickers. They did not provide any support or safety equipment to the waste pickers. The local-level government benefits from the dump pickers work as they reduce the amount of waste thereby increasing the life of the landfill. One of the landfills in Bangkok underwent a similar process of modernisation and privatisation, ‘officially’ denying access to waste pickers. Soon afterwards, the company ‘allowed them to continue picking under the condition that they sell only to that company – at even lower prices’ (Scheinberg and Anschütz 2006:264). In Delhi, a private company came to one of the dumpsites and allegedly told the waste pickers that they had been given the contract to mine recycling and if the waste pickers wanted access, they needed to pay them money (Langer 2011).
WASTE PICKERS BECAME INVISIBLE

More than a year later, previous traders from Stung Meancheay have set up their businesses close to the new landfill, but now the waste pickers need to carry their heavy loads longer distances to get fairer prices. Although the waste pickers in Phnom Penh circumvented the monopoly set-up by the local-level government workers, the government has, nevertheless, been affective in pushing the dump pickers out of the media and development industry’s imaginary, affectingly de-voicing them. Although aid-groups have continued their support to families, there have not been the community protests or organisations advocating their rights as seen in parts of India and the Philippines.

CONCLUSION: A NEW GLOBAL ARENA

THE CONTEST IS MOVING FROM LOCAL TO GLOBAL ARENAS

While waste pickers in countries like Cambodia and Thailand are being pushed into the shadows, waste pickers in India and the Philippines are firmly moving into the national and international spotlight. Where in the past, waste was contested predominately in the local domain, within local-level governments and cities, these contests are now being fought in global arenas relating to global events.

GLOBAL EVENTS RAISE THE VISIBILITY OF WASTE PICKERS

Recently, there have been a number of international conferences and recognition events for waste pickers. Asian waste pickers have met with their counterparts in Latin America and Africa to share ideas and voice their concerns. The First World Conference of Waste Pickers was held in Bogota, Colombia in March 2008, the first day of the conference being held on the National Day of the Waste Picker in Colombia, the 1st March. A waste picker from Columbia was quoted as saying, “We waste pickers will keep our hands in the garbage bag that provides our livelihood, but our head outside of the bag, to fight for the public policies that we need to improve our situation” (Bonner 2008). A small group who call themselves the Global Alliance of Waste Pickers and other allies attended the Second Franco-Brazilian “Waste and Citizenship
Week” in May 2011 and in the same month, waste pickers in South Africa won a UN award for social and environmental entrepreneurship. There are video documentary competitions to raise their profile, such as the one run by the Waste Pickers and Recyclers Project, offering cash prizes to both the filmmaker and featured waste picker in either Hong Kong or Bogota.9

**INDIA HAS LED THE RECENT FIGHT FOR RECOGNITION FOR WASTE PICKERS IN ASIA**

In India, city based waste picker cooperatives, organisations and unions have formed the Alliance of Indian Wastepickers (AIW), a national network representing 35 bodies in 22 cities. The alliance focuses on advocacy, peer support and sharing of information and experiences (KKPKP 2010). Alliance efforts have affected positive changes to policies and government action plans affecting waste pickers. The National Environment Policy 2006 calls on local-level governments to give legal recognition to and strengthen informal recycling by enhancing access to finance and technology (KKPKP 2010). A mass rally held simultaneously in 16 cities across India was held on 10 March 2010, calling themselves the ‘invisible environmentalists’ (Sawant 2010). Their first demand was for local-level governments to issue waste pickers with photo ID cards which authorises the picker to collect and sell waste. There is a need for urban planning to provision for recycling and composting spaces in every neighbourhood. More funding was needed for cooperatives to purchase capital and infrastructure. All registered waste pickers be eligible for health benefits (KKPKP 2010). The first national conference for waste pickers was held at the same time attended by 500 waste pickers from 22 cities, organised by the Alliance of Indian Waste Pickers (AIW). “The Ministry has issued a directive to all Chief Secretaries urging them to ensure that Urban Local Bodies (ULBs) integrate the informal sector in Solid Waste Management” (TheTimesofIndia 2011) An outcome of the rally and conference was the Bopha, Minister for Urban Administration promised to register waste pickers as local-level government workers (KKPKP 2010). While the State government of Pune has called for local-level governments within its boundary to give priority to waste picker cooperatives to perform this work, however, that the nation-wide Municipal Solid Waste rules were working counter-productive to the State

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9 Information about the competition was found at the website http://www.wastepickerproject.com/, last accessed 27 June 2011.
government in Maharashtra where Pune is located. Municipal Solid Waste Rules 2000 oblige local-level governments to move from collection of waste at common sites such as containers and bins to door-to-door collection with an emphasis on “improved appearances rather than job protection, improved recycling, or diverting waste from landfills.” Instead, these rules are encouraging privatisation (Anagal 2009). However, more recently, the national government have passed “Plastic Waste Management and Handling Rules 2011” is a ray of hope of integrating waste pickers into waste management (Venugopal 2011).

NEW WASTE COMMISSION IN PHILIPPINES ACKNOWLEDGES ROLE OF WASTE PICKERS ONE DECADE AFTER THE TRAGEDY AT PAYATAS DUMPSITE

In July 2000, nearly 300 people in Manila lost their lives at Payatas dumpsite when a mountain of waste fell on a slum community located at the foot of the mountain of debris. The tragedy received international media exposure and highlighted the dangerous working conditions of dump pickers throughout the world. Since that time, the local-level government has transitioned the site into a controlled landfill, with environment protection measure and a methane power plant that produces electricity for the local community. On the government’s webpage it boasts of its achievements; “From scene of tragedy and shame to become a showcase of best practice recognised not only locally but internationally.” Now waste pickers are divided into groups and given safe areas to work within.  

But for some waste pickers, government attempts to resettle them back to their home provinces has proved unsuccessful with many returning back to work on one of the city’s landfills or dumpsites. In 2010, a National Solid Waste Commission reiterated its push for formally recognising the informal waste pickers, buyers and traders as key partners in achieving environmental targets (PIWS.Net 2010). Recycling traders, or junkshops as they are called in the Philippines, are also beginning to become more organised, with local government partnership, acquiring loans to build new recycling recovery centres and training for community members to form a new association. The Philippine Informal Waste Sector Network (PIWSNet) also supports waste pickers.

Community-based waste picker projects have also begun catching the attention of international foundations. In Bangalore, a large processing facility is being built to process 1.5 tonnes of plastic per day (Peters 2011).

Despite the progresses made by the waste pickers, international sporting events have the effect of pushing waste pickers into the shadows. The most recent was the Commonwealth games in Delhi in 2010. In the move towards a ‘Clean Delhi, Green Delhi’, prior to the Games, the local-level government launched an urban renewal policy in 2005 titled the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Within the urban renewal policy, 80 per cent of Delhi’s waste system was to be privatised. At present five corporations are currently subcontracted by the government through public-private partnerships. Waste picker advocates argue that these companies are monopolising garbage, displacing waste pickers often forcefully through threats and outright violence. Another part of the Commonwealth Games preparations included shutting down many small recycling traders (Chintan 2009).

There have been more than 30 waste-to-energy projects in India in the past few years. In the past, these projects in India were considered unviable as the garbage was too wet and did not contain enough plastic and paper due to the activities of the informal recycling economy. However waste-to-energy plants are becoming more lucrative as they have been recognised to reduce carbon entering the atmosphere in two ways; firstly as a cleaner substitute of electricity otherwise generated from fossil fuels and secondly burning waste reduces methane released from a landfill. Methane is 24 times more potent a greenhouse gas than CO₂, and burning rubbish does not release CO₂ instead. As a result, the reduction in greenhouses gases has enabled waste-to-energy projects to be considered under Kyoto’s Clean Development Mechanism. One of the companies in Delhi, the Jindal Group, will process 1950 tonnes of waste a
day, by segregating it, drying it and finally burning it to produce electricity. Profits from the sale of electricity and carbon credits under Kyoto's Clean Development Mechanism are expected to cover the costs of investment within the first three years (Langer 2011; Wysham 2008). Sandra Cointreau-Levine states that facilities require a degree of sophistication to qualify for carbon funds and these are typically operated by private firms (Cointreau-Levine 1994). Waste-to-energy plants are meeting resistance from waste picking groups and anti-incineration advocates. They consistently warned about the health and environmental risks associated with burning waste. They argue that these projects reduce the incentive to segregate recyclables and displace waste pickers in the city. This latter point proved true when in April 2011, in Chennai, a wall was being built around the city's biggest dumpsite to keep out the 3000 waste pickers who forage there. It was the first step after the city awarded a 20 year contract to a private company to build a processing plant to create compost and refuse derived fuel (Hemalatha 2011).

WASTE PICKERS ARE CHALLENGING ASSUMPTIONS ABOUT CLEAN AND DIRTY, ORDERED AND DISORDERED, GOOD AND BAD

Indian based environmental research and action group, Chintan, engaged scientists and researchers to assess the levels of methane savings as a result of the work of waste pickers. A report recently released by Chintan found that Delhi’s waste pickers reduce greenhouse gas emissions by an estimated 962,133 tonnes of carbon dioxide each year, over three times more than waste projects gaining and selling carbon credits in the city. As it is India already has above higher gas emissions from waste and these waste-to-energy projects will increase these levels (Report cited in Khullar 2010). In 2009, waste pickers made presentations at both the Copenhagen United Nations Climate Change Conference and the Bonn (Germany) Climate Change Talks (Birajdar 2009; Jadhav 2009). Members of the Union in Pune, KKPKP made several demands; firstly to recognise the contribution of the informal recycling sector and its contribution to climate change, include recycling recovery programs within a global climate fund that is accessible to waste pickers, and finally halt the inclusion of waste technologies that produce more methane and displace livelihoods (Birajdar 2009). It is a difficult battle to be won, because it is not only about climate emissions, but also links to notions of order within waste technology, against the perceived disorder of the waste pickers.
CONCLUSION

In her review of literature on waste pickers in Africa, Melanie Samson wrote “the key to reclaimers (waste pickers) being engaged as legitimate stakeholders within waste management and municipal policy processes will be reclaimers developing their own collective identities and mobilising to demand that they be recognised within the public sphere” (Samson 2010). Her position regarding the need for waste pickers to become organised and visible resonates with the struggles of waste pickers in Asia.

Samson’s use of the term ‘reclaimers’ reflects the changing nature of the narrative that describes the recent history of waste. Once the work of lower castes and society’s disadvantaged has become business for private corporations, community collectives and informal sector workers all intently focussed on reclaiming fiscal value from remnants of our consumption driven cities. Unfortunately for those in the informal sector without the means to collectivise to protect access to the waste stream, as it is now termed, they are increasingly likely to remain disadvantaged in the face of competition from well-funded private companies protected by government. However, as I have seen in Phnom Penh, where the waste pickers appeared infinitely resourceful, adaption to change occurs and every modification in the environment is generally met with a reconfiguration in their practice. This is a fascinating area of policy study in Asia.
REFERENCES


Harvey Neo: I will invite the discussants to give their comments. First is Dr Bikram from Banaras Hindu University. Bikram’s main research is on the political ecology of tuberculosis but he has also researched extensively on solid waste management in Delhi and so, Bikram please.

Bikramaditya Kumar Choudhary: Thank you Harvey. Let me begin by congratulating Ms Cindy Godden for taking the challenge to try to work from a micro scale to a macro scale on the theme of waste picking and making certain valuable generalisations. It is indeed a challenging task to generalise waste picking activity across time and space and different cultural and economic locations. There are similarities and differences in solid waste management practices and also amongst the waste-pickers but it is not too simple to conceptualise these similarities and differences about waste pickers from different cities across Asia. Cindy Godden has not only done that, she has also tried to generalise the process of waste collection, status of local governments, the role of privatisation, shrinking and also expanding spaces of waste pickers in different regions, going through multiple factors ranging from profit-making by corporations and interventions by NGOs in the process of waste collection, waste recycling and also in bringing to the forefront the precarious living condition of waste-pickers. NGOs like Vatavaran, Naya Severa, Chintan and so on are working with waste-pickers along with the existing community organisations of waste pickers. Through the detailed field-work of garbage combers at the dumpsite in the capital city of Cambodia, she highlighted the contestations and conceptions of waste pickers, order and disorder, contestations in the ownership rights of garbage, and the outcome of each of them.

However, I would like to offer my own observations for Cindy to consider these as a possibility to integrate in her own work, or simply as a parallel discourse to understand and analyse the process of waste picking. Most discourses link waste picking to two simultaneous and continuous processes that are demographic and economic: the growth in urban populations across cities of the third world and the growing consumption owing to rising income of
Recycling Cities

urban population. This, along with the process of changing consumer behaviour toward disposable consumer durables and other commodities, technological changes that make recycling more effective and so on have made waste picking more a matter of economic analysis rather than a pure sociological discourse. Cindy has focused on these issues in detail, along with the several other issues, that we have heard just now. Most important in the presentation has been that she brought in the third dimension about the existence of the waste-pickers i.e. value(s) of the waste. Across the world, the example of each of the stated phenomena is sometimes found all in one place, but more often, particular examples can be seen in one city and others in different parts of the city of a different country. Cindy has been brilliant in collecting these examples from Brazil to Belgium, from the Caribbean to Cambodia. Nevertheless, I find these are not comparable more often, as they emerge in different socioeconomic settings and varying economic regimes. Apart from these, the multiplicity of local level governments and formation of community-level networks, and the union/association of actors are also the outcomes of fairly divergent realities and might be hard to compare. I believe scholars, including Cindy herself working in this field where official records are scattered and often unavailable are aware of this limitation in generalisation and the dangers associated with it.

