From waste to resource: the trade in wastes and global recycling economies

Nicky Gregson & Mike Crang

Affiliation for both authors:

Department of Geography, Durham University, Lower Mountjoy, South Road, Durham DH1 3LE, UK

Email addresses:

nicky.gregson@durham.ac.uk

m.a.crang@durham.ac.uk

Corresponding author: NG – contact as above (++44 191 334 4683)

TABLE OF CONTENTS

KEYWORDS (NOT IN TITLE):

municipal waste; sustainable consumption; waste-pickers; global environmental justice; resource recovery; Global South.

ABSTRACT

We outline the frameworks that shape and hold apart waste debates in and about Global North and South and that hinder analysis of flows between them. Typically waste is addressed as municipal waste, resulting in a focus on domestic consumption and urban governance, and a resulting emphasis on cities and the national scale. The prevailing ways of addressing the increasingly global flows of wastes between North and South are those of global environmental justice and are underpinned by the geographical imagination encoded in the Basel Convention. New research on the trades in used goods and recycling in developing countries challenges these accounts. It shows that arguments about dumping on the South need revision. 'Wastes' are secondary resources for developing countries, 'harvesting' them is a significant economic activity, and consequent resource recovery is a key part of the global economy. Four areas of further research are identified: (1) changing patterns of global 'harvesting'; (2) attempts to re-scale resource recovery and the challenges faced; (3) the geopolitics of resource recovery; (4) changes in resource recovery in developing countries.

1: INTRODUCTION

Most research on waste in the social sciences springs from environmental concerns and examines it at the national scale. Social science work also pays little regard to the physical materials, or materiality, of waste which remain largely the preserve of the technical and engineering disciplines. Such social science research on waste in developed countries focuses almost exclusively on post-consumer or municipal waste, and research is positioned largely in one of two domains: environmental psychology and environmental governance. In contrast, a growing body of work in sociology, human geography and cultural studies has also recently turned its attention to waste. It takes its cues from different theoretical traditions, positioning municipal waste as a dynamic social and cultural category, and as the outcome of social practices. Work on waste in the Global South has also addressed the generation of municipal waste, but here the prevailing paradigms are those of governance failures in the cities of the South and the focus is often on informal waste scavengers, or waste-pickers, and their relationship to changing forms of urban politics.

In work on both developed and developing countries the tacit assumption is that wastes occur where they are produced, typically by consumers living in cities. As a result, the wastes of the Global North and of the Global South are treated as largely unconnected and the work of recovering wastes for recycling is largely understood as occurring at the local or municipal scale. The last two decades, however, have been characterised by a large, and growing, international trade in used goods and discarded materials, or stuff that is often categorised as 'waste' – although this classification is frequently disputed. By 2011, for example, 80% of the value of the UK's paper product exports to China were scrap, 66% of the metals (mostly copper), and 20% of all plastics exported were also scrap. Moreover, much of this 'waste' is associated with industrial products and by-products of processing, not domestic consumers.

Debate on trade in waste from developed to developing countries has, until recently, been framed by the environmental justice paradigm. In this reading, the wastes of profligate western consumers and of the throwaway consumer societies of the Global North are a form of neo-colonialism as they are dumped on the peoples and environments of the Global South. In economic terms, the environmental costs of consumer society are seen as being externalised through using nature in the Global South as an uncosted sink. Recent research on global recycling has challenged these accounts, showing them to obscure a complex global trade in secondary resources and their recovery for further rounds of manufacturing. Whilst high profile instances of toxic waste dumping continue to grab media headlines, these are the exception rather than the rule. We will introduce in later sections how wastes are instead harvested by networks of buyers and traders from the South in the Global North. They are then shipped to the South, where they are processed and recycled into yet more manufactured goods, many of which find their way back to the Global North – either as new consumer goods, or as packaging for those goods. In this way, new research has highlighted the importance of the global scale for understanding waste. It has also shown the importance of materiality to anticipating how, where and why wastes are transformed to become resources. Furthermore, it has not only challenged prevailing environmental accounts of waste but also has complicated, and even upturned, understandings of the relationship between Global North and Global South. As Alexander & Reno (2012) state: 'familiar economic geographies and understandings of how the global economy works are upturned as the developed North becomes a source for scrap/raw materials; marginal regions add value before (re)finished goods are sold, sometimes back to where they came from' (p4) [1].

2: NORTH AND SOUTH IN WASTE DEBATES

2.1: Waste in the Global North

2.1.1: Post-consumer municipal waste, environmental psychology and environmental governance

There is a large literature which, from Vance Packard's *The Waste Makers* [1960] onwards, has positioned waste as the effect of over-consumption, resulting from profligate consumers in the Global North and a built-in product obsolescence [2, 3, 4, 5]. Mountains of waste, both literally and metaphorically, are used as evidence of a waste crisis in the Global North and as the material testimony that throwaway societies are rapidly depleting global resources. When placed in landfills, discarded wastes contribute to greenhouse gas emissions, and so waste is conjoined to climate change. Environmental policy in the Global North has sought to intervene in ways that connect these two policy domains, seeking to divert materials from landfill, through the promotion of recycling. In such a way, household-based collections of 'dry-recyclables' (paper, card, glass, aluminium cans and certain plastics) have become commonplace across the Global North. Latterly, at least in certain nation states, there have been moves to ban organic materials, which include food waste, from landfill.

As environmental policy has promoted recycling, so waste research examined its uptake. The focus has been on attitudes towards recycling and recycling behaviours. A large number of studies since the 1990s have identified social, economic and demographic predictors of (non-)participation in recycling schemes. The focus for the most part is on national case studies, and within that, typically, within-city or across-cities comparisons [e.g. 6, 7, 8, 9, 10, 11, 12, 13, 14]. This body of work assumes that differing attitudes (or values) determine the behaviours that individuals adopt, in this case towards recycling.

Research in this tradition has gone beyond the early association of pro-recycling behaviours with certain types of households (e.g. older, higher income, those living in houses rather than flats or apartments [15]) to examine perceived 'problem groups' of transient populations such

as students [16], and to examine recycling beyond the home in commercial institutions [17]. It has also sought to identify sustainable lifestyle groups by connecting everyday reported recycling practices to other sustainable behaviours, including energy saving, water consumption and 'green' consumption [18, 19, 20].

Work in this environmental psychology paradigm has been highly influential in environmental policy circles, where Elizabeth Shove has shown 'ABC' (or attitude, behaviour, choice) thinking to prevail [21]. She argues in relation to UK climate change policy, but it equally well applies to waste policy, that framing environmental issues 'as a problem of human behaviour marginalises and in many ways excludes serious engagement with other possible analyses' [21, p 1274 – see section 2.1.2). The 'ABC' framing also focuses attention on strategies of intervention seeking to modify individual behaviour, by resolving a putative 'value-action gap' in terms of better information and/or knowledge [e.g. 22]. In such a way, research has turned to evaluate the effectiveness of different forms of information or incentives for improved public participation in recycling schemes [23, 24, 25]. As the emphasis in waste policy has shifted further up the Waste Hierarchy to focus on minimisation and prevention [26, 27] alongside recycling, so work on attitudes and behaviours has begun to examine these, and to highlight the differences between attitudes and behaviours with respect to reuse and prevention on the one hand, and recycling on the other [28, 29, 30, 31].

If environmental psychology is one of the dominant paradigms framing research on municipal waste; the other is environmental governance, which has been argued to be the primary organising concept and priority area for much environmental research in human geography [32] and the allied disciplines of planning and urban studies. Early work on waste in these fields focused on policy making, rather than implementation, and highlighted 'barriers to' as the means to analyse the problems faced by waste policy [33, 34]. More recent

research has continued to focus on policy making but has positioned this within broader debates about the configuration of the state [35]. It has turned to the meta-concepts of governance, modes of governing and governmentality to frame its analyses [36, 37]. These perspectives focus on the range of actors shaping waste management within given nation states, including publics and NGOs alongside municipalities, the private sector and government [38, 39]; they emphasise the importance of multiple, simultaneously interacting scales; and they highlight distinctive modes of governing waste: disposal, diversion, eco-efficiency and resource. They also have a wider interpretation of the policy process than that which featured in early environmental research, extending this from a narrow concern with policy-as-defined (or, what Bulkeley et al. label as a 'linear, technical-economic model of the policy process' [35 - p 9] to encompass the social, cultural and political practices of policy implementation.

Notwithstanding their differences, there are two points of connection between waste debates framed through the environmental psychology and environmental governance paradigms. The first is the close attention paid to the shifting contours and content of environmental policy in relation to waste management mostly at the national but, where appropriate, also supra-national levels, such as in the case of the EU [40]. The second is the focus on households as the key target of policy implementation for local authorities or municipalities. Given the prevalence of 'ABC' thinking, the success, or otherwise, of municipal scale intervention is often understood by municipal actors as shaped by household attitudes and behaviours. However, research informed by environmental governance argues that attitudes and behaviours relate to the materialisation of policy in particular configurations of infrastructure (such as bins, collection rounds) at the municipal scale [41, 42]. In the terminology of Steve Woolgar & Daniel Neyland, waste bins become a form of 'mundane governance', or

governance through ordinary objects [43]. Furthermore, the household scale is but one aspect in the multi-scalar governance of waste.

In this way, waste research framed through environmental governance has distanced itself from the environmental psychology paradigm. It has looked not just to work in political science to strengthen understanding of the ways in which environmental governance relates to the state but has also made connections to wider bodies of literature in the social sciences on socio-technical systems and the importance of social practices (see Section 2.1.2) and on the scaling of waste governance. In the former regard, the work of Simin Davoudi on the UK has been particularly significant [44]. Davoudi emphasises the role of the region in rescaling the UK's environmental governance. She argues that the regionalisation of waste demonstrates the resilience of spatial Keynesianism and illustrates how redistribution relates not just to 'goods' but also to 'bads'. This, she argues, is 'best conceptualised as the state's ongoing struggle to secure new 'spatial fixes' to manage the inter-local tensions over the redistribution of environmental bads within an EU policy framework' (44 – pp 152-3]. As such, her work makes connections to another body of work that has been highly influential in shaping debates on waste: environmental justice and waste management framed as reducing harms (see Section 3).

