Wasting the Nation

making trash of people and places

groundWork

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the groundWork Report 2008

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Making trash of people and places

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Cover Credit:

Pickers rush for waste at Boitshepi dump, Vanderbijlpark, Emfuleni.

Photo by Victor Munnik

Foreword

In my two decades of working on waste issues around the world, I've read hundreds of reports by credentialed "experts" who approached waste primarily as a technical problem and presented a range of technical solutions. I am happy to say that groundWork's latest report, Wasting the Nation, is a much needed break from that limited line of discussion.

Waste is not an isolated technical problem but is a symptom, a physical manifestation, of much deeper problems with the current economic, political and social systems. Waste is the visible face of a development model built on the assumption that some people matter more than others, that pollution is the inevitable price of progress and blind economic growth is the highest possible good.

Until we see waste through a broader systems lens our interventions are at best limited, and are often worse, perpetuating the environmental health and social problems which motivate our interventions in the first place.

If one looks at a pile of municipal waste as an isolated problem and asks "what can be done with this waste?" there are no solutions. The line of enquiry is self-limited. We can bury it in a big hole in the ground. We can burn it in an incinerator, which creates even more toxic by-products. Or we can dump it on someone else's land, usually someone perceived to be less powerful than we. None of those approaches solve the problem, and all perpetuate the disregard for the planet and communities which lead to the waste creation in the first place.

Yet, if we take a step back, if we look at the larger system, we can see that the waste is, in fact, not all waste. Much of it is resources in the wrong place: paper, cardboard, glass, metals, nutrient-rich organic waste, durable goods which could be repaired. By broadening our enquiry to include the local communities which survive by recovering valuable materials from the discards, and the local remanufacturing facilities which can repair or recycle these resources, more solutions become available. Unfortunately, around the world, municipal waste planners tend to have a collective blind spot about the scores of people who work every day, exposed to health risks, social scorn and police harassment, to recover the valuable materials that were discarded as waste. These informal recyclers are immensely knowledgeable about local materials flows and provide

a valuable service to the planet and to the municipality; they should be celebrated and supported, not scorned and excluded from the official waste planning processes.

The failure to recognise, validate and support the people in this informal recycling sector – often called ragpickers – leads to short term techno-fixes, such as landfills and incinerators, which not only encourage continued material wasting, but also waste entire communities which survived through small scale recycling. Incinerators and landfills lock up valuable resources in inherently destructive technologies, decimating the informal recycling economy and driving the demand to extract, mine, harvest, and process ever more resources from the earth – thus fueling the cycle of destruction.

And if we take another step back in our systems view, we can see that even the most skilled ragpickers cannot recover certain discards because they have been designed not to be recyclable or they contain too many toxics to be safely handled and re-used. The problem here lies not in the piles of waste, but in the corporate headquarters and design labs which reward product designers for making products containing toxic materials which are designed to break soon after purchase. The problem lies in our elected officials and regulatory agencies who grant permission for corporations to routinely use toxic compounds known to cause cancer, neurological problems, reproductive disorders and other health threats. Toxics used in production inevitably lead to toxics in our environment, our communities and our waste. We'll never find a solution to our waste problem within a regulatory system which permits the use of inherently toxic compounds in the products we bring into our homes, schools and workplaces every day.

And if we take one final step back, as Wasting the Nation does, we see that a truly transformative solution depends not just on supporting informal recyclers and redesigning products to be more durable and less toxic, but in rejecting an entire economic system which values unlimited economic growth and capital accumulation over public health, ecological integrity and community well being. It is through challenging and replacing this underlying system with one that respects ecological limits, nurtures public health, and fiercely promotes social justice that we'll finally stop wasting both the planet and its people.

Annie Leonard

Annie Leonard is an expert in international sustainability and environmental health issues, with more than 20 years of experience investigating factories and dumps around the world. Annie communicates worldwide about the impact of consumerism and materialism on global economies and international health. She is the co-founder of the Global Alliance for Incinerator Alternatives which was launched in Johannesburg in November 2000.

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Thanks to the many people who gave their time to help with the making of this report. In particular, we are indebted to the waste pickers and site cleaners who took the time to speak to us when we visited landfills and dumps in KwaZulu-Natal and the Vaal Triangle in May this year. They make a living in hard conditions and some feel vulnerable to recrimination from employers or the authorities and did not wish to be named. Those who spoke to us include: Caroline Dlamini, Ntoko Madondo, Douglas Maphumelo, Siyabonga Mbanjwa, Thokozile Mbatha, Dumisani Zondi from Pietermaritzburg; Sylvia Chelwane, Mantwa Mokoena, Pulane Ralephanyane and Mmateboho Sekhoto who are on the committee elected by waste pickers at the Boitshepi dump in Vanderbijlpark; and Themba Khosa at Palm Springs, Sebokeng. There are several hundred people working through the waste on the Vaal Triangle dumps and large groups gathered to talk to us at Palm Springs and Sasolburg. We are grateful for the many insights offered by people within those groups.

Local residents, workers and activists also shared their experience and analysis with us. In KwaZulu-Natal we spoke with S'bu Zikode of Abahlali baseMjondolo; Arun Edwards and Roshan Autar of the Clare Estates Ratepayers Association; Busi Mbokazi from the Sobantu Environmental Committee, Councillor Ngubane and Andries Radebe from Sobantu; and shopstewards Innocent Mhlongu, Patrick Mbhele and Jabu Ncobo of the South African Municipal Workers Union in Pietermaritzburg. Members of the Vaal Environmental Justice Alliance helped organise and accompanied our site visits in the Vaal Triangle. Particular thanks to: Samson Mokoena, Moleleki Fantisi, Themba Mjikane, Matshediso Tsotetsi-Dlamini and Caroline Ntaopane. Patrick Sindane and other comrades from the Anti-Privatisation Forum and the Water Coalition introduced us to the residents of Zone 20, Sebokeng. We were also joined by members of the Vaal Ethical Investment Forum and the South African Council of Churches in the Vaal Triangle. Sas and Douw Coetzee from the Wonderfonteinspruit valley talked to us about their experience of mining waste, as did people in the Brugspruit Valley and Maguqa, Emalahleni (Witbank). In Durban, we also spoke to Messrs Babs, Basha and Ali and Firoz Kader who own and manage local recycling businesses.

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We enjoyed extended conversations with Chris Albertyn, Dee Fischer, Jenny Hall, Peter Lukey and Bobby Peek on the history of struggles around waste and on policy issues and got a view on the beginnings of global organising by waste pickers from Chris Bonner and Melanie Samson.

Thanks to the team at groundWork who were, as always, a pleasure to work with and have fed us information and commented on drafts. Particular thanks to Musa Chamane who organised the KwaZulu-Natal field visits and to Jane Harley for her support in editing the final text.

Melanie Samson has written a separate report for groundWork specifically focused on waste reclaimers. Musa and Melanie accompanied us for the field research and we were joined by Bobby for parts of the trip as well. They shared insights with us over many conversations along the way and greatly enriched the experience. Neither they nor any of the other people we spoke to are responsible for our mistakes or our interpretation of the information that they shared.

Contents

Chapter 1: Dust and ashes

Waste used to be something of the past, a part of life turned to dust and ash. For much of the 19th Century, dust and ash was all that went into the domestic dust bin. Everything else was separated and recycled one way or another. Even shit – politely known as 'night soil' – was taken out along with organic wastes to fertilise fields. Or at least some of it was. The rest was thrown into the streets where waste pickers competed with dogs, pigs and crows for anything of value.

The business of waste was neither clean nor orderly. In the rapidly growing cities of the industrialising world, the luxurious houses of the elite classes rose above the filth and contrasted with the jerry built tenements housing the mass of working people. In Manchester, at the centre of imperial Britain's industrial revolution, about one sixth of the population lived in cellars "with walls oozing human waste from nearby cesspools" [Pichtel 2005: 26]. Elsewhere poor people were crowded around narrow courts with their excrement heaped in the middle. According to a report of the Poor Law Commissioners "whole courts up to the very doors of the houses were covered with filth …" [quoted in Pichtel 2005: 27]. Such conditions were replicated in the 'old world' of Europe and the 'new world' in America.

Waste pickers, scavenging for bones, clothes and coal, were amongst the poorest. Most did not have a secure roof over their heads and worked and lived in the filth of the city, vulnerable to diseases and periodic epidemics of cholera and dysentery. Epidemics were not confined to the poor, however, and once the link between disease and dirt was made,[1] middle class activism demanded sanitary improvements from city authorities. This marked the origins of modern waste management and the construction of what US researcher Heather Rogers describes as "a border separating the clean and useful from the unclean and dangerous" [2005: 3]. Moreover, cleanliness was found to be good for business. The middle classes no longer deserted the city in the face of epidemics and clean streets enhanced property prices, made for easier transport of goods and workers and for an altogether more pleasurable shopping experience. From the start, cities

[1] The link was made by Louis Pasteur, Robert Koch and Ignaz Semmelweis in second half of the 19th century.

prioritised the service to business and middle class areas and "left the poor, working class and immigrants to live with a disproportionate amount of waste" [64].

In the 20th Century, the nature of waste was to change. The mass manufacture of plastic goods began to expand. Packaging started to displace the practice of measuring out groceries such as sugar, flour and milk at the shop counter. The shops themselves were reorganised as the forerunners of the modern supermarket replaced the counter with check-out tills and channelled customers down aisles to select pre-packaged items from the shelves. These changes took time but, by the 1930s, household bins were filling with rubbish that does not biodegrade. And they positively bulged with plastic and paper when the packaging and marketing industries took hold after the Second World War. Separation and recycling were entirely abandoned as household goods flooded the market, things broken could not be repaired or were not worth the effort, chemical fertilisers displaced organic wastes on the fields, and packaging was made for instant dumping.

Box 1: Some milestones in municipal waste generation

1868	Celluloid, the first plastic made from a natural polymer, is invented
1903	Corrugated paperboard containers are in commercial use
1908	Paper cups replace tin cups in vending machines, public buildings & trains
1913	Corrugated cardboard becomes popular as packaging
1930s	Kimberly-Clark markets sanitary pads
1935	First beer cans manufactured
1939	First paperback books "cheap enough to throw away"
1944	Dow Chemical invents Styrofoam
1963	Aluminium beverage cans developed
1977	Apple develops mass-produced personal computers
1977	PET plastic bottles replace glass for cold drinks
1985	Swatch markets the disposable wristwatch
1986	Fuji introduces the disposable camera
1988	An estimated 20 million personal computers have become obsolete
2004	Disposable cell phone

Source: Pichtel 2005: 37

Surveying England's biggest tip, Andrew O'Hagan observes: "A dumped bath, a heap of carpet, a thousand empty bottles of orange squash, a hundred thousand legs of lamb, a million bottles of shampoo: it was all the stuff of life and it was all evidence of death" [2007]. The business of burying or cremating[2] the wastes of consumer abundance was and is accompanied by the stench of industrial scale rot and decay. Writing for Greenpeace, Robin Murray of the London School of Economics observes:

> Throughout the twentieth century, waste was the terminus of industrial production. Like night cleaners, the waste industry had the task of removing the debris from the main stage of daily activity. Some of the debris had value and was recycled. Most was deposited in former mines, gravel pits and quarries or, via incinerators, was 'landfilled in the air'. The principle was to keep it out of sight. Whereas consumer industries seek publicity, this post-consumer industry prided itself on its invisibility. [Murray 2002: 5]

The sheer scale of waste is staggering and this is just what we throw away. For every bin of consumer waste, says Annie Leonard [2008], another seventy are dumped by corporations in the process of production – from mining and extraction to manufacture, distribution and marketing. This waste is kept on the other side of the boundary between clean and unclean. It lies behind the bright new goods displayed in bright clean shopping malls and must be concealed from the consumer. Increasingly, the dirty part of the 'value chain' is located in 'developing countries' while the economies of 'post-industrial' nations are said to become cleaner as their economies are 'dematerialised'. The wastes of manufacturing at the lowest possible cost fill the air and poison the water in the rapidly growing mega-cities of the East. And upstream from manufacturing, mining waste is dumped right next to the mines, smothering the land, choking the rivers and laying waste to the people who used them and must be thrust aside.

Meanwhile, what is thrown away and supposed to disappear overflows the dumps, it leaches into the water, it blows on the wind, it contaminates the food chain. Everywhere, countries and municipalities are running out of space for landfills and both landfills and incinerators are meeting with determined opposition from local communities. Ultimately, says O'Hagan, we find that "there is no such place as 'away'". What we throw away comes back to us, our past catches up with us.

[2] Cremation was indeed the word used for incineration in the 19th Century.

Sea trash

The sea is one kind of 'away'. The North Pacific sub-tropical gyre is a vast area of the ocean where the wind hardly blows. It is called a gyre because the atmosphere and ocean circulate – very slowly – towards the centre. So things that drift in to the edge – on the wind or in the sea – tend to get stuck in the system. In the days of sail, it was known as the doldrums and terrified sailors who feared being becalmed with never enough wind to sail out again. It remains outside of the main shipping routes so hardly anyone goes there. In 1997, US ocean researcher Charles Moore took his boat through the gyre. He expected to see pristine ocean but "was confronted, as far as the eye could see, with the sight of plastic … In the week it took to cross the subtropical high, no matter what time of day I looked, plastic debris was floating everywhere: bottles, bottle caps, wrappers, fragments" [2003].

The gyre has become the world's unseen dump as ever more rubbish accumulates. Over time, the plastic breaks up into smaller pieces but, even when microscopic in size, it is still plastic. The result is a plastic soup mixed up with the plankton that is the basis of the ocean food chain. There is now more plastic than plankton in the gyre.

The North Pacific gyre is the biggest of six subtropical gyres covering about 40% of the world's oceans. All are accumulating trash. But sea trash is not restricted to the gyres. Greenpeace [2006] reports that plastic can be found floating everywhere in the world's oceans, including the arctic and Antarctic seas, and litters the world's coasts, even the coasts of remote and uninhabited islands. Much of it does not float on the surface. It is either suspended in the water or sinks into the sediments on the sea bed, particularly in coastal areas. The trash enters the food chain via filter feeders and fish and birds that mistake plastic objects for food. The toxicity is enhanced because plastic absorbs and concentrates other chemicals polluting the seas. Toxicity is then further concentrated up the food chain until it returns to people in the fish on the plate.

Some 20% of sea trash is from shipping. The rest is from the land. Much of it is blown or washed off streets and waste dumps by wind and rain. Condoms and other items commonly flushed down the loo are washed out of overflowing sewage works. And the plastics industry commonly spills 'nurdles', the sand-like plastic pellets from which they make products. Greenpeace comments, "Although plastic pellets are one of the least visible forms of plastic pollution, it is apparent that they have become ubiquitous in ocean waters, sediments and on beaches and are ingested by marine wildlife" [2006:

Box 2: Managing waste

The term 'waste management' gives the false assurance that the managers are in control, that they know how much waste there is, what is in it and how to handle it, that they really do 'manage' it. Waste expert Michael Thompson notes the procedures:

> Just get a grip on the system – a list of hazardous wastes, a register of producers, a set of procedures for the licensing of treatment and disposal sites, a trip-ticket scheme for controlling transportation … an entire cradle-to-grave accounting framework – and then install the managers at the appropriate points. [1990: 117]

Yet this obscures the reality that a large proportion of waste is not managed at all, says Thompson. Where waste information systems are actually in place, waste managers rely on waste producers and transporters to tell them what is in the waste. They may also take samples from the waste stream, employ spotters at the dump gates or make estimates based on other information and a variety of assumptions.

Waste classifications are approximations at best. The hazardousness of waste is determined by the bureaucracy of waste, and their conclusions are based on what they can manage and how as much as on science. Municipal waste, for example, is counted as non-hazardous but is littered with batteries, light bulbs and other goods containing heavy metals as well as a variety of toxic chemicals in paints, cleaners and garden pesticides.

The metaphor of a 'waste stream' is also misleading. The waste stream does not start in quiet headwaters that flow down to the sea like a river. Its 'headwaters' are formed through myriad decisions, a chaotic process of creating and discarding waste. The waste stream is heterogenous, composed of many different materials that are mixed together and interact with each other to produce a toxic soup of new compounds. It seems more apt to talk of backwaters and cesspools of waste.

And what is waste is itself disputed and made subject to the vagaries of the market. Just as suddenly as Christmas giftwrap becomes waste, waste may slip back into an economic value chain through recycling or by being redefined as a resource. Crude oil production provides a good example of the implications of leaving the definition of waste to the market. Associated gas is produced with oil and flared off

unless there is an infrastructure to gather it. That infrastructure will only be built if there is a profitable gas market *and* if building the infrastructure does not delay the production of oil. This is because oil is the more profitable product and rapid production represents the most efficient return on capital invested. The definition of gas as waste thus turns on shareholder 'value'. On South Africa's gold belt, the old toxic mine dumps are being reworked with the latest technologies to extract gold that earlier miners had missed – while a fine dust laced with uranium blows over Johannesburg's poorer southern suburbs. Lately, mine managers have argued that their waste is not waste, but 'mining residues' which may one day become resources as future technologies allow for improved extraction. A similar argument may now be made for landfills themselves. In Britain, landfill managers started mapping what was dumped where in the 1980s. At the height of the commodities boom in early 2008, several firms proposed using these maps to mine the landfills for materials. With the subsequent drop in commodities, this resource will have reverted to waste.

In terms of materials conservation, recycling waste before it gets to landfill is obviously a far better option. Mixing waste together, even before dumping, already contaminates it, sucks value from it and creates hazards. Waste pickers working at the margins where markets require the waste of value, including human value, are also working the wrong side of the border of the unclean and dangerous. They are themselves represented as dangerous, not least to the procedures of orderly waste management, and they work in danger and at the mercy of a volatile recyclables market.

Dumping on the poor

For industry and the middle classes, 'away' is mostly where poor people live. Observing and fighting against this gave rise to the idea of environmental injustice and racism in the US. As activist Dana Alston put it, "We have learned … that communities of colour are targets for the siting of toxic waste dumps and most hazardous industries" not wanted in white, middle class communities [1993: 188]. This targeting was accompanied by the promise of jobs in areas with high unemployment. But "the few jobs that we did get were lower paying and more hazardous jobs" [189]. The US

environmental justice movement thus saw 'putting it in black people's back yards' as the other side of the coin to 'not in my back yard'. The principle has now gone global as corporations export waste from North to South in search of cheaper and less protected recycling labour or unregulated dumping. In many cases, recycling is merely a cover for dumping.

South Africa's apartheid planners similarly located poor and black communities next to polluting mines, industries and waste dumps. Waste services were well developed in white areas and the waste dumped in black areas, while basic services for waste and sanitation and water and energy were systematically neglected in black areas. Formal townships received partial and perfunctory services which were not expanded even as population growth was stimulated by the policy of removals from 'white areas'. Removals also led to the creation of large and completely unserviced settlements in rural areas or on the distant peripheries of the cities. Human waste and garbage accumulated, smoke filled the air and water sources were contaminated or difficult to access.

In the post-apartheid period, government 'rolled out' housing, electrification and water projects. These programmes have been highly problematic, with poor quality housing reproducing slum conditions and electricity and water delivered on the basis of cost recovery, resulting in the 'beneficiaries' being regularly cut off. In 2000, under pressure from civil society, government announced free basic water and electricity provision. This provision has been miserly, however. Combined with new technologies of pre-paid metering, people are still regularly cut off because they do not have the money to feed the meter when the free supply runs out.

Government was tardy in addressing sanitation needs. In 2003, it published Towards a Ten Year Review [SAG 2003]. The document gave new attention to sanitation and, in 2004, government said it would "eradicate the backlog" in sanitation by 2010 and eliminate the bucket system by 2007. By March 2006, 15,3 million – just short of one third of the population – were still "without adequate basic sanitation facilities" according the official South Africa Year Book [SAG 2007: 600]. The 2007 budget allocated R400 million to municipalities for a "final push to eradicate the bucket system". The South African Municipal Workers' Union (SAMWU) comments, "This did not eradicate the bucket system. Instead the goalposts were shifted to say that this money was for eradicating the bucket system in 'formal' informal settlements only.

Government failed to do even that and now has not allocated any money to complete the programme."[3]

Meanwhile, poorly maintained sewage systems are breaking down across the country. There are nearly 1,000 municipal sewage works and 70% are close to collapse. The crisis is not confined to small towns like Delmas where, in 2005, 600 people contracted typhoid and five died of it while more than 3,000 suffered from diarrhoea. In 2007/8, a DWAF study found that drinking water in 28 Western Cape municipalities was contaminated by faecal matter. In the Vaal Triangle, raw sewage spills from dysfunctional sewage works into streams used by local women for washing clothes and by children to swim in. Ultimately, it drains into the Vaal River. In December 2007, thousands of fish turned belly up in Durban Bay following a sewage leak. In April 2008, it was reported that 78 children died from diarrhoea in the Ukhahlamba district of the Eastern Cape because people's water was contaminated by sewage. The municipality did nothing until the deaths were made public. The provincial government then noted other factors "including poverty, poor service delivery, environmental health and human resource 'challenges'".[4] It is indeed poor people who die. Yet, when government cites poverty as a cause, the sub-text seems to be that poor people's lives are less valuable.

Sewage sludge, produced by conventional sewage works, is reckoned to constitute around 2% of the total waste stream. It is toxic partly because people themselves carry a high 'body burden' from substances in food and in their environments, partly because it is subsequently contaminated with industrial effluent, and partly because of the method of treatment. Recent research found that, except in the larger cities, many "plant managers didn't really care where they put the sludge, as long as it is disposed of" [Herselman et al 2005: ix]. Some is sold to farmers but the benefits even of uncontaminated manure turn toxic if it is spread too thick. Most is dumped on 'sacrificial land' or trenched at landfills.

Waste management is not even mentioned in the Ten Year Review and is yet to be mentioned in the President's annual State of the Nation address. In terms of government's overall policy priority, it remains the invisible industry. Services have been expanded in black urban areas but research carried out in 2003 for SAMWU showed that "[w]ealthy and working-class areas did not receive the same quality of

[3] SAMWU Media Release, February 20, 2008.

[4] *Water contamination cited in E Cape child deaths*, Sapa, April 30, 2008.

service – apartheid still existed" [Samson 2003: 100]. This is largely because cost-cutting and privatisation has been imposed unevenly: the suburbs are generally still serviced by municipalities or commercialised companies owned by municipalities, while townships are frequently serviced by private contractors. Cleaning streets and open spaces are most likely to be neglected because this service cannot be charged to individual households. Samson shows that the costs of privatisation fall heaviest on women, both as workers and residents.

Meanwhile, poor people are still living with the dumps fed by the wastes of the rich and of industry. Indeed, most dumps now have shack settlements alongside because, like other environmentally hazardous locations, this land has next to no value on the market. It thus appears as open land on which poor people can establish a place to live. Some also find the means of a bare livelihood in picking through the rubbish.

This pattern of injustice is not only a feature of societies with a history of racist exclusion. It is part of the global ordering of power relations necessary for the conduct of business. State investments in infrastructure are designed to defend high value locations in a global competition for private sector investment and both private and state investments are increasingly concentrated in wealthy areas. South Africa's metropolitan municipalities are now all focused on creating competitive 'world class cities', producing 'development corridors' linking prestige industrial clusters, high value residential enclaves and airports, all wired up for global connection.

In Bénit and Gervais-Lambony's analysis, these spaces are produced as glittering 'shop windows' specifically designed to attract international investments. Thus Johannesburg's Security Strategy focuses on "areas which are visible to investors and will have an impact on their perceptions" [quoted in Bénit and Gervais-Lambony 2005: 6]. As part of 'cleaning up' these visible areas, the poor are driven out to spaces on the periphery where the language of 'participatory democracy' is invoked, with more or less sincerity, to manage poverty in the decay at the 'back of the shop'. The wastes of these investments must also be cleaned away. The richest 20% of the world's people "account for 86% of total private consumption expenditure" [UNEP 2002: 35]. They consume "68% of all electricity, 84% of all paper, and own 87% of all automobiles" [Sachs et al 2002: 19]. It follows that they produce a similar proportion of polluting waste. In Cape Town, taking residential wastes alone, the richest 16% of

households[5] produce over half the waste while the dumps are located in poor areas [Swilling 2006]. Dumps are expensive but this is an investment that destroys value. The object then, is to invest in removing the waste from wealthy areas and to invest as cheaply as possible in disposing of it at the 'back of the shop'.

Waste and war on the poor

Yet the relation between poverty and waste goes deeper than this. Development has, since the Second World War, been associated with geopolitical strategies. Thus, the green revolution promised a better life for the rural poor in Third World countries who might otherwise be inclined to revolt under the flag of the red revolution. For the most part, it delivered new markets for corporate agri-business in alliance with local elites while the dispossession of peasants and rural workers was naturalised in the language of development as part of 'the urban transition'. Policies that supported the accumulation of wealth in urban areas would, it was promised, create industrial jobs to absorb the flow of migrants. Nevertheless, permanent urban migration was restricted in many countries, including South Africa, in order to subsidise low wages for migrant workers with the shrinking product of peasant farming. Rural insurgencies resisted dispossession across much of the Third World and were contained by the deployment of counter-insurgency strategies framed in Cold War terms. The defeat of this strategy in Vietnam was central to the crisis of US power in the 1970s. The empire fought back. In the 1980s, the US used the economic instruments of neo-liberalism to reclaim power and reframe development as a function of 'the market'.

There are now more people in the cities than in the country and one third of them live in slums with little hope of secure work as economic growth yields fewer jobs at lower wages. The urban poor are now at the centre of a development discourse which expects them to create their own jobs through entrepreneurial enterprise. This follows the World Bank's prognosis that, throughout the 'developing' world, the informal sector will now provide the jobs that the formal sector no longer offers. In South Africa, it has been formalised in the language of the 'two economies' adopted by the Accelerated and Shared Growth Initiative (Asgisa). Even dump picking is now counted as a job in employment statistics.[6] As urban scholar Mike Davis comments, "it makes more obvious sense to consider most informal workers as the 'active' unemployed, who have no choice but to subsist by some means or starve" [2004: 25].

[5] This represents a much smaller proportion of the population as fewer people live in wealthy households than in poor households.

[6] A fuller critique of Asgisa is offered in The groundWork Report 2006.

The poor have not gone quietly to the back of the shop. Across the world, local resistance has manifested in protest actions: against removals from homes or from street trading sites, against restricted and unaffordable essential services, against pollution by industries and waste dumps, against rising prices of energy and food, against exclusion from decisions concerning their own futures. Confronted by armed security deployed by the state, many protests turn into riots. They are not exclusively urban but it is the urban terrain that is now given strategic significance. At a global level, the 'war on terror' has replaced the Cold War as the organising principle of violence directed at maintaining the conditions for capital accumulation. The US Pentagon now draws on the theorists of 'fourth generation war' against 'non-state enemies'. These enemies may be international migrants or the urban poor who are held to threaten state order and incubate or shelter terrorists. US battle field training grounds are therefore being made over, transformed from rural terrains for the tanks to roll across to replicas of Third World slums – with a little help from Hollywood set designers.

The global sphere is not the sole reserve of the US or even of the Northern states in general. Raúl Zibechi, a Latin American researcher, notes that the Brazilian army has admitted to using the same techniques in its occupation of Brazilian favelas as it uses in its peacekeeping mission in Haiti. Zibechi comments that the admission "largely explains the interest of Lula da Silva's government in keeping that country's troops on the Caribbean island: to test, in the poor neighbourhoods of Haiti's capital, Port-au-Prince, containment strategies designed for application in the slums of Rio de Janeiro, São Paulo, and other large cities" [2007].

Force is not enough against 'non-state enemies'. US commanders in Iraq see it as one dimension of 'total war' in which traditionally civilian functions of service delivery, political legitimacy and capitalist economic development are deployed. In this context, Zibechi observes, "Electoral democracy and development are necessary to prevent terrorism, but they are not objectives in and of themselves." They are rather the obverse of the walls built to contain those who refuse subordination. Gaza is the final image of the walled in slum, cut off from all development and made into a free fire zone for the Israeli Army which has specifically targeted its capacity to deliver municipal services. Yet in much of the world, the walls are as often symbolic as made of concrete and razor wire.