Let me raise certain conceptual and theoretical points for your consideration. In the contemporary society of eco-humans, it has become fascinating to analyse sociological and socioeconomic processes in demand and supply framework. With regard to waste picking, two sets of demand-supply relationships could be formulated that indicate the existence and persistence of garbage combers across different cities of the third world. The first is the garbage generation, collection and management, and the second is employment generation and labour management. In the first set of demand-supply framework owing to increasing consumption level and change in commodity characteristics, more waste is being generated than municipal bodies are able to collect, sort and dispose in Asian cities, therefore giving rise to informal activities of waste picking. If this is the case, then it is easy to argue that it is primarily the inefficiency of local governments that has given rise to a less than rosy picture of urbanisation across Asian cities. It is in this context that suggestions like incorporation or private sector, automated sorting and so on are argued for. Cindy has brought up these issues and has also analysed the contestations that are emerging due to privatisation. One such example, I would like to cite, though it occurs in a different context, is the example of solid waste management in Varanasi, where the municipality was as inefficient as Cindy has demonstrated in most of the cities, and that solid waste management
was poorly addressed. Consequently, under Public-Private Partnership (PPP), the rights to garbage have been awarded to a firm, known as ‘A to Z’. However, the problem started when the firm was given a land of sixty acres in the outskirts of the city and villagers begin to protest more vehemently, particularly in the aftermath of reports of similar cases in other parts of Uttar Pradesh in the national media. Yesterday, a Singapore newspaper also published news about land acquisition in India. This leads us to the fundamental debate on the model of development and the fierce divisions of academicians into Left and Liberal.

Coming to the second set of demand-supply issues, the situation needs to be analysed differently. Despite the growing economy, the availability of employment opportunities is decreasing in the real sense. Most of the economies, including developed ones, are struggling to bring down the level of unemployment. In developing economies, unemployment is not alarmingly high, but they are subject to rampant disguised unemployment. Explanations for such a scenario range from Malthusian to Neo-Malthusian, Marxist to political ecologist. Waste picking becomes a supply-side activity in this sense i.e. from a labour perspective, poor people have to do something for survival and it is interesting to note that in certain cases the income from waste collection has been estimated to be higher than industrial wages. Cindy has expressed a similar view from her experiences from the landfill site. In a personal interview conducted a decade ago, the overt response to the question “why here” has been uniform across all age groups, all castes, which is that nobody is here by choice, instead it is a compulsion. No one was there to make the city clean or save the world from methane pollution, which contradicts the argument of most NGOs that portray waste pickers as a significant contributor in keeping the city clean. Keeping the city clean and reducing the burden on the municipality is just a by-product of the community’s attempt to survive. It would be very interesting to find the correlation between the numbers of new entrants in the waste picking activity after the introduction of different employment guarantee schemes in various parts of the world, such as the National Rural Employment Guarantee Scheme in India.

Finally, waste picking is primarily an outcome of marginalisation of certain sections of society in the contemporary economic regime which can be better explained by push-pull factors. It should be looked at as an outcome of the push factor from the labour market rather than the pull factor of municipal inability. This in no way undermines the findings of Cindy Godden about the value of waste from the dumpsite, though it needs to be kept in mind the weaker negotiation capability of waste-pickers in the trading of recyclable commodities. The high prices and the preciousness of waste material hardly contribute to the
material betterment of waste pickers. It is thus important that we still retain the central conception of marginalisation and vulnerability into the analysis of social groups like waste-pickers. Marginalisation is a process operating not only in the economic sphere but also in the social and cultural sphere across societies and times and waste pickers are one such group faced with different kinds of marginalisation even within the recycling industry despite having some brighter spots of their assertion, as Cindy has pointed out, from different cities. Simple cost-benefit analysis of the waste material, the amount of waste collected daily, a comparison of price with the market and then the income of the garbage combers serve to explicitly reflect the extent of the group’s marginalisation within the recycling sector (Choudhary 2003).

The issue of vulnerability is clearer but needs further analysis. The waste pickers in general are vulnerable to ill health because they’re working with material that carry and spread disease. Within the waste pickers, specific attention should be paid to women and children when discussing vulnerability. They’re not only vulnerable to vectors and bacteria but they’re also vulnerable to various kinds of abuses, including sexual and drug abuses by the individuals and they are also subject to institutional vulnerability. For example, when any crime is reported, waste pickers are the first to be suspected. The waste pickers and itinerant buyers should be dealt with separately because itinerant buyers deal with the clean disposable artefact, and arguably have greater self-respect, compared to the waste picker, as they depend on disposed waste. The waste-pickers just have a slightly higher self-respect, above that of beggars. Then the formal sector and informal association of the formal party in waste should also be dealt separately and it would good to look at how relocation of dumpsites affect waste-pickers in a greater detail. Lastly, once again, I thank Cindy Godden for her paper and hope some of these comments would be helpful. Thank you all for your attention.
DISCUSSANT NOTES

Tim Bunnell

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Tim Bunnell: I certainly am not in the position to replicate the kinds of comparative insights that Bikram [Bikramaditya Choudhary] has very nicely drawn out in his comments. Instead, what I thought I’d do is just try to pick out some points from my reading of Cindy’s paper. It contains clear, rich insights from extended periods of ethnographic research which I really value. I appreciate the fact that you have invested in the language skills to be able to participate in the kind of social networks and practices that you foregrounded and of course, the photographs were wonderful. I have four sets of comments.

The first has to do with questions around some of the social practices associated with the people concerned. Issues of age and child labour have come up, not just in your presentation but some of the presentations yesterday as well. There’s been passing reference made to gender issues but very little explicit consideration of them. And I wondered, in particular, whether there are social hierarchies amongst the kinds of people that you’re talking about, whether that be on the basis of gender or something else. On a related note, I’m interested to hear the extent to which there is, or has been, internal conflict amongst the people concerned. I understand why you want to emphasise that this [waste picking] is often being done in very ‘disciplined’ ways. However, I’m sure there must also be cases where there have been contests or conflicts, not merely between the waste pickers and municipal authorities or the private sector people, but amongst the waste pickers themselves. I think it’s important not to ignore those to the extent that they do exist. Another point which is part of this set of concerns about social practices has to do with what we might think of as the rhythm of the city. Cities have rhythms, we know, around working times, schooling schedules (as we heard from Gay Hawkins yesterday), traffic flows and I wonder if you can give some sense of how the activities of the people concerned relate to and constitute some of the ongoing rhythms in the city. We talk about ‘the city’ but of course, cities vary a lot from one time of the
day to another, in terms of what’s actually going on in them, temporal as well as spatial variation. I would really like to hear more about what you mentioned with regards to spirits. We were talking about more-than-human yesterday right, and this [the role of spirits] is another dimension of the more-than-human characteristic of some of these processes. Relatedly, you didn’t make mention of animals. I wonder whether there are certain kinds of pests or animals that also inhabit these (dump site) spaces. What kinds of ecological considerations are there? You mentioned issues related to the difficulty of combustion in tropical environmental contexts and that’s another more-than-human factor. So that’s the first set of comments.

The second set of comments has to do with issues of social organisation. You talked about examples of organisation internationally, but to what extent have the groups that you dealt with in Cambodia also been organised in various way? Have they been organised, or have they organised themselves? You mentioned the role of international agencies, noting that the site is often being overwhelmed by NGOs and donor involvement. I think it’s important to differentiate between different types of NGO activity as well, rather than sort of lumping them together as one undifferentiated whole. I think there’s a lot of variation in terms of their approaches and desirability or social progressiveness in terms of what each of these is about. I was very interested in the issue of international alliances. Again, I would like to hear a little about the extent to which, or ways in which, Cambodian waste pickers have been enrolled in these transnational networks, counter-globalisation networks, if you like. And I wonder if there are any models of – I hesitate to use the term – good practice which are circulating in the context of Cambodia, either on the basis of things that have happened Cambodia itself, or through the travel of ideas from other international locations through various academic or NGO networks?

The third set of issues has to do with the distinction between formal and informal. Of course, I appreciate that you know that this dichotomy has been widely criticized, but to what extent do you think it’s still useful in a refined form? I know in the written version of the paper you considered the ‘semi-formal’ nature of some of the waste networks that you refer to. In other articles that I read in trying to get up to speed to make these comments today, I noted that other people had also used terms like formal/informal networks. This raises the question of the extent to which we should even continue to use these terms. To what extent do you think socially progressive outcomes are bound up with moves to greater formalisation, as we conventionally understand that? Conversely, to what extent is it a case of seeking to harness the capacities and resourcefulness of existing informal networks? There’s a common lamentation
in the West, I think, that just at the moment when global environmental consciousness was taking off, many of the long-established informal recycling practices were being phased out and Western countries therefore often struggle to meet the targets that they have for recycling and perhaps even to reach the levels that they were at several decades ago because of the absence of these informal networks. So, what do you think is the way forward, if you like, especially for a place like Cambodia to avoid replicating the mistakes of the West?

The fourth point takes me back to issues of models and international standards and benchmarks. I thought I’d just reflect a little bit on where we are at the moment. Singapore is a city-state which very much prides itself on its achievements in urban planning and even seeks to export its expertise in various ways. The Lee Kuan Yew School of Public Policy, which I’m sure you know about, is one of the vehicles for this. I imagine that policy makers, city authorities in somewhere like Phnom Penh would be very much seduced by Singapore’s ‘clean and green’ model, seeing it as something that they wish to replicate. And I guess, conversely, they’re likely to be correspondingly ashamed of internationally broadcast images of the kind that you talked about -- people living off dumpsites. However, to what extent is a place like Singapore a legitimate model? It seems to be widely accepted that what’s transpired in many Western contexts is not necessarily applicable to much of Asia, but I think it’s also important to acknowledge that Asia itself as a region is highly diverse. We shouldn’t see Asia in opposition to the West, and obviously the differences between somewhere like Singapore and Phnom Penh don’t even need to be elaborated. To what extent might we, in fact, even reverse conventional imaginings of what constitutes progress? Are there lessons from Cambodia or some of the other sites you mentioned which could form the basis for learning in societies or contexts that we conventionally consider to be more socially ‘advanced’? What can Singapore learn, possibly, from some of these issues that you dealt with? One possibility that I thought of has to do with something that Tim Winter mentioned yesterday and also which Harvey Neo has in fact written about recently. That has to do with the karung guni man, the rag and bone man in the context of Singapore. These are important informal resources, if you like, but they’ve never been addressed as such in the Singapore context. They’ve generally been seen as impeding technocratic, state-centred efforts to implement waste disposal practices. And so it would be interesting to see whether Singapore could, in turn, learn something from ways of harnessing or making use of what we might again, perhaps in scare marks, call ‘informal sector practices’. Thank you.
The session began with Cindy Godden responding to points raised by the discussants. Ms Godden agreed with the need to examine the demographic and economic processes underlying why waste pickers work in many cities in Asia. She acknowledged that it was ambitious to offer a comparative study and that her aim was to draw examples from Asia rather to explain how things are being done differently in Asia. In terms of her own research in Phnom Penh with the waste pickers, Ms Godden was intrigued as to why people worked as waste pickers, which led her to question the material value of waste for different people in her own ethnographic research. She agreed that more attention should be paid to women and children in research on waste pickers, especially when discussing vulnerability issues.

Ms Godden addressed the hierarchy of waste pickers versus itinerant buyers and city pickers in her responses. She acknowledged that while researchers tend to view dump pickers as being at the bottom of this hierarchy, they were also the biggest community at the dumpsite where she conducted her research and didn’t feel that they themselves constitute the lowest rung of society. They felt that the dumpsite was a safe environment and some of them who tried to collect in the city said that they didn’t like it because they faced discrimination and harassment. By contrast, at the dumpsite they were surrounded by fellow waste pickers and government workers who drove the bulldozers and the private company employees of the garbage collection firm with whom they enjoyed friendly relations.

On the issue of demographics, Ms Godden found that the average length of employment at the dumpsite (according to waste pickers who worked there) was an average of six years, but for some longer than twenty years. There were almost equal numbers of men and women and Ms Godden conducted daily counts of the number of waste pickers who were working, including men versus women and children. Generally one-fifth of the population comprised children, and only a handful of children were working full-time while the others worked part-time after school. In Cambodia, school is only half a day, so from 8am to
12pm, or from 1pm till 5pm. In the village where Ms Godden worked, one or two families and single mothers sent their children to work in the dumpsite until they’ve paid off their debts; in other words, child labour was only used in times of domestic crisis. The children of those families were then incorporated into NGO programmes and went to school and stopped working on the dumpsite.

In terms of conflict on the dumpsite, Ms Godden assumed this was rare as she never saw fights amongst the waste pickers and found them to be very friendly and polite. Generally, someone didn’t reach in front of someone else when they were collecting as that was considered rude. When the trucks arrived everyone lined up in an ordered and respectful fashion. That said, unfortunately some waste pickers, especially if they had a friendship with one of the garbage truck drivers and the bulldozer driver, were able to buy a truckload of waste. The other waste pickers did not like the truck buying and the people who had bought the truck really had to be careful.