A key characteristic of the environmental governance literature is that it sees waste as self-evidently waste. It defines what is managed as waste as self-evidently waste, and sees waste as stuff that must be managed [45]. In contrast, a small but growing literature in the humanities, sociology and human geography has problematised this definition of waste by locating it within circuits of consumption.

2.1.2: Waste as the fall-out of consumer practices, and the connection to political waste regimes

A growing body of research positioning waste in consumption practices poses a challenge to the environmental psychology paradigm, with its emphasis on individual behaviours and choices, and to much research on consumption, which has focused on acts of purchase and acquisition. It argues that as much is to be learnt about consumption through the devaluation, divestment and disposal of goods, and it is here that the connection to waste is made. Critically, though, in these readings waste is an effect, or consequence, of how something is disposed of, not an innate property of particular materials nor harmful stuff that has to be tamed. In short, waste is not; rather, it becomes.

The key contributions to shaping this field have come from Nicky Gregson and her colleagues, Kevin Hetherington and David Evans, all of whom have worked in the UK context [46, 47, 48, 49, 50, 51, 52, 53]. Their work builds on earlier waste scholarship [54, 55, 56, 57] to show how waste is a dynamic social category, intimately related to how identities are performed but also embedded in, and falling out of, the routines and practices of ordinary, everyday social life, for example: shopping, parenting, cooking, cleaning, doing the laundry. For these researchers, to understand waste involves understanding consumption practices. Further, their research focuses attention on the conduits by which devalued things, and stuff, can be 'moved along', be that through bins that define such things or stuff as waste, by moving them towards landfill, energy recovery or recycling, or through a range of alternatives that are assumed to rekindle and revalue discarded things by connecting them to new social lives. These alternatives include a variety of online and face-to-face exchange forums (e.g. eBay, Gumtree, car boot sales or garage sales), the 'hand-me-down/around' economy of social networks, and the gift economy associated with the unknown, but assumed to be deserving, poor (e.g. charity shops, thrift shops, swap shops and re-use outlets [58, 59, 60]).

Taking its inspiration from anthropological, cultural and sociological theory, this approach works with a key distinction, which is that between surplus and excess, and draws attention to the importance of what Gregson terms 'the gap in accommodation' [46]. The importance of this for work on waste management is that it is the category of the excess which connects things or stuff to the conduits that in turn connect to the waste stream: bins. In contrast, surplus things are either held on to, as household stocks, or got rid of through conduits that are imagined to revalue them. The combined work of these researchers shows how waste is an effect of social life (for example, generated by separation, death, moving house, or major home renovation and redecoration) and an effect of the entwining of materiality and the social in the case of food that is allowed to quietly decay, become 'risky' and then, as discourses of safety trump those of caring for the environment, legitimately placed in the bin, as food waste [61]

A key contribution of this research is that it demonstrates the poverty of conceptualising waste through individual consumer behaviours. As such, it provides a critique of the kind of 'ABC' thinking that shapes waste policy (2.1.1). Instead of individuals and choices, it highlights that effective policy with respect to waste reduction, minimisation and prevention needs to address the social and material conditions that generate it. Rather than blaming the consumer, and engaging in a politics of morality and moralising, this research argues that as policy moves up the waste hierarchy it needs to 'cross the threshold' into the household [62] and engage with consumer cultures and the socio-temporal practices that constitute consumption [63].

This research also highlights that the material transfer of waste from private households to waste management infrastructure also transfers its legal and economic status [64]. Households are, effectively, transferring ownership of their discard to whoever has the collection rights to their bins. This point is recognised by Martin O'Brien in his contribution

to a special issue on food waste [65]. Rather than focus on household practices, O'Brien shows how, on being discarded, food waste is no longer food waste but rather has been transformed into feedstock for the generation of new commodities, in this case renewably-generated electricity and bio-fertiliser [66].

The same argument provides the starting point for much of the research produced under the auspices of the Waste of the World programme, funded by the Economic and Social Research Council in the UK (see Section 4). Both sets of research argue that, whilst household practices undoubtedly matter to understanding municipal waste generation, they only go so far. Rather than tracing discard back into the households that generate it, following the conduits that connect households to waste management infrastructure allows research to recognise that what appears, from the perspective of households, to be their discard, is actually the raw materials for endless cycles of further commodity production. Through its placement in certain bins, discard is transformed: what is waste has become resource. The question is whose resource is this?

O'Brien's work uses the example of food waste in supermarket bins and the legal cases brought in the EU against 'freegans' or 'dumpster divers' to show the transformation of waste from a property of the commons to private property. This approach shows the collision in values between political activists, who appropriate waste for redistributive purposes and/or as a critique of the profligacy of contemporary consumption [67, 68, 69], and the alliance of interests that constitute waste as private property [70]. Further, it shows that waste policy is not best conceptualised as a reaction to the problem of capitalist surplus but rather contributes to constituting that surplus, by transforming waste from non-accumulating to accumulating capital [65 p 206]. In making that argument, O'Brien returns to old debates in Marxist political economy but in more general terms, his point is that acts of placing discard are acts that position stuff in a regime which governs who profits from this, and what happens to it. In

that regard, his argument has affinities with the concept of waste regimes developed by Zsuzsa Gille in relation to Hungary [71] and subsequently applied by other researchers to other contexts [72].

Gille's idea of 'waste regimes' is a dynamic, macro-level concept which analyses the production, circulation and transformation of waste as materials with differing specific properties that render them amenable to different operations [73]. Her argument is that wastes are much like resources: certain wastes will be considered valuable by particular societies and others not. Societies will lay down which those wastes are; they will constitute principles of valuation; and they will identify mechanisms for resolving value conflicts. Which wastes are considered valuable varies according to different regimes. In these terms the transformation which O'Brien describes is a transformation in a (municipal) waste regime, in which certain waste (food in this instance) has become resource and in which the social relations of waste's production have shifted, from a public service provided by municipalities to one in which households generate raw materials for further capital accumulation, and provide the unpaid labour to sort them.

Like so much waste research, the focus of work on waste regimes has to date been nationally bounded. The tendency is to equate regimes with nation states – something which is as much an effect of the sociological imaginary as it is of the institutions that govern waste. Gille acknowledges this, when she states: 'we need a more nuanced understanding of how local and national waste actors and practices deflect or use global ones' [73 - p 1062], and we turn to this in Section 2.3. First, however, it is important to establish how waste has been researched outside the Global North and particularly in developing countries.

2.2 Waste beyond the Global North: waste-pickers and the crisis in urban waste governance

Research on waste in the Global South and the emerging economies has had little to do with consumers and households. Indeed, studies of household segregation and recycling behaviours are only just beginning to appear in the literature [74, 75, 76, 77, 78]. Instead, research on waste has focused much attention on waste-pickers, or scavengers. There have been two waves of such research. The first, in the late 1970s to mid-1990s, was positioned in the paradigms of development studies. This research began from the visibility of waste-pickers in public spaces in the cities of the South. It characterised and classified waste-pickers; it explained their presence in terms of rural-urban migration, and it positioned waste-picking within analyses of the informal economy, and within ethnically, racially and gender-segregated labour markets [e.g. 79, 80, 81, 82]. The second wave of research post-2000 is coincident with growing concerns about a 'waste crisis' in the Global South consequent on both urban expansion and increasing scales of consumption and new types of materials in consumer discards. Solid waste management (or, municipal waste) is widely acknowledged to be one of the biggest challenges facing Southern cities [83]. The inability of municipalities to handle the waste being generated is seen not only as a crisis in waste governance but also as deeply symbolic. Mountains of rubbish are here taken as emblematic of the crisis facing 'developing cities' and as evidence of their inability to be modern [84]. They also challenge the legitimacy of the state, which is predicated upon capacities to create order; the presence of waste and rubbish has been mobilised by citizens, through strikes and public acts of dumping [85]

Current research on waste-pickers can be characterised as follows. First, there is a large volume of literature describing and classifying waste-pickers in specific Southern cities. Typically, this work surveys waste-pickers working at city dumps and on city streets and focuses on the single city case study [e.g. 86, 87, 88, 89, 90]. It reiterates many of the findings of the earlier wave of literature in development studies. Secondly, another large

body of work focuses on the importance of waste-pickers in systems of urban waste governance in the South. It argues that waste-pickers play a valuable role in Southern recycling and, as such, should be integrated into formal municipal waste management systems, but that to do so they need to be upgraded [91, 92]. The means to this is argued to be to establish waste-picker co-operatives in partnership arrangements, be that directly with municipalities or as collaborations with NGOs and international aid agencies [93, 94, 95, 96]. A growing literature has examined these co-operatives in a range of cities [for surveys see – 97, 98] producing a mix of positive and negative evaluations of waste-picker co-ops in contemporary urban waste governance. Positive accounts frame waste-picker co-ops as both a poverty-reduction strategy and a waste management strategy; they relate this to arguments of social justice, and they tend toward a celebratory account of the creative cultural politics afforded by working with waste [99, 100, 101]. More critical accounts go back to the insights of Mary Douglas with respect to dirt and social order [54] to highlight the ambiguities between waste work and development [102, 103]. Alternatively, accounts seek to position informal waste-pickers as exemplars of and/or challenges to neoliberal urban governance. The latter accounts point to the 'globalisation of garbage' in the municipalities of the South, as contracts are won by multinational waste management companies, often from the Global North. They emphasise the casualisation of sub-contracted co-operative labour, and point to the sanitisation, and displacement and re-settlement of urban waste workers, and they highlight the deleterious effects of these changes on the livelihoods of well-established groups of waste-pickers such as Cairo's Zabaleen [104, 105, 106, 107, 108, 109, 110, 111].