> Control mechanisms – whether dressed in military garb, or as NGOs for development, or promoting market economy and electoral democracy – are

> interlaced and, in extreme cases like the suburbs of Baghdad, the slums of Rio de Janeiro, or the shanty towns of Port-au-Prince, they are subordinated to military planning. [Zibechi 2007]

In South Africa, Desai and Pithouse observe that the urban poor have found themselves "under armed assault from the state" [2004: 2]. In Durban, "The police that do this work, are equipped and conduct themselves like soldiers and are popularly known in fear as *amaSosha* …" [Pithouse 2006: 8]. Elsewhere, the 'red ants' have come to symbolise forced removals but are themselves impoverished casual workers hired by firms contracted by local government. Even removals are privatised. The objectives, observed in all South Africa's cities, are to exclude the poor from the centres where the cities hope to sell themselves to foreign investors and to discipline their consumption of essentials. The scale of confrontation is escalating. In 2007, 10,000 protests were officially registered.

The people so excluded have been made the waste of the global economic system as shown by the repeated use of the metaphor of cleansing to justify the removals of street traders and poor residents. Robert Mugabe's government in Zimbabwe made the political stakes clear when it named its assault on people's livelihoods and dwelling places Operation Murambatsvina. This was given the English title of 'Operation Restore Order' but was also known as 'drive out the rubbish'. The Zimbabwean government was widely condemned for the action, including by such institutions as the World Bank. Yet this institution itself has been widely associated with similar operations justified in the more moderate language of globally sanctioned development.

People who are seen as waste understand it very well. At Sasolburg, the people who pick waste from the dump explain why the local council did not consult them when it handed out a recycling contract to a private company: "They say you are just people from the dumpsite. You are just scrap" [see Chapter 6]. This is echoed by casualised workers in Johannesburg's waste system. In 2002, they told researcher Melanie Samson, "You are like the thing, which is inside that dustbin. You are just stupid." [2004: 1].

The Kennedy Road settlement in Durban is located next to the city's Bisasar Road dump. The people there initiated the formation of Durban's shack dwellers' movement, Abahlali baseMjondolo (AbM), whose central demand is that they should be addressed as equals, capable of expressing their own will, and should take the central role in deciding their own future. They make the point that they are seen as "stupid, dirty,

lazy, criminal and dangerous" [Pithouse 2006: 21], a stereotyping that associates them with waste – unclean and dangerous – and makes them appear less than human and incapable of thinking and acting for themselves. Hence it is used to exclude them from the city authority's decision making process which has the intention to remove them from the central city. For several years the residents of Kennedy Road acted within the official process. They moved to protesting both the process and the agenda when the promises made to them were repeatedly broken. Two things followed from this: first, the city authorities effectively branded them as enemies of the state and, second, they started organising for effective resistance within both the settlement and other shack settlements across the city.

In the years since its inception, AbM has matured. This is not about the mere passing of time, but about an insistence on democratic practice and on people thinking and speaking for themselves. In May 2008, people from other African countries were subject to a series of 'xenophobic' attacks by South African citizens. The attacks took place mainly in poor areas because, it was said, foreigners were taking what properly belonged to South Africans. In its response, AbM emphasised that its membership, and indeed its leadership, includes "people born in other countries". At meetings called in response to the crisis, it opened up the issue to debate but questioned those who attributed anti-social behaviour only to foreigners. The message was that people should respond to the behaviour, not to the identity of the person. "An action can be illegal. A person cannot be illegal. A person is a person where ever they may find themselves. If you live in a settlement you are from that settlement and you are a neighbour and a comrade in that settlement." At the same time, the AbM asked "why it is that money and rich people can move freely around the world while everywhere the poor must confront razor wire, corrupt and violent police, queues and relocation or deportation?"[7]

[7] Abahlali baseMjondolo Statement on the Xenophobic Attacks in Johannesburg, Wednesday, 21 May 2008.

Chapter 2: Rubbish figures

No-one really knows how much waste is produced, recycled or dumped in South Africa. Developing a waste information system has been consistently identified as a priority since the early 1990s and has as consistently been neglected. As discussed in Chapter 3, a start is now being made on constructing a system but with little evidence of coherence or purpose. This chapter briefly discusses the figures that have been produced to give a basic sense, however uncertain, of the quantities and proportions of different waste streams. Table 1 shows the figures for the main waste streams from different sources.

Table 1: Main waste streams

	CSIR		NSFD	SAEO	
	1992 mt/y	1997 mt/y	Mt/y	mt/y	%
Mining	378.0	468.2	450	470	87.7%
Industrial	23.0	16.3		22	3.0%
Power generation	20.0	20.6	30	33	3.9%
Agriculture and forestry	20.0	20.6			3.8%
*General / MSW**	15.0	8.2	20	13.5-15	1.5%
MSW disposed				8.8	
Sewage sludge	12.0	0.3			0.1%
Total	468.0	533.6			100%
Hazardous	1.89				

* Otherwise reported as 'domestic and trade' waste.

Sources: CSIR figures given in Karani and Jewasikiewitz [2006]; National Framework for Sustainable Development [DEAT 2006b]; South Africa Environment Outlook [DEAT 2006a]

The CSIR 1992 figures represent the first stab at an overall quantification of hazardous waste from industrial sources and the authors issued several cautions on the data: they relied on information from corporations most of whom knew little about waste, had no waste information, and would only speak on condition of confidentiality because they thought the information might involve "commercial risks" [CSIR 1992: 5].[8]

[8] Wastes were calculated from "a simple mass balance of inputs and outputs". In some sectors, all major waste generators were surveyed. In others, results were extrapolated from small samples.

The figures published subsequently are in fact even less reliable. The table does not therefore establish a trend. It is, for example, a running certainty that there was no reduction in industrial or general waste between 1992 and 1997 as the two sets of CSIR figures might indicate. Subsequent figures are both dated and misreported. Thus, the South Africa Environment Outlook, published in 2006, gives figures for "total hazardous waste generated in the financial year 1997/1998". It comments, "The only additional studies undertaken since 1997 have been in the Western Cape, where 68% increase in waste generation was documented between 1997 and 2002" [261-263]. In fact, the hazardous waste figures given for 1997/8 are merely recycled from the 1992 CSIR study as shown below.

Hazardous waste

The 1992 CSIR study proposed five categories of hazardous waste. Table 2 shows the categories and equivalent disposal – landfill or incinerator – requirements.

Table 2: Hazardous waste categories

Waste categories		Disposal categories	
Group 1	High hazardous: Containing highly toxic constituents which are highly accessible, mobile, persistent in the environment, or bio-accumulative.	High Hazard	H:H
Group 2	Moderately hazardous: Dangerous, meaning highly explosive, flammable, corrosive, reactive, or infective; or Containing highly toxic constituents which are moderately mobile, persistent, or bio-accumulative; or Containing moderately toxic constituents which are highly mobile, persistent, or bio-accumulative.		
Group 3	Low hazardous: Moderately explosive, flammable, corrosive or reactive; or Containing constituents that are potentially highly harmful to human health or to the environment.	Low hazard	H:h
Group 4	Potentially hazardous: Often large scale wastes – Containing harmful constituents in concentrations that in most instances pose a limited threat to human health or the environment.		
Group 5	Non-hazardous: Containing, at most, insignificant concentrations of harmful constituents.	-	-

The definition of these categories was as much pragmatic as scientific. They were conceived to identify priorities for dealing with wastes but also to make waste management "affordable" to industry. In consequence, the report locates as much waste as possible in the lower categories. Thus, the bulk of mining waste is rated in groups 4 and 5, with only the waste of zinc refining and antimony mining seen as hazardous enough to fit into group 1. The authors acknowledge that "the lack of information … on the composition and site-specific circumstances of each individual waste stream" make the hazard ratings uncertain" and better information "might produce rather different results" [CSIR 1992: 5,9]. Indeed, the "rather different results" are evident on the ground. To take just one example described in Chapter 4, the Wonderfontein River on the West Rand has been turned radio-active by bulk mining waste probably classified as group 4 or 5.[9] These hazard ratings were incorporated into the DWAF's 'minimum requirements' with some amendments, made in 1998, notably to include carcinogens and teratogens.[10]

The Environment Outlook gives the following table for hazardous wastes from industry and mining.

Table 3: Hazardous wastes per sector (in tonnes/year)

Industrial sector	Group 1	Group 2	Group 3	Group 4	Group 5	Total
Manufacturing	22,313	148,205	281,167	4,772,190	10,149,134	15,373,009
Metals	0	11	334,698	4,566,830	0	4,901,539
Services	0	33,300	14,001	1,654,098	20,190,000	21,891,399
Sub-total	22,313	181,516	629,866	10,993,118	30,339,134	42,165,947
Mining	180	1,046,489	12,317	34,775,629	340,807,436	376,642,051
Grand total	22,493	1,228,005	642,183	45,765,747	371,146,470	418,804,998

Source: South Africa Environment Outlook [DEAT 2006a]
Note that the final total is wrong. Vertical and horizontal totals add up to 418,807,998.

Environment Outlook references sources from 1998 and 1995. In fact, these figures are from CSIR 1992. Thus, the grand totals for groups 1, 2 and 3 in the table add up

[9] We cannot know the actual classification because the data was confidential. However, the very large bulk of this waste suggests that it cannot have been included in the more hazardous categories.

[10] Carcinogens cause cancer. Teratogens cause birth defects.

to 1.89 mt/y, the figure given in 1992 as hazardous waste. Further, the figure here for all hazard rated mining waste is precisely 3,000 out from 1992's total mining waste figure of 376,639,051 t/y – suggesting that a typo crept in along the way.[11] The final total is then copied from the source, rather than calculated, and is consequently 3,000 out. In short, there has been no update since 1992 but the figures have been turned from cautious estimates to 'facts'.

The original hazard ratings covered *all* mining and industrial waste. If it is classified as non-hazardous, it goes into Group 5. CSIR 1997 apparently added 90 mt/y to the 1992 mining waste figure,[12] but this is then reported as additional to the hazard rated waste. Thus, according to the Environment Outlook, "The Department of Minerals and Energy indicated in 1997 that mining was accountable for about 470 million tonnes of waste, both general and hazardous" [261]. So the extra 90 mt/y is made to appear as 'general waste' – a category that does not exist in the rating system. It is indeed likely that mining waste increased from 1992 to 1997. That the entire increase was non-hazardous is improbable. Rather, it is apparent that the additional waste was not classified. Clearly the authorities, starting with the DME which has insisted on keeping mining waste under its authority, do not know what is in the waste. Further, it seems that the hazard rating system itself is no longer understood.

This is perhaps a useful incomprehension in that the democratic transition has made classification itself hazardous. By avoiding it, the authorities can evade demands for public accountability and so shelter corporations from the "commercial risks" that might come from people knowing what is dumped in their locality.

There is another difference. The 1992 figures included waste matter in air and waste matter in waste water as well as solid and liquid waste. Thus, the 15,373,009 t/y total for manufacturing is divided as follows:

- Waste in air: 323,358
- Waste in waste water: 602,027
- Solid and liquid waste: 14,447,624

[11] The typo is in mining waste hazard group 4, which reads 34,772,629 in CSIR 1992.

[12] The 1997 CSIR report seems unavailable so it was not possible to check how it arrived at its figures. It seems to be one of three 'baseline studies' referred to in the DWAF's 1998 edition of the 'minimum requirements'. None are available.

These figures are highly dubious. Emissions from Sasol Synfuels alone are more than double the 'waste in air' figure.[13] But the point here is that subsequent representations imply that the totals are for disposable solid and liquid wastes, not for total wastes to air, water and land. Again, it is not merely that the figures are questionable, but that they are not understood.

In one sense, CSIR 1992 attempted to create an official language of waste: a common set of terms and assumptions so that officials, consultants and waste managers would all know what they were talking about even if the figures were disputed. The DWAF's minimum requirements extended this language to corporate and local government waste managers. In principle, managers should know how to classify their wastes and what forms of treatment or disposal are required by regulation. For any national accounting or management of waste, however, the language has broken down. The figures are now meaningless and, at a certain level, the state does not know what it's talking about.

The figures nevertheless reinforce the illusion created in the phrase 'waste management'. The first national State of the Environment Report in 1999 estimated that only 5% of hazardous waste "was disposed of at permitted hazardous waste disposal sites" [DEAT 2008]. Of course, this estimate is as doubtful as anything else said about waste. It is nevertheless apparent that South Africa produces a very large and growing quantity of hazardous waste and very little is coherently managed.

General waste

General waste presents as deep a mystery – as is indicated by the wide spread of figures in Table 1 from 8 to 20 mt/y. It includes all waste from households, shops and offices – known as 'domestic and trade waste' – which, if collected, is headed for municipal dumps. While it is regarded as non-hazardous, it in fact contains many hazardous substances such as old batteries, paint and solvents. 'De-listed' hazardous waste can also be dumped at general waste sites. 'De-listing' is the bureaucratic re-classification of hazardous waste which is supposed to follow from treating it or diluting it to the extent that the risk is deemed acceptable. In practice, it is suspected that much waste is de-listed without being treated simply to allow it to be dumped. Because these toxic elements are mixed in and decompose with other wastes, much of the waste body ends up being more or less toxic.

[13] This excludes carbon dioxide emissions which were not counted in CSIR 1992.

For the most part, the quantity of domestic waste is calculated on the basis that different income groups produce more or less rubbish per capita. However, not everyone uses the same assumptions as shown in Table 4.

Table 4: Per capita domestic waste production

Cape Town			Durban		
Income group	Kg/day	Kg/year	Location	Kg/day	Kg/year
High	1.3	474	*Suburbs*	0.5-0.8	180-290
Middle	0.7	255	*Township*	0.4	146
Low	0.35	127	*Informal*	0.18	*65*

Sources: Swilling 2006; eThekwini Municipality 2004.

The Environment Outlook uses figures similar to Cape Town's, although it attributes more waste (0.4 kg/day) to low income groups. It then calculates national domestic waste at 8.8 mt/y. According to Swilling [2006], Cape Town produces just over 2 mt/y. Of this, 895,000 t/y is domestic so the larger part is 'trade' waste from commerce, industry and institutions such as universities and hospitals. On this basis, the higher range of the Environment Outlook's estimate of general waste – 15 mt/y – looks credible.

The Outlook observes that waste has "increased over the last 7 years due to rising population and economic growth" [DEAT 2006a: 261]. Better off South Africans appear peculiarly wasteful. According to the National Framework for Sustainable Development (NFSD), domestic waste from richer households in some cities "is rising above the daily average of 2 kg/person, which is 3-4 times the quantity disposed of by the average household in most European cities". Further, "MSW quantities are growing faster than the economy in many cities – for example, at 5% per annum in Cape Town" [DEAT 2006b: 34].

In 2007, DEAT commissioned an assessment of municipal waste management [DEAT 2007a]. The assessment surveyed all municipalities although not all responded. If the figures reported by municipalities are to be believed, then the country produces far more general waste than previously estimated. Table 5 shows how much waste municipalities said they collected. It shows the categories of municipalities, the number of municipalities in each category, the total number of households in all those municipalities, and the amount of waste collected averaged across those municipalities. The last two columns are calculated on the basis of the figures reported in the assessment.

Table 5: Waste collected as reported by municipalities

Municipal category	No.	Total Hhlds	Ave. mt/y	Total mt/y	Hhld/t/y
A: Metropolitan	6	4,914,930	1,752,613	10,515,678	2.1
B1: Secondary City	21	2,048,937	247,743	5,202,603	2.5
B2: Large town at core	29	1,063,207	129,351	3,751,179	3.5
B3: Small towns, no core	111	1,575,946	16,041	1,780,551	1.1
B4: Mainly rural	70	2,774,493	98	6,860	*0.002*
Totals	**237**	**12,377,513**	**2,145,846**	**21,256,871**	**1.7**

Compiled from DEAT 2007a.

According to the DEAT assessment, there are over 2,000 municipal waste facilities of which only 530 are permitted. Table 6 shows how much waste the municipalities said they disposed of.

Table 6: Waste disposed as reported by municipalities

Municipal category	No.	Total Hhlds	Ave. mt/y	Total mt/y	Hhld/t/y
A: Metropolitan	6	4,914,930	2,419,100	14,514,600	2.9
B1: Secondary City	21	2,048,937	155,684	3,269,364	1.5
B2: Large town at core	29	1,063,207	65,410	1,896,890	1.7
B3: Small towns, no core	111	1,575,946	29,478	3,272,058	2.0
B4: Mainly rural	70	2,774,493	16,607	1,162,490	*0.4*
Totals	**237**	**12,377,513**	**2,627,410**	**24,115,402**	**1.9**

Compiled from DEAT 2007a.

Municipal responses to the assessment thus indicate that they collected over 21 mt/y of waste and disposed of over 24 mt/y. Clearly this cannot be taken at face value. B2, 3 and 4 municipalities do not have weighbridges or other means of measuring waste and many have no waste management capacity to speak of. Their reported figures are estimates if not thumb sucks.

Metros do have weighbridges etc., suggesting that the figures of 10.5 mt/y collected and 14.5 mt/y disposed of should be in the ball park. The additional waste disposed would be accounted for by dumping by private waste companies and individuals. Assuming an average 4 people per household,[14] the disposal figure implies per capita

[14] The national average is 3.8 people per household.

waste of 725 kg/y. If, as in Cape Town, 55% of municipal waste is 'trade' rather than domestic, then per capita waste drops to 326 kg/y. Given that the majority of the population falls in the low income group, the implication is that middle and high earners are indeed pushing profligacy to new limits as argued by the NFSD.

B1 and B2 municipalities reported more waste collected than disposed of. This means they are spilling it, dumping illegally or their figures are completely cocked up. The last is most certain although there may also be some illegal dumping by municipalities. That B1 cities, some of them now bidding to be given metropolitan status, cannot give a coherent account of waste is a sign of the deep malaise in waste management. 19% of B1s and 34% of B2s did not respond to the DEAT assessment, indicating that they have no effective waste management capacity[15] or are indifferent to the issue. The absence of capacity itself indicates the low priority given to waste.

B3 and B4 figures look somewhat more credible, reflecting very low collection rates and people taking their own rubbish to dumps. At best, however, these figures are rough guesses as few of these municipalities are likely even to monitor incoming waste by sight if, indeed, there is anyone on site. No waste management functions whatever are carried out in several B3 and most B4 municipalities that did respond to the DEAT assessment. It is likely that those who did not respond – 39% of B3s and 62% of B4s – similarly just don't do waste management.

In principle, if not necessarily in practice, figures should include illegally dumped waste as municipalities are supposed to clean it up and many report doing so. However, costs cannot be recovered for this or for area cleaning and these tasks are widely neglected or under-resourced even in the metropolitan councils. This is particularly the case where services are outsourced or corporatised as shown by Samson [2003]. Irrespective of privatisation, the principle of cost recovery falls hardest in poor areas where municipalities cannot hope to recover costs for any services. The effect is to reproduce the spatial inequities of apartheid.

Municipalities do not regard waste minimisation or recycling as 'core business', despite the priority given to it in policy, and 87% say they "lack capacity" for it – which really means that they ignore it. Where recycling is done, it seems that it is outsourced or simply left to the private sector. The DEAT assessment comments, "The existing municipal

[15] The consultants made follow up phone calls and comment that, "Typically, the municipalities that did not respond indicated a lack of information and personnel to complete the questionnaire."

waste operation model is historically based on 'end of pipe' waste functions … With this model it is extremely difficult to budget for waste minimisation programmes." Yet the "core problem" is that "too much waste is generated … due to inefficient industrial production, wastefully designed products and over consumption". Addressing it "requires a fundamental change in mind set from all role players including all levels of government, industry and the general public …" [S. 7].[16]

Put another way, confining this problem to municipalities and the waste management system ensures that production and accumulation are not encumbered by minimisation or, indeed, by their own wastes.

[16] The report is not paginated, hence the reference is to the section.

Chapter 3: The politics of waste

The Waste Management Bill is currently on its way through the parliamentary system. It has been a long time coming. Waste was a low priority for the apartheid government and remains a low priority for the post-apartheid government. This chapter traces the history of how environmental justice activists politicised the issue of waste – and the reaction of the South African state and corporate waste managers to it.

Throughout the 20th Century, South African municipalities tipped waste in old quarries or any convenient open ground. Management of some sites in the larger towns and cities was more or less formalised in time. In smaller towns, the dumps grew into mounds and hills or waste was simply dumped in the veld.

The waste was typically dumped in black areas. The pressing issue in the townships, however, was the lack of services. The National Environmental Awareness Campaign, founded in Soweto in the aftermath of the June 1976 uprising, identified the accumulation of filth in the streets as a serious health hazard. Arguing that apartheid's puppet local councils could not deliver on this or other services, it used clean-up campaigns to pioneer the articulation of environmental issues within the understanding of liberation. The call resonated with broader demands for decent services. Thirty years later, the rubbish is still not being collected in many areas while the more general paucity of services remains central to people's experience of injustice.

Waste was meanwhile inching its way onto the agenda of the apartheid regime. In 1972, parliament held the first "comprehensive discussion" on national waste legislation. The Hoon Commission was appointed several years later to investigate waste issues and reported in 1980. Its recommendations were taken up in the Environment Conservation Act of 1982, the first law governing general waste, although to little effect. Draft waste control regulations were published for comment in July 1985, and again in August 1988, but not promulgated "due to limitations in the Act", according to Bredenhahn and Airey [1990]. Finally, in August 1990, a general notice officially brought landfills under a permitting system under the authority of the Department of Water Affairs and Forestry (DWAF). DWAF subsequently published the 'minimum

requirements' for landfills, designed primarily to prevent leachate contamination of ground water but to the neglect of air pollution.

The situation for hazardous waste was no better. Over time, some 33 legislative acts parcelled out authority to different government departments for some aspect of handling toxic and hazardous wastes. In 1990, Ball and Bredenhahn observed that "no specific and integrated regulations pertaining to the management of such wastes (had) been promulgated and consequently cradle to grave control of toxic waste (was) non-existent" [1990: 204]. They predicted that this state of affairs could lead to "some sort of disaster" and anticipated public reaction "based on sensationalism and/or emotionalism, but not facts. Distasteful as this might be to the authorities and waste management professionals, it would result in the restructuring of priorities, albeit from a position of relative weakness" [206].

Politicising waste

Indeed, public reaction was already being mobilised. Earthlife Africa was formed in 1988 on a radical 'green' agenda that brought a political understanding to the environment. This agenda was later taken up by the broader environmental justice movement. Several key themes emerged: opposition to trade in toxic wastes; opposition to incineration; the demand for adequate services in black areas; the demand for an end to dumping waste in black and poor areas; a demand for proper information on waste and who was producing it; and a commitment to the waste hierarchy, starting with the reduction of all waste and the elimination of toxic wastes, and followed by the re-use or recycling of remaining waste. This agenda emerged from struggles at multiple levels: on the ground where waste is produced or dumped and in policy at local, national and international levels.

Earthlife took waste as its first campaign issue and was immediately confronted by a proposal, put to government by businessman Sydney Saunders, to build an incinerator on the West Coast to burn imported hazardous waste. The proposal thus linked trade in toxic waste and incineration, two issues high on the international environmental agenda, to anti-apartheid sanctions breaking. Earthlife argued against it on these grounds and, in a series of public debates with Saunders, won wide public support. The campaign was also linking anti-apartheid and environmental campaigners internationally. The political risk of the project thus escalated and it was abandoned.

Earthlife also argued that South Africa was not managing its own toxic waste and importing more would simply compound the problem. A series of tip-offs on illegal hazardous waste dumping confirmed the scale of the crisis. Ironically, but logically, a number of tip-offs came from formal waste companies who saw illegal dumping eroding their markets. Further investigation showed that dumping in poor black areas, mostly shack settlements, was routine for many waste handlers. Not knowing the dangers, people from some settlements were tipping the contents from waste drums and using them for storage or as water butts. Many were suffering evident symptoms of toxic poisoning. The conclusions were obvious: industry, including large corporations, preferred cheap disposal to responsible disposal; government regulation was entirely ineffective; neither industry nor government gave a damn for the people or the environment; and both hid behind a purposeful ignorance.

Toxic waste trading and incineration were again at issue in the case of Thor Chemicals [see Box 3]. Thor traded in toxic mercury waste and used an incinerator to separate out the mercury for 'recycling'. The consequences were stark: four workers are known to have died from mercury poisoning, many more suffered chronic poisoning, the site itself was saturated with mercury, a stream used by local people was heavily contaminated, and mercury emissions to air were unknown because not measured.

While apartheid South Africa liked to represent itself as a First World state – and positioned itself as such at the Basel Convention negotiations – the case highlighted its habitual collusion with industry and the Third World state of environmental regulation: Thor ignored air pollution regulations and was not penalised by the Department of Environmental Affairs and Tourism; the Department of Water Affairs and Forestry did not act on evidence of water pollution until it became a public scandal; the Department of Manpower inspectorate failed to identify health and safety issues until forced to do so. Next, prosecutors were reluctantly forced to bring Thor to court but botched the case and created the impression that legal action against corporate interests would fail in South African courts. Under the new government, the Davis Commission was set up to enquire into the case and found that government shared responsibility with Thor for the disaster because of the failure of regulation.

Box 3: Thor Chemicals

Thor, a British transnational corporation, set up a mercury waste processing plant at Cato Ridge outside Durban in the late 1970s, just as the anti-apartheid sanctions campaign was beginning to bite. Thor was soon also on the run from British regulators. Successive inspections at its British plant showed mercury in the air up to 20 times the legal limit and, in 1987, the regulators told Thor to clean up or face court action. Rather than do either, it closed down the British plant but expanded at Cato Ridge where it could draw on a pool of cheap labour from the impoverished Inchanga area which fell under the authority of the KwaZulu homeland. By this time, Thor was clandestinely taking waste from the US and Britain at US$1,000 a tonne. Authorities on both sides sanctioned the trade. In 1986, the US Environmental Protection Agency accepted Thor's claim that the plant was the largest mercury 'recycling' operation in the world and had no environmental impacts. South African authorities allowed Thor to accept more waste than it could reprocess and effectively condoned the use of the site as a dump.

In 1988, local utility Umgeni Water traced mercury contamination from 15 kilometres downstream in the Mgeni River to the Mncgweni stream which rises next to the Thor factory. The Department of Water Affairs and Forestry (DWAF) was alerted but took no action. Over a year later, a frustrated Umgeni official leaked the story to the press. Earthlife launched a campaign that drew in the Chemical Workers' Industrial Union (CWIU), local communities and international environmental organisations. The coalition mounted protests at Thor and at the US plant of American Cyanamide, a major exporter of mercury waste. It also established that the body burden of most workers was way over the limit for mercury. The Department of Manpower, responsible for occupational health, was pushed into making a formal enquiry at Thor in 1992. It found "gross negligence leading to the poisoning of at least 29 workers" [Butler 1997: 200]. In 1993, three ex-Thor workers died from mercury poisoning.

Under pressure, the provincial attorney general charged Thor with culpable homicide and transgressions of health and safety laws. It bungled the prosecution and Thor was let off with a plea bargain and a minimal fine of R13,500. The outcome appeared designed to protect Thor and, in response, the parent company was sued in Britain. Thor finally settled out of court in 1996 for R9.4 million against the claims of 20 workers whose blood samples showed high levels of mercury contamination.

In South Africa, Thor promised to stop mercury-based production in 1995 but it resumed production of mercuric chloride for export to US transnational Borden Chemicals in 1997 and was suspected of already having broken its promise a year earlier. More workers showed symptoms of mercury poisoning in 1997 and a second group of workers sued the corporation in Britain.

Other workers and affected people in the neighbouring community have not been compensated. Many ex-workers were hired as casuals and say they were fired when they showed symptoms of poisoning. Thereafter, no-one else would employ them. Obtaining adequate compensation remains the priority for ex-workers but government has offered "no meaningful response" to their demands.[17]

Meanwhile, over 3,500 tonnes of mercury-containing waste remained at Thor's site, posing a continuing threat to workers and local communities. Most of it is still there. The ground at the site remains heavily contaminated. Cattle are reported to have died from drinking the water well downstream from Thor. Plants next to the stream are now absorbing the mercury. Considerably further downstream on the Mgeni River, fish caught in the Inanda Dam have shown "dangerous levels of mercury" poisoning[18] and the metal is showing in hair samples taken from local people by the Medical Research Council. It cannot be demonstrated with certainty that Thor was the source or that it is the only source. Indeed, it seems that Thor may be part of a larger mercury pollution crisis, possibly including mercury carried on the wind from Eskom's Mpumalanga coal-fired power stations.[19]

The Davis Commission of enquiry recommended, in 1997, that the waste be disposed by incineration on site. This was rejected by environmental groups and health experts because incineration was likely to compound the problem particularly as the mercury was mixed with unknown other wastes. Similarly, the option of burying the waste at Holfontein H:H site in Gauteng is opposed because, like all other hazardous sites in the country, Holfontein has a history of leaks, spills and fires. Nevertheless, it appears that contaminated concrete and soil was sent to Holfontein in 2006. The DEAT did not respond to groundWork's enquiries on

[17] Rico Euripidou and Bobby Peek, *Still nothing happening at Thor*, groundWork Newsletter, September 2007.