Ms Godden explained that spirits and ancestors were an integral part of dumpsite life. In part, this was because health was for the waste pickers she worked with, very involved with their spirits and ancestors. For example, people could fall ill if a spirit was upset about something, or they could call on the spirit to help them recover. People also believed that spirits of the dumpsite could help them to find treasures of gold and so forth. There were very strict rules about how when people found precious jewellery they needed to sell it quickly and pay their respects to the spirits of the dumpsite through an offering. They believed that if they didn’t do both of those things then the spirit would come back and hurt them or their family. This brings us back to this idea of waste as a commons, and certainly anything on the dumpsite, once you found it, was considered yours and there were no arguments. However, some things were considered dangerous and ownership was questionable because these things had a connection to someone, like a previous owner. Ms Godden explained that blood stained items were also treated as having someone else’s spirit in them (and as a threat due to biological contamination), as was any type of paperwork such as photographs, birth certificates and identity cards.

In terms of animals and pests on the dumpsite, Ms Godden observed no rats, few cockroaches and only the occasional maggot. Because so much waste arrived and was collected in the city every second day, it was relatively fresh and attracted very few animals. There was also not much wildlife in the area.

Ms Godden explained that there were very few international NGOs or international aid agencies at the dumpsite. Almost all of them were started by
compassionate people who wanted to help, which brought a level of development that was focused on food, shelter, basic provisions and getting kids off the dumpsites and into schools. They did an amazing job. A family arrived in the village and the next day, there was an NGO that was trying to snap them up and get them into their programmes. But the competition between these NGOs was fierce and they all had their own often conflicting plans of trying to create alternative employment programmes.

Finally, in terms of ‘what can Singapore learn’ from Cambodian waste pickers, Ms Godden felt that in Singapore, where the government recycling collection service takes place once every two weeks, and where waste pickers tend to be elderly and poor, there are opportunities for HDB collection services of recyclables, particularly the more valuable ones, such as aluminium cans and cardboard.

The ensuing open discussion is summarised as follows:

- In response to a question from a member of the public about the limits of visual research methodologies, Ms Godden explained that her aim through the use of photography was to create more of an embodied understanding of the situation. She said her initial approach in the field was to be cautious in using her camera, but eventually she began passing her camera around so that everyone could have a turn and see what it was like to frame. Her collection of fieldwork images comprises more than 14,000 photographs and her PhD thesis is a half-visual, half-written body of work.

- Prof Hawkins asked two questions about a) theoretical considerations arising from how waste pickers themselves understand their own skills at enacting value through their labour, and b) the different ways of organising waste pickers, including organising waste collectives and alternative economies. Ms Godden felt that among the waste pickers she encountered, waste classification systems and the sorting process were two very important elements in creating value. In her PhD thesis, she also distinguished between recycling materials, which were quickly sorted, and things that were whole and could still be reused, which provided moments of contemplation. In the latter case, the waste pickers were able to experience consumption in ways that mirrored the middle classes. Regarding waste management theory, Ms Godden referred to the work of Sandra Cointreau-Levine, who framed waste management as a public problem and we will suffer collectively from not managing our waste. Ms Godden felt that waste is contentious because it has a dual element of
problem and resource, because waste is dirty and carries health risks and yet waste pickers confront it and make use of it every day.

- Prof Lepawsky elaborated on Prof Hawkin’s questions by reflecting on the relationships between fiscal and social values, and asked about how the issue of spirituality might be broadly conceived as value in the context of waste pickers, spirits at the dumpsite and the motivations of the NGO workers who try to help them. Ms Godden saw fiscal and social values as being interlinked, especially in terms of the discovery of perishable food items at the dumpsite that lacked resale value but which had both material and social value to the waste pickers. The waste pickers also tended to value gifts from visitors to the dumpsite more (irrespective of the fiscal value) if they felt the visitors were giving them a gift and that they valued them as a person rather than pitying them.

- Dr Gillen continued the discussion about value by questioning whether the Cambodian waste pickers were able to generate monetary value through the goods they collect in a way that the general market responded to. Ms Godden confirmed that waste pickers were solely responding to what their dealers said would be valuable or not, and not to wider market forces.

- Dr Miller asked about health and life expectancy issues on the dumpsite, and what happened to the fabric of the waste picker community when a new dumpsite was opened that the waste pickers were denied access to. Ms Godden explained that waste pickers were most afraid of accidentally coming into contact with dirty syringes, and that they had to pay for government health services in the area. She said that although the government had refused access to the waste pickers at the new dumpsite, they were eventually allowed in and faced growing competition from waste pickers from other dumpsites. Eventually, when the situation settled down, things returned to how they were at the old dump, just re-established at the new dumpsite.

- Dr Winter asked about how the positioning of Ms Godden’s photographic work in relation to clichéd framings of Cambodia set against counter-visual narratives, and the issue of her positionality within critiques of ‘poverty porn’, that is, Cambodia being seen as this least developed country and the ways in which this imagery cements that image. Ms Godden explained that this is something she is particularly sensitive about, as she wanted to tell sustained ethnographic stories that were enriched by photographs so that they don’t become clichés. She added that she was careful in her presentation as her photos were only shown publicly for the first time in
the Recycling Cities forum because she was a speaker and would therefore have an opportunity to elaborate on the lives behind these photographs.

- A member of the public addressed the temporal aspects of waste picking in terms of daily routines and seasons, and how waste pickers conceive of their future and imaginings of a better life. Ms Godden described the 24 hour life cycle of the dumpsite, and explained that trucks came at all hours and people either worked at night or during the day for roughly seven or eight hours a time. She added that Sundays were ‘kids’ days’ when most of the waste pickers rested and the children worked and they loved collecting and the process of classifying the metals. During religious periods, the waste pickers would stop collecting and often the dealers would stop collecting and the trucks would come and recyclable goods would remain at the dumpsite until everyone returned from holidays and start collecting again. In terms of the future, from the stories Ms Godden heard, people continued to work as waste pickers and if they found that ‘big thing’, they didn’t tend to invest it, they just spent it on family or a motorbike or something but they didn’t really change their occupation.

- Dr Chandola asked Ms Godden how she reflected upon her outsider position at the dumpsite, and whether it is possible to fall into a trap of over-determining the agencies of waste pickers as individuals, as communities, as a group that is essentially transient and marginalised. Ms Godden acknowledged that she never escaped her outsider status, but as her position was always to learn about the people in the community, she gained insights that would not have been possible if she had only spent a month there or read secondary source materials. Regarding agency, many of the waste pickers owned property in rural villages and they either had a house or they had rice fields or just land. And they all had somewhere to go if they got kicked off their land and the dumpsite was closed. They all had other options. She added that she would not have found that out if she had not spent a prolonged period in the community because there was a culture that whenever someone from outside arrived they exaggerated their poverty but within the community and on an everyday level amongst themselves, they didn’t.
Recycled Buildings: Challenging Sustainability in an Era of Air-Conditioning

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It is now often said that the greenest building is one that is already built. But as we approach the question of re-using buildings very different issues and challenges come up when compared to other discussions about recycling. In contrast to the recycling of consumer goods, the built environment involves questions of planning, urban development, legislation and an unclear disaggregation of who are the customers, producers and end users. As such then there are very different ideas of responsibility involved. The majority of recycling debates typically focus on the present or recent past, but in buildings we are faced with the ideas, visions, politics and failures of previous years, decades or centuries. To ask the question about recycling buildings is thus a consideration of the possibilities and limitations of recycling the past, in all its material, concrete, earthy and immovable forms.

As we will see, the recycling of buildings is increasingly featured in discussions about sustainability and the reduction of energy consumption, with the re-use of existing structures having very real benefits over newly constructed ‘eco’ or ‘green’ architecture. This is particularly applicable in the face of an epidemic of architectural design now spreading across regions like Southeast Asia, that of electronic air conditioning. In the pages that follow, the emergence of electronic air conditioning is seen as a pivotal transition in urban design and living, such that two phases of modernity are identified: the pre-conditional and conditional. Across Asia there is an extensive stock of buildings designed and built in a pre-conditional era, which kept occupants – human and non-human – cool and comfortable in the heat and humidity, without requiring
energy intensive forms of electronic air conditioning. This paper considers the degree to which Asia’s ‘modern’ pre-conditional architecture constructed over the last one hundred years or so can be re-cycled and re-used without modification for AC today, in the quest for a more sustainable, less energy dependent built environment. To head in such directions, it will be argued, we need to move beyond current debates about tropical architecture design, adaptive re-use and urban planning and engage with a series of wider political, cultural and socio-technical forces. Given the limited space here, the paper presents this position by focusing specifically on some of the ways in which ‘the material imagination of air’ has shifted over the last 150 years or so and how this bears upon the future of sustainable urbanism in regions like Southeast Asia. The argument advanced is that under the conditions of modernity, the materiality of air, and the material imagination of air, has altered dramatically.

AN UNCOMFORTABLE TRUTH

Any claims and ambitions for more sustainable futures in Asia are severely compromised by the widespread and rapid take up of energy intensive methods for cooling interior spaces. Over the coming two decades Asia will be the main driver of a 40 per cent increase in global energy consumption, more than three quarters of which will continue to come from fossil fuels (Fernando et al. 2008). As elsewhere in the world, for the majority of Asia’s countries the built environment, through its construction, operation, deconstruction and demolition, accounts for more than 50 per cent of all national greenhouse gas emissions (Carroon 2010). Given that around half of that energy consumption is typically associated with the cooling or heating of interior spaces, in the case of tropical Asia – much of which experiences extended periods of hot and humid weather – carbon emissions have increased dramatically in recent decades through the introduction of electronic air conditioning (Li & Yao 2009). Where once air-conditioning was regarded as a luxury, in a few short decades it has become a near ubiquitous technology for regulating the temperature and humidity levels of interior spaces throughout the region’s tropical and sub-tropical zones. With this trend set to continue, in Southeast Asia the mechanical cooling (and drying) of the built environment will be a significant factor contributing to a demand in energy that is outpacing much of the world, increasing from current levels by around 75 per cent by 2030 (IEA 2009).

Examining the rapid adoption of air-conditioning technologies in India, China and Indonesia, Wilhite (2009: 87) notes ‘changes that took place over
many decades in the US and Japan are happening at a rapid tempo.’ If we carry these trajectories forward, their significance becomes starkly apparent in places like China where it is expected more than 70 per cent of the population will live in cities by 2050. Asia’s rapid economic growth meant that 111 of the world’s 140 new large or big cities emerging after 1990 were in the region; its population will grow by 1.25 billion by 2025, more than half of which will live in cities (UN-HABITAT 2008). As megacities continue to spring up across different parts of the planet, the vast majority of growth will occur in the developing world, with Asia once again dominating the statistics. Once we situate the recent region-wide adoption of air conditioning in these wider social contexts and trajectories, it is clear that an alternative, less energy intensive, climate control paradigm is urgently needed, one that will contribute to more sustainable urban futures and forms of socio-economic development. As Wolfgang Lauber et al. (2005: 198) state in their contemplations on the future of architecture for tropical regions:

This increase in urban density today means that in many parts of the world ecological issues are being ignored or abandoned. The intensive use of building sites, the stacking of living and work spaces and the increased density of traffic leads to urban spaces and building structures that are based on American models from the 1940s and ‘50s, which require an energy intensive use of technology and disregard the level of energy consumption and its effect on the environment. The invention of air-conditioning has ensured that large buildings and high-rises can be supplied with fresh air as well as sufficient cooling and heating energy. From an environmental viewpoint, the use of 300-400KWh/sqm per year to provide this technically produced comfort is simply too high.

DISCOURSES OF SUSTAINABILITY

Responses to this ‘epidemic’ of energy intensive cooling have varied, and in that regard directly reflect some of the discordancy in perspectives that currently shape debates in Asia’s built environment and urban sustainability. In the last ten years or so the discourse of ‘green’ building has gathered momentum and expanded in scope. Efficient and alternative have been the two guiding mantras of reducing the carbon footprint of construction. Within this, much attention has been given to the question of energy production and saving (Russek & Zimm 2006). The component based approach to this, largely advanced through the professions of building sciences and mechanical engineering, has focused on the constituent parts of building infrastructure such as water treatment systems,
HVAC systems and so forth (Atthajariyakul & Lertsatittanakorn 2008; Hwang et al. 2009; Mui 2006; Mui & Wong 2007). In the case of air-conditioning a highly technical field of expertise has emerged, advancing highly scientific, physiological standards of built environment comfort (Hindrichs & Daniels 2007; Yik et al. 2001). This has led to prescriptive proclamations about ‘optimum’ temperature and humidity ranges for indoor spaces (Lam et al. 2000; Tuohy et al. 2010). And while much attention has been given to making HVAC technologies more efficient in using existing grid-based power supplies, the search for alternative cleaner, greener energy has primarily been advanced in tropical and sub-tropical Asia via solar panel technology. In the case of both domestic and commercial architecture, this has typically involved introducing in-situ installations, whereby grid-supply electricity is supplemented, or in some cases even replaced. Equally important have been recent advances in the area of material technologies, with glazing, concrete, foam, and plastics all being branded as ‘high-tech’, ‘thermally responsive’ or even ‘intelligent’. Mathematical modelling in this area has grown in its level of sophistication, but it is a paradigm of human comfort analysis that has been critiqued heavily for inadequately acknowledging a host of social, geographic and micro-contextual variables. Authors like de Dear (2006; see also Brager & de Dear 2007) and Healy (2008) have spearheaded a critique of what they observe as the new regime of ‘thermal monotony’, that has spread rapidly across building types and between countries with very different climatic conditions.