The overwhelming majority of research conducted on waste-pickers in the South confines attention to acts of picking and who is doing the picking, in which social relations, and it positions this in the frame of urban governance. As a consequence, it analyses waste management as symptomatic of urban governance trends. The privileged scale of analysis

here is the city. In contrast, a very small number of studies either take explicitly, or begin to recognise the importance of, a political economy approach to waste-picking in the South. The most significant is the work of Kaveri Gill on Delhi [112, 113 and see too, 114]. Her work highlights the significance of the recycling value chain. Correspondingly, she focuses on the connections, as exchange relations, between waste-pickers and dealers and traders in recovered materials, and the further exchange relations between those dealers/traders and domestic manufacturing industries, which are the means to reprocessing recovered materials. Gill's work points to how value is made in recycling – not just through collection, but also through sorting, separation, preparation and treatment, and then through compaction and packaging, and storage. Key here are the grades and typologies, or the classification systems, which order sorting and separation activities. These are closely guarded commercially, being the key to competitive advantage, but by paying attention to exchange relations between pickers and dealers and traders, Gill shows that what is presented in the urban governance literature as a casualised labour relation is actually long term, and embedded – at least in the case of Delhi's waste-pickers. She shows that waste-picking needs to be understood through the relations of economy to society.

2.3 Connecting North and South in waste: North-South flows of ideas, capital and materials

Research on waste differs substantially in its focus, depending on its contextual domain. In the Global North it is framed as a problem of consumption; in the South it is understood in terms of poverty, labour and a crisis in urban governance. These framings are indicative of the pervasiveness of meta-level understandings of the global economy, in which production occurs outside the Global North, which is the primary site for the consumption of goods. A small body of literature has begun to challenge this separation in waste research, pointing to

the intricacies of the connections between North and South, and to the North-South travel in ideas, capital and materials.

2.3.1 Flows of ideas

The travel in waste management ideas connects to the crisis in waste governance in the South. As partnerships between NGOs and international agencies have been established with co-operatives and municipalities in the South, so a notion of 'good garbage governance' has taken hold which sees such partnerships as normative [109]. At the same time, particular understandings of what constitutes appropriate, and efficient, arrangements and configurations of waste management infrastructure have also taken root. An example is the waste transfer station. Zapata-Campos & Zapata highlight how the idea of the waste transfer station (a point to which collected materials are taken, for consolidation and/or sorting for onward transportation, either to disposal sites or recovery operations) has gained purchase in the South. This travelled through key international agencies (e.g. UN Habitat) and consultants' models, and has been applied successively in China, Vietnam, Egypt and Nicaragua, to date [115]. Waste transfer stations are integral to highly mechanised, capital intensive waste management infrastructures and are commonplace in the Global North, where they handle large volumes of waste materials on a daily basis. They also rely on a dense truck-based collection network, to transport materials to and from the transfer station. An open question, however, is to what extent such arrangements are appropriate in the cities of the South. Not only is there the problem of a dense urban fabric and road network unsuited to large trucks but there is also the question of how an arrangement geared towards efficiency in materials flow relates to more labour intensive waste-picker cooperatives and micro enterprises. Furthermore, the introduction of waste transfer stations – typically on the edge of informal settlements – brings with it another level of siting controversy, as people see these facilities as the proliferation of 'dumps' rather than as materials recovery facilities.

2.3.2 Flows of capital

Allied to the North-South traffic in ideas about appropriate waste management infrastructure is the North-South flow of capital. Critical research on the privatisation of waste management by municipalities in the South points in passing to the awarding of waste collection contracts to multinationals from the Global North. It does not go on to make the obvious connection, which is that these contracts are important emerging new markets for globalising, rather than national, waste management businesses. These firms are looking either to expand beyond the municipalities of the Global North, and become global waste management multinationals (e.g. Veolia), whose scale and size of operations is on a par with global firms in the manufacturing sector. Waste management, then, is now a global business and is often allied with parallel interests in the utilities sector, particularly water, where the financial underpinnings to the business are similar to those of waste. Headquartered in the Global North, and with an understanding of waste management that comes from these cities, these firms offer the promise of upgrading and modernising municipal waste facilities in the cities of the Global South, including closing old dumps and replacing them with 'sanitary landfills' and incinerators. What tends to transpire, however, is a familiar story of North-South technology transfer that can struggle in new and unfamiliar contexts. In this case, the material composition of municipal wastes (more organic matter content, and higher humidity) compromises technology's performance. Often it is also a story of contradictory logics, in this case between hygienic waste management, which favours capital intensive arrangements, and the poverty-reduction programmes favoured in the post-Millenium Development Goals context, which see waste and allied recovery activities as livelihoods and survival strategies for poor people. To this needs to be added the constitution of the people and cities of the South as a guaranteed, long term source of revenue for multinationals based in the North. Through long term municipal waste collection contracts, waste generated in the Global South

becomes the means to large financial flows from South to North and the means by which value in global municipal waste is becoming increasingly concentrated in large utilities TNCs.

2.3.3 Flows of Wastes

A final North-South connection that is obscured by the literature's focus on the distinctiveness of waste in the North and South is the material flows of 'wastes' from the Global North to the Global South. These flows have expanded dramatically since the late 1990s, so much so that they comprise the largest exports, by volume, from the major economies of the Global North.

[RELATED RESOURCE 1].

Linear conceptualisations of economies see these exports as the dumping of wastes on the countries and peoples of the Global South, where waste management facilities are seen to be inadequate for their own wastes, let alone those generated by the Global North. Such understandings are the basis for environmental justice accounts of how wastes connect North and South. These global environmental justice accounts are the prevailing paradigm shaping global waste debates. We turn to these in the following section.

3: TRASHING THE SOUTH? GLOBAL ENVIRONMENTAL JUSTICE AND ITS CRITIQUE

Reviews of the considerable literature in environmental justice show that waste has long been a key concern [116, 117, 118]. One of the founding disputes in the environmental justice movement was the protest in 1982 over the hazardous waste dump at Warren County in the US [119]. Early work highlighted the polluting wastes of manufacturing industries and their effects on environmental health, as well as controversies over waste management

infrastructures, where anti-incineration campaigns have been a backbone of studies linked to NIMBYism and locally unwanted land uses (LULUs) [120]. These concerns continue in the current literature [121, 122, 123, 124].

Waste's prominence in environmental justice research reflects its identification as an environmental 'bad' and an approach to waste that sees it primarily as potentially harmful (c.f. Section 2.1.1). The geographical distribution of wastes has been key to demonstrating the greater environmental burden carried by lower income groups and people of colour and hence to demonstrating environmental injustices [125]. It has also underpinned the development of the concept of environmental racism [126]. There have been hundreds of studies of wastes as environmental injustice, the vast majority of which focus on waste sites per se, or waste as pollution. Most take cities in the Global North as their case study sites, with the majority being US-based. They can be characterised as taking one of two approaches. The first is concerned with distributional equity, and uses quantitative, and increasingly GIS-based, approaches to map environmental risk alongside which population groups are subject to it. The second follows a procedural approach to equity, and uses largely qualitative approaches to examine the social movements that have opposed environmental injustices.

Research in the environmental justice tradition has also encompassed global environmental justice and environmental justice in the Global South, although the volume of research here is significantly smaller. A growing set of still largely qualitative case studies of environmental justice in the cities of the South has used the siting of waste management infrastructure as the basis for examining injustices [127, 128]. It has highlighted how the different social and political fabric of Southern cities disrupts understandings of injustice that are grounded in US cities. Another strand of work, particularly in Latin America, is firmly embedded in social movement analysis, locating this within the strong activist and participatory traditions of

social justice research that prevail there [129]. The vast majority of this work, however, is either nationally bounded or cross-comparative in nature. There are two exceptions to this. First there is a set of work on trans-border environmental justice, in which the US-Mexico border has been the paradigm case [130, 131, 132, 133, 134, 135]. It focuses on the Mexican maquiladoras and interprets the location of US TNCs as a shift of the environmental burden of production and waste disposal from the US to the Mexican side of the border. Grineski & Collins argue that this results in a very different, and highly unequal, cross-border environmental risk profile [135]. Secondly, there is research which has examined the global export of wastes from the Global North to the Global South. The key work here is that of Jennifer Clapp [136] and David Pellow [137, 138]. Their research has examined the work of NGOs in formulating the Basel Convention and later Basel Ban, which are the major international instruments for regulating the global flows of hazardous wastes. It has also focused on the role of social movements in resisting these flows, seeing this as part of a global movement against environmental injustice.

In environmental justice research on the global export of wastes, wastes are always hazardous and toxic, and they are invariably portrayed as being dumped on the South. The terms 'toxic colonialism' and 'toxic imperialism' are frequently used, whilst the term 'pollution haven' is reserved for those developing countries engaging in the race-to-the-bottom of environmental standards to handle the world's wastes. The effect is understood as the trashing of the South, through environmental degradation and the exposure of poor people in the South to enhanced environmental risk. Whilst not denying that there is a correlation between lower environmental standards and the volume of imported wastes [139] there are at least two criticisms that can be made of this research. The first is the evidence challenge; the second is the close connection between work on global environmental justice and NGO campaigning.

Many researchers, including global environmental justice researchers, point out that data on global waste flows, including UN-COMTRADE data, is poor and/or inadequate at best, due to problematic categorisations of used and discarded goods which, in turn, are often utilised by traders to allow high levels of misdeclaration in traded wastes. This makes quantitative assessments often wildly inaccurate if still dramatic [RELATED RESOURCE 1]. As a consequence, there has been a tendency to shy away from quantitative data and to rely on high profile cases to make the general argument about dumping [SIDEBAR 1]. Furthermore, a commonplace argument that appears in the environmental justice literature is that the label 'second-hand' goods is a proxy for *toxic* waste. As new research is beginning to show, this is a questionable inference.