[18] *Alarming silence*, The Mercury, June 21, 2007.

[19] Tony Carnie, *Pollution raises more questions*, The Mercury, October 27, 2008.

this. A third option is to package and seal it on site, but at the risk of future leaks. Together with local community groups, groundWork and Earthlife have called for the imported waste to be returned to sender or, where the sender cannot be identified, to Europe since "it is a British company that allowed this to happen in the first place".[20] European Green parties have supported this solution.

The DEAT appears unable to find a workable solution. In 2003, it issued Guernica, as Thor now calls itself, with a directive to clean up. This seems not to have worked. In 2004, DEAT itself commissioned an environmental impact assessment (EIA) for the treatment and disposal of the waste and decontamination of the site. In 2007, after two years of official silence, the consultants produced an inventory of the waste and recommended on-site retorting – another version of incineration. At the same time, the DEAT handed the ball back to Guernica, announcing that its EIA process would close and Guernica would start another EIA. A year later, nothing more has been heard.

Guernica, meanwhile, still wants to trade 'recovered mercury'.

The campaign against Thor reinforced the broader campaign against toxic trade. It won an early and significant victory when the state banned toxic waste imports in 1990. On the quiet, government nevertheless allowed Thor an exemption provided that it reprocessed only the wastes from products that it had produced in the first place. Even then, the Department of Health issued a licence to import mercury waste from a plant in Indonesia, owned by a US transnational corporation, which did not use its products.

The Thor campaign also set the pattern for coalition campaigning. Earthlife made a point of engaging with organisations representing people directly affected by pollution as well as networking internationally for information and support. This principle was given organisational form at a conference organised by Earthlife in 1992. The conference emphasised the connection between relations of power and environmental degradation and aimed to connect South African civil society with international debates. The concept of environmental justice, introduced by US activist Dana Alston, resonated with the experience of South African delegates. News received during the

[20] Rico Euripidou and Bobby Peek, *Still nothing happening at Thor*, groundWork Newsletter, September 2007.

Box 4: Mercury

Mercury in municipal, industrial and healthcare waste presents an ongoing and increasing health risk. Mercury, even at low concentrations, has devastating effects on the nervous system. Unborn babies and young children are particularly at risk, and studies have shown decreases in intelligence as a result of mercury exposure. Mercury also attacks the kidneys, liver and lungs and has been linked to harmful effects on the cardiovascular, immune and reproductive systems. The 'safe' level for mercury exposure has consistently fallen over the past 30 years, and scientists now doubt whether there is any such safe level.

The form in which mercury appears determines how easily it is absorbed by the human body. Mercury vapour is easily absorbed in the lungs. Methyl mercury bio-accumulates along the food chain, and poses a higher risk to fish-eating populations. Some 3,000 people in Minamata, Japan, were found to have been poisoned this way in 1960 and the poison was passed on to babies who were born with cerebral palsy, blindness and profound mental retardation. Organic mercury was involved in an incident in Iraq when hungry people ate seeds treated with mercury-based fungicides in 1971.

Mercury has been used for the extraction of gold and silver for centuries, in electronics and lights, thermometers and dental fillings. It is used in batteries, as preservatives in vaccines, in biocides and fungicides for paper, paints and seeds, in antiseptics, and as reactants in chemical laboratories. Many smaller uses of mercury have been banned in Europe. Currently the major demand for mercury worldwide comes from small scale (artisanal) gold mining (30%), vinyl chloride monomer manufacture (20%), chlor alkali works (18%) and batteries (12%), according to Karliner and Harvie [2007].

Mercury is also released from volcanoes and by evaporation from soil and water. These natural emissions also liberate mercury previously released into the environment by industry. Because mercury is a trace element in coal, it is emitted by coal fired power plants. Stationary combustion (with coal fired power stations the main source) contributed 67% to global man-made mercury emissions in 2000. The other sources were: gold production (10%), non-ferrous metal production (7%), cement production (5%), waste disposal (5%), caustic soda production (3%), and steel production, mercury production and other (all at 1%), according to Pacyna et al [2006].

Mercury is still mined on a large scale in China and by artisanal miners elsewhere on a small scale. It can also be a by-product of mining and refining zinc, gold and silver and from refining of natural gas. It is also recovered from old mine-tailings and recycled from mercury containing products and stockpiles, particularly in the chlor-alkali industry.

Activists, including groundWork, are pushing for a global ban in the use of mercury.

Health care products contribute less than 1% to worldwide mercury demand but pose direct health risks to health workers and to people whose teeth have been filled with dental mercury amalgams.

The global movement for mercury-free health care reports advances in the European Union and the United States in the phasing out and/or banning of mercury-based medical products. There are also advances in Argentina, Brazil and the Philippines. In South Africa the KwaZulu-Natal Department of Health has issued a directive phasing out all mercury products in public health facilities. Ironically, these initiatives have brought down the costs of such products. In China, by 2004 there were eight factories producing 150 million mercury-based thermometers, a 20% increase from 2000, using nearly 200 metric tonnes of mercury.

Additional sources: Health Care Without Harm;
and http://www.zeromercury.org/fact_sheet/index.html

conference that an Italian corporation was dumping toxic waste in war torn Somalia demonstrated its pertinence and urgency. Delegates adopted environmental justice as the core idea capable of linking disparate struggles – struggles for land, housing and services, and struggles against pollution, dispossession and exclusion – to a common movement. They also mandated the formation of the Environmental Justice Networking Forum (EJNF) to give shape to the movement. EJNF grew rapidly to represent over 600 organisations representing workers, local community groups, religious bodies and women's groups as well as NGOs active in a range of sectors. It took up the Thor campaign amongst others and led civil society participation in the debates that then seemed to promise a wholesale transformation of policy.

Spurred by controversy and bad publicity, the state began to fashion a response from the early 1990s. The Council for Scientific and Industrial Research (CSIR) undertook a desktop study which gave a general outline of the situation of waste management and pollution control. Referring to the Thor case, it also warned that "action groups in whatever form are here to stay". In response, the authorities would need to develop public relations expertise and "promote an image of being more aggressive and proactive in the field of environmental protection" [CSIR 1991: 297]. Activists were later informed that the intelligence services had also investigated Earthlife. Their key concern was to prevent a political mobilisation on environmental issues and they recommended soaking up the organisation's capacity by engaging it in technical processes such as the DWAF's minimum requirements for landfills.

A second CSIR report focused on hazardous waste and revealed a dismal picture of neglect. "Very few industries have waste management strategies" or expertise and there was "no registration or permit requirements" for contractors handling hazardous waste [CSIR 1992: 81ff]. It argued, however, that a few very large waste streams from mining and energy dominated waste generation and the bulk of it should not be "considered hazardous" [1]. This conclusion followed from an overriding concern to contain costs: Given "the poor current state of the national economy", disposal should be "as affordable as possible" to corporate waste producers. The report therefore proposed a hazard rating system to prioritise spending and relegate most mining waste to the low hazard categories 4 and 5. Nevertheless, the report admitted that "there is room for considerable debate regarding the speculative hazard rating of waste streams" [1992: 52].

These reports fed into the Integrated Pollution Control (IPC) process, initiated in 1993 and jointly managed by the DWAF and the DEAT, which centred on the interests of the state and corporate capital. It was criticised for its exclusion of labour and civil society and even industry agreed that it was ill-conceived and ineffective. In fact, rising environmental activism, linked to the prospects of a democratic government, appeared to be driving change – albeit not quite as the activists intended. Earthlife adopted the waste hierarchy to reduce, re-use and recycle waste but pointedly omitted disposal.

Poison dumps

As the illegal dumping was exposed, however, industry began looking for managed end-of-pipe solutions. The formal market for waste services expanded dramatically to the benefit of the larger waste corporations. This raised the costs of disposal but had

no evident effect on reducing waste production. It also focused activist attention on the formal dumps. Two notorious hazardous waste dumps operated by Waste-Tech were closed down following sustained campaigning: Margolis in Johannesburg and Umlazi in Durban [see Box 5]. The wretched Aloes site in Port Elizabeth, however, remains open. After a protracted struggle, the neighbouring Vermaak community was re-housed away from the site [see Box 7].

The leading corporations then started constructing new hazardous waste landfills. As usual, most were sited in poor neighbourhoods and Earthlife, together with local organisations, opposed them with uneven success. EnviroServ got in early with its high hazard (H:H) Holfontein landfill which it claimed would be a Rolls-Royce site. The subsequent experience for the neighbouring settlement has been anything but luxurious. The landfill has a history of fires, leaks and spills from collapsing cell walls.[21] Waste-Tech followed with the construction of Chloorkop, also slated as a Rolls-Royce, next to the Phomolong shack settlement but also close to wealthier Midrand suburbs. A protracted battle followed as diverse local communities and interests united in opposition to the landfill. The industry claimed that opposition to its dumps was based on the 'not-in-my-backyard' syndrome and was creating a crisis of hazardous waste in the province. Activists responded that the dumps should not be in anybody's backyard, denounced the project as an end-of-pipe response to hazardous waste and questioned industry's motives for claiming a crisis when it was simultaneously lobbying for permission to import wastes. Finally, the dump was permitted for general waste but not for hazardous waste [see Box 6].

In KwaZulu-Natal, industry similarly claimed that the closure of Umlazi would create a hazardous waste crisis and attempted to collapse the closure process into a process for identifying a new H:H site. Local activists rejected this out of hand. They noted that no-one actually knew how much waste was produced and argued that a process for identifying any new hazardous site could not be undertaken in a policy vacuum. At the same time, the experience of Umlazi consolidated awareness of the interlinked nature of environmental problems and activists from the various south Durban communities, hitherto separated in apartheid's racial boxes, joined to form the South Durban Community Environmental Alliance (SDCEA).

[21] Enviroserv's 2007 Annual Report records numerous complaints at Holfontein but does not give details of the cause of the complaints. Indeed, its 'sustainability report' focuses exclusively on process issues such as management systems and the number of training courses for workers. It says nothing about its actual impacts on the environment.

Box 5: Umlazi

Umlazi, one of the largest black 'townships' in South Africa, is an integral part of Durban but was incorporated into the KwaZulu homeland under apartheid. Waste-Tech's hazardous dump was established in the 1980s under the lax jurisdiction of the homeland government while operating as part of south Durban's industrial economy. It was located on the border of Umlazi and the Indian area of Isipingo and constructed without so much as a lining. It leached toxic waste into the Isipingo River while the stench of its emissions filled the air and forced the repeated closure of a neighbouring school.

With the democratic transition, the dump fell under the authority of the DWAF and was classified as a low hazard [H:h] dump. Faced with vociferous protest, the minister called for a forum to discuss its future. South Durban activists, however, demanded that the dump be closed and refused to join the forum until it was agreed that the issue to be addressed was its closure. They made this the defining issue through sustaining protest action on the streets rather than in negotiating chambers and by insisting that their voice remain autonomous of government, with people defining the issues and the terms of their participation. Hard evidence of DWAF's collusion in illegal dumping of high hazard waste at the site strengthened their case and their resolve.

Following the closure, the waste was diverted in three directions. Some was 'de-listed' – treated and/or reclassified as non-hazardous – and sent to Durban's Bisasar Road municipal site. Some went to Waste-Man's Bulbul Road H:h site, a poorly constructed dump in the Indian area of Chatsworth. Following heavy rainfall, the dump subsequently 'slipped', releasing toxic clouds into the air and a toxic flood into the Umlazi River below. The remainder went to EnviroServ's Shongweni dump which the DWAF quietly upgraded from a general to a H:h landfill.

Despite closure, a fourth stream kept coming to Umlazi. Even as closure was ordered, Waste-Tech dug out and lined a new cell at Umlazi. Across the valley, the Merebank community was meanwhile fighting for the closure of Mondi's toxic ash dump located on site at its south Durban paper mill and next to people's houses. When they finally succeeded, the DWAF allowed the ash to be dumped in the hole that had conveniently been prepared at Umlazi. The hole is now a mountain of ash and the final capping and closure of the site commenced only in 2007. This coincided with the installation of a 'multi-fuel burner' – a euphemism for an incinerator – through which Mondi is recycling its ash along with other materials. This reduces the amount of ash but increases its toxic load.

Box 6: Chloorkop

Waste-Tech intended Chloorkop as a national H:H dump, located close to its biggest customer base in Gauteng but taking waste from across the country. Plans to start construction were reported in the press in 1993 and provoked a fire storm of response from local groups who had not been consulted. Waste-Tech then rolled out the PR. It called a public meeting to convey the message that the site would not harm "anybody or anything" but was faced with a barrage of calls for its closure.[22]

The campaign gathered enormous popular support mobilised through local structures of the ANC together with the Transport and General Workers Union and Earthlife. ANC leaders, including Nelson Mandela, signed a petition against the dump and the momentum was sustained through the transition to majority rule. As in Durban, the terms of participation were hotly contested. A commission appointed by the previous government and composed of technocrats was rejected. The new local government structure, dominated by the ANC, established a new commission with community representatives sitting alongside the technocrats. It arrived at a split decision with the former opposing the dump while the latter supported it on the condition that Waste-Tech kept to strict standards.

Waste-Tech, now headed by a black entrepreneur, maintained an intensive lobbying campaign. It appealed to the regional planning structure which found in its favour. Given the intense opposition to a toxic dump within the ANC at local level, the provincial government then arrived at the compromise of refusing permission for a hazardous dump, but allowing construction of a general waste dump.

The experience of people living next to waste facilities was universally dire. At an EJNF workshop in 1995, they told "similar stories of serious health problems, leaking toxic waste sites, choking incinerators, illegal dumping and incompetent management …" Within industry, Waste-Tech was singled out for special mention. Indeed, the corporation was beginning to run out of options as one after another of its dumps came under scrutiny and key dumps were closed down. In 1997, the company was taken over by EnviroServ, creating a monopoly with 90% of the hazardous waste market.

[22] Tebogo Phadu, *Chloorkop toxic waste dump: People driven development wins the day*, EJNF Newsletter, No.4, Summer 1996/97.

The workshop similarly castigated government officials for incompetence while Kader Asmal, the first ANC minister of Water Affairs, was blasted for "inconsistent and contradictory statements" tailored to different audiences. Participants demanded that managers be held liable for damages resulting from their activities, that toxic wastes be tracked from producers to disposal and the information be made public, and that, if government could not or would not prosecute offenders, the public should be able to do so.[23]

In summary, activists were now demanding:

- Coherent policy governing waste ahead of any new developments;
- Rigorous regulation and enforcement at existing sites;
- A waste information system with compulsory reporting by hazardous or general waste producers and managers and open to the public scrutiny; and
- A serious programme for reducing waste.

Toxic waste trade

As these fenceline battles raged, the industry was lobbying for government to allow imports. Literally hours before the first democratic elections in March 1994, government rushed to sign the Basel Convention on hazardous waste trading[24] with qualifications designed to allow toxic waste imports to South Africa. The DEAT, under a National Party minister in the post-apartheid Government of National Unity, then introduced policy – effectively written by industry – to permit the trade. Earthlife mounted a public campaign while EJNF led a delegation that included unions and civics to appeal against the decision. They were rebuffed by the DEAT's Director General. Polelo Magane of the Chemical Workers Industrial Union (CWUI) commented: "We do not agree … that you can only protect the environment and health of workers as long as it does not affect economic growth."[25]

The Basel Convention, meanwhile, had become a battle ground between the proponents of free trade, led by the US, and those seeking to ban the toxic waste trade altogether. In a notorious internal memo, senior World Bank official Lawrence

[23] Chris Albertyn, *Help us Minister Asmal, we are being dumped on*, EJNF Newsletter, No.6, Winter 1995.

[24] To give its full title: The Basel Convention on the Transboundary Movements of Hazardous Waste and their Disposal.

[25] Quote in *Toxic waste: government rejects EJNF demands*, EJNF Newsletter, No.4, Summer 1994/95.

Box 7: No closure at Aloes

The Aloes hazardous landfill was built in the late 1970s in the neighbourhood of the large black township of Motherwell but virtually on top of the informal but well established settlement of the Vermaak community. An incinerator was added in the early 1990s. The Vermaak community was then caught between the incinerator and dump. In 1998, residents told EJNF journalist Mpume Nyandu that these facilities were imposed on them without consultation and that they changed their lives. The community was always poor but they became sick as well. Many people died "as a result of this pollution" while others became too ill to work. The community was then further impoverished. In 1995, they formed the Aloes Environment Committee and, in 1998, government agreed to their demand for resettlement away from the dump. Actual resettlement, however, was delayed till 2002 and issues relating to health and compensation were never addressed.

The original Aloes dump was unlined and leached toxics down through the groundwater and into the Swartkops estuary below. It was closed in 1998 when Aloes 2, engineered to the H:H standards, was constructed alongside. The old dump was and is an environmental disaster. The new dump soon ran into troubles of its own. The municipality quite rightly refused to accept untreated leachate at its sewage works while Waste-tech, and subsequently EnviroServ, was reluctant to invest the capital to treat the leachate. For three years from 2000, the site was closed as the growing lake of leachate occupied the space available for new waste. The DWAF nevertheless kept extending the operating permit and EnviroServ eventually invested in a leachate treatment plant. Aloes continues to operate as one of its three H:H landfills.

Summers commented in 1991 that "the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable …". Jim Puckett of the Basel Action Network (BAN) responded that "his words were shocking" because "with respect to traditional free market economics, they were true". The waste would arrive at the cheapest destination.[26]

Basel was itself intended to defend the trade in toxic wastes. Following a series of scandals over toxic dumping in poor countries, African countries moved to ban waste

[26] Jim Puckett, *South Africa must lead in preserving Basel ban*, EJNF Newsletter, No.15, Spring 1997.

imports into Africa through the Bamako Convention.[27] Basel countered Bamako and took the initiative away from Africa. It was negotiated in the late 1980s and came into force in 1992. It permits toxic trading between any countries that agree to it subject to various regulatory requirements such as documenting shipments. In March 1994, however, negotiators proposed 'the Basel ban' amendment to prohibit hazardous waste exports from OECD countries – that is, rich countries – to non-OECD countries.[28] It was adopted in 1995 and carries some moral force but not enough countries have ratified the amendment so it has not entered into force legally.[29] The agreement that is legally in force merely allows individual countries to prohibit waste imports. The US, as usual, has not ratified Basel and is therefore not legally bound by it.

As the 'Basel ban' battle raged, it was discovered that the DEAT had handed government's authority to issue trading permits to a private consultant with close ties to the waste industry – in fact the same consultant that had drafted the pro-trade policy. The consultant then approved a shipment of toxic waste from Finland but ignored the requirements of the Basel Convention. The shipment was thus illegal and, when the news broke, already on its way. EJNF called for the DEAT Director General's head. Earthlife took to the streets once more. Transport workers threatened to embargo the cargo. Seriously embarrassed, government ordered the ship back. It also agreed to ban the import of all toxic wastes and to include civil society representatives in its delegation to the Basel negotiations. Activists hoped that this marked an "irreversible turning point" in policy.[30]

The Department of Trade and Industry, however, seemed unimpressed by the ban. While DTI simply ignored questions posed in South Africa by EJNF, government did respond to questions posed by European politicians. It claimed that South Africa must continue importing toxic wastes produced in neighbouring countries which did not

[27] Bamako was negotiated in the context of the Organisation of African Unity. It was never ratified by enough African countries and so has never entered into force.

[28] Free traders subsequently weakened the prohibition. The amendment that was actually adopted creates a list of countries who cannot export toxic wastes to those not on the list. At present, OECD countries are listed but others could be added. If the ban ever comes into force, it is likely that the pressure for new additions will increase.

[29] The amendment has been ratified by 63 countries, less than half of the number required for it to come into force.

[30] *Toxic waste scandal has positive outcome*, EJNF Newsletter, No.7, Spring 1995.

have the capacity to deal with them. This was rather rich given South Africa's own record – but perhaps DTI was simply oblivious to the catastrophe of waste management, much as it was and is oblivious to wastes generated from the industries it promotes. EJNF pointed out that waste traders were likely to use neighbouring countries as a conduit for importing wastes to South Africa. Indeed, the local industry's continued interest in waste trading was soon confirmed when EnviroServ tendered to import New York's waste to Namibia and incinerate it. The project was abandoned when it met with opposition from the Namibian public and then from its government. DTI, however, remains sympathetic to such proposals. Since that time, department officials have periodically questioned why South Africa should not make money from trading in waste, implying that waste is just another commodity.

In 2000, a shipment of toxic mining waste from Australia to South Africa was authorised by both governments. The waste was destined for Mintek, the state owned mineral research corporation which essentially aims to support the competitiveness of the minerals industry. Mintek said the waste was for research and what was left of it after the research was done would be returned to Australia. According to BAN, this was the first time that the Basel ban was intentionally violated by two member countries. groundWork, then in its first year of operation, and Earthlife called on government to clarify its position on toxic waste imports, ratify the Basel ban amendment and join the Bamako Convention. Government ignored all three calls.

Meanwhile, toxic trading scandals keep recurring. In 2006, transnational oil trader Trafigura tried to off-load a cargo of toxic waste, misrepresented as 'slops', in Amsterdam. On inspecting the waste, Amsterdam authorities found it that it was highly toxic oil sludge and said they would charge $300,000 for disposal. Trafigura refused the deal and the ship set sail to Abidjan in the Ivory Coast. There, it contracted a local company which dumped the waste at 18 different sites around the city. Over 10,000 people were poisoned and at least 10 died. The Ivory Coast government commissioned a clean up and prosecuted some of the offenders including two Trafigura officials.

In Somalia, sea pirates this year highlighted the fact that the toxic dumping initiated in the early 1990s has never stopped. They demanded an $8 million ransom for a captured arms trading ship to contribute to a clean up. After 20 years of dumping, said a pirate spokesperson, "The Somali coastline has been destroyed, and we believe this money is nothing compared to the devastation that we have seen on the seas." The United Nations Environment Programme confirms the pirates' allegation. The 2004

tsunami smashed open rusting barrels and washed them ashore. Hundreds of people have been poisoned by the waste sent from Europe by corporations avoiding high disposal fees.[31]

Connepp: policy opening

The IPC process had meanwhile lost all credibility and was terminated. The ANC had, moreover, adopted the idea of the waste hierarchy. In 1996, government accepted civil society's argument for coherent policy. It launched the Consultative National Environmental Policy Process (Connepp) which was to provide the overarching environmental policy framework within which a coherent waste policy could then be developed from scratch and with the involvement of all sectors. Connepp represented the high point of post-apartheid participatory policy development and adopted most of the principles that civil society had been calling for, including: sustainable development; environmental justice; the waste hierarchy; the polluter pays principle. Two years later, these principles were incorporated into the National Environmental Management Act (NEMA) of 1998.

Also in 1996, and in marked contrast to Connepp, macro-economic policy was produced in virtual secrecy. The Growth, Employment and Redistribution (Gear) policy was primarily aimed at stabilising the economy on the terms of capital and produced little growth, declining employment and no redistribution except to the rich. While Connepp proposed sustainable development based on the Environment Right in the Constitution, Gear adopted the market discourse of economic sustainability implicitly based on the Property Right.[32] Connepp appeared to limit corporate power while Gear consolidated it. Subsequent 'real economy' policy on minerals and energy and trade and industry confirmed the subordination of environment and people to market imperatives.

Under the Connepp umbrella, subsidiary policy on Integrated Pollution and Waste Management (IP&WM) was developed simultaneously. This was then to be implemented through the National Waste Management Strategy (NWMS) and within the broad legal framework provided by NEMA. As distinct from Connepp, the waste

[31] Najad Abdullahi, *Toxic waste behind Somali piracy*, Al Jazeera, October 11, 2008.

[32] See The groundWork Report 2004 for a full discussion of the Environment Right and its neglect by the state in favour of the Property Right.

process was, as they say, 'quick and dirty'. The country could not afford the time for thorough participation, said the DEAT, because municipalities were clamouring for policy direction and the means of implementation. The IP&WM and a first draft of the NWMS were brought out in short order in 1998. Then the process stalled. Two years later, and without further participation, the NWMS was finally published. It could add almost nothing to what was known about waste in 1990 and its statement of the problems echoed that of the CSIR reports:

- Waste management legislation was fragmented and ineffective and government had no capacity to enforce it;
- Trade in hazardous and radioactive waste was not regulated or monitored;
- Waste services were still discriminatory – inadequate in black urban areas and non-existent in rural areas;
- Minimisation and recycling were neglected, leaving disposal as the only response;
- Waste disposal was anything but safe. Dumps and landfills were "poorly sited, designed and operated", general waste sites were used for hazardous waste and illegal dumping was still widely practiced;
- Workers and neighbours were exposed to safety, health and environmental risks;
- Waste pickers disrupted landfill operations and were themselves exposed to a variety of hazards;
- The management of people's participation in decisions relating to pollution and waste management was shambolic.

In theory, the IP&WM and NWMS marked a paradigm shift in the approach to waste management. Founded on the waste hierarchy, reducing waste generation is central to the stated objective. The objective, however, faded from the practical strategies: Waste prevention was altogether lost; minimisation through 'cleaner production' was flagged but with no real means of implementation; incineration, particularly for hazardous waste, was retained as a disposal option despite the fact that it contradicts reduction; recycling was reduced to a symbolic cipher without adequate funding or any requirement for producers to use recycled materials and so create a viable market. Further, while NWMS prioritised development of a waste information system, it did not require industries to report on waste. It thus created no credible basis for waste information but rather sustained the wilful ignorance that allows producers to disregard their own waste and the externalised costs.

In short, the NWMS had no purchase on the production system presided over by the 'senior' departments. For government as a whole, the environment in general and waste in particular were scarcely a priority. The inter-governmental Committee for Environmental Co-ordination, established in law by NEMA, was all but ignored by senior departments, environmental budgets were squeezed and waste management was in reality abandoned without adequate resources in the flood of waste.

Closing down

For six years, EJNF coordinated the emergence of a remarkably vibrant environmental justice movement linking disparate struggles over a very wide range of issues including land and labour, municipal services and waste, and air pollution and climate change. It also challenged the central premises of development, notably through its coordination of the environmental sector inputs to the 'poverty hearings' organised by the South African NGO Coalition (Sangoco). In 1998, however, internal tensions opened into painful divisions and the organisation suffered a collapse of capacity. It survived another eight years but never regained the momentum of the earlier period. groundWork emerged from the fall-out, taking the form of a conventional NGO, to focus on working with fenceline activists mobilising against industrial pollution and challenging the power of large corporations.

On the fencelines, people still faced the issues thrown up by toxic production systems and the overbearing power of corporations. Gear reinforced corporate power. Its neo-liberal logic came to define development and was entrenched in policy across the range of government functions. It represented the will to subordinate environmental concerns to economic growth at whatever cost. The relative openness evident in Connepp was thus closed down as environmental policy making began to brush up against the imperative of growth directed by corporate interests and the minerals and energy complex in particular. Effectively, government had abandoned environmental regulation to the 'market' – that is, to the decisions of individual firms and the presumed incorporation of environmental management in the 'triple bottom line'.

The effects were highly uneven.[33] Some firms adopted the discourse of 'sustainable development'. Some even made real improvements either because of sustained pressure from local activism or because their access to Northern markets required at least the

[33] See The groundWork Report 2003 for the uneven effects of market regulation.

appearance of responsible environmental management. Most did not. Government meanwhile used 'stakeholder participation' to manage dissent while negotiating non-compliance with polluting corporations. Outside of managed participation, it was increasingly intolerant of dissent, closing down on people's rights to information and free speech and contesting the legitimacy of civil society mobilisations. This provoked a confrontation with emerging social movements which had its symbolic climax on the world stage provided by the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg. As host, government managed that event to establish the primacy of economic growth over environment in the conference hall, but it lost the battle on the streets where its claim to the banner of emancipation was exposed as a threadbare remnant.[34] For their part, the social movements could not sustain the momentum created around the WSSD. The event nevertheless marked a profound shift in South African politics.

Polokwane's zero waste puzzle

Following its publication, the NWMS gathered dust for another year. In 2001, the DEAT convened a National Waste Summit which issued the Polokwane Declaration agreed by government, business and civil society stakeholders. It envisaged waste management contributing to sustainable development and "a measurable improvement in the quality of life" and it "reaffirm[ed] our commitment to the Integrated Pollution and Waste Management Policy, the National Waste Management Strategy and the principles of waste minimization, reuse, and recycling for sustainable development". The need to 'reaffirm' was really confirmation that nothing was happening. Nevertheless, Polokwane defined a bold national goal to:

> Reduce waste generation and disposal by 50% and 25% respectively by 2012 and develop a plan for ZERO WASTE by 2022. [Emphasis in original]

To achieve this, the declaration laid out a set of actions starting with implementation of the NWMS and the development of legislation. Activists welcomed the zero waste commitment. Then … nothing happened. Rather than trumpeting a new era, Polokwane was the last hoarse whisper of the spirit of Connepp – the project for social democratic reform.