Alongside, and often operating in tandem with this component-based approach has been the field of ‘eco’ or ‘green’ architecture, which has attempted to forge a more holistic conceptualisation of design and construction for environmentally responsible and responsive buildings. The rallying cry of sustainability has given new impetus to the vocabulary of ‘tropical architecture’, whereby climate sensitive materials and designs inherited from the past are combined with new ideas and construction technologies to create structures that require less energy in their provision of occupant comfort. In their 2006 volume *Tropical Sustainable Architecture*, Bay and Ong identified both the importance and challenge of creating a culture of architectural design appropriate for high-rise, high density in tropical urban spaces:

While the air-conditioned high-rise is easily replicated in the tropical city, the effects of urban canyons and heat entrapment in the city are different for the tropics. While sunlight is welcome in the temperate city and buildings are set back to allow sunlight to penetrate to the road level, shade is preferred in the tropics. While snow and sleet may
be a problem in temperate cities, the problem in the tropics is heavy rain and flooding. While strong gales are better avoided in colder cities, more wind and ventilation are welcome in the tropical (and subtropical) city. It is only recently that urban studies have been made to some depth in tropical cities and the findings are suggestive in terms of the design of the tropical city for the future. (2006: 8)

In the context of Southeast Asia, the ‘eco-skyscraper’ has given this language of tropical architecture its most spectacular and grandiose form. Architects like Ken Yeang are among the pioneers in this field, whose ‘bioclimatic’ high-rise designs seek to offer a solution to an inescapable future of densely populated urban spaces. A philosophy of ecological design is made manifest through a mix of natural ventilation of spaces, sunshading, wind-scoops, vertical landscaping, natural lighting systems, and building orientation and material (re)usage considerations (Yeang 1994, 2007, 2009). The National Library in Singapore is among the examples that exemplify this approach.

The third strand of sustainability that can be identified here is one oriented by the philosophy of conservation, and the maintenance and re-use of the existing building stock. The US based architect Carl Elefante is widely given credit for the aphorism ‘the greenest building is...one that is already built’ (2007). What he and other preservation-oriented architects point to is the need for proper life cycle assessment (LCA) models which more realistically consider the ‘cradle to grave’ energy properties of the built environment. Indeed, in her notable volume, Sustainable Preservation: Greening Existing Buildings, Jean Carroon (2010) highlights the importance of calculating the ‘embodied energy’ of a building in relation to its lifespan. This notion of embodied energy seeks to capture the environmental debt incurred from the resource depletion and energy used in construction (ibid.: 7). As the service life of a structure increases, the ratio of embodied to operating energy decreases proportionately. Whilst Carroon and others now position their arguments relative to the current discourse of ‘green’ or ‘eco-’ architecture, they stand on a literature of empirical studies that demonstrate the benefits of preservation over demolition and reconstruction (Balderstone 2004). Early research conducted by organisations like the Advisory Council on Historic Preservation in the USA in 1979 through to more recent UNDP studies point unequivocally to the significant economic and energy savings that can be made from recycling and reusing buildings. As Elefante puts it:
Seeking salvation through green building fails to account for the overwhelming vastness of the existing building stock. The accumulated building stock is the elephant in the room: Ignoring it, we risk being trampled by it. We cannot build our way to sustainability; we must conserve our way to it. (2007: 27)

To date the majority of these studies have been conducted in Western developed countries like Australia, France, Germany, UK or the United States. Given the accelerated speed of construction, destruction and redevelopment in regions like Southeast Asia – such that buildings often have significantly shorter life spans than they do in the urban economies of North America or Europe – locally conducted studies demonstrating the environmental merits of building conservation or recycling would offer an important contribution to the conceptualisation of urban sustainability. The questions about energy intensive electronic cooling methods raised here mean the potential benefits of extending the lifespan of the existing building stock extend far beyond a reduction in the ‘embodied energy’, to include sizeable reductions in their ‘operating energy’ too. In tropical and semi-tropical Asia extending the life-span of buildings that continue to live and breathe without mechanical air-conditioning promises sizeable energy reductions. More specifically, recycling buildings that lie outside the current AC paradigm have the potential for making an important contribution to countering or mitigating the prevailing trends towards increased energy consumption cited earlier.

In order to achieve such goals, however, this paper argues that the questions and challenges involved in recycling more energy efficient buildings extends far beyond themes of architectural preservation, or urban planning and legislation. While the value and urgency of the different approaches outlined above is readily accepted, my argument here is that, in themselves, they are not enough. To date, responses to the challenges of built environment sustainability vis-à-vis energy in Southeast Asia have largely focused on issues of design, technology and the materiality of construction. What is all too often absent here is an appreciation of the wider social, political and cultural contexts within which buildings have evolved, and the ways in which that emplacement has shifted over time. A tempting critique to offer here, and one that would be valid, is the need for paying greater attention to questions of ‘social context’ – understood as political, legislative, market formation or governmental – which might prevail or have influence at any given moment in time. The insights provided by those working in the analytical space of Science and Technology Studies, for example, would be extremely pertinent for interpreting such
factors. Instead, however, I wish to pursue a somewhat different analytical path by considering how certain socio-cultural shifts come to bear upon, and in so doing reshape, the built environment over time, in the making of history. The propensity of the _longue durée_ to render change invisible is well understood, but in this context imperceptibility is reinforced by the very immateriality, the ethereality of that which has now become unsustainable: cool, dry air. The aim here is to give focus to this immaterial, and to that which very often remains invisible, unseen, and as such beyond the realm of critical discussion and scrutiny.

Accordingly, the aim is to reveal some important hidden histories, tracing what Gaston Bachelard and Steven Connor have referred to as ‘the material imagination of air’, and its various pathways of evolution over the last 150 years or so in Southeast Asia. In his recent volume, _The Matter of Air_, Connor argues the material-centrism of philosophy, science has been matched by an equal unease and discomfort with the seemingly unpredictably and unreliable immaterial. His work seeks to both expose and address this imbalance through a focus on air and its relation with the material world. Such themes are directly relevant here and I seek to extend his analytical frame into the domain of air-conditioning, a theme he surprisingly passes over.

**PRE-CONDITIONAL MODERNITY**

To render the invisible more visible it is helpful to differentiate between two distinct, albeit overlapping, phases of a modernity in Asia: the _pre-conditional_ and _conditional_. In their conceptualisation and historical dating, modernity, modernism and the even more circumspect notion of the ‘modern world’ are inherently contentious and evasive terms. Different fields of scholarship have considered a wide variety of historical trends, ruptures and turns - in manufacturing, architecture, literature, art, technology, religion or philosophy - in order to proclaim the arrival (and subsequent death) of modernity and the modern. In broad terms, the Enlightenment and Reformation, together with events of epochal importance like the French Revolution, are now widely recognised as key factors in the shaping of a ‘modern’ European era. More recently, however, a vibrant debate has emerged concerning the Eurocentric historiography of modernity and the degree to which non-western modernities can be adequately understood within Euro-American analytical frames (Gaonkar et al. 2001; Alatas 2006). Walter Mignolo (2003), Partha Chatterjee (1993), Dipesh Chakrabarty (2000), and Timothy Mitchell (2000) are among those that
have convincingly argued that the historiography of modernity suffers from profound euro-centric biases. Mitchell distances himself from those advocating a history of ‘alternative modernities’ (Gaonkar et al. 2001), suggesting instead that we attend to the incomplete universalisms and singularities of modernity’s project in different regions of the world under specific historical conditions (Mitchell 2000: xii-xiii). Chris Bayly (2004) has also drawn on Hobsbawm’s (2002) notion of the ‘age of revolutions’ to argue Europe was not alone in experiencing a series of profound cultural, political or technological shifts. Accordingly, he describes the period of 1780–1820 as a time of ‘converging revolutions’, whereby the after-shocks of events in Europe be felt in Asia, North Africa and the Americas, and, crucially, ‘the repercussions of these extra-European conflicts fed back into the European convulsions’ (ibid.: 86).

A detailed exploration of modernity in Asia is beyond the scope of this discussion. It does however form an important backdrop to the emergence of a ‘modern’ built environment and architectural form in the region. Greater attention is now being paid to the complex processes which enabled the emergence of modernism and modern modes of construction and design ideas in Asia. A more detailed picture is emerging of how the modern emerges in different ways in different places and over different timespans. The arrival of new technologies, shifts in political systems, economic transitions, freak encounters, the incorporation of new ideas and so forth all mean the history of a modern idiom for the built environment, and what might be identified as modernism, is chaotic, haphazard and largely incoherent. Nonetheless, some key patterns and milestones provide greater clarity to the story of particular countries and regions. Cody (2001, 2003, 2010) and Denison and Ren (2008) are among those that trace key transformations in the built environment and the arrival of Modernism in China from the mid-late nineteenth century onwards. Each approach modernism and modernity with a distinct sense of caution, with the latter stating:

The term 'Modernism' is vague and often hides a multitude of semantic sins...to write a book on the Modern Movement in China would result in a very meagre read, as no such singular movement existed. Instead, it is a story of an intriguing range of different movements and influences appearing on China's soil from all corners of the globe. (Denison & Ren 2008: 9)

Together such external movements and influences would have a catalytic affect on Chinese society, creating a series of political, social and intellectual shifts that would bear upon architecture and the planning of cities. Throughout much of China traditional forms of construction relied heavily on wood.
Although masonry and brick were used extensively, they were primarily used for walls, bridges, ceremonial sites and monumental structures. Tradition based architecture was, in the main, designed around load bearing wooden columns and beams. Interior spaces were created by linking together units (jian) of four columns with interlocking horizontal beams. As Denison and Ren state, ‘timber was abundant, cheap, easy to work, flexible, strong, pleasing to the eye, and tactile. The one thing it lacked was permanence’ (2008: 19). The authors suggest however that as the nineteenth century progressed, the construction and design of buildings began to alter in significant ways. Engineers would lead the way through the incorporation of metal, concrete and glass. Ideas would arrive from Europe and, as Cody (2003) highlights in substantive detail, from the United States. China’s Treaty Ports would undergo the greatest changes, as engineers, both foreign and domestic, set about building roads, railways, bridges, power stations, and transforming their urban centres with cement. 11 In the closing decades of the nineteenth century the United States would become one of the world’s key exporters of construction knowledge and materials. World’s Fairs hosted in Chicago, San Francisco and Philadelphia provided showcases for ‘American architecture, urbanism and technology as exemplars of modernity’ (Cody 2003: 8), from which newspaper journalists from all over the world would report. At the beginning of the twentieth century the American skyscraper ‘invaded’ countries across Europe, Central America, Africa and East Asia. It was a form of construction that came to increasingly rely upon the marriage of steel and concrete. At first steel skeletons would be clad with concrete walls. Subsequently though the idea of steel ‘reinforced’ concrete delivered significant advances in strength and load bearing capacity.

The industrialisation of Europe and the United States provided an important base for modern architecture in many parts of the world. Much like elsewhere, the first architects in China came from engineering backgrounds. But equally important was the boom in factory construction, the development of such large-scale, industrial designs, and the mass production of the technologies and materials required to build them. China was long familiar with the importance of iron in construction, but only transitioned to the production of steel in the mid to late nineteenth century. The country’s first cement factory was established in 1882 in the town of Qinzhou, near Macau, with others following shortly afterwards. 12 The arrival of foreign architects and engineers

11 See Denison and Ren (2008: 47) for further details.

12 Ibid.: 59
would greatly accelerate the speed and scale of industrialised urbanism, a landscape characterised by multi-storied reinforced concrete and great expanses of glass. Shanghai’s first office building constructed entirely from reinforced concrete was completed in 1908. The Shanghai Mutual Telephone Company Ltd would rise six stories, but the take up of steel frame, reinforced concrete designs in the years thereafter would lead to skylines of taller, lighter and ever more efficient buildings across a number of Chinese cities.  

If we turn to India, a similar pattern of foreign engineers and architects importing new ideas and technologies is evident. British rule played a definitive role in defining the styles, designs and construction methods, which together constituted modernism in cities like Delhi, Calcutta and Bombay. The formation of an Anglo-Indian architecture was most monumentally realised in Edwin Lutyen’s designs for New Delhi. Characterised by their neoclassicist style, parliament buildings and government offices for the new capital incorporated various features from traditional Indian architecture. Although built on an altogether different scale, the colonial bungalow offered another example of the Anglo-Indian style of architecture that emerged under the British. As Anthony King (1984) highlighted, the constant reinvention and reproduction of the bungalow in different contexts meant it became one of the most recognisable examples of what latterly came to be known as ‘tropical architecture’. Accordingly, Margaret Purser (2003: 295) notes:

From these early roots, the bungalow as colonial administrative form moved out to encircle the globe, and by the mid-nineteenth century was an instantly recognisable imprint of British imperial presence. Its evolution continued to exhibit the simultaneous expression of British cultural identity, and of a rapidly expanding body of adaptive knowledge about how to build and live in structures in tropical climates. The buildings were raised on posts to avoid insects, disease, and rot; rooflines were modified to alleviate the oppressive heat of the metal roofs; ceilings rose, and interior rooms themselves became larger.