A 2004 paper by Alastair Iles [141] was the first to point to the complexity of transnational recycling chains, comprising networks of traders and dealers, as well as small-scale recycling entrepreneurs in China and India. It flags the intricacies of patterns of trade, and particularly the export of wastes from the major global manufacturing centres, including Asia, to poorer Asian neighbours making lower-end electronics. Other work using proxies and quantitative data has since begun to systematically challenge the North-South flow assumed by global environmental justice research. Particularly important here has been the work of Josh Lepawsky and colleagues [142, 143]. Lepawky's work on e-waste, based on UN-COMTRADE data, joins with other work on e-waste to show that the flows of e-waste from 'rich' to 'poor' countries were relatively modest, even in 1996, and negligible by 2012, and that inter-regional trade is of greater significance [143]. It shows that there is no pollution haven dynamic at work and throws into serious question the geographical imaginary that frames the Basel Convention [144]. This research suggests not just that Basel is regulating a trade that is no longer relevant but also that trade is going in different directions to that which Basel regulates.

Issues over evidence point to the second critique that can be made of global environmental justice research. This is the close connection between work on global environmental justice and NGO campaigning. NGO campaigners have stated publicly that their tactic in highlighting waste as the 'dark side' of globalisation was to focus on iconic wastes, specifically the e-waste of the digital revolution and merchant ships which are the workhorses of globalisation [145]. In both cases, graphic, highly visual campaigns featured child labour and toxic wastes leaking uncontrolled into the wider environment. The campaigns proved extremely effective as political devices, ensuring that international debate on exported wastes remained firmly grounded in toxicity and the dumping of wastes by 'rich' countries on 'poor', and these representations continue to shape current debate (RELATED RESOURCE 2). However, in relying on NGO evidence rather than reported trade data, global environmental justice research reproduces as evidence the most egregious cases which NGOs had selected to make their political arguments. Research led by environmental justice agendas therefore has tended to look to prohibit flows of wastes, a prohibition that is welcomed by environmental campaigners and those who seek to realise profits from the premiums prohibition creates [146]. In so doing, global environmental justice research has missed the complexities of reuse, refurbishment, remanufacturing, repair, recycling and recovery that accompanies the export of second-hand, or used, goods, and which has been the focus for a further area of new research.

4: WASTES TO RESOURCES: GLOBAL RECYCLING ECONOMIES AND GLOBAL RECYCLING NETWORKS

Research which highlights the transformation of wastes to resources in developing countries provides a fundamental corrective to another line of work which has explained the global shift in manufacturing from the countries of the Global North to Asia in terms of the flight of capital in search of cheaper labour. It has shown this to be but half the story, for

manufacturing activity outside the Global North also has an insatiable demand for resources. High levels of economic growth, based on manufacturing for both the export market of Northern consumers and a rapidly expanding domestic market of middle class consumers, has required scouring the planet for new, and cheaper, sources of resources. Satisfying that resource demand has required utilising secondary resources, that is, materials derived from 'wastes'. The prime example is China, which for example consumes 43% of the world's copper, with 50% of that sourced from scrap [RELATED RESOURCE 1].

Scouring the world for, and harvesting, the wastes of the world to become secondary resources has become a multi-million dollar business. Estimates place the turnover of the global recycling industry as somewhere in the region of $500bn per annum, with employment exceeding any other sector bar agriculture [147]. The business is made more profitable by the cheap costs of shipping containers on the 'back-run' (from West – East, or North – South) of global shipping routes. Just as containerisation has enabled global logistics for production, the ability to ship discarded goods back in containers, rather than hiring bulk carrier ships, has enabled many small-scale entrepreneurs to enter the market in the global trade in waste goods [147]. Once imported, cheap labour costs plus less stringent environmental regulations allow for further rounds of materials separation, segregation and sorting. The latter are critical to extracting value from resource recovery, where the degree of purity of the grade, as well as its converse – the degree of contamination – is key to the acceptance of material for onward processing (i.e. recycling) by manufacturers.

4.1: Harvesting in the North: buyers, traders and brokers in global recycling networks

Adam Minter's research [147] on the global scrap metal trade describes the US as 'the Saudi Arabia of scrap' (p 100) [c.f. 148]. A conservative estimate of 100 Chinese traders are at any one time driving around the US, from scrap yard to scrap yard, sourcing scrap metal and wire

to fill containers to send back to Chinese importers. These traders are likened to high stakes commodity traders: when the market is right and prices are high, they can buy and sell some 50 containers a month, with a value of somewhere between $10000 and $100000 per container. Price connects to demand, and demand for scrap metal – and indeed, for scrap paper and plastic - is high in both China and India. Whilst cable and wire chopping plants exist in the US and Europe, even in vertically-integrated operations, they will rarely accept used wire with less than 60% metal content. Correspondingly, wire with less metal content, such as Christmas tree lighting, gets bought up by Chinese traders, shipped to China and ends up in places like Shijiao in Southern China, where some 20 factories process upwards of 20 million pounds (slightly over 9000 tonnes) of such wire per annum. Not only do these factories supply secondary copper to other factories making more wire, power cables and smart-phones but they also shred the insulation, for manufacturers to make into slipper soles. In contrast, demand for Christmas tree lighting from manufacturers in places like the US is non-existent. So, without China, this stuff would end up in a landfill.

A similar pattern comprising networks of traders working in the Global North linked to importers in developing countries characterises other sectors of the global recycling market. The prevalence of small scale traders and informal networks has been argued to be caused by needs for knowledge of both specific products and market demand, leading to what Rivoli calls a ‘globalisation for the little guy’ [149]. The trade in used clothing is a good example [150]. Recent research by Olumide Abimbola has shown how family-based networks of Igbo Nigerian traders operate in the European used-clothing market [151]. West African importers are sending their sons to work as apprentices in the sorting factories of UK used-clothing exporters to overcome their lack of knowledge about which garments are selected to go into which bales of used clothing sent for export [152]. They provide free labour for the clothing exporters but also a means of quality assurance for importers, who also have the advantage of

knowing the content of bales in advance of their arrival in West Africa. Once imported, bales are sold to further traders. Some may split the bales, to separate out things of value from items of worn clothing, such as zips, buttons and designer labels, and then re-bale them to be sold to other wholesalers. Others, such as 'entry-level' street traders, may only have sufficient working capital to purchase part of one bale of used clothing, which they then sell in street markets [153]. Similar family-based networks of buyers and importers move used clothing to India, but this time for the recyclables market. Here Lucy Norris' research has shown how used clothing is slashed, and the fibres separated and then re-woven [154]. [RELATED RESOURCE 3]

Another sector to demonstrate the importance of family-based networks of traders is used cars. Here, Andrew Brooks' research on Japanese used-car imports to Mozambique, via South Africa, shows the importance of a small number of Pakistani traders in controlling the trade [155]. In Benin and Nigeria, it is again ethnic and family-based networks that control the used-car trade that flows through Cotonou Free Port [156]. Beuving's research goes further to show how the cultural dynamics of ethnicity and family have business effects, demonstrating how a combination of authority and the pressure to live up to familial expectations leads used-car traders to create a false impression of commercial success, and to continue to direct working capital into activities that are no longer as profitable as they once were. In Cotonou, as with other parts of the world where recycling activities predominate, used-goods are widely seen as a means to making money. This reputation works both to attract more 'fortune-seekers' and to undermine levels of profitability through ruinous competition.

Whilst most research on global recycling continues to emphasise the importance of small-scale or family-based trader networks in moving the 'wastes' of the Global North to the South, other research has begun to position these flows within the explanatory framework of

global production networks. Andrew Brooks' research on used clothing in Mozambique is one instance of an attempt to stretch a framework derived in relation to primary production to encompass goods returning to the commodity form [157]. As well as emphasising the importance of family-based networks of traders and diaspora populations, he links these to the networks of charities and firms who collect and sort used clothing in the UK and argues for conceptualising these relationships as either coordinated or non-integrated chains. Taking as their empirical focus, end-of-life merchant ships and used clothing, Crang et al. use the concept of global recycling networks to argue that secondary resource flows from North to South are connected by different regimes of value [158]. They show that these flows are based on highly brokered forms of governance, grounded largely in trust relations – hence the importance of ethnic and familial trader networks – which in turn connect with the practices of valuing heterogeneous materials, through sorting, separation and segregation. Further confirmation of the importance of trust relations comes from research on e-waste [159] with an emergent strand of work focusing on interventions which use labels and standards to guarantee ethical recycling [159, 160].

The majority of new research on global recycling seeks to position this within global economies. In contrast, a small amount of research in criminology and international law emphasises the interface between illegality and legality in the trades in 'toxic' wastes, particularly e-waste [162]. Research here illustrates how networks of traders, buyers and also sellers exploit gaps in both environmental regulations and classification systems; how opportunities are 'fixed', and how this often relates to indirect patterns in trade and/or key centres of coordination and brokerage.

A further line of research focuses on economic illegality and seeks to explore the effects of the illegal import of used goods on domestic industry [163]. Brooks and Simon's research on Africa highlights the ineffectiveness of policies that seek to counter trade liberalisation by

imposing bans on imports of goods such as used clothing. It recognises the porosity of borders and the importance of trans-border exchanges amongst ethnic and family-based trader networks, the role of rents extracted through corruption at borders in enabling these exchanges, and the significance of cultural transformations in dress to the continued success of the international second-hand clothing trade in Africa.