[34] See The groundWork Report 2004 for the clamp down on people's rights and the confrontation at WSSD.

The Polokwane Declaration remains a formal declaration of national intent and is displayed on the DEAT's website. Insiders comment that the reduction target was no more than a rhetorical flourish made in ignorance of the reality of waste. It is also said to be out of step with government's managerial cycle which starts with good information as a basis for understanding the problem. Government, however, was not collecting the information. Nor was it developing a waste information system as mandated in the NWMS and again at Polokwane.

Another two years passed before the DEAT initiated an NWMS implementation project. As if to emphasise the low priority given to waste by government as a whole, the department had to resort to foreign donor funding from Danida. Within the period 2003 to 2006, the project aimed, amongst other things, to establish a working waste information system. In 2005, it produced a framework document for a waste information system [DEAT 2005c]. The beginnings of a working system were only evident in 2008 and data appears to be coming in from just six or seven municipalities nationally. Waste handlers are required to register on the system although it is not clear how many have done so. There is no requirement for waste producers, including hazardous waste producers, to register. The system thus remains focused on the end-of-pipe. This is perhaps the default position arrived at in the absence of any discernible purpose driving the collection of information.

For environmental activists, Polokwane's 'zero waste' declaration indicated a commitment to radical change in the whole system of production and consumption: First, it implied that the use of materials must be substantially reduced, not merely in relation to GDP but in absolute terms; second, that production must be detoxified to eliminate hazardous wastes as well as to reduce the energy intensity of production; third, that the by-products of one production process are redefined as resources for other processes; fourth, that products are designed so that they last longer, can be re-used and mended, can be returned to the producer as a resource for the next round of production and / or, finally, will degrade and be assimilated back into the environment without harm. This is discussed further in Chapter 7.

It appears, however, that other stakeholders understood something quite different. Thus, eThekwini's 2004 Integrated Waste Management Plan (IWMP) argues that the limits of minimisation and recycling are reached when the costs exceed the avoided costs of dumping. It then estimates this limit at a 25% reduction against current costs and a maximum 50% reduction against total costs including future investments in

landfill and vehicles. "At Polokwane, incineration/waste-to-energy was promoted to deal with the balance of waste remaining and to ensure zero waste to landfill as per the US and European models" [3-32]. The IWMP points out two flaws in the reasoning: first, that incineration does not result in zero waste as the ash from incineration adds up to 15% of the original waste volume and must still be dumped[35] and second, that South African waste streams might be less than ideal for incineration because the proportion of highly combustible materials such as plastic is less than in Northern countries. It should be noted that eThekwini's assumptions that waste reduction can precede incineration and that incineration has been a success in Northern countries are themselves flawed [see Box 8].

Incineration is not in fact mentioned in the Polokwane Declaration and some observers think eThekwini's interpretation bizarre. eThekwini waste managers, however, thought it implied incineration because the European example was made a constant point of reference at Polokwane. Either way, it seems that the waste managers were redefining the concept of zero waste – together with waste prevention and waste minimisation – to fit their situation. The concept was no longer about reducing waste at source in the production system. It was moved downstream to the end-of-pipe.

It may be that the waste managers did not understand a concept imported from a different paradigm and so redefined it in more familiar terms. More likely, however, the redefinition was a necessity because the waste managers, and indeed the DEAT itself, have zero influence on production. That is, they are structurally positioned at the end-of-pipe so that the mandate for zero waste, and the legal requirement for minimisation, confronts them with a contradiction.

In the 2004 IWMP, eThekwini's Department of Solid Waste (DSW) reflects this positioning. It argues that zero waste is impossible while minimisation is "contrary" to a waste service provider's "primary goal" of growing the business [2004: 3-30]. It supports waste reduction and recycling "because these are national objectives" and concludes that "recycling markets will drive the waste minimisation process to a large extent" [3-15]. Thus, it reduces minimisation to recycling which, in turn, has been placed in the domain of private enterprise. The IWMP sees entering and controlling the recycling market through public-private-partnerships as the only way to off-set the contraction of its business but is reluctant to commit resources to recycling as long as markets and prices are unstable – which is as long as they are unregulated.

[35] This is a conservative estimate of the volume of ash [see Box 8].

DSW's view of the economics of waste reduction has since been changed by escalating fuel prices, as described in Chapter 6. The economics of recycling have been similarly changed by the commodities price boom. They have not been changed by the impact of policy because there has been no impact.

Box 8: Incineration – the great Northern model

The first waste incinerator was built in Britain in 1875. It resembled nothing so much as the inner circle of hell and it spewed out pollution. Since then, every new generation of incinerators has been advertised as solving the problems with new technologies. In Europe now, the latest generation is claimed to be a far better solution to waste disposal than landfills. And they have an added advantage in that they can be used, though not all are, to generate electricity. That landfills are environmental nightmares is beyond question. That the new incinerators are much better is less convincing. Indeed, it seems likely that, in combination with the ever changing chemical composition of waste,[36] they are simply creating new hazards for people's health and for the environment. It took decades to understand, let alone regulate for, the impacts of early incinerators and it will take time before the impacts of the new generation are understood.

The first problem relates to the laws of physics: matter can neither be created nor destroyed but can be transformed from one state to another. Thus, the problem with what disappears in a puff of smoke is what is in the smoke following the chemical reactions that combine burning rubbish with the oxygen and nitrogen in air. Incinerators typically emit sulphur dioxide, hydrogen chloride, nitric oxide, particulates and dioxins and furans.[37] Particulate emissions include various toxic metals including lead, cadmium, arsenic and chromium. Assuming well maintained equipment, some of these can be captured. Mercury, however, becomes a gas at high temperature and its removal from the flue gas, using activated carbon, is more costly and less certain. Dioxins are particularly tricky to control. Incinerator operators claim they are destroyed if the incinerator is operated at consistently high temperatures. However, they re-form as the flue gas cools unless cooling is very rapid.

[36] Growing quantities of PVC are coming into the waste stream and substantially increasing the chlorine content, while e-waste is contributing an exotic mix of plastics and metals.

[37] Dioxins and furans are chemical cousins and are formed in more or less the same way. There are around 75 different dioxins and 135 furans. Below we use 'dioxin' to mean both.

Solving one problem often creates others. High temperature incineration designed to destroy dioxins "led to higher nitric oxide formation, the greater liberation of toxic metals, and reduced mercury control," says chemist Paul Connett, and "the desire to [generate] energy … increased the post combustion formation of dioxin" [1998: 8]. High temperatures also reduce emissions of large particulates (PM_{10}) but produce more fine ($PM_{2.5}$) and ultra-fine particulates (PM_{1}). Thompson and Anthony [2005] observe that bag filters – currently the best available technology – catch the large particulates but most fine and virtually all ultra-fine particulates escape. Further, ammonia used to reduce nitrogen oxide emissions results in the formation of 'secondary particulates' ($PM_{2.5}$) beyond the bag – and beyond the view of the regulators. The fine particulates are more dangerous to human health than PM_{10}. They penetrate deep into the body through the lungs to the blood stream and ultimately into individual cells. There, they disrupt DNA with consequences not just for those exposed or even for unborn babies, but for those yet to be conceived. The effects are exacerbated as toxic metals and dioxins attach themselves to the particulates.

Regulators commonly measure emissions by weight. Fine particulates, however, are lighter than the less dangerous PM_{10} caught in bag filters. The reduction in the weight of emissions thus gives a "false impression of safety" [Thompson and Anthony 2005: 8]. That impression is reinforced by the regulators ignoring secondary particulates along with a host of other nagging questions. Writer Richard Girling notes that Europe's stringent new standards for all emissions from incinerators are arbitrary: "The legal limits do not meet any standard set by a health authority, for no such standards exist. Rather, they represent the best that current technology can achieve …" [2005: 196]. That is, they represent a kind of collusion between industry and regulators to provide false comfort.

Then there is what is left behind. Incinerator ash weighs in at 15-20% of the original weight of the rubbish according to the industry, and at up to 30% according to critics. It is divided between 'bottom ash', from the furnace grate, and fly ash captured from the flue gas. The industry says bottom ash is safe because it is contaminated only by insignificant amounts of toxic metals and can be dumped as non-hazardous waste, used to make ash bricks or to mix with cement, or even spread on land as a fertiliser. Critics argue that this depends on how well the incinerator is run and what actually went into it. Fly ash goes up with the flue gas and contains high concentrations

both of heavy metals and dioxins. The better the emission control technology, the more toxic the ash. It should therefore be dumped at hazardous landfills.

The second problem is that the claims of industry and regulators assume that the incinerator is consistently well operated to ensure 'complete combustion'. Operation is complicated by the mixture of rubbish. Some burns fiercely, some absorbs more energy than it releases and so dampens the fire. New generation incinerator managers must therefore also control the waste stream to exclude toxics, materials that do not burn well and also those that should be recycled. This brings up another contradiction as candidates for recycling include paper and plastic which do burn well. As with other large plants, incinerators do not in fact operate without periodic upset conditions or without occasional shut-downs and start-ups. These "non-steady-state conditions … induce dramatic concentration[38] increases of products of incomplete combustion such as dioxins" [Watson 2007: 51]. Moreover, the accumulation of dioxins in these conditions creates a 'memory effect' that induces further dioxin formation for up to 24 hours after optimal operating has been restored.

Good operating is also compromised by costs. In the US several corporate operators have been caught by-passing pollution control equipment. At Columbus, Ohio, this was only revealed after people started getting rare illnesses. Connett notes that this single plant was emitting 5 times more dioxins than the Environmental Protection Agency admitted for all US incinerators. In fact, although emissions vary according to the waste that comes in, continuous monitoring of dioxins is not possible and no-one knows how much is actually emitted. Inspections are rare and the corporations are given notice.

In Britain, the Newcastle City Council allowed the corporation running the Bykers incinerator to spread ash, as a 'soil improver', on footpaths, parks and allotments and so avoid costly landfill. The result was dioxin levels at 2,000 times the recommended limit for topsoil. The saga ended in 2002 with a paltry fine for the council and the corporation and the termination of waste incineration at Bykers. Girling quotes a leading corporate waste manager's response to the scandal: "only a complete berk"

[38] In a "sophisticated" Japanese incinerator emissions during a single start-up were equivalent to 2 months' worth of "normal" or steady-state emissions; in China a single start-up clocked emissions equivalent to 60% of a full year's "normal" emissions [Watson 2007:51].

would mix bottom ash with fly ash. The next complete berk was soon revealed to be running the giant Edmonton incinerator in London. LondonWaste sold off its ash for use in cement blocks, so creating "a chemical booby trap" for builders or anyone else taking a hammer or drill to the wall [2005: 194]. Over 5 million blocks were made before the scam was uncovered and the UK's Environment Agency was unable to trace them.

The third problem is the cost itself. Large incinerators are capital intensive and in Europe respectable pollution control comes close to doubling the price. A 2,000 tonne per day giant built in 1995 in the Netherlands cost US$600 million (about R4.5 billion) according to Connett.[39] GAIA [2004] lists new proposals in the global South which come in at a fraction of the price, suggesting that pollution control is somewhat less respectable. They are nevertheless still very costly with proposals for new plants ranging from US$41 million (R307 million) for a 600 t/d plant in Chennai, India, to US$315 million (R2.4 billion) for a 1,500 t/d plant in Selangor, Malaysia. Most are built by northern engineering corporations and many are financed with international debt.

They are also costly to run provided that the pollution control is properly serviced and ash is properly disposed. In the US, customers pay twice as much to dump in an incinerator than in a landfill, irrespective of revenues from electricity generation. In Europe disposal fees are generally supplemented by taxes, creating a subsidy for big waste generators. Such subsidies are even greater in many Southern countries according to GAIA. North and South, standard contracts include a municipal guarantee to deliver a minimum quantity of waste for 25 to 30 years whether to cover capital debt and running costs or to guarantee the fuel for electricity generation.

This indicates the fourth problem: incinerators demand waste in contradiction to the aims set out in the waste hierarchy. Not only do they demand waste but they drain local revenues which might otherwise be used for minimisation or recycling initiatives. In economists' parlance, the opportunity cost precludes other options. The Stockton Borough Council in Britain concluded that "we are into waste maximisation" [quoted in Girling 2005: 203].

[39] Exhange rate calculated at R7.5 to US$1, the low end of present volatile price fluctuations. Gaia [2003] gives US$658 and 808 million (R4.9 and 6 bn) for two much smaller incinerators (200 and 400 tonnes) built in Japan in the late 1990s. Girling gives £100 million (R1.5 bn) as a ball park figure.

These costs exclude environmental and health costs. Incinerators emit a bewildering cocktail of known chemical compounds. Many more, particularly from the combination of new waste and new generation incinerators, are not yet known and some may never be known. The health impacts of only some specific compounds and heavy metals have been studied. The combined impact of the cocktail of compounds and heavy metals is also not well studied, partly because of the limitations imposed by scientific procedure, but is almost certainly greater than the sum of impacts from individual pollutants.

Particulates cause lung cancer and heart disease but also carry other pollutants into the cells of the body, predisposing the next generation to cancer. According to the World Health Organisation, there is no safe limit for fine particulates as "health effects have been observed at surprisingly low concentrations with no threshold" [Thompson and Anthony 2005: 10]. From the metals, mercury is known as a neurotoxin, affecting the brain and nervous system. It disorders childhood development leading to learning disabilities and hyperactivity and to lowered intelligence. It also causes Alzheimer's disease and may lead to dementia. Other metals, such as cadmium, are associated with lung cancer and heart disease. Nitrogen oxide affects the lung, spleen and liver. Organic compounds are those based on carbon. They include such exotic families of chemicals as polycyclic aromatic hydrocarbons (PAHs); halogenated compounds (containing chlorine, fluorine and bromine); and dioxins and furans. They affect just about every bodily system: heart and blood, brain and nerves, lungs, hormones, glands, the immune system (with obvious implications for HIV/Aids), and on down to the genes. Dioxins alone cause a variety of cancers; suppress the immune system; interfere with the reproductive system and hormones of both men and women leading to infertility and genital abnormalities and dysfunctions; impair foetal and childhood development leading to still births, birth defects and "cognitive deficits"; and have toxic effects on specific organs including the liver, spleen, thymus and skin and causing diabetes, wasting syndrome and chloracne amongst other things [Greenpeace 2001: 73].

The impact of dioxins is most intense in the vicinity of incinerators but they have also spread around the world on the wind. They do not affect only those directly exposed to emissions. In common with other organic pollutants, they also bio-accumulate up the food chain. Further, they become concentrated in fatty tissue and in milk. Thus, dairy products from Europe and the UK contain very high

levels because cows eat grass contaminated with dioxin fallout from incinerators. They are then further concentrated in mothers' milk. Finally, Thompson and Anthony conclude, "All chemicals capable of entering the food chain will sooner or later reach their highest concentration in the foetus or breast fed infant" [2005: 34]. The foetus and infant are also most vulnerable to pollution but the limits set by regulators are calculated only against the presumed tolerance of adults.

The burn

Incineration seems to have a peculiar fascination for both the industry and officials. While South Africa's incinerators continued to belch poisons, the Danish development aid agency Danida was engaged in a laudable international effort, the 'African Stockpiles Programme' [see Box 9], to collect abandoned agricultural chemicals scattered across rural Southern Africa. Having removed them, Danida planned to incinerate the chemicals in a cement kiln at Matola in northern Mozambique. Shortly before, Denmark's environmental aid agency Danced had refused to support a proposal from Pretoria Portland Cement to burn hazardous waste at its Pretoria kiln. Danced's research on cement kiln incineration apparently showed very heavy pollution with little prospect of mitigation.[40] Danida took no account of this research and produced only a perfunctory environmental impact assessment.

Nor did it consult local people or civil society. Not even the mayor of Matola was aware of the project until a delegation from EJNF arrived to alert people. The visit resulted in the formation of Mozambique's first environmental NGO, called Livaningo. The name means 'shedding light' and was chosen because Mozambican "civil society had previously been kept in the dark".[41] After an intense battle with the Mozambican government and Danida, Livaningo won its demand for a public review of the EIA. The review strongly opposed incinerating the obsolete chemicals and proposed that they be returned to the countries of origin.

[40] Danced's research was not made public.

[41] *Mozambique civil society unites against Danida incineration project*, EJNF Newsletter, No.19, Spring 1998/ Summer 1999.

Box 9: Toxic gifts

The pesticide industry, from its origins in the 1930s, was part of the explosive growth in manufacturing and marketing of chemicals after World War II. The provision of pesticides and other agricultural chemicals became standard practice in development programmes throughout the world, as exemplified in the Green Revolution in Asia. This has made agriculture the largest diffuse source of pollution. In addition to this, unused and obsolete pesticides become toxic waste. The global 'stockpile' of obsolete pesticides, scattered in storerooms and sheds, is estimated at some 500,000 tonnes with 200,000 tonnes in Eastern Europe and at least 50,000 tonnes abandoned in Africa.

In the 1980s the UN Food and Agriculture Organisation (FAO) began inventorying obsolete pesticides in Africa. After discovering its extent, FAO raised funds for a clean-up. The Africa Stockpiles Programme (ASP) was initiated in 2000 by non-government organisations (NGOs) including the Pesticide Action Network (PAN) and the World Wide Fund for Nature (WWF). It is now a multi-stakeholder partnership involving African country governments, regional bodies, international agencies and the private sector as well as NGOs. The ASP aims to clean up pesticide wastes and dispose of them in an environmentally sound manner. At around $3,500 per tonne, the cost will be in the order of $175-200 million. In addition, information and prevention programmes are estimated at around $50-75 million, bringing the total cost to over $250 million.[42]

Following the exposure of Danida's plan, disposal of the obsolete pesticides remains controversial. The ASP encourages non-burn disposal technologies but, in 2005, incinerator vendors were present at ASP meetings and NGOs fear that governments and business want to upgrade existing incinerators or use cement kilns in Africa. Currently, collected pesticides are incinerated in Europe. It seems that the operators of non-burn facilities did not bid for the disposal because they could not meet the difficult requirements for international transport whereas the better resourced incinerator operators could.

NGOs support disposal in Europe partly because it is better able to manage hazardous wastes but also because the problem originates in European and other Northern countries.

[42] see www.africastockpiles.org

According to Pesticide News:

> The biggest stocks of pesticides are invariably found where major donor operations have taken place, large scale cash crop production exists or has existed in the past, and centralised agricultural input supply systems operate or operated in the past. Cotton, for example, has consistently been a major user of pesticides and national cotton production and marketing organisations have commonly been involved in buying and distributing pesticides. Low cotton prices encouraged farmers in many countries to grow other crops leaving in many cases massive stocks of pesticides and pesticide treated seed unused. To a smaller extent a similar pattern was repeated with coffee production.[43]

Changes in policy as well as markets have contributed to the problem. In countries where the state promoted chemical agriculture, whole warehouses full of obsolete pesticides were left to rot when structural adjustment programmes forced cuts in the support to small farmers. Stockpiles were also created when the rules regulating pesticides in sending countries were changed. The results on the ground are atrocious, as the experience in Vikuge, Tanzania, shows.[44]

Vikuge became the victim of a toxic donation in 1986, when a private company in Greece donated partly expired pesticides to the government of Tanzania – via the Greek government. These pesticides had been made obsolete in Europe by tighter regulation. A technical examination suggested that the 'donation' contained not only pesticides, but also waste from pesticide production. The pesticides were stored in an open shed at Vikuge State Farm. They were never used – partly because local managers did not understand the Greek labelling – and the shed later collapsed. In 1995 the pesticides were partially burned by a bush fire. In 1996 the shed was rebuilt and the pesticides collected and repacked with donor support from the Swedish International Development Agency (SIDA). Development workers have reported that no vegetation grows around the shed, there is a strong smell and some pesticides are still scattered in the vicinity. There is an obvious risk that villagers are exposed to the pesticides through contamination of their wells as well as the pollution of air.

[43] Pesticides News, September 2005

[44] Based on *Obsolete pesticides threaten Vikuge village, Tanzania,* by Michael Kishimba, Henry Kylin, Matabola Mihale and Sara Elfvendahl. Pesticide News, September 2005.

Livaningo has since re-formed as Justicia Ambiental and remains at the centre of Mozambique's environmental debate as well as the network of southern African environmental justice organisations.

In South Africa, over 300 incinerators were operating by 1997. Most are used for medical waste but some are operating on industrial sites. Most have no emissions controls whatever and operate with minimal regulatory oversight. On the DEAT's own account, "many … failed to comply with the required emission standards for human health and environmental protection" [DEAT 2006: 254]. However, the department took action only when pressured to do so. The Aloes incinerator was temporarily closed in 1998. In south Durban, the department ordered EnviroServ to close its Isipingo incinerator following repeated demands from SDCEA and a groundWork investigation that showed it had been allowed to transgress its permit conditions for years. The DEAT noted that the corporation had consistently showed "a lack of commitment" to compliance with environmental and health standards.[45]

At Ixopo, the largest medical waste incinerator in the country was exemplary of a badly run plant. It was owned by the local municipality and operated by Compass Waste under a permit from the DEAT. It burnt a mix of local municipal waste and medical waste brought in by Compass from across the province of KwaZulu-Natal. For the most part, the municipality failed to deliver its share of waste but escaped penalties because Compass had ever more medical waste to burn more profitably.

Combustion was so 'incomplete' that identifiable items of medical waste were visible in the bottom ash which was itself illegally dumped in a hole on site. Black smoke was regularly emitted from the chimney along with half-burned paper. The door to the burn chamber was left open so that a worker could stir the burning waste with a poker. The plant itself was in such disrepair that bits were falling down. Meanwhile, the municipality was using adjacent land for new housing and a shack settlement was also expanding next to the plant.

Starting in 1999, groundWork fought for six years to get the authorities to enforce the conditions imposed in their own permit or close the plant. In 2002, it took the municipality, Compass and the DEAT to court. The court ordered an 'appeals hearing' which the DEAT failed to act on. In the next three years, the municipality and Compass

[45] Quoted in *KZN incinerator closed down*, groundWork Newsletter, Vol.2, No.3, September 2000.

did nothing to rectify the operation. Provisional permitting was extended several times to give the municipality time to develop an alternative waste plan. The municipality accepted an offer from groundWork to assist with the plan but then did nothing to initiate the process. Finally, following a further inspection, the DEAT closed the plant at the end of 2005.[46]

It may be hoped that Ixopo was the worst incinerator in the country. It is not certain however as it is doubtful that the DEAT's inspections there would have been carried out but for the pressure from groundWork. In the last two years, DEAT has been beefing up its capacity, off a base so low it was scarcely visible, but it is unlikely that it will meet even the lacklustre standards of US or British oversight any time soon.

Ixopo was the last medical waste incinerator operating in KwaZulu-Natal. Compass Waste has subsequently invested in an autoclave – a non-burn technology. EnviroServ proposed a new incinerator at Shongweni outside Durban in 2002 but met with stiff local resistance. In 2005 it opted for an autoclave at this site and announced that it would move away from incineration of medical wastes nationally. Other companies followed this lead in KwaZulu-Natal. Nationally, however, there was a steady stream of proposals for new medical waste incinerators.

Box 10: Health Care Without Harm

While opposing incineration, groundWork also worked with selected hospitals in KwaZulu-Natal to reduce their waste streams and separate potentially hazardous medical wastes from ordinary waste. In 2000, it linked with the international campaign for Health Care Without Harm and initiated skills share programmes with two hospitals in KwaZulu-Natal. Both hospitals dramatically reduced the number of red bags, containing hazardous waste, and consequently made considerable cost savings. The campaign achieved a further success when the provincial department of health decided to phase out the use of medical equipment containing mercury.

'Improving' health care waste management was subsequently made one of the objectives of the DEAT's NWMS implementation project. Nevertheless, the DEAT appears reluctant to let go of incineration as a disposal option and has not insisted on non-burn technologies for waste disposal.

[46] The saga is reported in the groundWork Newsletter, March 2006

Industrial incineration proposals were also rolling in. In 2002, groundWork documented 16 such proposals. Several were backed by the US Trade and Development Agency (TDA) or by the International Finance Corporation (IFC), the private sector lending arm of the World Bank, looking for expansion opportunities for Northern corporations as their technologies ran into opposition on their home ground.

Sydney Saunders' company, Peacock Bay Environmental Services, decided that the time was ripe to try its luck again in 2001 – a decade after its west coast incinerator proposal was shot down. In partnership with a US corporation, Peacock Bay proposed a large hazardous waste incinerator for Sasolburg. The proposal was funded by the US TDA and supported by South Africa's own DTI who appeared to be interested not only in 'technology transfer' but also in making money from importing waste. When challenged to explicitly state its position on toxic waste imports, DTI refused comment. The Sasolburg Air Quality Monitoring Committee, with support from groundWork and the Global Anti-Incinerator Alliance (GAIA), opposed the project and won the support of the local municipal council. The Free State provincial authority then took the rare step of rejecting the EIA. The local council's opposition appeared decisive but the Record of Decision also cited the EIA's failure to address health risks and the impact on cumulative emissions in the already polluted town.

In south Durban, Mondi proposed its 'multi-fuel burner' designed to burn coal, together with ash and pulp wastes and, in the view of SDCEA, any other rubbish that Mondi might conveniently throw into it. This 2002 proposal followed an earlier Mondi proposal instigated by the IFC for burning briquettes made from general waste. When challenged, the IFC could not answer questions on dioxin emissions and how they would be monitored and the World Bank killed the project. The new project, which Mondi claimed reduced the use of dirty fuels in south Durban, was given fast-track approval by the provincial environmental authority. SDCEA challenged the decision in court, demanding a full EIA. This was granted but provided only temporary relief. In 2005, the Record of Decision for the full EIA again approved the project. It imposed a much deeper cut in sulphur dioxide emissions from the plant than previously required but did not meet SDCEA's concerns relating to dioxins.

In Richards Bay, the US DTA also stumped up funding for the feasibility study on an energy from waste plant proposed by Rainbow Millenium Power in 2003. Despite official backing, the plan appears to have stalled in the context of Eskom's cheap power regime. The electricity supply crisis of 2008 has given it new life. Rainbow Millenium

is now proposing a 270 MegaWatt plant, which may be expanded to 540 MW, as part of Eskom's co-generation programme. It is to be fuelled by discard coal, biomass "and other fuel sources", according to Business Report.[47]

In 2002, groundWork caught wind of the first proposals to burn waste in cement kilns in South Africa. Natal Portland Cement (NPC) proposed burning hazardous waste at its Port Shepstone plant. In a curious twist following the struggle over Danida's plans in Mozambique, the provincial Department of Agricultural and Environmental Affairs itself suggested that NPC consider 'disposing' obsolete pesticides in the plant. Next followed proposals from Pretoria Portland Cement (PPC) to burn old tyres and from Holcim to burn 'alternative fuels' – the usual industry euphemism for waste. [See Chapter 4 for a description of the cement industry.]

The local industry's push to burn waste followed a global push led by the big transnational corporations including Holcim. This coincided with international negotiations to control the production, use and disposal of 'persistent organic pollutants' (POPs) including dioxins and furans emitted from incineration [see Box 11]. The Stockholm Convention on POPs was agreed in 2001 and came into force in 2004. South Africa ratified the agreement in 2002. A year later, government was authorising 'trial burns' at NPC. In 2005, at the first 'conference of the parties' to the Stockholm Convention, African NGOs expressed concerns that, if South Africa permitted waste burning in cement kilns, other African countries would follow that lead. The Deputy Minister for Environmental Affairs, Rejoice Mabudafhasi, then told groundWork and Earthlife that government would never permit cement makers to burn hazardous wastes. Shortly thereafter, the North West provincial authority did indeed refuse Holcim's proposal to burn unspecified wastes. Four months later, in March 2006, Holcim submitted an almost identical proposal to burn waste at its plant in the small Northern Cape town of Ulco. The Northern Cape promptly granted permission. On a field trip, groundWork found that local people in Ulco, the unions organised at the plant and the local municipal council had not been consulted in the EIA process and knew next to nothing of the proposal. groundWork also wrote to the Deputy Minister objecting to the decision and calling for a moratorium on cement kiln incineration. It received no response.

Cement kilns are scattered across the country in small and big towns. Ulco is typical of a number of small company towns wholly dependent on the cement corporation.