European architects had to learn how to build and design for the cultural and climatic conditions of tropical and sub-tropical Asia. Indeed, considerable scholarship has been dedicated to the ‘evolution’ of the ‘tropical architecture’ typology, one that came to be increasingly oriented around verandahs, overhanging roof-lines, perforated screens, as well as an accumulated

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13 Ibid.: 64. Also see Cody 2003 Chapters 1 and 2 for further details.
knowledge of the need to design in accordance with orientation, shade, cooling breezes and water (Coles & Jackson 2006, Fathy et al. 1986, Ford et al. 1998, Fry & Drew 1964). More recently, however, by attending to the connections between politics, governmentality and technological advances that existed across great distances, authors like Jiat Hwee Chang (2011) have offered new insights for interpreting this form of colonial and tropical architecture as an unfolding ‘situated knowledge’. Chang argues an international power-knowledge network of design came into being, one that relied upon a particular notion of place which was abstracted as ‘far’ away from temperate, civilised Europe and principally known in terms of climate and the challenges of thermal comfort. Although Chang’s focus is the socio-technical pathways of British tropical building, his arguments are equally pertinent for understanding the histories of French and Dutch construction in countries like Cambodia, Laos, India, Indonesia and Vietnam.

At the beginning of the twentieth century in India this vocabulary for building in the tropics was infused with the design motifs of Art Deco. Houses, apartment buildings and civic structures all included flat roofs, cylindrical external staircases, curved verandahs, pastel colours and various decorative motifs familiar to the Art Deco movement elsewhere. But as Lang (2002) points out, experimentation and the importation of new design themes and ideas was not merely dependent upon foreign architects and engineers. Between the two world wars cities like Mumbai and Delhi were being transformed by avant-garde Indian designers, who playfully incorporated decorative motifs popular in the United States and Europe. Interestingly, by the 1930s Art Deco increasingly expressed a sense of Indian Modernism, through the incorporation of local cultural themes and traditional design elements. As Lang (2002: 17) explains:

The integration of local elements and Art Deco motifs displayed in the Indo-Deco is more complex than in many other countries because of the diversity of India’s architectural background. The elements borrowed from traditional house forms included sloping overhangs, corbelling and cement jaalis. Not only were Hindu and Islamic elements used but also elements of the country's colonial heritage. Patterns in Art Deco murals varied from abstract swastika patterns to representations of Indian legends and myths.

For the country’s more strident nationalists, however, it was an architectural trajectory that represented yet another form of cultural imperialism. An important response was The Modern Indian Architectural Movement, which took hold across a number of regions and cities. Tradition and past architectural styles were explicitly referenced in the creation of a new, present Indianness, such that the modern built landscapes of cities would be
the source of pride and identity (ibid.: 25). In cities like Hyderabad, the symbolism of tradition drew heavily from an Islamic architectural heritage. However, under the guidance of the architect Sris Chandra Chatterjee, *The Modern Indian Architectural Movement* was clearly Hindu; influenced heavily by the principles of the Swadeshi movement of the early twentieth century and the canonical texts it referenced. The language of revivalism and ‘Indian principles’ did not, however, negate the incorporation of new construction ideas and technologies. Chatterjee extensively used modern materials such as concrete in his buildings. Nonetheless, his ideas steadily came to be seen as retrogressive and out of step with the directions of mainstream modernism, and, crucially, the political ambitions of figures like Nehru, who in the 1950s gave his support to a radically different form of architecture, that of the steel, glass and reinforced concrete of Le Corbusier.

Indeed, during those mid-century years of Independence across South and Southeast Asia, architecture and urban planning were the vanguards of ambitious claims of national sovereignty and progress. In Cambodia for example, from 1953 onwards Norodom Sihanouk channelled his vision of a modern, independent nation into a particular style of urbanism, coined ‘New Khmer Architecture’ (Grant Ross & Collins 2006). Conceived at a time when air-conditioning was prohibitively expensive to install and run, this predominantly public and commercial architecture was designed to facilitate airflow and natural cooling to counteract the tropical heat. The chief architect of this movement, Vann Molyvann, undertook carefully planned, well considered research, referencing the various Cambodian urban centres of the past 2,000 years (Vann 2003). The heritage of these long-lasting, structured societies was one of the reference points for the development of a style of architecture and planning that would form the physical environment for new urban centres intended to be of comparable greatness. Cooling features such as the iconic, fanned concrete roof tops, and double-brick walls shielded Vann Molyvann’s buildings from the tropical heat. Many buildings were raised on stilts, consistent with Cambodia’s pre-modern vernacular architecture. Windows were positioned in order to avoid the path of the sun. The use of stilts, also demonstrated his regard for the practical heritage of cooling found in the Cambodian vernacular. These implementations of local knowledge were combined with innovations enabled by modern scientific research; techniques gained by Vann Molyvann, along with a modern aesthetic, while studying under Le Corbusier in Paris.
Lai traces a similar story for post-independence Malaysia, where a nascent national architecture was energised by architects and engineers returning home from training and employment overseas. Lai (2005, 2007) sees concrete — narrated as both metaphor and construction material — as pivotal in Malay proclamations of freedom and independence (*merdeka*). The construction of large buildings, civil engineering projects and monuments enabled the state, the nation, its territory and its ideals to take on an embodied, tangible form. But as Lai points out, it was the very physical properties of concrete that were instrumental in realising a bold, radically new statement of political intent:

Local architects and engineers were able to create reinforced concrete structures [in their] most technologically advanced manifestation, such as complex systems and thin-shell concrete forms. Used especially for large-span spaces for congregation and commemoration, the buildings and monuments were projected as distinctively novel and national for audiences at home and abroad, and expressed the optimistic employment of modernist architecture's forms and vocabularies. (Lai 2005: 31)

Panning back out then, what we see across Asia in the first half of the twentieth century is a steady shift towards the adoption of new technologies and facilities for large scale construction, new idea(l)s about architecture, urban planning and the role of cities, as well as the uptake of new building materials that dramatically transformed the scale and form of the built environment. As the decades advanced, a modern construction industry was also increasingly defined as such through the standardisation and modularisation of its systems and resources; a process Sigfried Giedion so eloquently documented in 1948.

Within these interconnected processes, the arrival of electronic air conditioning in Asia sometime around the 1930s would prove a significant technological development. At first, and right through to the 1950s and 1960s, the uptake of AC was slow and it remained a rare technology due in large part to its extremely high installation, operational, and maintenance costs. The real beginning of the end of the *pre-conditional modernity* as outlined above, however, came in the 1950s with the arrival of a more techno-scientific language of climatic design in the United States. Chang (2011: 224-5) argues the development of reliable, science-based climatological and meteorological data at that time provided a basis for a new paradigm of architectural practice. It would be some years before the instruments for collecting the indices of climate – like wind speed or effective temperature – would be in common usage across different parts of the world. Nonetheless, a new science of thermal comfort was now filtering outwards from the US, one that divided the
world into certain ‘zones’, with the tropics being sub-categorised into three principal climatic types: warm and humid; hot and dry; and upland (ibid.: 226). Design guidelines for a new science of architecture for these regions followed. But perhaps most significantly, it was a development that would also come to play a key role in the transformation of the material imagination of air; providing one of the foundation stones for a ‘conditional modernity’ that would subsequently arrive across large parts of Asia.

**CONDITIONAL MODERNITY**

The precise origins of electronic air-conditioning in Asia are difficult to trace. As an emergent technology in the decades of the mid twentieth century, its high costs meant it was frequently associated with spaces of luxury. International hotels were among its early proponents, creating temporary respites of comfort from the heat and humidity of the tropical climes. In the case of Singapore, Lee Kuan Yew’s regard for air-conditioning as one of the ‘signal inventions of history’, was also hugely influential in the early adoption of AC in the spaces of work and home. As both the equipment and cost of electricity decreased in relative terms, HVAC systems and domestic air-conditioning units became an increasingly common feature of commercial and domestic buildings across the tropical regions of South and Southeast Asia from the 1960s onwards. Writing in the context of Indian cities, Wilhite (2009: 86) states the adoption of concrete and imported temperate climate design features like large windows, south facing façades, and flat roofs in the 1950s set the stage for a rapid take up of air-conditioning some decades later, as costs reduced. Most significantly though, these technological and design shifts were accompanied by a series of socio-cultural changes in how air, and associated notions of climate, atmosphere or environment, were understood and materially fashioned. To understand such processes better I follow a line of enquiry articulated by Steven Connor that centres upon:

> the ways in which new understandings of the air entered social experience and altered human experiences of their ways of inhabiting the world...[this is]...not isolating the air as a specific subject of concern, but with following through some of the ways in which new apprehensions of the air entered into composition with forms of social life and imagining. (2010: 14)

Connor cites the invention of gas lighting in nineteenth century Europe as an example of such an historical analysis. Gas lighting superseded candles and
lamps, representing a technology that transformed the human relationship with light. The illuminating flame and its fuel were now less intimate, of a greater distance and more abstract. Gas piped underground and behind walls was also burnt behind panes of frosted glass that diffused flames into panes of light. Light became predictable, uniform and less prone to localised fluctuations. As Connor notes ‘what had previously been proximate, iterative and particular was to become remote, absolute and general’ (ibid.: 9). In the introduction of electronic air-conditioning in Asia we can excavate a parallel transition. Prior to the advent of AC, the cooling of the body and attainment of its thermal comfort was achieved in a number of ways, as we shall see. But perhaps the most identifiable parallel to the story of candles to gas lighting was the transition of the fan to air-conditioning unit. Much of Asia has a rich cultural and technological history of fanning. China and Japan in particular have long traditions of hand fans, with frames made from bamboo, wood or ivory supporting blades of feathers, paper and silk (Tsang 2002, Iröns 1982a). Although China is credited with designing the earliest hand-fans, the invention of the folding fan, somewhere between the second and sixth century AD in Japan, brought about a revolution in how they were carried and used as everyday, personal items (Iröns 1982b: 40). Dating the arrival of the ceiling fan is equally difficult. The history of the punkah, a term denoting a swinging blade system attached to the ceiling, is associated with Arab culture. At some point in the eighteenth century the Indian subcontinent adopted the technology, with the punkahwallah becoming a feature of colonial rule. The wallah, or servant of the house, would operate a pulley system to maintain the flow of air in the room. While the arrival of electricity enabled ceiling and desk fans to become more efficient and regular, cooling was still a process of moving air, rather than introducing new cooler, dryer air into the room. Fanning, both electric and manual, thus remained localised, directional, momentary and a perceptively sensorial experience. In marked contrast, the electronic conditioning of air moved the provision of comfort to the background, whereby its technologies were removed from view, hidden behind surfaces; and in cases where whole buildings, rather just individual rooms, came to be cooled, comfort was ‘plumbed’ in via channels and ducts that led back to a central source. For the first time then, the ability to chill and dry the air of an entire, enclosed interior meant bodies were able to dwell in and move about spaces of evenly distributed, non-directional thermal regulation.

14 A less technologically advanced, hand-held version of this involved the wallah holding a fan of large feathers bound to a handle.
But the effect of air conditioning was far more than merely an act of disappearance. Its transformative properties become manifest once we look at the role it played in enabling the materiality of a new ‘conditioned modernity’ in Asia, a transition that was felt first and perhaps most profoundly in a number of Southeast Asian countries. Lee Kuan Yew’s admiration of the technology of ‘civilisation’ related to the benefits it delivered in workplace efficiency. Quotidian and annual rhythms such as siestas and hill-station retreats were interruptions in the Southeast Asian work-day that could be removed through electronic cooling. The maintenance of ‘optimum’ temperature and humidity levels throughout the day was also linked to productivity gains, and a marked increase in the attractiveness of cities like Singapore to expatriates originating from temperate climates. But as with laptops, the penetration of air conditioning into the home also meant these became sites of efficiency gains, wherein uninterrupted sleep was the backbone for a more productive workforce (Wyon 2004; Rihal et al. 2009). It was a powerful logic that saw the work, leisure and homely environs of daily life increasingly move indoors, and the widespread emergence of what Connor has referred to as ‘the many enclosures of the air, artificial atmospheres and sealed environments’ (2010: 19). Modernity thus became an enclosed one, whereby the aspirations, desires, ideals and activities of modern urban life and urban culture increasingly resided inside. The notion of public space, for example, was transformed, with the contemporaneous rise of consumer economies meaning the indoor shopping mall came to the fore as the rarefied eco-sphere of modernity across many of Asia’s cities. In the creation of the other ‘modern’ spaces of public leisure – cinemas, restaurants, hotels and galleries – designers set about creating a new world of indoor capitalism predicated on comfort and convenience. Such principles even extended to bodies in motion, as public trains, buses and taxis all came to be classified in a hierarchy of ‘Non-AC’ and ‘AC’. Indeed, as recently as March 2011, Indian Railways proposed to offer passengers ‘improved comfort and more exclusivity’ via a new ‘Super AC Class’.  