4.2: Reuse, recycling and resource reclamation economies in developing countries

Research on the waste to resource transformation in developing countries highlights the agglomerative tendencies of these activities. A good example is the Sitakunda-Bhatiary area near Chittagong, Bangladesh, which provides a classic illustration of the ways in which reuse, remanufacturing and resource recovery for recycling can exist in a symbiotic relationship [164]. Whilst NGO campaigns focused their attention on the ship breaking activity taking place on the beaches, this research points to ship breaking's vertical integration with a Bangladesh steel industry based on secondary production, and the close connection between that industry's emergence and the closure of primary steel manufacture in post-Independence Bangladesh. It highlights how secondary steel production has been critical to supplying reinforcing rods to meet the burgeoning demand of the construction industry in Bangladesh, but also how a myriad of other activities grounded in reuse, remanufacturing and repair have also grown up in the proximate area based on goods and materials besides steel. Notable here is a furniture remanufacturing sector whose primary customers are some of the Bangladeshi middle classes [165] and the refurbishment of marine engineering goods which are purchased to power domestically-oriented manufacturing activities, particularly in the apparel industry.

Agglomerative complexes such as Sitakunda-Bhatiary exemplify the symbiotic possibilities that accompany the reclamation of resources from complex commodities such as merchant vessels. Nevertheless, it is important not to lose sight of their relation to the environmental

conditions that seem to encourage and enable symbiotic activities to occur. A long way from the eco-parks favoured by environmental policy geared toward industrial symbiosis – but which have had questionable success in the developed world [166] – places like Sitakunda-Bhatiary are more zones of national sacrifice. They are places where the pollution from recovering materials from wastes tends to be overlooked by both the state and regulators. A well known Chinese example is Guiyu, the major site of e-waste reprocessing in Southern China and the focus for the NGO campaign, *Exporting Harm* [167]. Guiyu developed in response to local government concern about the effects of e-waste processing in Guangzhou and Shenzhen which were the major centres for recycling in China in the 1990s [147]. Pressure from local municipalities led to the relocation of activity to a remote, mountainous and agricultural area of the province, Guiyu. Originally dependent on global imports, Guiyu now processes internally-generated scrap, and is widely seen in the trade as a site of national sacrifice, which contrasts markedly with the hi-tech, internationally certified forms of recycling now found in Chinese eco-parks [168]. As well as reprocessing e-waste to extract metals for Chinese manufacturers, Guiyu firms also export used gold-bearing computer chips to Japan. Guiyu is therefore not just a key hub in China's recycling economy but also part of global supply chains in used computer chips.

The location of these clusters points to a different patterning than either models of cradle-to-cradle circular economies or pollution havens suggest. Agglomerative tendencies signal the dynamism of capital and labour in resource recovery. Resource reclamation often involves trade-offs between labour and capital intensive processes. It involves balancing the volume of material processed and the separation and purity of the materials extracted. Hi-tech machinery of the type that characterises resource recovery operations in the developed world, and which is seen to epitomise clean recycling, needs to process high volumes of material at speed to amortise its costs but that speed typically leads to a relatively mixed stream of

recovered materials [169]. Since the fine separation of materials is what adds value, it often creates materials of the lowest grade which are frequently exported to other parts of the world for further segregation [66]. There, 'dirtier' more labour intensive operations in developing countries spend more time sorting, separating and segregating materials to generate highly differentiated grades of materials and thus supply a much wider range of markets. As such, in developing countries there are multiple circuits of materials sorting and separation, leading not just to agglomerative tendencies in resource recovery but also, in some instances, to the exhaustion of value, where the physical capacity of materials to be endlessly recovered is reached. This occurs in the case of textile recycling in India where leftover fibres from the manufacture of shoddy blankets are then sent for further processing and mushed together with other materials to produce aid blankets which disintegrate into a handful of dust [154].

5. FUTURE DIRECTIONS

Recent research on the flows of goods and materials declared to be 'wastes' in the Global North to developing countries for recycling has brought to prominence patterns of trade and economic activity that have been 'business as usual' in the global economy since the 1990s. That it has taken so long to make this visible within academic research is indicative of two tendencies. They are, first the pervasive influence of environmental readings of waste – when waste is just waste it remains un-economized, just stuff that is unjustly dumped. Second, there is the effect of prevailing framings of economies in heterodox accounts. They still tend to frame manufacturing activity as based on primary resource extraction and as connected inexorably to consumption and then disposal, thereby occluding the extended economic and social lives of things, and materials. New research challenges both these understandings. It shows that what might be termed 'wastes' in one part of the world are part of intricate resource supply chains in another and this research has done much to unravel the workings of

the back-end of the value chain. That said, major changes are occurring in resource reclamation and recovery, which all require further research. Four are particularly important.

First, as the economies of the developing countries have grown so too have the numbers of urban, middle class consumers in these countries. Their discarded goods now form an important, and growing, part of the resource reclamation supply chain. Indeed, the UN-StEP project indicates that the majority of e-waste now comes from non-OECD countries [RELATED RESOURCE 4]. Harvesting activities therefore are no longer confined to the Global North, and there is not only evidence of networks of Chinese traders in Africa [170] but also of African (Nigerian) traders in China. Further research is required to document emergent research on South-South material flows, to establish how enhanced competition affects trader activities, and how firms supplying them respond to increased competition for their scrap.

Second, environmental policy within the European Union has worked to constitute sustainable 'green,' circular economies within the EU [66; 171]. It seeks to sequester all wastes within the boundaries of the EU, seeing these as secondary resources which can be recovered for European manufacturing. These visions attempt a re-localisation of resource reclamation. To justify this, they draw on global environmental justice accounts, to depict recycling in developing countries, as 'dirty' and 'dangerous' and contrast this with high-tech and clean, European forms of ecological modernisation. New research has begun to challenge these assumptions, by focusing on recycling labour in 'rich' countries [172], but more research on this is required, not least to counter the heavily technical and celebratory emphasis in the literature on ecological modernisation. Further new research is also pointing to the difficulties of turning wastes to resources in the North and thus to the difficulties of enacting circular economies [68]. It has shown how the financial imperative to rapid volume processing tends to the production of low-grade products, which are rejected by European

manufacturers, and the difficulties that 'recycled' products can face when in competition with established products. There is a need for more research on the longer term market trajectory of these proto-products and, at the same time, for research to examine the inter-relations between recovery-for-recycling and the carbon-incentivised energy-from-waste market.

Third, there is the geopolitical challenge of resources in a multi-polar world. China, like Taiwan before it [173], has shown how secondary resources can power development and several other developing countries are following suit. At the same time, arguments for sequestering wastes for resource recovery in the EU, as well as for the mining of wastes (through, for example re-casting landfills as urban mines), are receiving a considerable boost through political concerns about growing resource scarcity in relation to key metals and minerals (e.g. the rare earths). This adds to further concerns about resource insecurity. Seen through this lens, resource sequestration within the EU is a new form of mercantilism, in which the EU's version of ecological modernisation is increasingly pitched against the secondary resource recovery of China and other developing countries. There is a need for more research to examine resource reclamation as a geopolitical, as well as economic, phenomenon.

Fourth, and finally, there are the changes to recycling activities occurring in developing countries. Two tendencies are worth further investigation. These are, firstly, the increasing concentration of capital in the sector, the rise of global waste management and waste-to-resource business and its connection with technology transfer, the development of 'cleaner' forms of recycling in developing countries, and their effects on recycling labour. Second, there is the effect of attempts to regulate and upgrade recycling labour in developing countries. Whilst one effect has been to push the flight to the bottom, another has been to threaten livelihoods. Thus, attempts to license e-waste trading in Bengalaru have effectively worked to dispossess what had been a sector dominated by small Muslim-owned firms and

replaced them with a few government-owned, large Hindi ones [174]. Both tendencies complicate the representation of recycling in developing countries that prevails in the current literature. In charting an ecological modernisation in the South, they also pose a challenge to the North-South dichotomies that underpin the current global politics of resource reclamation and recovery.

Literature Cited:

1. Alexander C, Reno J. Eds. 2012. *Economies of Recycling: the global transformation of materials, values and social relations*. London: Zed Books

2. Packard V. 1960. *The Waste Makers*. New York: Ig Publishing. 2011 ed.

3. Rodgers H. 2005. *Gone Tomorrow: the hidden life of garbage*. New York: New Press

4. Royle E. 2005. *Garbage Land: on the secret trail of trash*. New York: Back Bay Books

5. Humes E. 2012. *Garbology: our dirty love affair with trash*. New York: Penguin

6. McDonald S, Oates C. 2003. Reasons for non-participation in a kerbside recycling scheme. *Resources Conservation and Recycling* 39(4): 369-85

7. Do Valle P, Reis E, Menezes J, Rebelo E. 2004. Behavioural determinants of household recycling participation – the Portuguese case. *Environment & Behaviour* 36(4): 505-40.

8. Robinson G, Read A. 2005. Recycling behaviour in a London borough: results from large-scale household surveys. *Resources Conservation and Recycling* 45(1): 70-83

9. Martin H, Williams I, Clark M. 2006. Social, cultural and structural influences on household waste recycling: a case study. *Resources Conservation and Recycling* 48(4): 357-95

10. Collins A, O'Doherty R, Snell M. 2006. Household participation in waste recycling: Some national survey evidence from Scotland. *Journal of Environmental Planning and Management* 49 (1):121-140.