[47] Justin Brown, *Waste matter can generate 540MW near Richards Bay*, Business Report, August 26, 2008.

It has a high rate of unemployment but most of those who do have work depend on the plant both for their jobs and their housing. In the larger centres of Port Shepstone and New Brighton, Port Elizabeth, people say the kilns employ few locals. In large and small centres, people told groundWork that cement kiln dust – which includes particulate emissions from combustion – covers everything from field and garden crops to washing. In the small town of Slurry outside Mafikeng, people harvest rain water from their dust covered roofs because they do not have piped water. The impact of traditional cement kiln pollution on people's health is undoubtedly severe but not monitored by government. Adding waste to the coal now used as fuel will compound the problem. Government reportedly intends tighter emission standards for alternative fuel kilns – but seemingly has no intention of tightening "lenient" standards for conventional fuel kilns.[48] This leaves communities with a choice of more or less visible pollutants – assuming that they'll be given the choice.

Box 11: Persistent Organic Pollutants

The Stockholm Convention is the global treaty designed to protect human health and the environment from persistent organic pollutants (POPs). It originally dealt with the 12 chemicals known as the 'Dirty Dozen' although other chemicals are being added to the list. POPs are toxic and persistent in the environment. They bio-accumulate along the food chain and can be carried on the wind over long distances. The dirty dozen includes nine organochlorine pesticides, the industrial chemical PCB, and dioxins and furans.

The pesticides are used to poison agricultural pests, termites and ants. In South Africa, the Department of Health claims that the pesticide DDT is the only way to control malaria carrying mosquitoes but has not, according to Wells and Leonard [2006], seriously investigated alternatives used effectively elsewhere. PCBs are used in electrical equipment. Dioxins and furans are formed in combustion processes, and most notably in incinerator exhaust gases.

People who work or live near POPs sources are at risk of acute exposure. The most important chronic exposure to POPs is through eating contaminated fish, meat and dairy products. Exposure through the food supply leads to cancer, endocrine and immune system disruption, hormonal disruption, reproductive disorders, neurological and behaviour disorders, Parkinson's disease, birth defects and respiratory illness. POPs are passed to the next generation via exposure in the womb as well as through breast milk. Children of mothers who have eaten POPs-contaminated food can suffer from neuro-behavioural and developmental problems.

Source: http://www.ipen.org/ipenweb/library/ipendocuments/popstrainingmodule.pdf

[48] See 'National policy development process for high temperature waste incineration and AFR co-processing in cement production: Final comments and response report, August 2007 – July 2008, Response to Port Shepstone community meeting, p.58.

Gear shift

2000 marked the nadir of state regulation. Following a spate of environmental scandals and growing local resistance to corporate polluters, government announced a 'multi-point plan' for environmental management focused on south Durban, where environmental activism was most intense, but with national implications. The plan included the promise for new air quality legislation and tighter regulation to be piloted in Durban. The environment did not move up in government's priorities, however. Indeed, as hosts to the 2002 World Summit on Sustainable Development (WSSD), the DEAT itself led a government strategy to subordinate environment to development. This priority was justified as 'alleviating poverty' but was really about supporting capital accumulation as the condition of economic growth – even as the mostly poor neighbours to polluting industries were made to carry the costs.

Being acutely sensitive to bad publicity, government was increasingly resentful of resistance. It represented environmental conflicts as public relations battles with activists driven by Northern agendas. At the same time, it resorted to outright suppression of dissent, particularly by poor people, resurrected security legislation such as the Key Points Act, and whittled away at the right of access to information – not least in the text of the Promotion of Access to Information Act itself.

Nevertheless, the failure of development to alleviate poverty was manifest and the challenge from social justice and labour organisations was growing more acute. Gear, the primary instrument of development, was also failing in areas that were of concern to government as the manager of a capitalist economy. On its own terms, Gear was successful in imposing spending constraints and reducing inflation and the national debt but it predictably missed its stated goals on economic growth and job creation. In government's view, the key problem was that Gear failed to attract private sector investment – and particularly foreign direct investment.

By 2004, government was advertising itself as a developmental state and preparing a more aggressive strategy of intervention, summarised as the Accelerated and Shared Growth Initiative (Asgisa), to drive towards the magical 6% growth target.[49] While following broadly from Gear, it differs in that Gear assumed that state investment would 'crowd out' private investments while Asgisa assumes that it will crowd in private investment. Government investment focused on infrastructure development to be

[49] The groundWork Report 2006 gives a more detailed critique of Asgisa.

channelled through strategic state owned enterprises – primarily Eskom, Transnet and Denel. Privatisation of these corporations, mandated by Gear, was therefore put 'on hold' but with the intention of laying the ground for productive private investment.

At the same time, government expanded social spending and, although the environment still ranked at the bottom of government's priorities, the DEAT's budget for environmental management, supplemented by donor funding, expanded. In 2003, DEAT started setting up the Environmental Management Inspectorate – or Green Scorpions – and announced its presence by stinging the operators of an illegal toxic dump. The inspectorate was formally established in 2005, and now has 940 inspectors. The majority are in fact conservation officials and most of the rest are provincial and local government officials given extra training and rebranded as inspectors. The DEAT itself has just under 50 inspectors. The inspectors are thus scattered across multiple institutional locations around the country. They are working, says the minister, "to change the common perception in South Africa that government lacks the will to enforce our environmental legislation". The unit secured 746 convictions of environmental criminals in 2007-8, up from 134 in the previous year.[50]

The report on which the minister based his statement has not yet been published but it seems that most of the convictions are for conservation offences such as poaching. Nevertheless, the green scorpions have secured convictions against industrial polluters and this does mark a shift from the DEAT's tradition of negotiating non-compliance with big corporations. In consequence, EnviroServ sees "a growing demand for responsible … waste management services" [2007: 21].[51] The implication is that there is less illegal dumping on the cheap. Whether this is so is an open question because no-one knows how much is produced. In 1999, DEAT's State of the Environment Report suggested that only 5% of hazardous waste "was disposed of at permitted … sites, indicating extensive illegal dumping and/or frequent accidents and spillages" [DEAT 2008: 15].

The green scorpions respond to reported environmental crimes and have also initiated inspections of targeted industries including iron and steel, cement plants and oil refineries. Routine inspection, however, is in principle devolved to local level where

[50] Speech by Marthinus van Schalkwyk, Minister of Environmental Affairs and Tourism, at the 8th Conference of the International Network for Environmental Compliance and Enforcement, Cape Town, April 7, 2008.

[51] See also, Sibongile Khumalo, *EnviroServ profit surges 36% after tightening of green laws*, Business Report, February 19, 2008.

very few municipalities have any capacity to speak of – even if local officials are now designated as inspectors. Thus, cement kilns may have tried to clean up their act in preparation for a scorpion 'blitz' [see Chapter 4] but there are no guarantees that they will keep it clean when the scorpions move on. Despite being given notice, most of the industries inspected are not in fact "compliant with environmental legislation and permits", according to DEAT official Peter Lukey.[52]

Five years after promising new air quality legislation, the DEAT finally got the National Environmental Management: Air Quality Act (AQA) through parliament in 2005. The Act was broadly welcomed by civil society. However, after parliamentary hearings on the Bill were closed, the DEAT inserted a new clause which MPs thought was innocuous. The clause allows the minister to identify and regulate 'controlled fuels', defined as "a substance or mixture of substances which, when used as a fuel in a combustion process, result in atmospheric emissions …" [s. 26]. Far from being innocuous, it permits incineration by making provision to regulate it. The DEAT knew that environmental organisations would oppose it but its late insertion ensured that they did not see it until too late. "We were scammed," said groundWork director Bobby Peek.

The Waste Bill: law of deferral

The Waste Bill started going through the parliamentary process in 2007. The seven year delay was more about weak leadership in the DEAT than the low priority given to waste according to some observers. Certainly, with new leadership who regarded the delay as an embarrassment, the department began to drive the process with some vigour. Nevertheless, it is difficult to imagine government allowing the Department of Finance to sink into bureaucratic lethargy. As Ben Fine argues [2008], government has in fact built the capacity for what it regards as important. Several such priorities add substantially to the waste stream, including: the industrial development zones (IDZs) and associated mega-projects; the auto industry development programme; the information technology programme; the pebble bed modular reactor (PBMR) – government's largest, most secretive and least certain industrial development programme; the 2010 soccer stadiums; and the infrastructure development programme. Most of these initiatives are driven by senior departments or departments that have risen rapidly in stature: Public Enterprises, Minerals and Energy, Trade and Industry,

[52] Jacqueline Holman, *Deat expands strategic industrial projects*, Engineering News, October 31 – November 6, 2008.

and Science and Technology. Environmental affairs must pick up the waste but remains, as it was under apartheid, a junior portfolio.

Within the state system, the DEAT first had to fight for recognition of its authority to draft a Waste Bill. This relates to the Constitutional requirement for cooperative governance and the allocation of responsibilities to different spheres of government. Once it had established its authority, the Bill provided the ground for a series of running battles, including turf wars between departments and contestation over the contents of the Bill by business and civil society.

These disputes make their marks on the Bill but only to set the scene for future struggles. This is because the Waste Bill, like the Air Quality Act before it, is 'framework' legislation. A key function of the Bill is to establish the authority – given to the minister and provincial MECs – to make regulations governing various aspects of management. Regulations are not merely the technical means of implementing policy but constitute the detail of policy. The formulation of each set of regulations will thus become a ground of struggle, some involving very specific interests. Legal consultant Jenny Hall comments, "Deferral is the curse of framework legislation." First, the most intense battles are still to come. Second, implementation must wait on the making of regulations. Thus, two years on, the AQA is not being implemented except through the declaration of 'priority areas' – that is, pollution hotspots.

Some of these battles will take place on the terrain of waste in general. Thus, the minister must establish a national waste management strategy within two years of the Bill's enactment. While the NWMS has been around for years, it is most likely that it will be picked over by interested parties including other departments and spheres of government who will be bound by it once it is legally established.

Many battles, however, will be case-by-case and liable to disappear into behind-doors negotiations between DEAT, specific industries and corporations, and officials from DTI and Finance. For example, the minister may declare a particular waste to be a priority waste if it "poses a threat to health, well-being or the environment" [S.14] and must then make regulations for managing that waste or prohibiting it. This is a potentially important provision. However, if the waste arises from an activity with any economic significance, the minister must consult the ministers of trade and industry and finance before making the declaration. The environmental significance will then be put up against the economic significance which, given the concentration of ownership

in South Africa, is likely to attach to anything that big corporations are engaged in. And they will be able to appeal any declaration to the senior ministries which can be expected to support them. Everything from the initial declaration to the details of regulation will be contested with powerful interests and ranks of corporate lawyers lined up behind the economic significance.

At the same time, it appears that the DEAT is now cultivating its own corporate constituency in industries involved in managing, recycling or recovering energy from waste. If so, this reflects the 'political' culture of key South African departments which are positioned in relation to particular economic interests. Thus, the DME is integral to the minerals and energy complex while the DTI relates primarily to interests within the industrial manufacturing sector. The mandate for growth has the effect of reinforcing these relationships as the private sector is seen as delivering on it. During the parliamentary hearings, it appeared that the DEAT was ready to call up industry allies to give weight to its positions, particularly in defence of incineration.

Waste struggles codified

In a certain sense, the Waste Bill summarises – and codifies – the current state of play in struggles around waste initiated in the late 1980s. Understood this way, it makes sobering reading.

The definition of waste

In its submission to parliament, Business Unity South Africa (BUSA) argues that waste is anything the holder discards. This would leave the practical definition of waste to businesses and the market. It would, as the American Petroleum Institute put it, leave businesses "free to increase or decrease waste production rates … and negotiate treatment or disposal service contracts in a free and competitive market" [see Chapter 4].

BUSA points out that the private sector is driving recycling without government intervention. Indeed, the commodities boom has boosted the market in recyclables, turning wastes into resources. The boom is now turning to bust as commodity prices fall in anticipation of global recession and those resources are now likely to turn back into waste. Either way, the market is interested in the potential for profit and indifferent to the use value of materials. Recycling is of interest only in so far as it comes in below the cost of 'virgin' materials – or is compatible with the interests of dominant market players.

For law makers, the volatility and vagaries of the market pose the problem of unintended consequences: on the one hand, re-use may be penalised if something is defined as waste while, on the other, the claim that something is re-usable may be used to evade regulation. The Bill broadly adopts the market definition but with some qualifications: the minister may declare something to be waste, and recyclables are waste until they are recycled.

The Waste Hierarchy

The Bill invokes the waste hierarchy in the preamble and the objectives but in fact inverts it. This is signalled by the 'mays' and 'musts'. Thus, the minister 'must' set norms and standards for waste storage, treatment and disposal but 'may' set them for minimisation, re-use, recycling and recovery of waste. This sets the pattern for the document as a whole and it is notable that minimisation tends to disappear when the Bill addresses municipal waste management.

Zero waste, advocated by civil society, is the most comprehensive approach to waste avoidance. DEAT evidently regards it as unrealistic. In fact, it anticipates a growing flood of waste with avoidance, minimisation and recycling mitigating the rate of increase. This view accepts the production system as it is and, indeed, a transition to zero waste would require government as a whole to commit to economic transformation. As remarked earlier, avoidance and minimisation are located primarily in the production system where DEAT and waste managers have little purchase. As DEAT official Joanne Yawich told the parliamentary portfolio committee, "The bottom line [is] that South Africa [is] a country in need of economic growth and development. DEAT [is] thus trying to manage the negative effects of dealing with waste."[53]

Practical regulations which the minister 'may' introduce include the declaration of priority wastes and extended producer responsibility. The minister may also require particular persons to reduce, re-use, recycle or recover product components and/or to include a percentage of recycled material in products. In all cases, the minister must consult with Trade and Industry. If government as a whole were serious about it, this is indeed where waste prevention and minimisation should belong. However, DTI's industrial strategy barely mentions the environment while the trade side generally sees environmental regulation as a barrier to trade.

[53] Parliamentary Monitoring Group, Meeting report on discussion on incineration March 4, 2008, at http://www.pmg.org.za

While all respondents to the Bill expressed support for the waste hierarchy, business was quick to emphasise the 'overlapping jurisdiction' with DTI in relation to production. It also played up potential 'technical barriers to trade' under World Trade Organisation (WTO) rules, specifically noting "regulations to give effect to any product requirements".[54] Finally, business demanded a more rigorous 'regulatory impact assessment'. Such assessments are pushed by the World Bank and share a common purpose with the Bank's annual *Doing Business* reports. They are designed to restrict the regulation of markets. As French legal scholar Alain Supiot comments, these are instruments of a global economic system in which "it is no longer products that are in competition but the normative [regulatory] systems" [2006: 119]. Government is in the process of developing a regulatory impact assessment system which will be used to reinforce arguments for making the country more attractive to investment capital.

Incineration

Prior to the parliamentary hearings, it became clear that the DEAT had decided in favour of incineration. Following groundWork's meetings with communities next to cement kilns, the DEAT initiated its own series of workshops within the 'National policy development process for high temperature waste incineration and AFR ['alternative fuels'] co-processing in cement production'. groundWork's Musa Chamane observes that, far from consultation, government was "essentially … marketing incineration" to communities.[55]

Background reports for the policy process were prepared by advocates of incineration and the use of AFRs in cement kilns. They were subject to detailed criticism in a response from groundWork [Watson 2007]. These documents were put to the portfolio committee which subsequently held a discussion specifically on incineration. The DEAT argued that regulation should focus on emissions rather than technologies and that modern incinerators have low emissions and provide a better alternative to landfills, particularly for medical and certain hazardous wastes.

For the incineration advocates themselves, the claim of superior environmental performance depends both on 'best available techniques' (BAT) and 'best environmental practice' (BEP). Amongst other things, BAT incinerators are designed to burn particular

[54] Business Unity South Africa, Submission to parliament on the Waste Management Bill.

[55] Musa Chamane, *Incineration in our backyard a big No No!* groundWork Newsletter, Vol.10, No.2. June 2008.

wastes and, according to a DEAT policy paper, "establishing and maintaining controls over the waste input" is therefore critical [DEAT 2008: 46]. The DEAT assured the committee that both waste inputs and emissions would be controlled through the licensing process. The implication, however, goes beyond individual plants to the rigorous management of the broader waste stream. Given the state of waste information, this seems improbable. Moreover, the Bill allows incineration of municipal waste – Ekhuruleni has recently proposed a municipal incinerator with 'energy recovery' – and it is difficult to see inputs from this chaotic waste stream being controlled.

It should be noted that the Waste Bill is not founded on BAT or BEP, but on 'best practicable environmental option'. The difference is that BAT is not in principle compromised by costs, whereas BPEO is.

The DEAT also argued the benefits of energy recovery, particularly in the context of the electricity crisis, and said this supported the waste hierarchy. Energy recovery is in fact a new addition to the waste hierarchy and placed above disposal. It thus elevates waste-to-energy incinerators above disposal but puts it below recycling which is where industry would have it.

The DEAT claimed it has the capacity to regulate incineration to the very demanding standards indicated by the policy papers. The portfolio committee remained sceptical, however, and finally demanded parliamentary oversight of "any regulation which pertains to the treatment of waste by means of incineration" [s. 69].

Toxic trading

Following Basel – but not the 'Basel ban' – the Bill regulates waste trading in order to allow it. All waste management activities must be licensed and the minister is the licensing authority for activities subject to international obligations, "including the importation or exportation of hazardous waste" [s. 43]. The minister may also impose specific conditions on trading priority wastes, which could include prohibiting imports and / or exports [s. 15]. Finally, the minister 'may' make regulations controlling "the import or export of waste", whether hazardous or general [s. 69].

The Bill does not preclude South Africa signing the Basel ban amendment, which would change its international obligations, but indicates that there is no intention of doing so. Rather, it allows the minister to decide on a case-by-case basis and the

effect will be to create a series of struggles around each particular waste: first to have it defined as a priority waste and, if it is so defined, then to include a prohibition on its import. It can be anticipated that any regulation restricting trade will be contested on the grounds of compatibility with WTO rules.

Mining waste

The mining waste stream is by far the largest in South Africa but is excluded from the Waste Bill. Responsibility – or the lack of it – for mining waste resides with DME who, it appears, refused to countenance its inclusion within the Waste Bill. Apart from the vast mine dumps littering the country, the industry also operates incinerators. Responding to questions from the portfolio committee, DEAT officials noted that they could not account for incinerators operated by mining corporations as this information is in the hands of the DME.

It may be observed that the DME is located within the 'minerals and energy complex' that has both shaped South Africa's development and subordinated that development to its own interest. The DME's defence of its turf is also the political defence of those interests.

Salvagers

The DEAT was reluctant to allow any legal acknowledgement of dump picking. groundWork pointed out that pickers are active on most dumps and are in fact responsible for much of the recycling that actually happens. Refusing them any legal recognition leaves them vulnerable to exploitation and abuse. Rather, the Bill should enable the regulation of salvaging with the aim of drawing "salvagers, who hold a wealth of information with regard to recyclable material, into viable and sustainable recycling initiatives".[56]

At present, the minimum requirements disallow dump picking although this condition, like many others, is unevenly enforced. In terms of the Waste Bill, the licence will set the conditions for all waste management activities. Following the intervention of the portfolio committee, the licence "must specify … if applicable, the conditions in terms of which salvaging of waste may be undertaken" [s. 51]. This does not restrict salvaging to landfills but suggests that regulators and waste managers must apply their minds to

[56] groundWork Briefing Paper: The Waste Management Bill.

salvaging in whatever context it takes place. Read with the section on integrated waste management plans [s. 12], it implies also that salvagers must be recognised in those plans.

Given the requirements for participation, this provision opens a political space for waste pickers to engage with the official processes that define their work. How they use that space will depend on how organised they are and whether they are in fact recognised by officials and others. Chapter 6 documents people's struggles and shows that local conditions are highly variable.

Enforcement

As noted, the 'green scorpions' have made some impression on the culture of corporate impunity. The Bill provides for substantial fines and for imprisonment of offenders. Actual penalties will depend on the courts which have historically been sympathetic to business. Waste managers remain sceptical that penalties, and the chances of being caught, are sufficient to deter activities such as illegal dumping. For this reason, eThekwini's Department of Solid Waste (DSW) is cautious of raising the price of disposal which is one of the few levers that they have for encouraging waste reduction.

Following from the requirement for cooperative governance, however, municipalities themselves are exempt from criminal sanction. National or provincial government could take civil action although this would go against the grain of South Africa's political culture. Holding municipalities to account is thus effectively devolved to citizens.

Contaminated land

The Bill enables the minister or MEC to order an investigation into land suspected of being contaminated, irrespective of when the contamination took place, and to order remediation as necessary. When ownership of land is transferred, it requires sellers to declare any contamination to buyers. The potentially dramatic effect on land values was highlighted by a submission from Standard Bank arguing that banks should not be liable where they have taken possession of land used as security against a loan. They have been granted an exemption provided that they held such land before the Bill comes into law. Otherwise, the implication is that they should investigate the contamination, or likely contamination of land, before lending money.

Land is contaminated on a very wide scale in South Africa, notably by mines and industry but also by agriculture. How the law works in practice will relate to the practical definition of 'contaminated' in the land market and in the minister's decisions.

Chapter 4: The toxic cradle of production

Post-consumer waste is what people throw away. Production waste is what is dumped by industry while producing not just consumer goods but also the infrastructure of state and capital. Production waste outweighs post-consumer waste 70 to 1. This chapter opens with some observations on the global context and the interests driving production wastes. It next looks at mining, the first link in the waste chain, and then at a number of industries further along the chain: iron and steel, chemicals, plastics and packaging, aluminium and cement.

Making and wasting

Capitalism is not only a "gigantic accumulation machine" [Kovel, 2002: 59]; it is also a gigantic waste creation machine. Its logic is to turn more and more raw materials and energy into sellable commodities, commodities into accumulated profit and profit into investments which then expand the system as a whole. Its restless need for never ending accumulation and expansion means that it must keep on consuming resources and creating an ever growing pile of waste.

Behind each product on the shop shelf lies the 'value chain' of production which is shadowed by a vast chain of waste and destruction. This shadow leaves a deep toxic stain that spreads through air, water and land across the face of the earth and across time into a poisoned future. And it represents a cost externalised from the value chain and from the price of the product on the shelf. For corporate producers and retailers, it is not only important that this cost is stripped out to keep the goods cheap but also that the good appears without its contaminating shadow. The wastes of production – the mountainous mine heaps, the polluted spaces of production and the harsh disciplines and toxic conditions of workplaces – must not be associated with the packaged and advertised products on the shelf.

Confronted by public unease and environmental activism, a prime corporate strategy is to move the battlefield from producer to post-consumer waste, with anti-litter and local beautification campaigns, and the collection of recyclables from an ever increasing

stream of waste. In the domain of production big corporations have consistently and fiercely resisted regulatory 'intrusion'. As documented by sociologist Andrew Szasz, the first waste regulation battles in the US, in the early 1970s, were fought by an alliance of polluters including Dow, Dupont, Union Carbide and various steelmakers on the proxy terrain of packaging waste. Dow protested to lawmakers:

> We object to the absolute blanket authority to control production processes and composition … Orderly and timely investment of capital and replacement of plants would be seriously impeded… it would lock in technology to any given point in time … create artificial cost and supply/demand distortions … Authority to control production, composition and distribution of products … would be devastating to free enterprise commerce. [Quoted in Szasz 1994: 19]

Dupont joined them with the argument:

> We believe that the disposal of wastes ought to be regulated instead of regulating the nature and use of the product or the type of manufacturing process used … greatest emphasis should be placed on establishing standards which assure that the ultimate disposal method is satisfactory. [19]

And the American Petroleum Institute was blunt:

> No specific requirements or prohibitions should be set governing the recovery, reuse or disposal of industrial wastes … Generators should be free to increase or decrease waste production rates, terminate waste production, treat their own wastes, and negotiate treatment or disposal service contracts in a free and competitive market. [19]

Lawmakers then obediently confined themselves to the control of disposal of the ever growing waste stream whose production was placed beyond public control. The immediate consequence was the need for ever more waste disposal facilities and, as the Petroleum Institute indicated, further opportunities for business to profit as the state vacated the market for disposal facilities. This in turn led to an explosion of protests against the siting of toxic waste dumps – mostly in poor black neighbourhoods – and to the growth of a social movement when groups opposing these dumps coalesced into the environmental justice movement in the US in the 1980s.

A related and equally ominous result is that producers remained free to produce and release into our environments an ever growing number of chemicals – most of them never tested for harmfulness. Jack Doyle, the chronicler of Dow Chemical's history, writes that "only about 700 of the existing registered 100,000 chemicals used in global commerce have complete toxicological profiles" [2004: 11]. Regulators fight a losing battle, often against active resistance from chemical manufacturers, to identify dangers from chemicals and regulate against them.

Paint it green

A crisis of capital in the 1970s, associated with the US defeat in Vietnam and the subsequent 'oil shocks', led to a major restructuring of the organisation of production starting in the 1980s. This is generally described as a shift from Fordist to post-Fordist production. Fordism concentrated and integrated the production chain within single corporations to mass produce standard products whereas post-Fordism organises production through global networks of firms dominated by leading transnational corporations.[57]

Networked production has its origin in the East Asian economies and Japan in particular. It introduced a range of innovations to cut production costs such as 'just in time' delivery of inputs and 'total quality management' aimed at 'zero defect' in goods produced. The concept of zero waste, according to industrial economist Robin Murray, is an extension of zero defect and derives, on the one hand, from the pressures exerted by the environmental movement and, on the other, from "the world of industry and its rethinking of production" [2002: 19]. Zero waste, he argues, is central to the post-Fordist "wave of industrial development … centred on electronics" and "marked not so much by a new material … as by the pressure to reduce materials and their toxicity … We live in an age [that] speaks of 'dematerialisation', of finding ways of avoiding production, of making more with less" [69]. And he goes on to applaud the World Business Council for Sustainable Development's (WBCSD) leadership in promoting 'eco-efficiency'.

Murray emphasises the role of social movements and government regulation in ushering in a new paradigm of 'post-industrial' production with design for inbuilt re-use, upgrading and recycling etc. But finally it is corporate capital that leads this wave

[57] See The groundWork Report 2003 for a more detailed discussion on the restructuring of production.

Box 12: Making the Bhopal disaster

What are the consequences of leaving decisions about production processes entirely up to the producers? Analysing the 1984 Bhopal disaster in India, Joel Kovel concludes that the disaster was caused by a series of decisions to lower costs in order to make bigger profits:

> There is no mystery here: at virtually every point… we find that Carbide did this or that to lower its costs; further, that the 'this and that' had the effect of summating the risks that the monstrously dangerous MIC[58] (itself chosen as a product to lower costs) would escape; and, further, that Carbide's blameworthiness consisted precisely in the callous and self-serving way in which it was prepared to put Bhopal in harm's way to lower costs. Its evasion of legal responsibility needs to be understood within the universe of meanings that cluster about this prime necessity, from particular legal and public relations manoeuvres to the whole international setup that makes an ancient and proud country such as India unable to stand up for the rights of its own people. The efficient cause here, then, would have to comprise not just the particular greed of this corporation, but the system imposing upon it the never-ending pressure to cut costs – or, from the other side, to make profits. [2002: 35]

Similarly, many waste management decisions are made to lower costs, rather than to manage the waste as well as possible. This approach even has a name as official policy: Best Available Technology Not Entailing Excessive Cost, or BATNEEC. What is excessive cost? The Bhopal experience illustrates this too. Without admitting liability, Carbide agreed to pay $470 million, equivalent to $0.43 per share of its stock market value, to the Indian government. The government then decided not to prosecute the corporation and, on the day of that decision, Carbide's shares went up by $2 each – yielding a net benefit to shareholders of $1.57 per share. Why?

> The answer is brutally revealing: because the company proved – in this first large-scale industrial accident case affecting a transnational corporation operating in the so called 'Third World' or South – that it could get away with murder, now and in the future. Wall Street knew then that business could go forward, and that the orderly extraction of profits from the South had become more secure. [37]

[58] MIC is methyl isocyanite

of development and shapes the new world of clean production. "In the words of Edgar Woolard Jr, former chairman of DuPont, 'The goal is zero: zero accidents, zero waste, zero emissions'" [71].

This representation of green capitalism, in a book written for Greenpeace, could not be further from the experience of actual networked production and it fundamentally mistakes the nature of capital. First, the new wave of development has been accompanied by a new wave of waste precisely from the cutting edge sector of electronics, as shown in Box 13.