Conditioned modernity also gave a new legitimacy to glass as a construction material. The mechanical cooling of interiors enabled glass to evolve from merely being used for windows to being the material of entire walls, and most significantly the façades of office and retail architecture. The adoption of this new ‘light’ architecture was most apparent in the design of Asia’s skyscrapers, where glass began to replace concrete for their outer skins.

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from around the 1970s onwards. Indeed in the case of many high rise towers, glazed façades involved the removal of window openings as interiors were hermetically sealed in the name of ever more precise climatic regulation. In effect, glass had become a pivotal construction material of a conditioned modernity, at once bringing nature indoors in a visual sense, yet simultaneously withholding it in other ways. As architects adopted glazed façades and roofs to visually ‘open up’ otherwise dark interiors, they closed in their inhabitants by separating atmospheres, dividing the controllable from the uncontrollable.

Interestingly, where air conditioning has enabled a ‘lighter’ architecture it has also made possible a culture of heavier furniture and furnishings. AC has underpinned a transformation in interior design in regions like Southeast Asia, in that previously climate sensitive furniture designs and materials employed to allow ventilation and the dissipation of heat away from the body have been replaced by deep pile cushions and heat retaining textiles. In the last thirty years or so, the adoption of AC has been closely followed by a style of furnishing more familiar to the temperate climates of Europe and North America. More specifically, with the ‘West’ continuing to act as the principle point of reference in the material culture of ‘modern’ living in Southeast Asia, items like duvets, mattresses and living room seats filled with insulating feathers and foams are symbolically coded and circulate as the focal point of desires and aspirations. Indeed if we recall Shove’s (2003) arguments concerning the historical trajectories of comfort and luxury, we are reminded how sinking and snuggling into the soft, malleable fabrics of home furnishings become the embodied practices through which modern, middle-class urban life is marked, felt and lived; a symbolic, sensory dyad enabled by and dependent upon electronic air conditioning. It is now common practice for residential property developers across Southeast Asia to foreground such furnishings, together with thick window curtains and carpeting, as the signifiers of ‘luxury’ or ‘contemporary living’. Lifestyle and home magazines offer a very similar aesthetic, gently conditioning their readers to hold certain aspirations and ideals.

In a few short decades, air conditioning has also had a profound transformative effect on the clothes of Asia. Across the region, the history of clothing is one deeply rooted in local climatic conditions. In tropical and subtropical areas, garments were typically loose fitting and made from fabrics that could ‘breathe’. Air conditioning not only removed the logic for such forms of dress, but also facilitated the introduction of new forms of clothing, most notably the Western business suit. In thousands of offices across Asia the standard business attire for both men and women has become the dark coloured suit made from heavy cotton or wool. In keeping with international
business attire, men wear the polyester shirts and ties more suitable to temperate climes. But perhaps most intriguingly, air conditioning has also transformed the material imagination of the body itself in such contexts. The modern, professional body is one free of perspiration and odour. Water, excreted from the skin, is now well and truly out of place in the modern workplace; sweating after all clearly signals losing one’s cool. Despite the year round temperatures of cities like Singapore and Kuala Lumpur, air conditioning has deemed the productive human body of post-industrial, knowledge economies to be clean, dry and free of any signs of climatic response.

Stepping back from these various examples, I wish to suggest then that, together, they add up to two broad trends – what might be referred to as ‘epidemics’ – which have now secured a firm hold across many of Asia’s societies, particular in the hot and humid countries of Southeast Asia. The first is the widespread, and somewhat viral like, emergence of electronic air-conditioning as a powerful socio-economic and technological complex, one that now both breeds and sustains itself as a seemingly vital component of contemporary life. In a few short decades, AC has become an invisible, yet omnipotent backdrop to modern, urban lifestyles in Southeast Asia. Today, the amount of networked spaces of seamless cooling is expanding rapidly across urban landscapes, meaning that people can now move between the office, classroom, home, restaurant, shopping mall and other climate controlled environments with minimal exposure to the ‘outdoors’. AC thus needs to be considered in terms of the ‘path dependency’ it has created; a socio-technical system that has come to be ‘locked in’, with its unforeseen and unpredictable influences and impacts only becoming apparent over time (Abbott 2001, Dennis & Urry 2005).

Such trends also speak of a second, and closely associated, phenomenon that has emerged in recent decades, that of a subtle, yet discernible, form of agoraphobia. As a term, ‘the outdoors’ has always had somewhat vague connotations, but in recent times it has come to be increasingly burdened by anxieties of its vagary. Like elsewhere in the world, in Asia there is a growing fear about the outdoor environment. The outdoors has become a space of contamination and risk, whereby science and associated cultural shifts have rendered air pregnant with concerns about pollution, crime, vector-borne diseases, skin cancer, ageing, and bodily discomfort and impurity. The menace of the mosquito endures, for example, with stories of dengue fever or malaria outbreaks continuing to give a seasonal rhythm to news reporting. Fears and anxieties are often particularly acute in Asia’s cities, where industrial scale air-borne pollutants mix with dense populations to create a concoction of deadly
haze, smog and disease-carrying water droplets. The cultural and etymological lineage of today’s crowded streets in Shanghai, Jakarta and Bangkok brings us back to the Agora, or ‘places of assembly’, of ancient Greek city states. They all share the chaos of densely packed open spaces, and the squeezing and bumping of bodies in confined gathering places. Inhabiting public space is to be walking, commuting, dwelling in the crowd, and whilst many in Asia continue to live and work in densely occupied indoor spaces as well, a sense of privacy, security and comfort therein arises from the proximity of the familial and familiar. Across Asia today an increasing number of daily activities are moving indoors, whereby, in Lefebvrian (1991) terms, ‘hermetic’ interior space is both conceived and perceived as safer, more hygienic, more convenient and of course more comfortable than the outdoors.

**Towards An Alternative; An Unconditional Modernity**

The possibilities and limitations for recycling buildings thus need to be seen through this prism of indoor/outdoor spaces. Indeed what I have suggested here is that the electronic cooling of interior spaces has been far more significant than merely a feature of building technology, and instead should be read as the catalyst for a new form of built environment modernity. The wholesale transformation of the material imagination of air presents major obstacles for re-using buildings that don’t comply with the demands of today’s AC paradigm. If a more sustainable built environment is to be developed in Asia, we need to move towards a more unconditional modernity. By unconditional I mean we unhook AC as the axial technology and culture of indoor living. This is not an argument for abolishing air conditioning, a proposal that would rightly met by a rebuttal of naivety. Rather it is a proposition concerning its de-centring in the name of creating alternative, low carbon trajectories of thermal governance. The invisibility and intangibility of air is a significant factor in its absence from public debates about climate change and sustainability. Air too often remains in the unconscious background, far beyond the robust, critical debates about the material world. An unconditional modernity is one where this imbalance is better addressed, where understandings of the climate of the everyday, quotidian are pursued much more rigorously. The themes explored here illustrate how the possibility of re-cycling buildings and interior spaces that were built prior to electronic cooling and are to be used without such technologies today raises questions about furniture, clothing, furnishings, and the politics of the body. Certain assumptions and norms about these now have to be reassessed and de-stabilised, in ways that open up alternatives to
electronically conditioned interiors. An unconditional modernity probes such questions and assumptions, in the search for alternatives. It is a modernity that revisits the fan, allows the air to move again, and questions our rising phobia about the outdoors.

Put simply, if we are to alter the current path of electronic conditioning, we need to open up a new material imagination of air, and redefine how the air is imagined in material terms. Built environment sustainability is much more than the technical questions of design and engineering. Indeed, what has been revealed here is that, while it is recognised that recycling existing built structures has clear environmental benefits, to understand such possibilities a dance is required, one that takes us back and forth, in and out of the material and social, the tangible and the intangible. Only then can more critically engaged, multi-vector discussions about built environment sustainability have the air they need to breathe.
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182 Recycling Cities


Chang Jiat-Hwee: As someone from the architecture department, we cannot be outdone because we’re a visual discipline, and Johannes, who is an Associate Professor from the Department of Architecture, will also provide us with hopefully a very visually seductive commentary.

Johannes Widodo: Thank you. I’m freezing, because I wear local batik, a cotton shirt and we are in the other world. This room is called ‘Nexus’ and there is also another place called ‘Vista’, it’s something that will give us visions. But as you can see, we enclose our vision with this curtain, so we block all view of the greenery and we pump air-con into this room to create a temperature of 22 or 23 degrees centigrade, so this is the irony of Asia. So I just imagined, when you flashed a photo of that man sleeping in Penang under the trees in one of your slides, if you managed to convince Lee Kuan Yew to do that, we’ll be successful in achieving this dream of unconditional modernity. If you go to Pinnacle at Duxton, the highest public housing buildings in Singapore, you will see the strong verticality of the façade design, probably inspired by the movie “Matrix”. But unfortunately, that building is situated in Tanjong Pagar, which is the constituency of Lee Kuan Yew, and because of that building has a horizontal viewing glass box on top to show off the beautiful tropical Singapore. That is the reality.

So that’s why I want to flash some images here, which is not in Singapore although it belongs to Singapore, and I called it ‘recycled architecture’. We (NUS) have two units of shophouses in Melaka. As you know, Malacca is a UNESCO World Heritage Site, which hopefully will be delisted very soon because the government cannot maintain the integrity of historic core of the city, and has turned Melaka into a big Disneyland. It’s worse than Penang. But luckily, we have these two units of shophouses, given to us by Tan Cheng Lock’s
family. These two shophouses have a very long history. We don’t know when these two units of townhouses were built, but at least we know that in 1934, it was a maternity clinic, and then taken over by another maternity clinic, and then another maternity clinic, and then became a resthouse, and later a junk storage, and finally vacant and dilapidated building and it almost collapsed. So we received a gift which was a ruin. We’re thankful for that gift because it gave us an opportunity, a Singapore university, to create something different. It’s not big, it’s only 828 square metres. And we managed to, not reconstruct, not rebuild, but restored the shophouse with only 1.2 million ringgit, with consultancy costs, which is cheap. And we use local materials, and for roof tiles, because we can’t find them in Malaysia anymore, we got them from Vietnam. We found the oldest Dutch brick, which is very thin, and then there is the British brick, and then we have the modern, early modern Malaysian brick and you also have a contemporary brick.

So we want to use this centre as a textbook for students, also for the general public, to teach them about the history of building. It’s like an archaeological site. So in the past, it’s a maternity clinic, and now it has become a conservation or architectural clinic, to inform people about how to conduct good conservation practice. At the bottom picture you see a new toilet. We inserted the toilet because in the past there was no toilet, so we have no choice, we have to provide people with toilet and that toilet is modelled after Le Corbusier’s design, which is very modernist. It’s kind of a cynical play with the notion of modernity. For the upper floor, you see, it looks like it is new but it’s not entirely new because most of the material, 80 per cent, is recycled material. For the plans, no change, we still keep the courtyard, and we don’t use air-con in this building, although it’s a bit hot, but during the day sometimes we have rain, and after rain we can feel the breeze comes into the building. You can also see the new sense of materiality, which is not glass, which is not concrete, which is not steel. It’s very different from shophouses in Singapore. If you enter a renovated shophouse in Singapore which is used as a house, basically it’s just like a new condominium. But looking into this building, we can see still an aging building. So comparing these two, I have a joke to tell my students on what is good conservation, what is good recycling. I told them this example. I have a grandma, who used to be very beautiful but is now getting old, so I drag my grandma to a salon to get Botox injections to make her younger again and ask her to work as a hostess in a bar. So that’s what happens to conservation in Singapore. So all those so-called “adaptive reuse”, is akin to forcing our grandma to work in a nightclub as a hostess. But in contrary, we can bring our grandma to hospital to cure her disease and let her age gracefully.
while imparting her wisdom to the younger generations. That could be another concept or idea of recycling. Ageing, dying is alright, because in Asia we believe in reincarnation. It’s not about materiality but it’s a spiritual conservation. If a temple is rotten, we will replace the component and we still call it an authentic temple. It’s not like the Eurocentric or ICOMOS notion of authentic material conservation, but like renovation of Chinese temples or Thai temples. So we have these concepts to reflect on the past synthetically, to act the present authentically and to project in the future critically. I think that’s a very important way of looking into things. Now we use the place as a field school and resource centre. We organised the SOCooLH (Sustaining our Cool Living Heritage) conference here. Tim was hit by dengue fever or something strange in Malacca, probably because of the spirit, since this building was used as a maternity clinic.

Tim Winter: I think it was the heat actually.

Johannes Widodo: I think so. There must be a lot of dead babies and dead mothers in the past, but we did, four times, a spiritual cleansing of this house to ‘cool’ the buildings from spirits.