11. Nixon H, Saphores J-D. 2009. Information and the decision to recycle: results from a survey of US households. *Journal of Environmental Planning and Management* 52(2): 257-77

12. Fiorillo D. 2013. Household waste recycling: national survey evidence from Italy. *Journal of Environmental Planning and Management* 56(8): 1125-51

13. Gillespie R, Bennett J. 2013. Willingness to pay for kerbside recycling in Brisbane, Australia. *Journal of Environmental Planning and Management* 56(3): 362-77

14. Byrne S, O'Regan B. 2014. Attitudes and actions towards recycling behaviours in the Limerick, Ireland region. *Resources Conservation and Recycling* 87: 89-96

15. Tudor T, Robinson G, Riley M, Guilbert S, Barr S. 2011. Challenges facing the sustainable consumption of waste management: perspectives on UK households. *Local Environment* 16(1): 51-66

16. Robertson S, Walkington H. 2009. Recycling and waste minimisation behaviours of the transient student population in Oxford: results from an online survey. *Local Environment* 14(4): 285-96

17. Andrews A, Gregoire M, Rasmussen H, Witowich G. 2013. Comparison of recycling outcomes in three types of recycling collection units. *Waste Management* 33: 530-35

18. Barr S, Gilg A. 2006. Sustainable lifestyles: framing environmental action around the home. *Geoforum* 37(6): 906-20

19. Barr S, Shaw G, Gilg A. 2011. The policy and practice of 'sustainable lifestyles'. *Journal of Environmental Planning and Management* 54(10): 1331-50

20. Thomas C, Sharp V. 2013. Understanding the normalisations of recycling behaviour and its implications for other pro-environmental behaviours. A review of social norms and recycling. *Resources Conservation and Recycling* 79: 11-20

21. Shove, E. 2010. Beyond the ABC: climate change policies and theories of social change. *Environment and Planning A* 42 (6): 1273-85

22 Nixon H, Saphores J-D. 2009. Information and the decision to recycle: results from a survey of US households. *Journal of Environmental Planning and Management* 52 (2):257-277.

23. Evison T, Read A. 2001. Local authority recycling and waste – awareness publicity/promotion. *Resources Conservation and Recycling* 32(3/4): 275-91

24. Timlett R, Williams I. 2008. Public participation and recycling performance in England: a comparison of tools for behaviour change. *Resources Conservation and Recycling* 52(4): 622-34

25. Nomura H, John P, Cotterill S. 2011. The use of feedback to enhance environmental outcomes: a randomised control trial of a food waste scheme. *Local Environment* 16(7): 637-53

26. Read M, Gregory K, Phillips S. 2009. An evaluation of four key methods monitoring household waste prevention campaigns in the UK. *Resources Conservation and Recycling* 54 (1): 9-20

27. Zorpas A, Lasaridi K. 2013. Measuring waste prevention. *Waste Management* 33: 1047-56

28. Tonglet M, Phillips P, Bates M. 2004. Determining the drivers for householder pro-environmental behaviour: waste minimisation compared to recycling. *Resources Conservation and Recycling* 42(1): 27-48

29. Barr S. 2007. Factors influencing environmental attitudes and behaviours – a UK case study of household management. *Environment and Behaviour* 39(4): 435-73

30. Bortoleto A, Kurisu K, Hanake K. 2012. Model development for household waste prevention behaviour, *Waste Management* 32(12): 2195-2207

31. Farrelly T, Tucker C. 2014. Action research and residential waste minimisation in Palmerston North, New Zealand. *Resources, Conservation and Recycling* 91: 11-26

32. Himley, M. 2008. Geographies of environmental governance: the nexus of nature and neoliberalism. *Geography Compass* 2(2): 433-51

33. Petts J. 2001. Evaluating the effectiveness of deliberative processes: waste management case studies. *Journal of Environmental Planning and Management* 44(2): 207-26

34. Petts J (2004) Barriers to participation and deliberation in risk decisions: evidence from waste management, *Journal of Risk Research* 7: 115-33

35. Bulkeley H, Watson M, Hudson R, Weaver P. 2005. Governing municipal waste: towards a new analytical framework. *Journal of Environmental Policy and Planning* 7(1): 1 – 23

36. Davoudi S, Evans N. 2005. The challenge of governance in regional waste planning. *Environment and Planning C* 24(5): 681-700

37. Bulkeley H, Watson M, Hudson R. 2007. Modes of governing municipal waste. *Environment and Planning A* 41 (11): 2733-2753

38. Davies A. 2008. *Geographies of Garbage Governance: interventions, interactions and outcomes*. Aldershot: Ashgate

39. Davies A. 2009. 'Clean and green'? A governance analysis of waste management in New Zealand. *Journal of Environmental Planning and Management* 52(2): 157-76

40. Lasaridi, K. 2009. Implementing the Landfill Directive in Greece: problems, perspectives and lessons to be learned. *The Geographical Journal* 175(4): 261-73

41. Davies A, Fahy F, Taylor D. 2005. Mind the gap! Householder attitudes and actions towards waste in Ireland. *Irish Geography* 38(2): 151-68

42. De Feo G. 2014. Sociological survey in a municipality with a high level separate collection programme in an area of historic unpopularity. *Waste Management* 34: 1369-1380

43. Woolgar S, Neyland D. 2013. *Mundane Governance: ontology and accountability*. Oxford: Oxford University Press

44. Davoudi S. 2009. Scalar tensions in the governance of waste: the resilience of state spatial Keynesianism. *Journal of Environmental Planning and Management* 52(2): 137-56

45. Gregson N, Crang M. 2010. Materiality and waste: inorganic vitality in a networked world. *Environment and Planning A* 42(5): 1026-35

46. Gregson N. 2007. *Living with Things: accommodation, ridding, dwelling*. Oxford: Sean Kingston Publishing

47. Gregson N, Metcalfe A, Crewe L. 2007. Identity, mobility and the throwaway society. *Environment and Planning D: Society and Space* 25(4): 682-700

48. Gregson N, Metcalfe A, Crewe L. 2007. Moving things along: the conduits and practices of divestment in consumption. *Transactions Institute of British Geographers* 32(2): 187-200

49. Hetherington K. 2004. Secondhandedness: consumption, disposal, and absent presence. *Environment and Planning D: Society and Space* 22(1): 157-73

50. Evans D. 2011. Blaming the consumer – once again: the social and material contexts of everyday food waste practices in some English households. *Critical Public Health* 21(4): 429-40

51. Evans D. 2012. Beyond the throwaway society: ordinary domestic practice and a sociological approach to household food waste. *Sociology* 46(1): 41-58

52. Evans D. 2012. Binning, gifting and recovery: the conduits of disposal in household food consumption. *Environment and Planning D: Society and Space* 30(6): 1123-37

53. Evans D. 2014. *Food Waste*. London: Bloomsbury

54. Douglas M. 1966. *Purity and Danger*. London: Routledge & Kegan Paul

55. Thompson M. 1979. *Rubbish Theory: the creation and destruction of value*. Oxford: Oxford University Press

56. Rathje W, Murphy C. 1992. *Rubbish: the archaeology of garbage*. New York: Harper Collins

57. Strasser S. 1999. *Waste and Want: the social history of trash*. London: Metropolitan Books

58. Gregson N, Crewe L. 2003. *Second-hand Cultures*. Oxford: Berg

59. Lane R, Horne R, Bicknell J. 2009. Routes of reuse of second-hand goods in Melbourne households. *Australian Geographer* 40(2): 151-68

60. Watson M, Lane R. 2011. "Mapping geographies of reuse in Sheffield and Melbourne". In *Material Geographies of Household Sustainability*, ed. R Lane, A Gorman-Murray, pp 133-56. Farnham: Ashgate

61. Watson M, Meah A. 2012. Food, waste and safety: negotiating conflicting social anxieties into the practices of domestic provisioning. *Sociological Review* 60 S2: 102-20

62. Bulkeley H, Gregson N. 2009. Crossing the threshold: municipal waste policy and household waste generation. *Environment and Planning A* 41(4): 921-945

63. Gregson N, Crang M, Laws J, Fleetwood T, Holmes H. 2013. Moving up the waste hierarchy: car boot sales, reuse exchange and the challenges of consumer culture to waste prevention. *Resources Conservation and Recycling* 77: 97-107

64. Chappells H, Shove E. 1999. The dustbin: a study of domestic waste, household practices and utility services. *International Planning Studies* 4(2): 267-80

65. O'Brien M. 2012. A 'lasting transformation' of capitalist surplus: from food stocks to feedstocks. *Sociological Review* 60 S2: 192-211

66. Gregson N, Crang M, Fuller S, Holmes H. (2015) Interrogating the circular economy: the moral economy of resource recovery in the EU. *Economy and Society* 44(2): in press

67. Ferrell J. 2006. *Empire of Scrounge*. New York: New York University Press

68. Edwards F, Mercer D. 2007. Gleaning from gluttony: an Australian youth subculture confronts the ethics of waste. *Australian Geographer* 38(3): 279-96

69. Barnard A. 2011. 'Waving the banana' at capitalism: political theatre and social movement strategy among New York's 'freegan' dumpster divers. *Ethnography* 12(4): 419-44

70. Lane, R. 2011. The Waste Commons in an Emerging Resource Recovery Waste Regime: Contesting Property and Value in Melbourne's Hard Rubbish Collections. *Geographical Research* 49 (4):395-407.

71. Gille Z. 2007. *From the Cult of Waste to the Trash Heap of History: the politics of waste in socialist and post-socialist Hungary*. Bloomington: Indiana University Press

72. Cooper T. 2010. Burying the 'refuse revolution': the rise of controlled tipping in Britain, 1920-1960. *Environment and Planning A* 42(5): 1033-48

73. Gille Z. 2010. Actor networks, modes of production, and waste regimes: reassembling the macro-social. *Environment and Planning A* 42(5): 1049-64

74. Zhuang Y, Wang Y-L, Wu, W-X, Chen Y-X. 2008. Source separation of household waste: a case study in China. *Waste Management* 28(10): 2022-30

75. Afroz R, Tudin R, Hanaki K, Masud M. 2011. Selected socio-economic factors affecting the willingness to minimise solid waste in Dhaka city, Bangladesh. *Journal of Environmental Planning and Management* 54(6): 711-31

76. Mbiba M. 2014. Urban solid waste characteristics and household appetite for separation at source in Eastern and Southern Africa. *Habitat International* 43: 152-62

77. Zen I, Noor Z, Yusuf R. 2014. The profiles of household solid waste recyclers and non-recyclers. *Habitat International* 42: 83-69

78. Dwivedy, M., and R. K. Mittal. 2013. Willingness of residents to participate in e-waste recycling in India. *Environmental Development* 6 :48-68.