Second, global production networks have located the dirty end of the production chain in the global South giving the North the appearance of clean production. This is an uneven process but, schematically, what has emerged is a triangular ordering of the global economy. Raw materials from Africa and Latin America are taken to the Asian factory to produce goods consumed in the North. This flow of resources is largely managed by Northern transnational corporations who also determine the technologies of production, control product development and allocate 'value' – or profits – through the network. Heavy pollution in China, and recent scandals involving the contamination of goods produced there, has as much to do with cost cutting imposed by Northern lead firms as with cowboy development in the wild East. Europe, in Murray's view, is leading the revolution in clean production. A critical European perspective on this is given by environmentalist Wolfgang Sachs in Box 14.

Third, the management of production networks is counted as 'services' rather than 'industry'. The transition from high energy industrial to low energy service economies is generally represented as inherent to the trajectory of development: where the (post)industrial developed world leads, the developing world will follow as they 'catch up'. But first they must pass through the stage of industrialisation. To the contrary, however, the service economies are possible only on the basis of the global structuring of production described above and they rely on the unequal global division of labour.

This brings us to the fourth problem – the wasting of people. Globally, and in individual countries as labour scholars Edward Webster and Karl von Holdt [2005] have shown for South Africa, the world of work is increasingly unequal and divided into three major 'zones': a shrinking core of permanent and well skilled workers with substantial labour rights; a growing 'non-core' of insecure casualised and contract workers who can

Box 13: The most (post)modern waste

A growing and toxic electronic waste stream flows from the so called 'post-industrial' and 'resource light' economies of the North. The major components of e-waste are discarded personal and mainframe computers, printers, copiers, faxes, cell phones, telephones, televisions and high-end telephonic equipment. In Europe it is growing 3 to 5 times faster than municipal waste as a whole. In the US, where around half of all households own a personal computer, the Environmental Protection Agency (EPA) estimated in 2001 that e-waste in US landfills would grow fourfold.

This rapid growth results from the purposeful design of inbuilt obsolescence. From the 1950s, as Annie Leonard observes, industrial design journals "actually discuss how fast [designers] can make stuff break and still leave the consumer with enough faith in the product to go buy another one" [2008]. Electronics take obsolescence to new heights. Rapid technology change is part of the arsenal. Old computers are made to become incompatible with evolving information and communication technology (ICT) systems. They could be designed for upgrading but, says Leonard, the "piece that changes" is given a different shape so it won't fit and "you gotta chuck the whole thing and buy a new one" [2008]. With cell phones, it is not just the technology, but marketing contracts are structured to force 'upgrading' to new phones every two years.

E-waste is toxic, yet most of it enters the municipal waste stream. In 2001, e-waste was reported to be the source of 70% of the heavy metals in US landfills, including mercury, cadmium and hexavalent chromium (the biologically absorbable form of chromium). Computer monitor screen glass contains lead to stop radio-active gamma rays from the display cathode from reaching user's eyes. This contributes 40% of the lead now in US landfills. Computers also contain polyvinyl chloride (PVC) which generates dioxins and furans during production and disposal by incineration, as well as PDBEs[59] which are endocrine disruptors.

By 1999, only 11% of discarded computers in the US were recycled. The task of recycling is dangerous to workers' health, especially in informal or semi-formal conditions. E-waste is moved to the South as 'donations', much as expired pesticides are 'donated', where they become toxic pollution sources.

Sources: Pichtel 2005; Leonard 2008.

[59] Polybrominated diphenylethers

be called up or dispensed with at a moments notice; and, in the 'peripheral zone', a vast pool of informal workers and unemployed people made surplus to the requirements of networked capital.

Fifth, the age of globally networked capital is integrally bound up with the neo-liberal policies associated with the names of Thatcher and Reagan and given global force through the 'Washington consensus'. A critical aspect of this revolution from above was the financialisation of capital – that is, an increasing reliance on financial dealing rather than production to secure profits, accompanied by a shift of power from production to finance capital. This turn to finance was a response to the crisis of the 1970s. At bottom, this was a crisis of 'over accumulation'. The finance houses found themselves with more money than they could invest safely and at a rate of profit which satisfied their shareholders.

This crisis was first passed onto Third World countries as low interest loans made in the 70s were turned into high interest loans in the 80s. It has since manifested in a series of spectacular financial crises in the South, virtually collapsing a number of national economies and engulfing most of eastern Asia in 1997. Each of these crises yielded high returns to global capital which could appropriate assets at fire sale prices. This was just one aspect of 'accumulation by dispossession' through which, during this whole period from the 80s to now, capital has managed a spectacular transfer of wealth from poor to rich globally and within most countries South and North. But the crisis could not be contained in the South for ever and has now returned to its proper home and collapsed the bubble blown up by global finance capital. Finance is, of course, also a service sector and it is financialisation, rather than reduced materials intensity, that has 'dematerialised' economies. In South Africa, the finance sector now accounts for 20% of GDP but, as Ben Fine [2008] argues, this was not a contribution of 'value added' to the economy but rather the finance sector's appropriation of value from the economy.

The crisis was also passed onto workers and the environment as indicated in the first and third points above. Beyond e-waste, however, WBCSD is very much part of the neo-liberal moment, promoting 'flexible business solutions' in opposition to mandatory regulation and precisely to deflate pressure for such regulation. Murray provides a seductive account of initiatives by this or that corporate. Many of the same corporations, however, operate by other standards in other parts of the world. And, as lead corporations in global production networks, their demands on subordinate

firms ensure practices which are directly contrary to those advertised to consumers. This is the flexibility that corporations seek to protect and it is enhanced by corporate advocacy in other fora such as the World Trade Organisation. It is this advocacy that has subjected national regulatory systems to international competition. And it is this advocacy which creates Byzantine market responses such as carbon trading: after a great deal of mathematics, and profit, the carbon credits traded still have no relationship to actual carbon emissions.

Box 14: The illusion of clean production in Europe
In his book *Fair Future*, Wolfgang Sachs writes:

> Only rarely is it still smelly and noisy in the late-industrial economy and winding towers and blast furnaces have all but disappeared from the landscape. But even where the Internet and design have taken over, a national economy cannot get by without raw materials. The acquisition and processing of raw materials, including the environmental costs associated with them, have only dropped out of sight in Europe … the greater part of the material flow never takes the form of a circulating object but remains somewhere along the product's life cycle as detritus or waste. …
>
> We may speak schematically of a multilayered distribution of ecological burdens around the globe. At the top of the ladder stand the late-industrial economies, in which visible environmental pollution is on the decline, while imports, which pollute the countries of origin, are on the increase … Cleanness is here largely achieved, but largely through relocation of the ecological burden. … Halfway up the ladder are the newly industrializing economies, which undertake heavy industrial production and therefore have to cope with classical forms of the pollution of water, air and soil – and people. Self-poisoning is the price they have to pay for a greater share of value creation, achieved in part by supplying the North with industrial goods. Right at the bottom stand the raw material economies of the poorest countries – or of poor regions within newly industrializing economies – which is where the great majority of people live. They supply raw metals and especially agricultural raw materials to the newly industrializing or affluent countries, and as a result they have to contend with waste, deforestation, soil erosion and water shortage. This especially affects people living close to nature and groups of small farmers who directly depend on it for their livelihood. [Sachs 2007: 61, 66]

Conspicuous consumption

As organisms, people constantly draw materials from their environment. At the most basic physical level, this amounts to 800 kg per year in the form of food, water and air, according to Sachs. Early hunter-gatherers using basic clothing, tools and shelter added a few kilograms to this amount. The first major change came with settled peasant agriculture which, as it exists today for possibly half of humanity, requires the use of between 2 and 5 tonnes of raw material per person per year. Industrialisation wrought a far greater change. Europe, for example, uses between 40 and 70 tonnes per person per year, excluding air and water, mainly for "installations run by organizations at various levels of the system: high-rise buildings, steel plants, supermarkets, swimming baths, airports, armoured vehicles and so on" [2005: 36].

'Per person' is thus a little misleading. The institutions of capital and state consume more than 'consumers'. It is not just the goods on the shelf, but the shelf itself, the shopping mall, the city that sustains the mall, the machinery of manufacture and the infrastructure of energy and transport and, finally, the extravagance of arms. On arms, the Pentagon's budget for the coming year is $700 billion, equal to the Treasury's fund to bailout the finance system[60] and more than the rest of the world's military expenditure. $100 billion of the Pentagon's stash is for laying waste to Iraq and Afghanistan while the other $600 represents its normal operational budget. In South Africa, the arms deal remains shrouded in secrecy and scandal, but the state's intention to use the state owned arms corporation Denel as a vehicle for 'strategic' investments is explicit.

Or take the city. It is not incidental that the financial crisis is connected to the contemporary process of urbanisation through the so called 'sub-prime' mortgage defaults, argues geographer David Harvey [2008]. Historically, grandiose urban development has repeatedly been used to absorb surplus capital when over accumulation threatens profits. Over the last decade or so, this process has gone global reflecting the globalisation of finance capital. The urbanisation of China has dwarfed everything else, but property markets have boomed across the world accompanied by frenzied demolition and construction. From the towers of Dubai to the golf estates of the Western Cape, it has been marked by competitive conspicuous consumption. And, as noted in The groundWork Report 2006, this investment has been focused in enclaves to the exclusion of the poor who are driven to the urban peripheries to make way for the high value investments of 'world class' cities.

[60] James Carroll, *Making some sense of $700b*, New York Times, October 6, 2008.

The competition in conspicuous consumption finds direct expression in the ritualised auctioning out of spectacularly commercialised sports festivals. Each Olympics or soccer World Cup competes with the last for extravagance as corporate sponsors demand yet bigger bangs for their advertising bucks.[61] When South Africa won the bid for 2010, the major cities started competing with each other for national funding of 'iconic' stadiums and transport infrastructure projects, running up debts that will settle on citizens into the future. Abahlali baseMjondolo comment that the KwaZulu-Natal Slums Bill "is an attempt to legalise a KZN Operation Murambatsvina before the World Cup in 2010".[62] The resources mobilised for the event contrast starkly with the repeated assertions that the state lacks capacity for 'delivery' to the poor.

The sacrifice to mining

Mining is literally an extractive industry, clawing materials from the ground and generally impervious to the environment and people around the mines. Solid mining waste is rarely managed beyond being piled into heaps or dams next to where they have been excavated and waste management textbooks pay little attention to it.

In some places the task of managing mining waste is turned over to nature. For decades, if not centuries, it has been accepted practice to dump mining slurry in water courses or the ocean, as illustrated by this 'historical analysis' given at a 1979 International Mine Drainage Symposium:

> Tailings disposal problems have faced the mining engineer for many years. Historically the easiest and most economical solution was to discharge tailings slurry by gravity to the nearest body of water and let nature take care of the problem. However, as communities and farming activities have encroached on mining areas, and fishing industries and interested individuals have applied pressure to government regulatory bodies, the need for properly engineered tailings disposal areas has become apparent. [Robinson and Toland 1979: 782].

In fact, it was mostly the mines that 'encroached' on farming, fishing and communities, but the idea that the land was empty made its enclosure easy, especially if it belonged

[61] Following the Beijing spectacular, Olympic officials challenged London to beat it.

[62] AbM press release June 21, 2007. Murambatsvina refers to Zimbabwe's operation to 'clean out the dirt' [see Chapter 1].

to indigenous people, North or South, without capitalist property rights. The term 'sacrifice area', reports mining activist and researcher Roger Moody,[63] was first officially attached to the Four Corners region of the US Midwest by the US Academy of Science in 1973, after it had been trashed by uranium, coal, oil and gas mining. In July 1979, a tailings dam in the area burst to release 1,100 tons[64] of milling waste and nearly 100 million gallons[65] of radio-active liquids into streams on Native American (Navajo) territory. According to Native American activist Winona La Duke "at least one member of every Navajo family has likely died from lung cancer and other diseases resulting from uranium mining" [quoted by Moody 2007: 127].

In Papua New Guinea, Rio Tinto insisted on the right to dump wastes from its very lucrative Panguna mine in Bougainville into a nearby river and so provoked a civil war:

> Leased in 1966, when the territory was under Australian control, within six years the Panguna mine had become the most commercially successful of all the company's operations. Costs were savagely cut by dumping all the mine's wastes (tailings) into the nearby river. By 1988 a few of the Panguna indigenous landowners, led by a former Rio Tinto mineworker, Francis Ona, demanded US$10 billion compensation for the ruination of their gardens, forest and waterways. The company jeered at the claim and refused to negotiate. Ona set up a nucleonic 'Bougainville Revolutionary Army', declaring independence from Papua New Guinea. Backed by Australian helicopter gunships, troops from the mainland invaded the island. In the bloody civil war that ensued up to a fifth of the island's population (between 15,000 and 20,000 villagers, many of them women and children) were to die before peace was reached in early 1998. [Moody 2007: 2]

Mines do not only leave physical waste, they also lay waste to the institutions of their hosts. Greg Lanning and Marti Mueller's 1979 classic *Africa Undermined* describes in historical detail how mining corporations underdeveloped Africa and intervened to make state structures in 'independent states' its servants.

[63] Moody is managing editor of the Mines and Communities website at www.minesandcommunities.org.

[64] The US uses imperial measures: hence 'tons' rather than metric 'tonnes'.

[65] About 378 million litres.

Abandoned mines

Globally, active mines have massive impacts on water. A text book on coal mining explains that water used for mining processes "is often seriously polluted and cannot be returned directly to the hydrological cycle without prior treatment". In addition "a large volume of water … is casually affected" by surface run-off, acid mine drainage, pumped mine water and groundwater flows. "It is not possible to apportion the damage among the 'process' and 'casual' categories, but the latter is probably the more important" [Down and Stocks 1977: 91].

Mining corporations arrive brazenly, but leave furtively. In North and South alike, they have left a toxic legacy of "abandoned and ownerless mines". In the US, there are half a million such mines [Moody 2007: 129ff]. In South Africa, the list is not complete but is estimated at 6,000. It seems outrageous that mine owners can abscond but, as noted below (under Aluminium), the asbestos case shows that miners can slip out of one corporate skin into another, taking their wealth with them but leaving their liabilities for others to clean up.

The Transvaal and Delagoa Bay coal mine near Emalahleni (formerly Witbank) tops the list of abandoned mines in South Africa. It operated from 1896 to 1953 but, more than half a century later, its waste is still producing an ongoing ecological catastrophe. Underground fires still smoulder, releasing sulphur dioxide, methane and carbon dioxide. The exposed rocks underground produce acid mine drainage (AMD) which seeps out from various cracks and covers the area with sulphate salts that kill all vegetation it touches.

A warm pool of water attracts local children. It is just two kilometres from their homes in Maguqa, one of Emalahleni's townships. It is AMD water heated by the underground fires. It is highly likely to contain carcinogens like benzene and toluene that have been detected in the gases from the fires by Pone et al [2007]. However, no health official has ever tested the water the children swim in.

The pond was constructed to deal with the AMD when the DWAF took responsibility for the abandoned mine. It is one of a series of ponds that collect AMD water which is then supposed to be pumped to a DWAF treatment works built ten years ago. The works, however, has been out of commission for more than a year and the AMD just runs into the Brugspruit which flows passed Maguqa. The sulphate salts are so thick on the water that the stream looks like it has been snowed over. The toxic water then

runs into the Olifants River, past fruit farmers and into the Loskop Dam. Over the past three years, officials at the Loskop Dam nature reserve have reported thousands of fish deaths as well as the deaths of crocodiles and water turtles.

The AMD degradation seems to have encouraged other factories – Highveld Steel, Vanchem, Samancor – to release their untreated waste water into these streams. The Emalahleni municipality similarly releases raw sewage into local streams and this too arrives in the Brugspruit. The stream is surrounded by townships in a busy valley. Children play in it, people cross it on their way to work, herders graze cattle and coal pickers work over heaps of discard coal.

Four mines in the Witbank area, belonging to AngloCoal and BHP Billiton, have constructed an acid mine water treatment plant. They show that AMD water can be treated but the price tag of R300 million seems to have put off the hundreds of other coal mines. The externalised cost from untreated AMD is far greater. It is imposed on the environment and the people living there. Finally, the costs from abandoned mines are imposed on the public purse – except, of course, that the DWAF itself appears to have abandoned the responsibility.

Laying waste to water

In more than a century of mining, South African gold mines have covered an estimated 180 square kilometres under more than 200 tailings dams. These areas are now permanently contaminated. In 2001, Roesner et al estimated that treating just the polluted topsoil (top 30 cm) would cost US$550 million [2001].

Mining waste is classified into rock and sand heaps and slimes dams. Slimes dams contain the silt and slurry together with the chemicals – arsenic, cyanide or mercury – used to extract gold from ore. The gold ore itself typically contains uranium and significant concentrations of chromium, copper, nickel, lead and zinc. The combination of acid mine drainage, high in sulphate salts, and heavy metals has impacted severely on the Vaal river system.

On the Far West Rand, gold miners physically destroyed a high quality dolomitic aquifer and also contaminated it beyond recovery by dumping radio-active mining waste into it. The ore contains high concentrations of gold making the Far West Rand the richest of all seven active goldfields of the Witwatersrand basin. It also contains

the highest concentrations of uranium and, when mining started in the early 1950s, nine of the 22 mines produced uranium as well as gold. Between 1952 and 1988, they processed the uranium into more than 11,000 tonnes of yellow cake (U_3O_8) according to Coetzee et al [2006].

But miners seeking a fortune here first had to conquer the aquifer that lay above the gold reefs. The aquifer consists of caverns weathered in the alkaline dolomite by the mild natural acidity of rain water. A number of impermeable dykes divide the aquifer into a series of 'compartments'. These dykes also ensured that pressure within the aquifer forced the water up and out through a number of springs feeding into the Wonderfonteinspruit. The water was of high quality and much prized by early black farmers and by the white farmers who displaced them. When the miners arrived and created a local market for food, the Wonderfontein Valley became a prime area for irrigation production according to mining geologist Jan Wolmarans [1984].

Early attempts to sink shafts in the area were abandoned as the shafts flooded. When real mining started in the 50s, the corporations pumped out water into existing irrigation channels, into overland pipes (one such pipe is 28 km long) or down to the Wonderfonteinspruit. They thus dewatered the aquifer. The Wonderfontein springs started drying up from 1957 and the first sinkholes – resulting from the loss of pressure in the caverns – appeared in 1960 to much public alarm. This provoked an official inquiry by the DWAF[66] and, on its recommendation, government decided to sacrifice farming and the aquifer to the interests of gold mining. Ever anxious to make someone else pay for the inconvenience of the aquifer, the mining corporations bickered about who was responsible for pumping and disposing the water, so prompting the state to regulatory action. In 1963 it made dewatering compulsory for all mines in the area, confirming the sacrifice of the aquifer in the interest of peace between the mining houses. Even so, the miners do not always win against the water. In 1968, the Wes-Driefontein mine was flooded.

The dewatering led to extensive damage to farms in the area. In 1964, the Far West Rand Dolomitic Water Association was formed. Behind its bland name, it was a cat's paw for the mining companies and each had to contribute according to the amount of water it was pumping out of its mines. The Association's task was to receive public

[66] Department of Water Affairs, Final report of the Interdepartmental Committee regarding Dolomitic Mine Water: Far West Rand, November 1960. (Known as the Jordaan report).

complaints, buy up the farms from the complainants and then rent them out again. As a result, the Association now owns large stretches of land affected by sinkholes and, as the landlord, is in a powerful position to deal with complaints. By 1984, the area had 589 sinkholes, most of them caused by dewatering and other mining activities. They seriously damaged railway lines, roads, mining infrastructure and buildings, including people's homes. Some structures just disappeared into the dolomite caverns below.

The gold miners deliberately built large numbers of slimes dams on top of sinkholes. In mining terms, according to an industry seminar [Robinson and Toland 1979], sinkholes add 'stability' to slimes dams by draining away fluid and so preventing a build-up of pressure with the potential to burst the walls. Slurry thus drains straight into the caverns of the aquifer which are then made into sumps for toxic waste. In some cases, miners attempted to plug sinkholes with mining waste. Predictably, in Wolmarans view, it didn't work. The waste simply dropped down into the water of the aquifer.

That the waste is heavily contaminated with uranium has been known to a closed circle of miners, scientists and state officials for decades. With the political transition from apartheid to majority rule, argues CSIR water researcher Anthony Turton, the mining corporations' controlling grip on this group slipped. Some began to speak out and confirmed public suspicions that the Far West Rand aquifer was contaminated with radioactive uranium. "It is this new generation of public domain literature that has given rise to the dilemma now confronting Government, because in essence, what it has shown is that there is a massive pollution plume downstream of gold-mining activities, consisting of a cocktail of heavy metals, sulphates and radionuclides" [2008: 3].

The seriousness of the situation was brought home to people on the Far West Rand in a dramatic way. Two local farmers, the Coetzee brothers Sas and Douw, decided to clean up their farm dam on the Wonderfonteinspruit during 2007. As soon as they removed the wall and exposed the sediment, a satellite picked up the radiation from uranium that had accumulated at the bottom of the dam and alerted the National Nuclear Regulator (NNR). The NNR then instructed the Coetzees to repair the wall, never to drain the dam again, not to disturb the sediment, not to allow their cattle to drink there, and not to sell any produce from their farm as it might be contaminated. The Coetzees complied because "we were brought up to believe that it is not right to knowingly harm someone". But they are not happy to bear the cost while those

responsible for the contamination, the owners of a nearby slimes dam from which the dun-coloured slurry water traces a clear trail to their dam, face no consequences.[67] The NNR has since declared that the food from the area is safe to eat. Nevertheless, its study of the catchment [NNR 2007] confirms that significant amounts of uranium are entering the Wonderfonteinspruit, that uranium is concentrated in the rivers and sediments from where it can be mobilised, and that it poses a health risk to residents. It has not explained the contradiction.[68]

The mining companies now propose to remove and consolidate all the slimes dams into two mega slimes dams situated on granite rather than on dolomite. This move is opposed by the considerable public mobilisation against the mining waste, which has given birth to a new environmental alliance, the Federation for Sustainable Environments.

Box 15: Radio-active waste

How much radio-active waste is there in South Africa and what is happening to it?

The status of radio-active waste has been a closely guarded secret, both because of apartheid South Africa's nuclear weapons programme and the miners' direct interest in it. However, in 2000, an unusually frank audit of radio-active waste was put together by the Department of Minerals and Energy (DME).

The report estimated that there could be 5,000 million tonnes of gold mine tailings containing uranium, and around 1,000 million tonnes of waste rock. About 25% of the uranium in mining waste had been extracted by 2000. Vast amounts of soil were also contaminated along with buildings and materials used in uranium plants and mines. Up to 1993, when mines first became subject to regulation by the NNR, contaminated mild steel scrap – an estimated 60,000 tonnes per year – was simply sold for recycling. More than 30 mines had been identified for decontamination, to be paid for by the gold mining industry but, by 2000, only eight were reported to have been cleaned up.

[67] Interview, 7 April 2008.

[68] See *Paying the price for mining*, Irin, February 15, 2008, at http://www.irinnews.org/Report.aspx?ReportId=76780.

The lax approach of the mining industry, and its regulators, can be seen in the DME report's argument for mixing contaminated materials into existing mine dumps:

> … there are recognised benefits of reintroducing radioactive residues from uranium and acid plant maintenance / decommissioning into the milling and gold-uranium extraction process. Apart from the financial benefits of recovering gold and uranium, the gradual reintroduction of this material into the process has the effect of returning the radionuclide concentrations back to their original values, i.e. to the levels prevailing in the original feed material to the plant. The reprocessing of these residues therefore avoids having to dispose of them separately (a potentially risky and expensive process if they are to remain at high activity concentrations). Instead, they simply end up as being an indistinguishable part of the tailings. [DME 2000: 52]

Pelindaba, the nuclear research facility near the Hartbeespoort Dam, placed its wastes in an excavated hillside called Thabana. For this waste, "complete records are not available", as the audit politely puts it. It was foreseen that all the Thabana trenches would eventually have to be excavated. The audit anticipated that decommissioning of buildings, stores and plants (including the Safari-1 reactor) would result in 13,000 cubic metres of waste, from a total volume of 150,000 cubic metres in contaminated materials. It expected this to be a costly process (but gave no figures) that would last between 20 and 30 years.

At the time of the report, Vaalputs in Namaqualand contained 7,371 m^3 of low and intermediate level waste which is mostly material coincidentally contaminated by radio-activity or with uranium. Vaalputs is now being considered for the burial of high level waste. Thus far, Koeberg nuclear power station has stored its high level waste on site. This waste is composed of spent fuel assemblies and stored in racks under water. The racks are periodically repacked to cram in more waste. According to the report, by 1999 Eskom had provided R1,164 million for the management of the spent fuel and the eventual decommissioning of Koeberg.

There is still no plan for final disposal of high level radio-active waste.

Platinum: more precious than people

Dispossessing people of their land while trashing their environments is by no means a relic of the history of colonialism and apartheid. The lives and livelihoods of thousands of rural people in Limpopo are being trashed right now by the mining activities of the world's largest platinum producer, AngloPlatinum,[69] reports Actionaid [2008]. They have lost their land, which is now being physically removed by open cast mining or covered with mining waste. They have lost access to drinking water, now polluted and unfit for human consumption. They have lost their livelihoods and have not received adequate compensation. Their ancestral graves have been removed, injuring their spiritual connection with the land. And they have been excluded from decisions about their own future, as the mining giant established front organisations – 15 different Section 21 companies – that signed agreements on their behalf accepting relocation. Their challenges to the AngloPlatinum land grab have been met with police brutality and corporate legal action.

The villagers are traditionally almost completely dependent on farming on communal land. Jobs are scarce and social services are minimal. Their other major source of income is from government grants – old age pensions and children's allowances.

Villagers in Ga-Pila, Potgietersrus, accuse the mine of cutting off their water and electricity to force them to move. Two water reservoirs disappeared under mining waste. The municipality did not reconnect or re-establish a water supply. Even where the land is not covered by waste, villagers are not allowed to plough because it is now 'mining property'.

The villagers live – or used to live – on the richest platinum resource in the world. The Bushveld Mineral Complex hosts 88% of the world's platinum and palladium. Platinum is used in catalytic converters for vehicles to reduce levels of carbon monoxide, hydrocarbons and nitrous oxides emissions to legislated levels. These catalysts, responsible for half the demand for the platinum minerals group, are mainly produced in Britain, Germany and Italy. Platinum is also used in the electrical, electronics and chemicals industries, for glass making and as jewellery. AngloPlatinum, which made record profits of US$ 1.75 billion in 2007, spends less than 1% of its profits on local community development but makes extravagant claims about its positive influence. The claims are at odds with what Actionaid found on the ground.

[69] Anglo Platinum produces 40% of global platinum supply and controls 60% of platinum resources.

South African law does not protect these communities from exploitation, and discriminates against communal land owners. According to Actionaid's report:

> The Mineral and Petroleum Resources Development Act of 2002, is very permissive towards mining companies … The law requires mining companies only to consult with the community and report back on the outcome of those consultations to the government department responsible for mining – the Department of Minerals and Energy (DME) – before a mining right is issued by the minister. The permission of the community is not required. The DME and the minister have no obligation to consult with the community affected and usually do not do so; they depend on the report given to them by the mining company, which the community has no right to see. Once a mining right is awarded to a company, the law does not require it to obtain permission from the occupiers or the owners of the land. Rather, the law expressly authorises the company to commence laying infrastructure and undertake mining on the land. Neither does the DME require written lease agreements to be concluded between the mine and the community. The negotiation and conclusion of a lease agreement is standard practice in relation to privately owned land (land owned by white people) but is the exception in relation to communal land (land generally used by black people). [2008: 12-13]

While the guardianship of the country's mineral resources is supposed to be vested in the state, mining and prospecting rights are allocated to corporations for free. Compensation is limited by the fact that the mining corporation's offer is usually the only one on the table, reflecting "at most the agricultural value of the land, not a proportion of the value of precious metals or minerals in the ground" [2008: 13].

Campaigners for community rights want the Mineral and Petroleum Resources Royalty Bill and the draft Mineral and Petroleum Royalty Bill to be amended to ensure that:

- communities have greater rights to be fully consulted and give informed consent before mining concessions are granted;
- the consultation process is supervised by the State or an independent, non-interested party delegated by the State and strictly governed by regulations;
- environmental assessments and safeguards are retained and strengthened and remain under the control of the Department of Environmental Affairs;

- mining companies' Black Economic Empowerment obligations include equity participation and/or community royalties for historically disadvantaged communities in mining areas. [2008: 13]

The villagers have actively resisted the enclosure of their resources. They have ploughed the land to establish active ownership, and protested on many occasions – for which they have been arrested and jailed. They have enlisted the help of environmental justice lawyer, Richard Spoor, and worked with the social movement Jubilee, groundWork and the Vaal Environmental Justice Alliance (VEJA) as well as the international social justice organisation Actionaid. Ironically, their best hope lies in the falling demand for and falling prices of platinum as the commodity boom is reined in by the prospect of global recession.