I’m also interested in your take on lifestyle. As you may know, in Japan we don’t really need the air-con, and we don’t really need the heater. During the winter, the temperature would drop to minus ten in some areas in Japan, but traditionally, the Japanese use to live in houses with very thin paper walls. So what they do is just put their legs under the kotatsu, so all the heat for cooking is trapped under the table; and they wear three layers of clothes and when you turn on television and you’ll see many sex movies, same also when you buy and read the manga (Japanese comic). The theme, during winter in Japan, is sex and love. In summer, it’s different. All manga and movies are about horror and murder, and they just eat different kinds of foods, kakigori (shaved ice) or cold noodles, and hang this glass bell to chill your feeling. So it’s through a totality of culture that we cool ourselves, and not by cooling the air but by cooling the emotions, cooling the brain, and also cooling the body. And talking about materiality again, my good friend Edward Ng brings students to China for field study and they saw that the school is located on the other side of the river, and every time the flood comes the bridge always collapses. So every time they have to replace the bridge, and it is very expensive. So together with the students, he invented this method of putting stones in a very light steel wire cage as a foundation, a very cheap method of building which is easy to carry to the hill. What they need is just to build the foundations and then placing few pieces of steel with bamboo carrier. So every time the flood comes, this bridge will collapse, and the parts of the bridge will fall down into the bottom of the
river. But because it’s heavy, so it will stay put on the bottom of the river. So after the flood, villagers just come and put that thing again back into the foundations. And because the foundation is porous, it will not collapse. It’s very different with foundations made of concrete. It’s a very ingenious way, we call it a ‘local wisdom’. We don’t try to fight the nature, but we try to be one with the nature.

It’s very different attitude, after Katrina hit America the American architects devised a lot of techniques to resist the next Katrina by building using better technology, such as a big balloon to suck all the water and turn it into a dam, and other kind of things. But what happened in Aceh and Sri Lanka after the Tsunami, we don’t pay more attention to building technologies but instead, on how to rebuild the community and let the community restore itself into a normal community.

And of course we’re talking about modernity. It’s also possible to combine these two (tradition and modernity) even in Singapore. This is an award-winning project by WOHA, one of the brand name architects in Singapore which just won an Aga Khan award for architecture about two years ago. And this building, Moulmein Rise, is a very expensive condominium, has this simple climatic device, and the idea came from the vernacular architecture in Philippines, or from Sri Lanka (called the Monsoon Window). It has a horizontal opening on the window that can keep the airflow, the cross-ventilations across the buildings. And because of the design of the building, the plan is very narrow to make it possible to create the cross-ventilations to control the breeze. At the same time you don’t have to open the vertical window. So you can block the rain or even the strong wind is coming. And the effect is the reduction of air-con usage because you have this cooling effect. And of course, you have an open concept, like in traditional house.

So it’s a matter of how we control ourselves in terms of cooling. So recycling is not just about material recycling but it’s also the change of lifestyle, change of pattern of consumption and production, and also how we are looking into our sensibility. In architecture, I think, in facing global warming, we must develop and build a sensitive architecture. Again, with regards to materialism and consumerism, we should focus more on architectural for humanity, focus on the human rather than the materiality. And to have this of course, we need to have a more humane architecture. We should go against adventurism and sensationalism with all this play of forms, and we have to be more focused on contextuality and culturally sensitive architecture. So, in conclusion, we should revise the concept of architecture. In Asia, we are practicing Vastu, not Archae-tecton (the origin of the term Architecture). Archae-tecton is originated from
Greek and Roman traditions which put a lot of emphasis on materiality. But Vastu is different. The understanding of Vastu is a process of holistic creations, so architecture is no more a noun. If you practice Vastu, then architecture becomes a verb, it becomes ‘architecturing’; it is how we put ourselves into the flow of nature and into the flow of society. And then, of course, we will have the beauty, and that beauty flows from the truth. So I think the biggest challenge to us now, is to admit what is truth. We can act as Pontius Pilate, after he sacrificed Jesus Christ, and washed his hands and said ‘what is truth’. So truth, I think, is something that we need to reflect on. Thank you.
Chang Jiat-Hwee: Next, we have our second commentator Stephen Cairns. Stephen is Scientific Coordinator at ETH Zurich Future Cities Laboratory, so he’s based here in Singapore as well.

Stephen Cairns: Thanks. I think we have witnessed two very complementary papers, so it’s nice to have this opportunity to reflect on them. I have some general comments about Tim’s paper first, and then a couple of larger, meta-, perhaps theoretical themes to propose at the end. So, to the first of three or four major headings: I thought the paper helps us develop a kind of infrastructural literacy, which I think is absolutely crucial as our everyday lives are more and more mediated technologically. Coming from architecture, where one of the primary jobs, in fact, is to hide, disguise or otherwise mediate infrastructure, I think improving our ability to know how infrastructure works, to know it is networked, how its enabling capacities are distributed, where it is centralised or not centralised, all of this stuff, I think, contributes to practices of global citizenship. I think Tim’s paper helps in that regard; it’s part of a growing literature around this idea of ‘infrastructural literacy’. This is important, in part, because of the vast amounts of economic and bureaucratic resource that is typically invested in infrastructure. The other key aspect of infrastructure is that it’s inevitably made up of large and bulky kit – roads, bridges, dams, power lines – but often, especially in cities and domestic environments, is also hidden. So it takes a special kind of analytical skill and sensitivity to understand infrastructure, how it works, and how it interfaces with everyday life. This skill will only become more and more pressing on us as infrastructures themselves become more and more complex, conceived, implemented and operated by multiple – governmental, private sector, and sometimes community – agencies. So infrastructural literacy I thought was wonderful.
Second, I also thought that there is another potential heading which is threaded through your paper, perhaps more evident in the written version of your paper, and this idea of ‘blurring the envelope’. Here I think we’re called away from building artefact as such to think about the many envelopes by which we condition ourselves in space. The built envelope tends to be the most privileged in my home discipline, architecture – like Johannes and Jiat-Hwee, we’re trained to think about prioritising the envelope of the building. But we can diversify this idea of the conditioning envelope, of course. We can think about clothing, carpet, curtains, furniture in the domestic or workplace interior. If we pop through the envelope of the building itself to the world around us, we can consider the capsular envelope of the car, the bus, of aircraft and so on. So the term ‘capsular civilisation’ is sometimes deployed in architecture recently. But I think you cited the work of Elizabeth Shove as a scholar literate on issues of the conditioning envelope. By blurring the idea of the envelope, or pointing to the multiple envelopes by which we condition everyday life, we think not only about the various envelope technologies of the envelope, the technical membranes of everyday life, but also how such membranes are practiced. So the envelope is another important theme that was threaded through the paper.

A third theme, which I think is very closely related to the previous one, is the dogged issue about the conventional nature of comfort – and this is related, I guess, to the way that we now know to say that waste is a conventional category. If we imagine that we live between two life-threatening extremes, extreme heat and extreme cold, then we occupy a relatively large zone where comfort, as a cultural category, is negotiated and practiced. I think this is a really crucial thing that the paper identifies. Despite that, it’s remarkable how the way in which we occupy that conventional comfort zone, in fact, in remarkably unconventional ways. We occupy this room in this building, as Johannes was saying, as if it were a kind of arctic zone. So the practices, if you like, of how you occupy the space between life-threatening cold and life-threatening heat, is a key aspect of this discussion. I also think it’s important that your paper activates the science of conditioning too; and I think that’s important in this kind of grouping as well; it’s impossible not to think about questions of science and technology in Singapore of all places. So air-conditioning, I think, inevitably raises both the cultural, technological and the practiced dimensions of everyday life, from the sensitivities of how air touches and wraps around the body to larger questions of infrastructure and, in Singapore, the nation-state.

Turning to two slightly more broader themes that I think are both troubling and kind of interesting. One theme I would be interested to know more about
and would want to talk further on is about cooling as a focus for analysis, as opposed to, or alongside of heating for example. Taken together, heating and cooling, it seems to me, having been thinking about your paper for the last couple of days, is a very charged and interesting pairing. Having recently come from the UK, where heating, I think in many respects, has a kind of moral charge that I think is completely often opposed to that of cooling. In this respect, cooling appears to be a kind of luxury, whereas heating (in colder climates) is a kind of human right. And I suspect that Bachelard, by prioritising categories of warmth in the name of a universal principle, has something to do with this. Or at least, Bachelard might stand for a wider universalising of a culturally specific principle that values of heat, warmth and the idea of the hearth. From the hearth, it doesn’t take too much imagination to consider the collectivity of family, of gathering – you know that story, it’s so well-rehearsed now. But it’s a very difficult story to reverse engineer, and to try to tell it from the perspective of cooling. Cooling seems to be an excess from this perspective; it’s typically placed in the zone of excess, of luxury, of something we should learn to do without. So I think by recoupling heating and cooling, it would certainly complicate the project, but I think it would also enrich the project, and avoid the charge, a kind of post-colonial critique, that a focus on cooling as dilemma of excess emerges from an implicit and normative privileging of heating – I’ll come back to this in a second.

I also think that heating and cooling, in a technological sense, are also deeply connected. The same technology that delivers the cool air in fact is often reversed in to deliver warm air into domestic and work environments. So it can be the same technology. I googled this issue and I could not find a definite answer, but it is a reasonable hypothesis. Related to this is the consequence that the cost of heating and cooling don’t seem to be hugely imbalanced either. Does it follow that the cost to global warming is relatively equitable as well? If so, then the technical rationale for focussing on, apart from the sheer convenience of having to give a paper in twenty minutes, is not so strong.

I think there’s another dimension to this issue which thickens up the wider discussion, and this concerns the morality of heating and cooling. My hunch is that this relates to the way in which heating seems to emerge in the domestic environment, where it is associated with the warmth and comfort of the hearth, to sociality, collectivity, and so on, whereas mechanical air-conditioning, and cooling more specifically, emerged in a commercial environment, which is directly related to the emergence of the high-rise office block in Chicago and New York at the turn of the last century. In this context, air-conditioning emerged as part of a bundle of technologies that enabled the high-rise office
block to function as a viable spatial and infrastructural organisation for work. The passenger lift, electricity, plumbing, later the telephone, and much, much later, digital data in wired and wireless forms were significant components of this bundle. This, from an architectural perspective, goes hand in hand with the emergence of steel framing and curtain walling, so there is an important mini history attached to those key images that you show. And I think this history has ongoing implications for the question of what to do with air-conditioning; that’s undeniably an immense question. So the rough hypothesis I would pose might be hinged on this question: is heating domestic and air conditioning corporate? Is this one of the implicit things that structures our horror for air-conditioning? It’s worth noting that, to fast forward the mini history of the high-rise office block, that Manhattan and Chicago, both early beneficiaries of this amazing conjuncture of technologies, are today, per capita, amongst the lowest carbon footprint cities in the whole U.S.. There is something about the enabling possibilities about those technologies that give high-density urbanism a remarkable effectiveness in terms of the contemporary threat of CO₂ emissions.

The second of these more meta-themes is already covered, or certainly Johannes talked about, and this is the question of heritage. First of all I think it’s important that heritage gets tangled in this discussion of air-conditioning, and I think it’s one of the nice aspects of the paper that you don’t just tell a kind of history of air-conditioning but that you engage with contemporary debates and strategies on what to do about it, in this case through analysis of heritage buildings. The question about heritage however, here in Singapore and certainly in Southeast Asia more generally, raises another question, and that is: whose heritage? Architectural heritage, again I’m sure Johannes would be better able to talk about this, but thinking about architectural heritage and doing architectural history in Southeast Asia is notoriously difficult, in part because the most prominent architectural traditions in the region are timber-based. The colonial architecture and the ceremonial architecture associated with those civilisations that developed under Hindu and Buddhist influence are more likely to survive. So it is often a very partial heritage that remains. Shophouses and other buildings that are ripe for retrofitting represent a specifically colonial heritage, even if this is in itself a complex hybrid condition, and one that often delivers a built fabric that is sensitive to passive and non-mechanical forms of air-conditioning. That said, many Victorian buildings are very insensitive. Many of them were designed in London and built in Calcutta and Kowloon, Melbourne and Wellington, certainly the buildings I know of in places like Wellington and Melbourne often faced exactly the wrong way with regard to passive solar principles. Designs conceived in London and built halfway around the world...
such that the service spaces – toilets, broom cupboards etc. – are most sunlit rooms in the building. So there’s a cultural-political dilemma about heritage, and a related issue of how heritage buildings are located in particular parts of the world.

And a final point: there are interesting possibilities in thinking through the idea of the conditional and conditionality in its various technical, cultural and political aspects. I think you worked through the various aspects of this term ‘conditionality’ in very nuanced ways. I’m a little bit hesitant, however, with the idea of an unconditional modernity, in part because my discipline, architecture, is dedicated to conditioning lived space. And more generally, as many have argued (Bachelard amongst many others!), all occupied environments are conditioned one way or the other. What I think the paper draws out, however, is the multiple technologies and practices by which lived spaces are conditioned – through the images of the fan, the various kinds of furnishings, to the fabric of the building itself and out into the kind of city as well. And I think if we hold on to the art of conditionality, as a negotiated, variable possibility to which we need to re-sensitise ourselves, individually and collectively, then for me it’s a very nice point on which to conclude. Thanks.
The roundtable session began with Prof Winter’s responses to the points raised by the discussants. Prof Winter thanked the discussants for their useful feedback, and acknowledged that it is important to also consider issues around the earth, issues of heating, issues of comfort, and even issues of ‘cooling’ and ‘heating’ foods (with their physiological and psychological modalities of cooling and keeping cool), for the parallels that they might offer. In academic literature on heating as well as on cooling, he observed a move from the body to the building, both in terms of provision and infrastructures, and now cooling issues have also moved from being a luxury to the ways in which it becomes linked to efficiency and an implementation of standards around that. Prof Winter reminded the audience that there are no easy answers, as cooling issues play out in different ways in different locations and contexts, and thus depend on the ways in which legislation kicks in at various points along those pathways, and that therefore heating and cooling may have parallels, but also significant differences.