79. Birkbeck C. 1978. Self-employed proletarians in an informal factory: the case of Cali's garbage dump. *World Development* 6(9/10): 1177-86

80. Furedy C. 1984. Survival strategies of the urban poor – scavenging and recuperation in Calcutta. *GeoJournal* 8(2): 129-36

81. Tevere D. 1994. Dump scavenging in Gaborone, Botswana: anachronism or refugee occupation of the poor. *Geografiska Annaler* 76(B): 21-32

82. Beall J. 1997. Thoughts on poverty from a South Asian rubbish dump: gender, inequality and household waste. *IDS Bulletin* 28 (3): 73-90

83. Myers G. 2005. *Disposable Cities: garbage, governance and sustainable development in urban Africa*. Aldershot: Ashgate

84. Fredericks R. 2013. Disorderly Dakar: the cultural politics of household waste in Senegal's capital city. *Journal of Modern African Studies* 51(3): 435-58

85. Moore S. 2008. The politics of garbage in Oxala, Mexico. *Society and Natural Resources* 21(7): 597-610

86. Agunwamba J. 2003. Analysis of scavengers' activities and recycling in some cities in Nigeria. *Environmental Management* 32(1): 116-27

87. Hayami Y, Dikshit A, Mishra S. 2006. Waste pickers in Delhi. *Journal of Development Studies* 42(1):41-69

88. Masocha M. 2006. Informal waste harvesting in Victoria Falls town, Zimbabwe: socio-economic benefits. *Habitat International* 30: 838-48

89. Afon A. 2012. A survey of operational characteristics, socioeconomic and health effects of scavenging activities in Lagos, Nigeria. *Waste Management and Research* 30(7): 664-71

90. Asim M, Batool S, Chaudry M. 2012. Scavengers and their role in the recycling of waste in SW Lahore. *Resources Conservation and Recycling* 58: 152-62

91. Agarwal A, Singhmar A, Kulshrestha M, Mittal A. 2005. Municipal solid waste recycling and associated markets in Delhi, India. *Resources Conservation and Recycling* 44(1): 73-90

92. Wilson D, Velis C, Cheeseman C. 2006. Role of informal sector recycling in waste management in developing countries. *Habitat International* 30(4): 797-808

93. Fergutz O, Dias S, Mitlin D. 2011. Developing urban waste management in Brazil with waste picker organisations. *Environment and Urbanization* 23(2): 597-608

94. Paul J, Arce-Jaque J, Ravena N, Villamor S. 2012. Integration of the informal sector into municipal solid waste management in the Philippines – what does it need? *Waste Management* 32(11): 2018-28

95. Ezeah C, Fazakerley J, Roberts C. 2013. Emerging trends in informal sector recycling in developing and transition countries. *Waste Management* 33(11): 2509-19

96. Tirado-Soto M, Zamberlan F. 2013. Networks of recyclable material waste-pickers cooperatives: an alternative for the solid waste management in the city of Rio de Janeiro. *Waste Management* 33: 1004-12

97.. Medina M. 2000. Scavenger cooperatives in Asia and Latin America, *Resources Conservation and Recycling* 31(): 51-69

98. Medina M. 2007. *The World's Scavengers*. Lenham MA: Alta Mira Press

99. Gutberlet J. 2008. Empowering collective recycling initiatives: video documentation and action research with a recycling co-op in Brazil. *Resources Conservation and Recycling* 52(4): 657-78

100. Nzeadibe T. 2009.Solid waste reforms and informal recycling in Enuga urban area, Nigeria *Habitat International* 33(1): 93-99

101. Zapata-Campos M, Zapata P. 2013. Switching Managua on! Connecting informal settlements to the formal city through household waste collection. *Environment and Urbanization* 25(1): 225-42

102. Beall J. 2006. Dealing with dirt and the disorder of development: managing rubbish in urban Pakistan. *Oxford Development Studies* 34(1): 81-97

103. Whitson R. 2011. Negotiating place and value: geographies of waste and scavenging in Buenos Aires. *Antipode* 43(4): 1404-33

104. Miraftab F. 2004. Neoliberalism and casualisation of public sector services: the case of waste collection services in Cape Town, South Africa. *International Journal of Urban and Regional Research* 28(4): 874-92

105. Fahmi W. 2005. The impact of privatisation of solid waste management on the Zabaleen garbage collectors of Cairo. *Environment and Urbanization* 17(2): 155-70

106. Fahmi W, Sutton K. 2006. Cairo's Zabaleen garbage recyclers: multinationals takeover and state relocation plans. *Habitat International* 30(4): 809-37

107. Mitchell C. 2008. Altered landscapes, altered livelihoods: the shifting experience of informal waste collecting during Hanoi's urban transition. *Geoforum* 39(6): 2019-29

108. Furniss J. 2010. Private Sector Reform of Egyptian Solid Waste Management. In *Participation for What: Social Change Or Social Control?* , eds. G. M. Gómez, A. A. Corradi, P. Goulart and R. Namara, 52-75. The Hague: ISS and Hivos

109. Bjerkli C. 2013. Governance on the ground: a study of solid waste management in Addis Ababa, Ethiopia. *International Journal of Urban and Regional Research* 37(4):1273-87

110. Sternberg C. 2013. From 'cartoneros' to 'recolectores urbanos': the changing rhetoric and urban waste management policies in Buenos Aires. *Geoforum* 48: 187-95

111. Obeng-Odoom F. 2014. Green neoliberalism: recycling and sustainable urban development in Sekondi-Takoradi. *Habitat International* 41: 129-34

112. Gill K. 2007. Interlinked contracts and social power: patronage and exploitation in Delhi's waste recovery market. *Journal of Development Studies* 43 (8): 1448-74

113. Gill K. 2012. *Of Poverty and Plastic: scavenging and scrap trading entrepreneurs in India's informal economy*. Delhi: Oxford University Press

114. Sasaki S, Araki T. 2013. Employer-employee and buyer-seller relationships among waste pickers at final disposal site in informal recycling: the case of Bantar Gebang in Indonesia. *Habitat International* 40: 51-57

115. Zapata-Campos M, Zapata P. 2014. The travel of global ideas of waste management: the case of Managua and its informal settlements. *Habitat International* 41: 41-49

116. Mohai P, Pellow D, Roberts J. 2009. Environmental justice. *Annual Review of Environment and Resources* 34: 405-30

117. Walker G. 2009. Globalizing environmental justice: the geography and politics of frame contextualisation and evolution. *Global Social Policy* 9 (3): 355-82

118. Martuzzi M, Mitis F, Forastiere F. 2010. Inequalities, inequities, environmental justice in waste management and health. *European Journal of Public Health* 20(1): 21-26

119. Bullard R. 1990. *Dumping in Dixie*. Boulder CO: Westview Press

120. Rootes C. 2009. Environmental movements, waste and waste infrastructure: an introduction. *Environmental Politics* 18(6): 817-34

121. Bullard R. ed. 2005. *The Quest for Environmental Justice: human rights and the politics of pollution*. San Francisco: Sierra Club Books

122. Hipp J, Lakon C. 2010. Social disparities in health: disproportionate toxicity proximity in minority communities over a decade. *Health and Place* 16(4): 674-83

123. Singer, M. 2011. Down Cancer Alley: the lived experience of health and environmental suffering in Louisiana's chemical corridor. *Medical Anthropology Quarterly* 25(2): 141-63

124. Boone C, Fragkias M, Buckley G, Grove M. 2014. A long view of polluting industry and environmental justice in Baltimore. *Cities* 36(31): 41-49

125. United Church of Christ. Commission for Racial Justice. 1987. *Toxic Waste and Race in the US*. New York: United Church of Christ

126. Pulido L. 2000. Rethinking environmental racism: white privilege and urban development in Southern California. *Annals of the Association of American Geographers* 90(1): 12-40

127. Baabereyir A, Jewitt S, O'Hara S. 2012. Dumping on the poor: the ecological distribution of Accra's solid waste burden. *Environment and Planning A* 44(2): 297-314

128. Oteng-Agabio M. 2013. Unscripted (in)justice: exposure to ecological hazards in metropolitan Accra. *Environment and Planning A* 45(5): 1199-1218

129. Carruthers D. ed. 2008. *Environmental Justice in Latin America: problems, promise and practice*. Cambridge MA: MIT Press

130. Frey R. 2003. The transfer of core-based hazardous production processes to the export processing zones of the periphery: the maquiladora centres of Northern Mexico. *Journal of World Systems Research* IX: 317-54

131. Carruthers D. 2008.The globalization of environmental justice: lessons from the US-Mexico border. *Society and Natural Resources* 21(7): 556-68

132. Johnson M, Niemeyer E. 2008. Ambivalent landscapes: environmental justice in the US-Mexico borderlands. *Human Ecology* 36(3): 371-82

133. Lara-Valencia F, Harlow S, Lemos M, Denman C. 2009. Early dimensions of hazardous waste generation in rapidly industrialising cities along the US border. *Journal of Environmental Planning and Management* 52(2): 195-216

134. Grineski S, Collins T. 2008. Exploring patterns of environmental injustice in the Global South: Maquilladoras in Ciudad Juárez. *Population and Environment* 29(6): 247-70

135. Grineski S, Collins T. 2010. Environmental injustice in transnational context: urbanisation and industrial hazards in El Paso/Ciudad Juárez. *Environment and Planning A* 42(6): 1308-27

136. Clapp J. 2001. *Toxic Exports: the transfer of hazardous waste from rich to poor countries*. Ithaca: Cornell University Press

137. Pellow D. 2007. *Resisting Global Toxics: transnational movements for environmental justice*. Cambridge MA: MIT Press