Steeling the future

Industrial processes are far more complicated and, in some respects, even more toxic than mining. Industrial waste is often hidden from public view, being dumped in heaps or ponds on site at the factory and with little regulatory oversight, or illegally flushed down drains or dumped elsewhere. One toxic waste dump that did attract public attention is ArcelorMittal's (formerly Iscor) slag heap at Vanderbijlpark because of the role it played in the destruction of the Steel Valley farming community. Its neighbours, from Jan Tromp in the 1980s to Strike Matsepe in the 2000s, were driven out or driven under by the pollution of the groundwater, of floodwater run-off and of the dust blown off the heap.[70]

The Vanderbijlpark Steel plant produces 2.2 million tonnes of solid waste every year. One million tonnes of this is hazardous, containing inorganic contaminants which leak into the groundwater: manganese, aluminium, cadmium, calcium, chloride, fluorides, iron, sulphates, titanium and zinc. Various organic[71] substances, mainly derived from coal tars, pose an additional toxicity threat. Most of these materials are found in the solid waste dumps, the evaporation dams and maturation ponds.

[70] See The groundWork Report 2006.

[71] In chemistry, 'organic' refers to compounds containing carbon. These are found in living organisms, as well as the hydrocarbons that make up fossil fuels and are used as the building blocks of plastics.

Iron and steel making takes place on giant scale. It involves the movement of millions of tonnes of raw materials, large volumes of water and large amounts of electricity, resulting not only in the finished product, but also huge quantities of waste and pollution to air and water. It is widely regarded as the most polluting industrial activity on earth. The raw materials – iron ore, scrap metal and coal – contain substantial impurities which must be removed to preserve the quality of the product and are discarded as gas through smokestacks, in liquid form or as solid wastes.

Impurities in iron ore include sulphur, manganese, and traces of heavy metal including cadmium, lead, zinc and mercury. Scrap is predominantly contaminated with tin, lead and copper and increasingly contaminated with plastics and paints. Some scrap metal is radio-active as described in Box 15 above. Flux materials such as limestone are used to act like "a kind of chemical sponge" [Davis 2002: 10] to capture and remove impurities and unwanted chemicals like sulphur from the furnaces. Slag is used flux and the scale on which it is produced is evident in the mountainous slag heap that looms over Steel Valley.

While impurities are removed, other metals are added to the iron-carbon mixture to give the steel special properties. Nickel and tungsten add strength, chromium increases the hardness, vanadium reduces the effects of metal fatigue, and lead makes steel more pliable. If large amounts of chromium and nickel are added, a hard oxide forms on the metal surface to make stainless steel. Zinc is used to coat or galvanize steel so it doesn't rust. All these additives are toxic heavy metals that can and do escape from the manufacturing process into the environment.

The coke ovens are particularly toxic. Coal is purposely starved of oxygen to create coke, used in blast furnaces, and so produces carcinogenic polycyclic aromatic hydrocarbons (PAHs). Water used to quench the coke catches much of this but the rest escapes as fumes and is particularly dangerous to workers. The gas created by heating the coal is led off to the coke by-products plant where ammonia and a range of volatile organic chemicals (VOCs), notably benzene, xylene, toluene, phenol and naphthalene, are recovered. During recovery, the gas is sprayed with water to produce flushing liquor. "This represents a very difficult pollution control problem," according to steel pollution expert Frank Kemmer, "since the liquor is very high in ammonium chloride … and contains such other contaminants as phenol, cyanide and thiocyanates" [1971: 10-16]. In addition, dioxins are formed in coke oven exhaust. Liquid and solid waste from the ovens includes highly toxic tars containing phenols, cresols, naphthols, acridine, and pyridine.

Iscor installed its first coke ovens and by-product plant at Vanderbijlpark in the 1950s. They have operated ever since but the difficulty of handling the waste has largely been neglected. In 2004, an environmental impact assessment for Mittal reported the annual waste from the plant's coke ovens as 70,000 tonnes of crude tar, 2,400 tonnes of tar sludge, 4,000 tonnes of ammonium sulphate and 180,000 tonnes of coke 'breeze' (fine dust).[72]

Traditionally, blast furnaces – which are huge steel stacks lined with refractory brick – are used to smelt ore into liquid iron. A mixture of iron ore, coke and limestone is dropped from the top of the stack and descends through blasts of hot air to the bottom over a period of 6 to 8 hours. Very high temperatures result. At the end of the process, the liquid iron is tapped off through one hole while the slag floats to the top and is tapped through another. While gas is caught and cleaned by special pipes, some of it is vented to the air or burnt as waste. Emissions include dioxins, sulphur dioxide, carbon dioxide, carbon monoxide and breathable iron dust particulates.

The Vanderbijlpark plant reportedly produced 28,700 tonnes of iron dust (or particulates), 13,000 tonnes of gas cleaning sludge, 600,000 tonnes of granulated slag and 36,000 tonnes of blast furnace slag from its two blast furnaces in 2004.

The iron dust and gas cleaning sludge are recycled to the sinter plant and the slag is used in the cement industry and for road construction. A sinter plant prepares sinters – pellets of iron and coal dust – to feed into steel making furnaces.

Molten iron from the blast furnace, sinters and scrap metal are used as feed for the steel making furnaces of which there are two kinds: basic oxygen furnaces (BOFs) and electric arc furnaces (EAFs). Mittal uses both at Vanderbijlpark.

In the BOFs, a lance is used to inject oxygen into the furnace at supersonic – and ear-piercing – speeds. This drives impurities off the molten steel and raises the temperature to melt the scrap metal added to the feed. Six storey buildings are needed so that the huge oxygen lances can be manoeuvred. Fluxing materials are added to carry off

[72] These figures, and those below, are given in the Draft Scoping Report for an environmental impact assessment on the closure of the slag heap and the opening of a new one (right next to it) at the Vanderbijlpark site, prepared by consultants Strategic Environmental Focus.

impurities. Iron fumes, carbon dioxide and large amounts of carbon monoxide are released when the furnaces are charged and tapped. Water is used to scrub gases of dust and fumes.

In 2004, Vanderbijlpark's BOFs produced solid waste consisting of 12,000 tonnes of iron dust, 45,000 tonnes of desulphurisation slag and 504,000 tonnes of furnace slag, all of which was dumped. Other solid wastes – 36,000 tonnes of mud, 8,000 tonnes of grit and 36,000 tonnes of furnace slag – were re-used internally.

In the EAF, an electric arc sprung between two giant electrodes provides most of the energy to melt the scrap and iron feed. Oxygen lances are also used in this process. EAFs produce low-carbon steels and ferroalloys used in the production of ferromanganese, ferrovanadium and ferrochrome. As in the BOFs, fluxing materials carry off impurities. EAFs "cause a rather high discharge of dust to the atmosphere" and wash water picks up very high levels of suspended solids [Kemmer 1971: 10].

In 2004, the EAFs produced 16,000 tonnes of dust which was dumped, and 100,000 tonnes of furnace slag which was reportedly re-used internally. The clouds of red dust that are regularly seen rising through roofs at the plant are from this unit.

The steel tapped from these furnaces is rolled or cast into intermediate and final forms at the hot or cold roll mills. In the rolling mills, water picks up oils and lubricants. The steel forms are then 'pickled' – treated in acid baths with sulphuric or hydrochloric acid – to remove rust from the surface. The waste – 'spent pickle liquor' – is strongly acidic and contaminated with suspended scales. The steel forms are then coated or galvanised with zinc or other substances at high temperatures, releasing fumes and heavy metals.

Slag heaps are the most visible solid waste from iron and steel plants. As slag results from removing contaminants from the production process, these contaminants are again leached or blown from the heap. The scale of slag production allows other wastes to be covered up. In 2005, activists observed Mittal staff burying what appeared to be bag-house waste in the slagheap. The bags filter particulates from the air exhaust. Altogether, a toxic brew of more than 100 chemicals is known to be emitted by steel mills. Recent research in Canada has shown that this cocktail not only affects all life forms around the mills, but goes down to the genetic level with hereditary DNA

damage reported around a plant in Hamilton Harbour.[73] In addition to local health impacts, sulphur and nitrogen emissions contribute substantially to acid rain. Table 6 summarises the main pollutants from iron and steel making processes.

South Africa's state owned Iscor was more or less gifted to the transnational corporation Mittal in the 1990s and is now owned by ArcelorMittal following the merger that created the world's dominant steel producer. The corporation fought a fierce battle to avoid recognition of and liability for its destruction of Steel Valley. It won. Repeating the strategy of the Far West Rand mining houses, it bought out the nearly 600 smallholdings in the valley and fenced it in. The municipality is now considering locating a new landfill in the valley, a sign that it is regarded as already sacrificed.

Table 6: Pollution from steel plants

Steel making process	Most significant pollutants from steel making processes
Coking plants (where coal is made into coke)	Particulates, sulphur dioxide, nitrogen oxides, raw 'coke oven gas', benzene and PAHs to air; oils and wastewaters containing phenols, cyanides and ammonia.
Blast furnace iron making	Iron fumes, carbon monoxide, sulphur dioxide and carbon dioxide to air; waste water containing iron and heavy metals. Bleeder openings can be noisy and release carbon monoxide and particulates.
Basic oxygen furnace	Iron fumes, heavy metals and carbon monoxide if they escape collection; and carbon dioxide.
Electric arc furnace	Iron fumes, other metals, dioxins and furans, and carbon monoxide into air; waste water; fume dust to landfill; and noise.
Reheat furnaces and on-site power plants	Sulphur dioxide and nitrogen oxides to air, particularly when burning fuel oil; large amounts of ash in the case of coal-fired power plants.
Sinter plants	Particulates, heavy metals, sulphur dioxide, nitrogen oxides, carbon dioxide and dioxins and furans to air.

Source: Stefan Cramer, Steel Valley workshop presentation 2004.

[73] Maggie Fox, *Air pollution damages across generations – study*, Reuters, December 11, 2002, at www.planetark.com.

Chemicals and plastic

Waste does not flow in neat 'streams'. It spills out of production, distribution and consumption processes along the entire length of the production chains. And these chains are themselves not as orderly as the metaphor of chains implies. Broadly speaking, there are three main sources of chemicals: petrochemicals from fossil fuels – coal, oil and gas – are used to make a very wide range of products including solvents, paints, plastics, fertilisers and pesticides; chemicals derived from plants are largely used in pharmaceuticals and cosmetics; 'inorganic' chemicals derived from minerals are used to produce chlorine, caustic soda, acids and fertilisers.

Chemicals from different sources are mixed in production. Thus, while plastics are primarily derived from petrochemicals, chlorine is a common ingredient, particularly in Polyvinyl Chloride (PVC). The endless manipulation of molecules, the basic building blocks of chemistry, results in some 2,000 new products coming onto the global market each year, many of which are toxic. Chemicals are also pervasively used in production processes, including the production of other chemicals. In the process, they are contaminated and so become unusable and end up as often toxic wastes from production.

The chemicals sector makes up a major slice of South African industry, producing 24% of the value of all manufacturing. This includes liquid fuels production which dominates chemicals, producing close to 33% of value within the sector and creating the feedstock for chemicals production. Liquid fuels are produced from imported crude oil, coal and gas. Table 7 shows the location, ownership, fuel source and capacity of the refineries. Sasol Chemical Industries, located primarily in Sasolburg, uses the same technology as it's Secunda coal-to-liquids plant to produce basic chemicals.

All these plants produce massive wastes to air, water and land. Chevron gives no account of its environmental wastes and has consistently reneged on promises made to local environmental activists to reduce emissions. PetroSA is a state owned corporation. Its 2007 Annual Report shows no sense of public accountability in respect of the environment. It claims that, "No environmental incident with a high negative impact on PetroSA's operations was experienced in the past year" [95]. Beyond this, it says nothing of its environmental performance or policies.

Table 7: South African Refineries

Refinery	Location	Owned by	Fuel source	Capacity barrels/day
Chevron	Cape Town	ChevronTexaco (Caltex)	Crude oil	100,000
Engen	Durban	Petronas 80% & Worldwide Africa Investment Holdings 20%	Crude oil	150,000
Sapref	Durban	Shell 50% & BP 50%	Crude oil	180,000
Natref	Sasolburg	Sasol 64% & Total 36%	Crude oil	108,000
Secunda	Secunda	Sasol	Coal	150,000
Mossgas	Mossel Bay	PetroSA	Gas	45,000

Notes:
Sasol and Mossgas synfuels are given in barrels of oil equivalent.
Engen's technical capacity is 150,000 but its official capacity is given at 125,000 barrels/day.

Table 8 gives the figures reported by Sasol, Sapref and Engen for 2006. Sasol's Sustainable Development Report [Sasol SDR 2006][74] gives aggregate figures on worker safety and environmental wastes for its global operations but does not break the figures down either for specific sites or for component businesses. The table therefore shows 2002 figures for the Secunda synfuels plant and Sasol Chemical Industries and Natref in Sasolburg. Since Sasol claims real reductions of some pollutants at some plants, it is curious that it will not release site specific figures.

The corporation does produce an annual Sasolburg Health, Safety and Environment (SH&E) brief [2006] which quantifies solid wastes produced by Sasol Chemical Industries and Natref. On air pollution, it gives ambient concentrations in Sasolburg but does not detail its own emissions. Sasol does not produce a similar brief for Secunda although this plant produces by far the majority of its global wastes. It is the largest single source emitter of carbon dioxide in the world and accounts for close to 90% of Sasol's own carbon emissions. From the figures that Sasol does give, it appears that Secunda accounts for something like 95% of Sasol's stupendous hazardous and general solid waste production. The most likely explanation for the different treatment given to Sasolburg and Secunda is that the corporation has felt more pressure from environmental justice activists in Sasolburg.

[74] Sasol's 2007 SDR strips out wastes from its Olefins and Surfactants business which was to be sold. The sale did not go through and Sasol says it will reinsert O&S figures next year. We have therefore used the 2006 SDR figures which do include O&S.

Sapref, owned by Shell and BP, is the country's largest crude refinery and is just one kilometre away from Engen which is the second largest. South Durban is the most active centre of local environmental justice activism and both corporations now report their environmental impacts. The refinery wastes appear small by comparison with Sasol. The latter's coal based process is undoubtedly the filthiest way of producing either fuel or chemicals. Nevertheless, it should be noted that Sasol's figures largely represent the integration of extraction and production whereas the refinery figures exclude the appalling costs of oil extraction in other countries, as reported in The groundWork Report 2005. Engen claims that it produced no high hazardous waste (H:H) in 2006 but does not report H:h waste. Sapref avoids specifying what proportion of its waste is hazardous.

Table 8: Wastes from selected petrochemicals (tonnes).

Pollutant	Sasol Global	Sasol Synfuel (Secunda)	Sasol Chemical Industries	Natref	Sapref	Engen
Air	**2006**	**2002**	**2002**	**2002**	**2006**	**2006**
Carbon dioxide	60,009,000	52,164,000	7,100,000	819,000	978,000	930,385
Sulphur dioxide	223,000	189,923	26,000	19,140	4,015	4,668
Nitrogen oxide	162,000	148,300	22,000	1,380	1,301	1,935
Particulates	7,560	8,000	3,000	1,150	NR	255
VOCs	461,000	409,783	42,000	NR	3,529	971
Hydrogen sulphide	78,000			-	-	-
Solid Waste	**2006**		**2006**	**2006**	**2006**	**2006**
Hazardous	270,000	NR	5,755	880	NR	NR
General	1,126,000	NR	11,557	NR	NR	2,391
Unspecified					6,335	

Compiled from industry sources. NR = Not Reported.

Sasol's SDR leaves out the mountains of ash produced each year, previously reported at over 10 million tonnes in Secunda and 1.8 mt in Sasolburg. This is because Sasol is now 'recycling' its ash by selling it off to brick makers. The Sasolburg SH&E reports just short of 1.6 mt ash sold in 2006. This figure includes ash mined from its old dumps. The ash contains various toxic residues, including heavy metals such as mercury, that leach from the dumps and into water so recycling this ash should result in local environmental benefits. Nevertheless, the toxic residues will remain in the bricks. They are therefore dispersed into the built environment and will be released over time: eventually the bricks will crumble or be crushed as buildings are demolished or paving is ripped up.

Sasol is now also selling spent catalyst and waste waxes to clay brick makers. This contributed to a substantial reduction in hazardous waste from its Sasol One site from 14,851 tonnes in 2005 to 4,257 tonnes in 2006. The corporation makes no comment on the final fate of the toxic material. As with ash bricks, however, this is effectively a strategy of dispersing toxic waste in space and time.

Catalysts are used to create chemical reactions in both the refining and chemicals industries. In oil refineries, catalysts 'crack' heavy fuel oil to produce a higher proportion of more valuable light elements such as petrol or diesel. In Sasol's process, catalysts react with 'syngas' to produce synfuels and a variety of chemicals. The catalyst is designed for specific processes but generally composed of grains of metal oxide coated with other metals. Commonly used minerals include iron, aluminium, nickel, cobalt, vanadium and potassium. In production, the catalyst is contaminated and is constantly regenerated until it is degraded beyond use. Waste catalyst is choked with heavy metals and highly toxic.

Sasol's Natref refinery is now disposing of its waste catalyst to recently established waste recycling companies for export "to companies abroad for metal recovery and final treatment" [SH&E 2005: 7]. This has reduced the refinery's toxic waste from 4,000 to 880 tonnes a year. In so far as the metals are recovered, this is likely to result from the commodity boom creating high metal prices. A sharp drop in metal markets, as is now happening, may collapse such enterprises and so return the problem to Sasol – or leave it at sea. It should also be recalled that toxic metal recovery has a poor record as was demonstrated at Thor Chemicals [see Chapter 3]. The problem of toxic waste may therefore be transferred to the workers in the foreign metal recovery factories. Given the documented experience of IT recycling, if the destination is another Southern country it is possible that a proportion of the waste is simply dumped on arrival.

Engen has increased its consumption of catalyst but claims zero H:H waste. This is achieved by 'de-listing' H:H to H:h waste which is then dumped at BulBul Drive landfill. It is not clear how the metals in catalyst waste can be treated to warrant the de-listing. Replying to queries from groundWork, Engen says that catalyst waste batches are variable and it may not always be possible to de-list. In this case, it will be disposed to an H:H site. Engen is also exploring the possibility of recycling catalyst wastes which have "a lot of monetary value due to their constituents". It justifies this also in terms of the requirement for waste reduction.[75]

Water pollution from these processes is intense. All plants produce effluent and say the quality of their effluent is within their permit conditions. These permits are in many cases "exemptions from the general standard" – meaning that they are permitted to meet lower requirements than in the national regulations. Whether the permits protect water or industry is thus questionable. Sasol is now cooperating with the DWAF in investigating the die off of fish at the Vaal Barrage where its Sasolburg effluents are released. Further, most large industries have on site dumps for more or less toxic wastes, including ash dumps and slimes dams. Sasol is now remediating old tar pits even as it develops new ones. In 2006, DWAF training materials identified some of the water pollution problems associated with the Sasolburg chemicals cluster:

- **Natref:** Contaminated groundwater in vicinity of evaporation dams; groundwater contamination in tank farm area.
- **Omnia Fertilizers:** Contaminated groundwater in plant area; spillages and seepages from hydrochloric tanks.
- **Sasol Chemical Industries:** Salt loading in surface water to Vaal Barrage. Discard dump causes groundwater pollution.
- **Dow Plastics (now Safripol):** Overflowing of effluent pond; storm water run off from site; currently no water use authorisation.
- **Karbochem:** Legacy issues regarding waste dumped on site; historic groundwater pollution.

Spills, fires and explosions are still common at all the petrochemical plants. In 2004, an explosion at Sasol's Secunda ethylene plant killed 10 people. Since then, Sasol has embarked on a major safety programme. Nevertheless, the corporation recorded 21 'fires, explosions and releases' in 2007, up from 15 the year before. Sapref recorded 16 fires in 2006 but does not mention spills. Engen records 4 spills in 2006, down from

[75] E-mail, Sandra Redelinghuys to Bobby Peek, November 05, 2008.

11 in 2005, but does not mention fires. 2007 was a year of fire in south Durban. At the Island View chemical storage on Durban docks a series of explosions ripped through 8 tanks which burnt through the night of September 18. The air was thick with chemical smoke and fish turned up dead in the water a few days later. The mangled wreckage of the tanks would have added to the solid waste stream. Three major fires at Engen spread fumes and soot across the neighbourhood. In July, a fire in the alkylation unit was caused when a corroded metal flange failed. In November, a storage tank was, according to management, struck by lightening and burned for three days. Just a week later, a leak at the lubricants plant caused an explosion and a fierce, if brief, fire. At Sapref, in November, a fire broke out in the catalytic cracker unit.

The plastics industry

Sasol started life as a state owned industry and was heavily subsidised even after it was privatised in the early 1980s. This followed the US example of providing massive subsidies to oil corporations to increase production of plastic feedstocks in the 1950s.

The basic chain of plastic production looks like this: monomer producers → polymer (or resin) producers → converters [see Box 16]. According to the Plastics Federation[76], the South African plastic industry consumes over 1.1 million tonnes of polymers a year of which 800,000 tonnes is produced from Sasol's monomers. Sasol is the only producer of monomers and also the largest producer of polymers. A major expansion, dubbed 'Project Turbo', was due for completion in 2007 and will nearly double capacity. Like monomer production, polymer production is capital and energy intensive and there are just three other producers: Safripol (formerly Dow Plastics) located in Sasolburg, SANS Fibres in Cape Town and Hosaf Fibres in south Durban. Converters are considerably less capital intensive and there are some 850 firms ranging in size from small local firms to transnationals.

Sasol does not give pollution figures for individual businesses. Sasol Polymers can reasonably be assumed to produce up to a quarter of the pollution at its Sasolburg plants in 2006. However, much of the monomer production is upstream of this plant both in Sasolburg and Secunda. Sasol notes ongoing remediation of mercury contamination at the Polymers plant [SDR 2007] and, while it has reduced VOC emissions, vinyl chloride emissions are up [AR 2007]. Safripol, SANS and Hosaf give no information on their environmental impacts. Spent catalyst may be assumed to be a significant

[76] At www.plasfed.co.za.

Box 16: Making plastic

Plastics are produced from polymers which, in turn, are produced from monomers. Monomers are composed of simple chemical molecules. Catalysts and energy are used to produce long chain molecules that make up polymers. Thus, ethylene is a common monomer and the basic molecules can be joined up to create the polymer polyethylene. Pure polyethylene is called a homopolymer because it is made from a single monomer. However, not all polyethylenes are the same: the longer the chain composing the molecule, the higher the density of the polyethylene. High density polyethylene is used to make thicker and more rigid plastics while low density polyethylene is generally used to make flexible light products like film-wrap.

There are a great number of monomers. Apart from ethylene, the most common are vinyl, styrene and propylene. Where a polymer is made from two or more monomers it is called a copolymer. Thus, ethylene combined with vinyl acetate makes EVA commonly used for electric plugs or foamed to make padding for sports equipment. Polymers are also combined with other chemicals. Chloride, for example, is commonly combined with polymers as in polyvinyl chloride (PVC). Finally, various other chemicals can be added in the process of producing polymers or plastics. Thus, plasticisers such as phthalates are used to add flexibility, pigments are added for colour and flame retardants are added to products subject to heat. The mix is called a resin and is sold in the form of liquids, solid rods or pellets, as the raw material for plastic fabricators or 'converters'.

The result is that plastic can be given almost any physical characteristic desired by the manufacturer and it can be moulded, extruded or blown into just about any shape. The first plastics were made from naturally occurring polymers but, as Heather Rogers observes, the invention of synthetic plastic made from the apparently limitless flow of petrochemicals freed industrial production from the limits of nature. During the 20th Century it was progressively used to substitute for wood, glass, paper, metal and pottery goods. Plastics are now used in almost all manufacturing sectors – in cars, aeroplanes, guns, garments, ropes, computers, household appliances and buildings. They are used for making plates and cups, the soles of shoes, tyres and rubbers. And, in the form of plastic bags, film-wrap, jars, jugs and bottles, they are now the most common form of packaging.

source of their hazardous wastes together with various other spent chemicals. The Berkeley Plastics Task Force notes that producing one PET bottle results in "more than 100 times the toxic emissions to air and water than making the same size bottle out of glass" [Stover et al 1996: 11]. Some of this pollution is from converters. There does not appear to be any information on this in South Africa. Nampak, one of the largest packaging firms, gives no information of process emissions or waste in its Sustainability Report [2007]. US data is also limited, according to Stover et al, but it indicates substantial VOC emissions to air. It seems likely that workers get the brunt of these emissions, particularly in smaller and poorly capitalised plants.

Box 17: Safripol

Safripol is owned by ABSA Bank (49%), Thebe Investments (21%) and Safripol managers (30%). The consortium was formed in 2006 to buy Dow Chemical's polymers plant in Sasolburg for ZAR 1.3 billion and has restored the company's original name.

Safripol was originally established in 1972 as a joint venture between German transnational Hoechst SA and state backed Sentrachem. Its main plant in Sasolburg was established in close cooperation with Sasol which supplied the monomer feedstock. This cooperation was maintained when transnational chemicals giant Dow, notorious for its association with the Bhopal disaster, bought the company and changed its name to Dow Plastics. In 2006, according to Safripol, "Dow's strategy with regard to emerging markets had changed."[77] This would seem to reflect Dow's 'invest-for-growth' agenda focused on joint ventures with petro-state corporations and the big emerging economies of China, India and Brazil.[78] Dow will continue to support Safripol's technology development.

Further, plastic products themselves emit chemical vapours. As a general rule, the more flexible plastics emit most. This is particularly significant in respect of food packaging. The migration of chemicals such as phthalates into food and the domestic environment has been shown to be associated with declining male fertility because they mimic oestrogen hormones. Other chemicals with potential for migration, including traces of

[77] At www.safripol.co.za

[78] See Dow's 2007 and 2006 Corporate Reports. The 2006 report is notable for its paean to Milton Friedman, the father of neo-liberalism.

monomers, are carcinogenic and the mixture of chemicals in many products is likely to be more toxic than the sum of their parts. Finally, these products accumulate in vast quantities on the dump and the migrant chemicals add to the toxicity of air emissions and leachate.

Power within the industry lies upstream, primarily with Sasol but also with Safripol. While state regulation of the petrol price awards import parity pricing to Sasol's fuel business, both Sasol and Safripol impose import parity pricing on polymers which are not regulated. Sasol is the monopoly producer of LDPE and PVC while Sasol and Safripol share the market for HDPE and PP [see Table 9 for types of plastic]. Industry analyst Ralitza Dobreva, writing shortly before Dow's sale to Safripol, observes that the behaviour of Sasol and Dow is "implicitly coordinated" as "their prices are consistently in line …" [2006: 9]. In short, they operate as if they were a monopoly and appropriate added profit equivalent to the transport, handling and tariff costs of polymer imports. SANS and Hosaf both produce PET, and must either import the PE monomer or buy it from Sasol.

While profits are concentrated upstream in the industry, labour is concentrated downstream. According to Dobreva, the plastics industry employs 35,000 people with 30,000 employed downstream. At both Sasol and Dow, new investment has been associated with labour shedding or with dramatically increased output per worker. Sasol Polymers reports a 26% increase in production per employee from 2006 to 2007 following the investment in Project Turbo.

Dobreva concludes that policy should aim for the expansion of the downstream industry in the interests of job creation. This recommendation is indeed reflected in the DTI's Industrial Policy Action Plan [2007]. The longer term benefits are doubtful, however. Expansion would certainly be accompanied by mergers and acquisitions predicated on expanding economies of scale and increased labour productivity. It thus appears as a short term response that will reproduce job shedding growth over the longer term.