Prof Winter then responded to the suggestion that cooling ought to be identified as a right to which all are entitled, by emphasising the importance of the question as contributing towards bringing the issues into a wider series of debates that could find answers to when, in which context, for which groups cooling should be seen as a right. In response to the comment that heating is domestic, whereas cooling is corporate, Prof Winter pointed out that in Southeast Asia, hotels as forms of hospitality and domestic spaces were among the first to introduce air conditioning into this region, and that hence cooling has long been associated with domestic spaces. His research on material forms in countries like Malaysia suggests that around 50 per cent of their electricity bill is now connected with air conditioning, and that more rooms are being cooled at quite a rapid pace; that therefore cooling is not only linked to corporate productivity, but that domestic comfort is a parallel history that is worth highlighting.
Finally, Prof Winter reiterated three reasons why his research is focused on cooling rather than heating. First, ongoing and massive urbanisation, with 95 per cent of urban growth in the next 20-30 years coming from the developing world (and Asia leading the surge on that). Second, the scale of AC adoption in Asia has been extremely fast over the last 20-30 years. And third, the comparative (in comparison to heating) lack of analysis and discussion around the cultural, social and political dimensions of air conditioning means it is a very significant theme on its own.

The subsequent open discussion is summarised as follows:

- Dr Chang Jiat-Hwee thanked Prof Winter for the responses and asked for clarification of Prof Winter’s use of the term ‘unconditional modernity’, suggesting that what is needed rather than creating very clear-cut division between pre-conditioned modernity and conditioned modernity is a framework that may be a bit more accommodating of some of these hybridised practices. Prof Winter clarified that his idea of unconditional modernity is a provocative one, and concurred that he needs to expand on and nuance dwelling in urban environments as certain spaces, rather than talking about them as prevailing trends, including the ways in which in-between spaces and ‘recycled’ buildings are being adapted for reuse within a particular material imagination of air.

- Addressing Dr Chandola’s question about aspects that go beyond the visual and infrastructural, Prof Winter acknowledged the thematical breadth of air conditioning, but emphasised that his paper is concerned with the materiality and material imagination of air, and that by setting his boundaries clearly, he may not interrogate everything that is going on.

- Prof Hawkins then raised the fundamental question about the relationship between infrastructure and the material experience of air, and Prof Winter acknowledges that bodily responses and feelings deserve further elaboration. Prof Hawkins then asks about public health issues related to recycling air. Prof Winter clarified that air conditioners typically draw in air from outside, and that the vast majority of AC units don’t actually recycle. Prof Winter then links back to the earlier discussion concerning the ‘heat islands’ phenomena that a lot of cities experience, which is being produced in part because the extractor units are located outside of buildings and the ways in which they are elevating the surrounding temperature. Such spaces are unable to cool down in the evening because of the concrete, the glass, etc.
• Dr Lepawsky asked for clarification on a perceived tension in Prof Winter’s paper, between the ‘materiality of air’ and its immateriality and invisibility. Prof Winter replied that he is positioning his work against the conventional notion of the air as being immaterial, while it appears counter-intuitive that air does have a materiality. He is trying to add to the discussion that there is a whole material culture that has been associated with air and a material world that has been redefined and reconstituted to it.

• In reference to Prof Winter’s paper and its three sections (pre-conditional, conditional, and unconditional modernity), and drawing on a recent example regarding urban renewal in Shanghai, Dr Marolt finds that in many parts of Asia there are ongoing negotiations between the pre-conditional modernity and the conditional modernity, e.g. in terms of which buildings to tear down and what comes next. He invites Prof Winter to reflect on the extent to which we would need to focus more on unearthing and contesting political narratives in order to better understand what it would take to move towards his ‘unconditional modernity’. Prof Winter acknowledged that in the paper he has neither picked up on the role of markets and market creation, including the production of the idea of cooling and the ways in which companies are doing that, nor has he incorporated state-driven responses and bottom-up responses around alternatives, and the ways in which people have now incorporated these into their daily rhythms and ways of dwelling in cities. He added that more debates around that at various levels would be productive.

• Dr Choudary reminded the audience that more and more elegant buildings, all across tropical parts of Asia are air conditioned buildings, and that at the same time we are defined by the market. Prof Winter responded that air conditioning related issues are so complex exactly because debates slip across many types of debates around the environment and sustainability issues, and that many of the issues brought up in the discussion bear upon the issue of sustainable architecture, as one of these extremely difficult and challenging questions. But rather than complaining and saying, ‘well, this is such a nightmare’, he has been trying to put together a research project that attempts to examine what are the spaces of intervention, where do those possibilities arise and what are the kind of barriers that exist. He reduced the issues in the context of this paper because we are thinking about ‘Recycling Cities’, and in that context he wanted to elaborate on the possibilities and limitations connected to recycling existing buildings and building stocks.
Dr Gandy suggested that looking at the political ecology of air might facilitate linking together the circulatory dynamics of capital of urban space and these technological systems and structures and also link to Dr Lepawsky’s concern about materiality and immateriality and what air is precisely as a kind of biophysical entity and its relationship with urban space and the urban body. He also noted the possibility of a historical periodicity, and wondered to what extent the issues discussed in Prof Winter’s paper are specific to this region, or might be indicative of wider trends. Prof Winter clarified that he indeed deems political ecology an important frame, which is pursued in other aspects of the project. Alluding to histories of sweating, clothing, the fan, and housing designs, Prof Winter suggested that there are manifold issues that are specific to Asia, and that he is planning to pursue this further.

It was noted that, in addition to air conditioning being linked to issues of comfort or status, there are also issues of air quality, particularly in urban China, where it would be detrimental to people’s health to shut off the AC and simply open the window, and that maybe it would be socially and environmentally responsible to enact rules that call for setting the temperature within certain temperature ranges. Prof Winter responded that creating a balance of indoor and outdoor spaces is contentious, and reiterated that he does not see any easy solutions. Another member of the audience suggested that the questions to ponder include whether or not we should be using air conditioning at all, and whether the heat produced could be feasibly utilised. Prof Winter agreed that the issue of reclaiming lost energy is an important one.

Dr Emily Potter stressed the importance of Prof Winter’s discussion of imaginaries, and raised the question of how more sustainable imaginaries could be generated. Prof Winter pointed out that imaginaries are becoming more nuanced, and that there are interesting developments and counter trajectories, such as in the tourism industry, where luxury is getting redefined and is now increasingly associated with putting you back into nature, without any air conditioning, and that such examples offer all sorts of spaces where we can be more optimistic about emerging alternatives.
• Cindy Godden-Bryson pointed out that by closing doors and windows, we no longer open ourselves to the impromptu relations with neighbours and strangers. Prof Winter agreed that the reconstruction of public and private space is very important, and noted that notions of privacy and familial relations are very prominent in this context. He suggested that methodological attempts range all the way from detailed ethnographic studies of building inhabitants, to political ecology, looking at the city as a whole, or the ways in which markets are created. Dr Lepawsky suggested as topic for further studies the crucial role of air conditioning in cooling machines of the information economy. Prof Winter acknowledged that there are many material dimensions to air conditioning, but that these dimensions do not only pertain to cooling, but also to humidity levels, and that some of the drivers of this are connected to considerations of preservation, particularly of paper and books.

• Prof Hawkins suggested the possibility of ‘air publics’, as a more human sort of political ecology, and mentioned that environmental education and other campaigns have begun to visualise and imagine possibilities of change in daily habits and practices. Prof Winter emphasised the importance of visual means such as photography for raising public consciousness and participation with regard to responsible uses of air conditioning, in an attempt to give some of the control over living environments back to the consumer in the process.
CONCLUDING REMARKS

Tim Bunnell: We’ve managed to maintain, I think, a consistently high standard of discussion across the two days. I will hand over to both Michelle Miller and Peter Marolt to make summary comments.

Michelle Miller: It’s hard to know where to begin. There have just been so many wonderful conversations and it’s hard to try and pull it all together. But, very briefly: we’ve looked at products—plastics, water and e-waste—and some of the overlaps of these processes of consumption and transformation, especially in relation to plastics and water of course. We’ve also learnt about processes, especially the informal sector of waste pickers and, this afternoon, the built environment including changing infrastructures and architectural heritage issues as well as some of the moralities of contemporary citizenship and environmental citizenship which have permeated all of the papers to varying degrees. Some but not all of the strands and common threads weaving through these papers have included adaptive re-use, knowledge economies and new material and immaterial imaginaries, human and more-than-human imaginaries and political ecologies as well as non-human forms of agency. We’ve discussed assemblages, boundaries and the often-blurry and contested edges, centres and peripheries of production and reproduction.

In the last session, Tim Winter led us in a discussion of conditional, pre-conditional and unconditional modernities and I think Matthew Gandy asked a very useful question: what can developments in this period of late modernity, as you called it, in Asia tell us about wider trends beyond the region in other parts of the world and what are some of the possible implications of these emerging trends? At some point in all of the discussions, we explored different structures and processes of inclusion and exclusion. These were according to age, gender, class, community and familial relations and so on and this, of course, goes to the heart of the politics of recycling and the attendant categories of belonging such as environmental citizenship, levels or degrees of consumer citizenship according to class differentials; gendered roles and responsibilities, especially in informal recycling processes; issues involving child labour in different contexts; formality and informality; and the spheres of legitimacy, illegitimacy, and quasi-legitimacy in the recognised and unrecognised practices and processes of recycling.
Geographically, of course, we’ve learnt about recycling in multiple and sometimes interacting Asian empirical contexts—Hanoi, Chennai, parts of Africa and North America, China, Phnom Penh, Penang and Singapore among others. And, through the papers and discussions, we’ve explored many of the tensions between materiality and non-materiality, visibility and invisibility, in the patterns, processes and modes of production and the footprints of recycling. We’ve also considered a lot of very potent visuals, beginning with the wonderful photography of Tim Winter and Cindy Godden, and then moving on to motherboards, garbage dumps, recycling plants, urban architecture, sweat, mosquitoes, flies. All of these things are brought together under the roundtable title “Recycling Cities” or the relationship between recycling and varying forms of the urban as it occurs in villages, in towns, in cities, in homes, in offices, in waste dumpsites and of course the public, private and personal spheres and spaces within these urban and periurban environments.

Peter Marolt: I’ll just talk about one specific absence that I kind of felt came up again and again, more in the papers than in the discussions so we kind of felt the absence and reacted to it in the discussion. I’m not sure if any of you agree but the absence that I saw had to do with the political and with action, with intentionality. So clearly you know, in my opinion, and Lefebvre’s opinion, politics is always there, it permeates everything, everything is political. So it makes sense to always think about it also as ever-changing, as being constantly reshaped by an ever-changing set of actors. Also, the way it is being reshaped is not only happening in traditional forms, there’s the new idea of media politics where specific new actors and media make us believe things about plastics, e-waste, water, waste picking, sustainable air conditioning, that, in a way, shape our ontological perspectives. And so, in a way, this means it’s up to us to imagine political meanings in new ways. So, social theories, in my opinion, reflect back on my thought that maybe there is a lack, not just in our discussion but in the theoretical literature. Social theorists have created and developed a theory around social action but I couldn’t find much about a theory of action that would encompass, incorporate issues, not only around individual consciousness and human agency but also more-than-human agency, and a theory of action that maybe could grasp the amalgam that constitutes person, acts, stuff, and politics that weaves it all together. And so, probably one reason why such a theory doesn’t exist is because those kinds of analyses that would try to adapt or use the theory would be too laborious to actually do because it gets too complex. But on the other hand, it might be useful to at least imagine or rethink the ways in our own works how the political is changing and whether
this needs to be brought into our work. Steve Pile wrote that individual consciousness is conceptually separate from social transformation, and so I think that’s probably the reason why our discussions always alluded to the political and to the shifting political meanings but we haven’t reached a conclusion there. Maybe that’s something we can continue to discuss. Thank you.
PROGRAMME

PANEL 1

RETHINKING RECYCLING: THE MATERIAL COMPLEXITIES OF PLASTICS WASTE IN HANOI

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ROUNDTABLE 1

DEALING WITH PLASTIC WASTE
The material and social organisation of plastics waste recycling.
PANEL 2

-CENTRICITY, PERIPHERY, BOUNDARY, AND EDGE: ASSEMBLING URBAN ORDERS FROM RUBBISH ELECTRONICS

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ROUNDTABLE 2

ELECTRONIC WASTE

The geographies of electronic waste products.
PANEL 3

RECYCLING PRACTICE: RAINWATER HARVESTING IN CHENNAI, INDIA AND THE POLITICS OF WATER PROVISION

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ROUNDTABLE 3

RECYCLING WATER

Water recycling practices and knowledge in Asian cities.
PANEL 4

WASTE PICKERS IN ASIA: CONTESTING VALUE AND VALUES

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ROUNDTABLE 4

INFORMAL SECTOR RECYCLING PRACTICES

The role of the informal sector waste pickers.
PANEL 5

RECYCLED BUILDINGS: CHALLENGING SUSTAINABILITY IN AN ERA OF AIR-CONDITIONING

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ROUNDTABLE 5

TOWARDS SUSTAINABLE URBANISM
Socio-cultural dimensions of sustainable urbanism.
CONCLUDING REMARKS AND DISCUSSION

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