138. Pellow D. 2008. 'The global waste trade and environmental justice struggles'. In *Handbook on Trade and the Environment*, ed. R Gallagher, pp 225-33. Aldershot: Edward Elgar

139. Kellenberg D. 2012. Trading wastes. *Journal of Environmental Economics and Management* 64 (1):68-87.

140. Margai F, Barry F. 2011. "Global geographies of environmental injustice and health: a case study of illegal hazardous waste dumping in Cote d'Ivoire". In *Geospatial Analysis of Environmental Health*, ed. J Maantay, S McLafferty,pp 257-81. Amsterdam: Springer

141. Iles A. 2004. Mapping environmental justice in technology flows: computer waste impacts in Asia. *Global Environmental Politics* 4(4): 76-107

142. Lepawsky J, McNabb C. 2010. Mapping the international trade and traffic of electronic waste. *The Canadian Geographer* 54(2): 177-95

143. Lepawsky J. 2014. The changing geography of global trade in electronic discards: time to rethink the e-waste problem. *Geographical Journal* doi: 10.1111/geoj.12077

144. Lepawsky J. 2015. Are we living in a post-Basel world? *Area* 47(1): 7 – 15.

145. Crang M. 2010. The death of great ships: photography, politics and waste in the global imaginary. *Environment and Planning A* 42(5): 1084-102

146 Kellow A. 1999. Baptists and bootleggers? The Basel Convention and metals recycling trade. *Agenda* 6 (1):29-38.

147. Minter A. 2013. *Junkyard Planet: travels in the billion dollar trash trade*. London: Bloomsbury.

148. Lyons D, Rice M, Wachal R. 2009. Circuits of scrap: closed loop industrial ecosystems and the geography of US international recyclable flows, 1995-2005. *Geographical Journal* 175(4): 286-300

149. Rivoli P. 2005. *Travels of a T-shirt in the Global Economy*. Oxford: Wiley

150. Brooks A. 2015. *Clothing Poverty: the hidden world of fast fashion and second-hand goods*. London: Zed Books

151. Abimbola O. 2012. The international trade in secondhand clothing: managing information asymmetry between West African and British traders. *Textile* 10(2): 184-99

152. Botticello J. 2012. Between classification, objectification and perception: processing secondhand clothing for recycling and reuse. *Textile* 10(2): 164-83

153. Tranberg-Hansen K. 2000. *Salaula: the world of secondhand clothing and Zambia*. Chicago: University of Chicago Press

154. Norris L. 2012. "'Shoddy rags and relief blankets: perceptions of textile recycling in North India". In *Economies of Recycling: the global transformation of materials, values and social relations*, ed. C Alexander, J Reno, pp 35-58. London: Zed Books

155. Brooks A. 2012. Networks of power and corruption: the trade of used Japanese cars to Mozambique. *Geographical Journal* 178(1): 80-92

156. Beuving J. 2006. Nigerian second-hand car traders in Cotonou: a sociocultural analysis of economic decision-making. *African Affairs* 105(3): 353-73

157. Brooks A. 2013. Stretching global production networks: the international second-hand clothing trade. *Geoforum* 44: 10-22

158. Crang M, Hughes A, Gregson N, Ahamed F, Norris L. 2013. Rethinking governance and value in commodity chains through global recycling networks. *Transactions Institute of British Geographers* 38(1): 12-24

159. Lawhon M. 2012. Power, trust and legitimacy in the governance of South African e-waste transition. *Environment and Planning A* 44(4): 954-71

160. Lepawsky J. 2012. Legal geographies of e-waste legislation in Canada and the US: jurisdiction, responsibility and the taboo of production. *Geoforum* 43: 1194-1206

161. Pickren G. 2014. Political ecologies of electronic waste: uncertainty and legitimacy in the governance of e-waste geographies. *Environment and Planning A* 46(1): 26-45

162. Bisschop L. 2012. Is it all going to waste? Illegal transports of e-waste in a European trade hub. *Crime, Law and Social Change* 10.1007/s10611-012-9383-0

163. Brooks A, Simon D. 2012. Unravelling the relationship between used-clothing imports and the decline of African clothing industries. *Development and Change* 43(6): 1265-90

164. Gregson N, Crang M, Ahamed F, Akter N, Ferdous R, Foisal S, Hudson R. 2012. Territorial agglomeration and industrial symbiosis: Sitakunda-Bhatiary, Bangladesh as a secondary processing complex. *Economic Geography* 88 (1): 37-58

165. Gregson N, Crang M, Ahamed F, Akter N, Ferdous R. 2010. Following things of rubbish value: end-of-life ships, 'chock-chocky' furniture and the Bangladeshi middle class consumer. *Geoforum* 41(6): 846-54

166. Gibbs D, Deutz P. 2005. Implementing industrial ecology? Planning for eco-industrial parks in the USA. *Geoforum* 36(4): 452-64

167. Basel Action Network [BAN]. 2002. *Exporting Harm: the high-tech trashing of Asia*. Seattle: BAN

168. Tong X, Li J, Tao D, Cai, Y. 2015. Re-making spaces of conversion: deconstructing discourses of e-waste recycling in China. *Area* 47(1): 31-39.

169. Gregson N, Watkins H, Calestani M. 2013. Political markets: recycling, economization and marketization. *Economy and Society* 42(1): 1-25

170. Furniss J. 2015. Alternative framings of transnational waste flows: reflections based on the Egypt-China PET plastic trade. *Area* 47(1); 24-30.

171. Karg K. 2015. Circling the economy: resource-making and marketization in EU electronic waste policy. *Area* 47(1): 16-23.

172. Gregson N, Crang M, Botticello J, Calestani M, Krzywozynska A (2014) Doing the 'dirty' work of the green economy: resource recovery and migrant labour in the EU, *European Urban and Regional Studies* DOI: 10.1177/0969776414554489 http://eur.sagepub.com/content/early/2014/10/29/0969776414554489 published online 30 October, 2014

173. Terao T. 2005. The Rise and Fall of 'Mixed Metal Scrap'Recovery Industry in Taiwan: International Trade of Scraps and Transboundary Relocation of the Business. In *International Trade of Recyclable Resources in Asia*, ed. M. Kojima, 63-84. Chiba: Institute of Developing Economies- JETRO.

174. Reddy R. 2013. Revitalising Economies of Disassembly. *Economic & Political Weekly* 48 (13):63 - 71.

RELATED RESOURCES

1: Online visualisations of the trade in wastes showing the importance of exports from the Global North and key importing countries (US$ 2010)

Source: http://atlas.media.mit.edu/ (last accessed 11 February 2015)

1.1: China's importing of recovered paper (1995-2012): http://atlas.media.mit.edu/explore/stacked/hs/import/chn/show/4707/1995.2012/

1.2: The importance of 'wastes' as US exports to China: http://atlas.media.mit.edu/explore/tree_map/hs/export/usa/chn/show/2010/

1.3: Scrap copper exporters: http://atlas.media.mit.edu/explore/tree_map/hs/export/show/all/7404/2010/

1.4: Scrap copper importers:

http://atlas.media.mit.edu/explore/tree_map/hs/import/show/all/7404/2010/

1.5: Used clothing exporters:

http://atlas.media.mit.edu/explore/geo_map/hs/export/show/all/6309/2010/

1.6: Used clothing importers:

http://atlas.media.mit.edu/explore/geo_map/hs/import/show/all/6309/2010/

2. Examples of NGO campaigns against the trade in global wastes

Short film on the Bangladeshi ship breaking industry, featuring the NGO Platform on Ship breaking: National Geographic (2014) Where Ships Go to Die, Workers Risk Everything - http://www.youtube.com/watch?v=WOmtFN1bfZ8 (Last accessed 17 October 2014)

3. Used clothing resources

3.1: Trailer of documentary film, *Unravel* (Soul Rebel Films), which follows the journey of used clothing to Panipat (India) and focuses on the women who work in the textile recycling factories there: http://soulrebelfilms.com/project (last accessed 17 October 2014)

3.2: Where do your old clothes go? – an investigation of what happens to clothing donated in the Global North, including tracking data - http://www.bbc.co.uk/news/magazine-30227025 (last accessed 13 February 2015)

4. Global resource on e-waste: http://www.step-initiative.org/index.php/WorldMap.html (last accessed 17 October 2014).

SIDEBARS

Sidebar 1: Trafigura, *Probo Koala* and Abidjan, Ivory Coast [140]

The Trafigura case of 2006 is at one level a classic case of global environmental injustice. The vessel *Probo Koala*, chartered by oil company Trafigura, arrived at Abidjan Port. Wastes from the hold, classified as 'slops', were taken to local dumps. The 'slops' turned out to be a cocktail of hazardous wastes, which Trafigura were quoted €500000 to dispose of in Amsterdam. Instead, the company negotiated a deal with an Ivory Coast sub-contractor, for €18,500. Public deaths from exposure to the wastes, which were placed in uncontained municipal dumps, led to an international outcry and investigation. Less commonly publicised is the back-story to the 'slops'. They were 'coker gasoliine' produced by Pemex, who sold this to Trafigura. The coker gasoline was trucked to Brownsville, Texas (the site of the US ship breaking industry), where it was loaded onto the *Probo Koala*. The vessel anchored off of Gibraltar, where Trafigura experimented in stripping sulphorous products from the coker gasoline. The resultant naphtha was sold, but this left a residue of 500 tonnes of extremely hazardous wastes to dispose of. This residue is what ended up in Abidjan. The wider case demonstrates how wastes are never just wastes, but rather open to further processing, how sea-borne chemical experimentation with wastes can evade land-based, or territorial, environmental regulations, and how 'dumping' is not a straight North-South exchange. In 2011, the *Probo Koala* in turn was at the heart of a political storm, in this case related to its sale for breaking - India: a dumping ground for toxic ships?

http://www.youtube.com/watch?v=N9-SNypchv4