Table 9: Plastics industry polymer classifications and SA producers

No.	Polymer name	Short name	Typical products	SA Producers
1	Polyethylene Terephthalate	PET	Cool-drink and water bottles, jam jars, pill bottles etc.	SANS and Hosaf
2	High Density Polyethylene	HDPE	Oil cans, crates, milk bottles, bleach bottles.	Sasol and Dow
3	Polyvinyl Chloride Plasticised Polyvinyl Chloride	PVC-U PVC-P	Smooth food trays, some cosmetic tubs, blister packs, plumbing pipes, roofing. Made flexible, as in garden hose, shoe soles, electric wire sheath.	Sasol
4	Low Density Polyethylene	LDPE	Garbage bags, frozen veggie bags, film-wrap, some squeezable bottles, cosmetic tubes, dust covers.	Sasol
5	Polypropylene	PP	Bottle caps, battery cases, cups and plates, hinged or pill containers, buckets, flexible yoghurt containers	Sasol and Dow
6	Polystyrene Expanded Polystyrene	PS PS-E	As rigid plastic as in some yoghurt containers and cosmetic tubs, cassette tape and CD covers, coat hangers and toys. Foamed to use in throw-away cups, fast-food packs and food trays, and electronic goods packaging and insulation.	
7	Other (Usually a combination of resins)		Vacuum pack for meat etc. and various speciality packaging; parts for cars and appliances, computer and electronic casings	

Plastic and packaging

Packaging consumes 52% of plastics by value. For their part, plastics make up 70% of the R29 billion packaging market and are rapidly expanding production and market share. In its submission to the parliamentary portfolio committee hearings on the Waste Bill, the packaging industry claimed commitment to extended producer responsibility and said it had "achieved impressive results" in reducing, re-using and recycling packaging in accordance with the waste hierarchy.[79]

Reduction is claimed because the weight of such items as beverage cans and glass and PET bottles has been reduced over time. Reduced weight reduces the embodied energy, and hence production wastes, in such items as well as the energy required for transport. The growth of the industry, however, means that the number of items and the total volume of packaging material are rising rapidly. As a whole, the industry now consumes 2 billion tonnes of raw material a year. Plastic is held to be particularly virtuous for its lightness and the substitution of plastics for other materials is claimed as environmental progress. What is not said is that reduced weight is not associated with reduced embodied energy in the substitution.

Despite expanding the market for cans and dumpies, South African Breweries still sells 75% of beer in returnable glass bottles. There is also some use of refill packaging. The industry claims that detergent refills reduce packaging materials by 70%, but do not say what proportion of the market is taken by refills. A quick glance at supermarket shelves indicates 'not much'. However, according to the industry, "One way packaging, in many cases, is the more environmentally friendly option, as return distances and fuel emissions as well as the amount of water and chemicals used to clean refillable packaging may have a more negative impact on the environment."[80]

Table 10 shows the packaging industry claims for recycling.

[79] Packaging Council of South Africa submission, November 15, 2007.

[80] This quote is taken from the Packaging Council of South Africa (PACSA) website but the argument is emphasised on the Plastics Federation and PETCO sites.

Table 10: Industry recycling

Material	Industry agent	Tonnes/ year	Proportion recycled
Cans	Collect-a-Can	50,000	67%
Paper	Manufacturer and recycler associations	965,000	55%
Glass	Glass Recycling Co	-	25%
Plastics	Plastics Federation and PETCO	-	33%

Source: The Packaging Council of South Africa

With no government requirement for recycled content, recycling has long been captive to a volatile market. Rates have improved in recent years, primarily in response to the boom in commodity prices which may have contributed to the establishment of PETCO, dedicated to PET recycling, in 2004. Nevertheless, the claims should be treated with caution. While registered as not-for-profit organisations, all the main recycling agents were established and are funded by the relevant industries and serve a PR function. Journalist Don Boroughs shows that the figures given by Collect-a-Can, funded mainly by Mittal and Nampak, are particularly suspect and appear to be thumb sucks.[81]

The plastics industry claims to recycle 33% of plastic packaging, implying that 66% is destined for dumping. The bulk of what is recycled would appear to be factory waste – off-cuts and trimmings from the plastics production floor – and industrial packaging. Consumer waste is rather less easy to recycle but is nevertheless the focus of industry PR aimed to justify plastic in environmental terms. The underlying strategy, however, continues the core business of expanding the market.

Understanding this requires a step back in time to see how, as Heather Rogers puts it, "today's polymer-laden reality is not simply the inevitable outcome of some natural process; it is the direct result of an industry that was nurtured by massive public spending, unrelenting lobbying, and sophisticated public relations" [2005b].

[81] Don Boroughs, *A case of collect-a-con?* Mail and Guardian, February 13, 2008. In its response to eThekwini's 2004 IWMP, Collect-a-Can simply gave the national figure for all cans collected from the organisation's inception. The IWMP consultants did not question this figure, supposed to be the annual figure for eThekwini. They noted, however, that Collect-a-Can's claims for paper recycling were not credible.

In the two decades after World War 2, the industry discovered the virtues of packaging designed for dumping. Returnable glass bottles, for example, were re-used up to 40 times. Single use plastic, glass and can throwaways thus made for a massive expansion in the market and in profits. Emphasising that the industry should aim for "low cost, big volume, practicability, and expendability", one farsighted participant told his colleagues at a plastics conference in 1956, "Your future lies in the garbage wagon!" [quoted in Rogers 2005: 121]. To make this future, they had to persuade people who were used to mending and re-using things that throwing them away was the natural thing to do. They had to make people think of themselves as consumers.

Throwaways also enabled market concentration and centralisation. Returnable bottles were generally tied to local markets within easy transport range of bottling plants where they were refilled. Throwaways thus became a weapon in hands of large corporations as they centralised production and used their financial clout to undercut and by-pass local bottlers. In the two decades following the war, the number of soft-drink makers in the US fell from 5,200 to 1,600 while brand leaders Coke and Pepsi established dominance, and the number of brewers dropped from 400 to 100. A study for the US Environmental Protection Agency confirmed that this trend to monopolisation was "encouraged and permitted by the introduction of nonreturnable bottles" [Rogers 2005: 137].

Bottled water exemplifies the twin drives for expansion and the concentration of power in the market – or rather, to make the market – and combines it with the agenda for privatisation. At the beginning of the 1970s, bottled water was largely confined to Europe and tied to natural springs supposed to have health benefits. During the 80s, the market expanded six-fold and then exploded in the second half of the 90s. This expansion drew in the big names such as Coke and Nestle as well as the major corporations pushing for the privatisation of public water supplies led by Suez and Vivendi. The industry has promoted itself on public concerns around water pollution and deteriorating public provision even where tap water is more rigorously regulated than bottled water. As with many soft drinks, the dispensable packaging is in fact more valuable than the contents and makes up the better part of the energy it takes to commodify the water. Corporate Accountability International comments caustically that this energy is equivalent to filling a quarter of the bottle with oil.[82] In 2001,

[82] At www.stopcorporateabuse.org

Ferrier estimated that 1.5 million tonnes of plastic went into bottled water, a figure that is likely to have expanded dramatically since. In South Africa the market grew by 33% in 2005 and another 26% in 2006.

The US packaging industry responded very quickly to environmental campaigns highlighting the destructive nature of plastics and consumer revulsion at the ever growing torrent of waste. It launched Keep America Beautiful in the early 1970s, ran advertising and 'education' campaigns on the virtues of plastic and funded lobbyists to prevent legislative restrictions. Finally, it initiated industry driven recycling and re-advertised itself as a green champion. In 1988, the US plastic packaging industry classified different types of plastics as shown in Table 9 above. The numbers were inserted in the middle of the chasing arrows symbol and advertised to mean both that the products could be recycled and that they were recycled.

The strategies honed in the US have been repeated around the world and the leading international industry association has even set up a Plastics Global Litter Group. Thus, the Plastics Federation of South Africa (PFSA) has taken up the US slogan: "Plastics don't litter, people do!" It reflects the core strategy of individualising the problem, confining it to the domain of consumption and so heading off questions about production and the structuring of markets.

PFSA was established in 1997, in time to participate in the final round of lobbying on the National Environmental Management Bill as well as in the drawn out waste policy process. It patented its own 'Enviromark' and adopted the US numbering system, or 'polymer identification codes', complete with chasing arrows.

The Berkeley Plastics Task Force argues that the US industry's recycling claims are not credible. First, within each of the seven codes, there is a very wide range of grades. Thus, Safripol produces just two polymer types – HDPE and PP – but 30 different grades. This is despite the fact that South African producers have actually cut down on the number of grades produced in order to secure economies of scale. Other grades are now imported. According to DEAT, "60 different types of plastic resins" are used in local production [2005: 29]. Recycling different grades of the same polymer type through the production process wrecks the batch. While the grades used for industrial packaging tend to be uniform and thus more easily recyclable, the codes are virtually meaningless for most consumer waste.

Second, even when the grades are compatible, the structure of the polymer is degraded by recycling through the production process. For practical purposes, new packaging such as PET bottles cannot contain more than 15 to 25% of recycled material. Moreover, bottles with recycled content cannot be recycled a second time to produce a third bottle. This compounds the problem of sorting for recycling. Most plastic recycling is therefore 'down-cycling' into products such as plastic pallets where the purity of the polymer is less of an issue. This saves on other materials, such as wood for pallets, and it delays dumping for the life time of the new product but it has no effect on the use of 'virgin' resins in packaging.

Finally, industry recycling programmes in fact served a different purpose. Coupled with PR, they gave the impression that the production of virgin plastic and the amount of waste going to the overflowing dumps was being reduced. The intention was to overcome consumer and regulatory resistance and the outcome was an increase in production, consumption and dumping.

The South African industry is mimicking the message, saying that "where the polymer logo is not present, it is much more likely in South Africa that the spent / waste item, will end up in landfill and that's just not an acceptable option anymore".[83] To the contrary, it is highly likely that the item will end up in the dump irrespective of the polymer logo and even in the unlikely event that the consumer finds a recycler. The intention of expanding waste is evident in the next sentence: "We need to recover as much as we can for recycling or energy recover" [sic]. The packaging and plastics industries are explicit in their promotion of incineration and, as is shown elsewhere, incineration demands the waste that feeds it.

In the energy sector, plastic and paper are known as 'non-energy' because they are produced from energy resources. Plastic has a much higher energy content than paper and, in the view of eThekwini waste managers [IWMP 2004], the South African waste stream does not have a high enough proportion of plastic to make energy production from waste incineration viable. The reason given is that most South Africans are poor. It may also be hoped that the plastic bag regulations, in so far as they have been successful, have further reduced plastics in the waste stream.

[83] PFSA website at www.plasfed.co.za

If poor people do not throw enough plastic into the bin, rich people certainly do. In promoting incineration, both government and industry are promoting a particular meaning of 'development': that it produces more waste and more energy intensive plastic waste in particular. Development, as the idea of 'a better life for all', is thus made to serve the active construction of the market in throwaway packaging. Such development, however, is not only unsustainable on environmental grounds. It also produces, rather than alleviating, poverty and inequality.

There is another twist to this logic of development. Markets must appear to be natural rather than constructed, the outcome of consumer demand rather than capital's apparatus of marketing. The state supports this way of representing things. Between 2002 and 2005, national energy statistics were given a make over. The most significant change was at the confluence of energy and waste. The 2002 figures showed that the residential sector consumed 9% of energy while 'non-energy' accounted for 16%. The 2005 figures gave 18% to the residential sector and just 1.3% to non-energy. So the proportion of residential energy consumption doubled while non-energy almost disappeared.[84]

There are two significant implications: The first is that non-energy makes up nearly half of the energy that goes into households. This would include packaging and all sorts of plastic household goods. Much of it is designed for instant dumping, having little use other than for marketing, and most of it goes to the town dump sooner or later. This is, of course, the waste of the rich and it is dumped mainly in poor areas. If incineration is to work in South Africa, it would seem that a sort of waste apartheid must be maintained to keep the wastes of wealth separate from the waste of poverty. Nevertheless, it can be predicted that the incinerators will mostly be located in poor areas.

The second implication relates to the politics of statistical representation: packaging foisted on more or less unwilling consumers is allocated to household energy consumption rather than being attributed to the industry that produces and markets it, to the commercial (retail) sector that markets it again, or to the municipal waste industry which is the 'end user' of most packaging and the necessary by-product of capitalist development, an externality paid for by the public in taxes or in health.

[84] See Energy Outlook 2002 and South African Energy Digest 2005.

Aluminium

In 2001, the Australian corporation BHP merged with Billiton to create the world's largest diversified minerals corporation. Billiton was previously owned by Shell who sold it to the South African group Gencor in 1994. The deal required a major export of South African capital and Gencor sought and received an exemption from the capital controls then in place from the Minister of Finance. Billiton was listed in London and it soon became evident that Gencor, the supposed parent, was in fact of subordinate interest. In an internal deal, Billiton bought Gencor's base metals assets, including the Richards Bay aluminium smelters. The deal thus preceded, and set a precedent for, the listings of other major South African corporations on the world's central stock exchanges in the late 1990s and early 2000s.

Gencor itself retained its own precious metals division but quickly unbundled, morphing into a capital holding company and selling off its last assets, a 46% holding in Impala Platinum, before closing its doors in 2003. The hollowing out and closure of Gencor seems to have been connected with a legal claim against it by people suffering from asbestosis. The corporation bought Cape Plc's asbestos mines when the latter disinvested from South Africa in the early 1980s. Without admitting liability, it made a "full and final" settlement of R380 million to the Asbestos Relief Trust. It was then quickly liquidated, returning very substantial 'shareholder value' while terminating corporate responsibility for the ongoing ruin of the environment and of thousands of people's health. In the meantime, much of Gencor's top management had transferred to Billiton.

Billiton continued a major expansion of aluminium smelting capacity inaugurated by Gencor. The Hillside smelter at Richards Bay, complimenting the older Bayside smelter, was completed in 1996 and the Mozal smelter outside Maputo in Mozambique followed shortly with production starting in 2000. These smelters linked with Billiton's existing bauxite mines and refineries: the Worsley mine and refinery in Australia and the mines in Suriname, in Latin America, which supplies a refinery operated by Alcoa in which Billiton has a 45% interest. The refineries produce alumina, a whitish powder, from the raw bauxite ore supplied by the mines. The process uses chemicals and heat to separate alumina from the toxic residue known as 'red mud'. Worsley appears to produce about 12 million tonnes a year of the stuff, although BHP Billiton [2006] is not exactly explicit on this point.

Box 18: Recycling red mud

The industry is busily looking for ways of getting rid of their mud – along with the costs of storing it – by touting it as a resource. In Australia, during the 90s, Alcoa helped fund a Department of Agriculture experiment using red mud from its refinery to stabilise phosphorus run off. The department persuaded farmers to participate in spreading it on their land, claiming that it would substantially increase yields. Instead, the farmers say, their cattle started getting sick. Spread at 20 tonnes a hectare, according to journalist Gerard Ryle, the red mud contained "up to 30 kilograms of radioactive thorium, six kilograms of chromium, more than two kilograms of barium and up to one kilogram of uranium" together with "24 kilograms of fluoride, more than half a kilogram each of the toxic heavy metals arsenic, copper, zinc, and cobalt, as well as smaller amounts of lead, cadmium and beryllium". The department nevertheless insisted that this had nothing to do with the cattle sickening and subsequently marketed the mud to farmers in south west Australia as a soil dressing. Alcoa agreed that the 'product' was safe but nevertheless demanded, and got, an indemnity for any environmental damage.

Source: Gerard Ryle, The great red mud experiment that went radioactive, The Sydney Morning Herald, May 7, 2002.

The southern African smelters are the primary market for Worsley's alumina – although this 'market' is obviously internal to the corporation. All three smelters were primary beneficiaries of state infrastructure investments. The original construction of Bayside, in 1971, was integral to the apartheid state's simultaneous development of the deep water port at Richards Bay. The project required close collaboration of government departments, major state owned corporations – primarily the Industrial Development Corporation, Eskom and Transnet – and private interests led by AngloAmerican. These institutional relations were, if anything, strengthened in the post-apartheid period and Billiton slipped into the seat already warmed by Gencor. Hillside was seen as an anchor project for a Spatial Development Initiative (SDI) intended to inaugurate another round of industrial modernisation at Richards Bay, while Mozal anchored the Maputo Corridor SDI and was accompanied by the development of a deep water port at Maputo. Mozal also provided a vehicle for practical collaboration between the corporations at the centre of the minerals and energy complex (state and private) and the World Bank, so reinforcing local-global institutional relationships as South Africa emerged from isolation.

Electric energy is the most significant input into aluminium smelting and, for Billiton, cheap electricity from Eskom was the primary reason for locating both Hillside and Mozal. Table 11 below shows energy consumption for the three Billiton plants equating to 12% of South Africa's electricity supply and 4% of total final energy demand. The balance of the smelters' energy is derived from coking coal, gas and liquid fuels. Mozal, of course, is not formally included in South African energy demand or carbon emissions, but it is directly supplied by Eskom on similar terms to Hillside and Bayside. In short, it would not be there if it was not bound to South Africa's energy economy. It consumes more electricity and emits more carbon than the rest of Mozambique put together.[85]

The precise terms of the pricing deal are secret but Billiton undoubtedly gets the cheapest electricity in the world. The normal industrial rate, at around 14c/kWh, is already the world's cheapest and the smelters are supplied below this price. It is also known that the price of power is tied to the world price of aluminium, so protecting Billiton from both currency and commodity price fluctuations. In fact, much of the risk is transferred to Eskom which reportedly "wins or loses $300 million" for every 10% swing in the value of the Rand [Bond 2007: 7]. There is one snag from Billiton's perspective: the contract includes an 'interruptible supply' condition which Eskom invoked during South Africa's electricity crisis in 2008. Eskom demanded a 10% reduction from the combined consumption of the three smelters and Billiton cut production at Bayside.

Table 11: Aluminium smelters: production, energy, waste (2006).

	Production tonnes	Total final energy (PJ)	Electric energy (PJ)	CO_2e million tonnes	SO_2 tonnes	Fluoride tonnes	Waste tonnes
Mozal	550,000	37	27	9.4	11,945	249	22,230
Hillside	700,000	47	45	11.6	11,161	354	48,272
Bayside	180,000	14	10	4.1	4,021	357	43,000
Total	1,430,000	98	82	25	27,127	960	113,502
South Africa		2,368	665	440			

Sources: Billiton 2006; SA Energy Statistics 2005.

[85] Mozambique's own energy production is chiefly from the Cabora Bassa Dam which adds 2,000 MW to South Africa's 40,000 MW installed capacity. The World Resource Institute puts Mozambique's CO_2 emissions at 1.2 mt/y in 2000. Its overall CO_2e emissions are put at 15 mt/y – but this includes methane from cattle farting and is really a measure of how the industrialised world is trying to make the non-industrial world co-responsible for climate change.

The smelters' high energy consumption is largely responsible for the intensity of greenhouse gas emissions (CO_2e), contributing the equivalent of 5.7% to South Africa's emissions. This is supplemented by perfluorocarbons (PFCs), which are extremely powerful and long lasting greenhouse gases, emitted primarily during upset conditions at the plants according to BHP Billiton [2006]. Power outages or poor management of the smelting process therefore increase emissions and it may be anticipated that 2008 was a very bad year for PFC emissions.

The table also shows an extraordinary intensity of sulphur dioxide emissions, with Bayside's emissions similar to that of Durban's oil refineries and Hillside and Mozal emitting nearly three times as much. In the smelting process, alumina is saturated with fluoride to give rise to the fluoride emissions. Fluoride is toxic to a variety of plants even at very low concentrations and also accumulates in plants. Exposure even to low emissions thus results in fluoride concentrations accumulating over time and so entering the food chain from vegetables or grass grazed by cattle.

Aluminium is smelted in pots at very high heat. The pot linings accumulate carbon and must periodically be renewed. Spent pot linings form the bulk of the solid waste from smelting and the carbon is impregnated with alumina and fluoride and laced with cyanide and arsenic. It is classified as a hazardous waste. Faced with rising disposal costs, BHP Billiton entered a partnership with EnviroServ to reduce costs and "increase the value of its waste streams into specific offset markets" [BHP Billiton 2006: 50]. In other words, it was looking to sell waste with the aim, according to EnviroServ, of "zero waste to landfill" [2007: 24]. EnviroServ now 'recycles' the waste as an alternative fuel for steel and cement production and so saves "enormous volumes of valuable landfill air-space" [25]. What does not go down into the landfill, however, generally goes up into the air.

Cement kilns

The major cement corporations are AfriSam, Lafarge, Natal Portland Cement (NPC) and Pretoria Portland Cement (PPC). AfriSam is the newest kid on the block, taking the place of transnational corporation Holcim. The latter dressed up disinvestment from South Africa as an empowerment deal which was carried through with R6 billion support from the state owned Public Investment Corporation (PIC). These four companies are the members of the Cement and Concrete Institute whose objective is "to increase the market share" of concrete in construction. At present, residential and

commercial construction has contracted sharply and the market is being sustained by the state's infrastructure programme, starting with the 2010 stadiums and with massive demand from Eskom and Transnet's expansion programmes to follow.

The raw materials of cement production are limestone and silica and alumina from clay. They are ground to a fine powder and then fed through the kiln, where temperatures reach 1,400° to 1,500°C, to produce 'clinker'. Kilns are traditionally fired by coal and the bottom ash is incorporated in the clinker. The clinker is then cooled and ground with various additives to the fine powder that is cement. The process is very energy intensive and the use of coal puts cement in the same bracket as the energy sector in terms of its contribution to climate change.

Internationally, the Cement Sustainability Initiative is putting a green spin on production but, as Jane Harley comments in a report for groundWork, it "has put out a great many documents, all of which avoid the central truth – that cement can never be sustainably produced". Rather, the industry has focussed on "the use of … 'alternative fuels', which translates to the use of waste as a fuel" [2006: 2]. While the environmental benefits of these fuels are dubious, the economic benefits to the cement industry are evident. Since 2003, coal prices have risen from around US$20 to over US$160 a tonne. PPC comments that international demand is limiting "the availability of the appropriate coal quality for cement manufacture" while "spiralling" international prices are pushing up costs [PPC 2007: 24].

The industry describes burning waste as 'co-processing' or 'energy recycling'. PPC goes so far as to suggest that co-processing replaces "fossil fuel with renewable sources" [50]. Apart from twisting the notion of 'renewable' beyond recognition, the statement implies that waste will indeed be eternally renewed. The industry favours waste with a high calorific content, many of which are hazardous petrochemical wastes derived from fossil fuels. Wastes used internationally include solvents, old tyres and oil, paint and dried sewerage sludge. The use of spent pot linings from aluminium smelters has an added advantage as the alumina substitutes for alumina in the raw material fed into the kiln.

Pot linings and dried sewage sludge are already used in some plants in South Africa with the approval of the DEAT. It is possible that other wastes have been used without approval. Used tyres, however, would require modification of the kilns and the industry is, somewhat impatiently, "waiting for the relevant legislation to be enacted", as PPC

puts it [2007: 50]. Harley notes estimates that South Africa's used tyres could replace about 25% of the 1.2 million tonnes of coal used in kilns. The industry anticipates something better than cheap fuel. It anticipates receiving a tipping fee for disposing of tyres and has also lobbied government for an 'establishment subsidy' against the costs of modifying the kilns. A draft Memorandum of Agreement between the DEAT and waste tyre handlers, negotiated in 2006, looks like a very good deal for both the waste and cement industries with costs paid by the public in taxes and in the price of tyres. The DEAT now says there is no intention of signing an agreement but does not explain why the negotiations were abandoned.

Meanwhile, DEAT's proposed waste tyre regulations, published for comment in April 2008, give priority to reuse or recycling over energy recovery, and of energy recovery over disposal. As noted in Chapter 3, incineration with energy recovery is thus lifted above disposal in the waste hierarchy. The regulations do not seriously address minimisation but they do impose 'extended producer responsibility' on tyre producers who must prepare integrated waste management plans. The regulations were published one month after the final hearings on the Waste Bill. They are in fact published in terms of the Environmental Conservation Act but clearly anticipate the Waste Bill's enactment. It is less clear how 'recovery of energy' relates to the clause requiring that any regulation pertaining to incineration be submitted to parliament or whether, in fact, their early publication is designed to pre-empt that requirement. Assuming, however, that the parliamentary hurdle is either crossed or by-passed and the cement industry invests in the modification of kilns, it can be anticipated that they will provide the easiest disposal option.

Kilns fired by coal are dirty operations. Kilns fired by used tyres are even dirtier. A study cited by Harley compares the two.[86] It shows that tyre burning emissions of hydrocarbons are lower but particulates and most gas emissions are higher while emissions of most metals are two or more times higher. Tyres, however, will not replace coal but be burnt with coal and whatever other wastes are allowed to be added to the mix. Emissions from the combination of fuels are likely to be dirtier than the sum of emissions from each. This is because more chemicals will be available to create more toxic compounds. Spent pot liners, for example, would add a heavy charge of fluoride.

[86] Carrasco, F., Bredin, N., and Heitz, M. 2002. *Atmospheric Pollutants and Trace Gases – Gaseous Contaminant Emissions as Affected by Burning Scrap Tyres in Cement Manufacturing*. Journal of Environmental Quality. 31:1484–1490.

Waste burnt in kilns produces similar emissions to waste burnt in incinerators. Thompson and Anthony note that cement kiln technology has not changed much since the early 1900s and is not well adapted to "toxic waste destruction". Moreover, even in the European context, they are less rigorously regulated than incinerators: they are allowed to emit more and "have poorer abatement equipment" [2005: 35]. In South Africa, cement kilns have operated without any scrutiny from the authorities, even after permission was given to burn spent pot linings at some kilns. This changed shortly after the confrontation over incineration at the parliamentary hearings on the Waste Bill. In May, the DEAT announced that the green scorpions would do a 'blitz' on cement kilns, heralding the start of a 'clean cement' campaign. It said the cement industry was growing rapidly and might "contribute significantly to pollution if not mitigated and managed properly".[87] This is laudable. The suspicion remains, however, that the real intention is to head off opposition to waste incineration in cement kilns when the relevant regulations are put to parliament. In the meantime, inspection reports have yet to be made public and it is unlikely that they will reflect normal operating. The industry was given notice of the blitz and will have been on its best behaviour. High standards – for example, ensuring complete combustion – costs money. It is doubted that they are maintained outside of inspection in Europe and it seems unlikely that the local industry will be more assiduous.

Toxics generated in the kiln, including dioxins and heavy metals, have three places to go: into the air, to the dump or into the product. The kilns do not produce substantial solid waste volumes. This is because the ash from the furnace binds with the limestone and other material inputs to form the clinker. Thus, the toxic residue in the ash is incorporated into the product. Where filters are used to reduce emissions of particulates (known as cement kiln dust), the captured waste is either sent to landfill or recycled through the kiln. The latter practice leads to a concentration of heavy metals which is ultimately incorporated into the clinker. Further, 'extenders' are added when the clinker is milled. During 2006, PPC increased its use of fly ash and limestone as extenders "to conserve nonrenewable resources" and reduce the proportion of clinker in its cement products [PPC 2006: 32]. This would also reduce costs and bulk up the product to meet expanded demand. PPC does not say whether the fly ash comes from its own plant or other industries nor does it mention whether it is tested for toxic contaminants. From whatever source, however, fly ash is particulate emission

[87] DEAT media statement, *Green Scorpions Embark on Countrywide "Clean Cement" Campaign*, May 27, 2008.

and almost certainly toxic. Toxics in the clinker are thus supplemented by those in the extenders and incorporated into the product. Cement and construction workers would be most immediately exposed to any such contamination but, as with the blocks using fly ash from London's Edmonton incinerator, it remains in the built environment and will be released during renovation or demolition.

Chapter 5: Modernising Municipal Waste

The municipal 'waste stream' starts in thousands of households and businesses where many types of waste are thrown together promiscuously and it ends – no surprise – fermenting in toxic 'waste bodies'. Its primary source is the consumption city, which buys in energy, water, food, clothes, appliances, vehicles, building materials and other resources to sustain itself. The richest neighbourhoods produce most waste and the flood is unerringly directed to the poorest. In Cape Town, more than half of the 895,000 tonnes per year of domestic waste comes from a tiny minority of high income households. This, together with Cape Town's commercial wastes, all goes to rubbish dumps located in poor neighbourhoods on the Cape Flats where people produce far less waste, much of which is not even collected.

Inside the municipal waste stream

There is little information on what South African municipal waste contains and, internationally, this waste is notoriously difficult to analyse. Waste composition varies by class and location, across different countries, and also by season. Waste management policies and practices also influence the waste stream: regulation and support for recycling can reduce it, while providing bigger bins and more efficient collection typically increases the amounts that households throw away. National averages should therefore be treated with caution, remarks Paul Williams in his waste management textbook [1998]. The figures from the world class consumer society of the US, shown in Table 12, thus give only a rough idea of relative proportions.

Table 12: Composition of Municipal Solid Waste in the US.

Paper	Yard (garden) waste	Food waste	Plastics	Metals	Rubber, leather & textiles	Glass	Wood	Other
37%	12%	11%	11%	8%	7%	6%	5%	3%

Source: US EPA quoted in Pichtel 2005.

A 1991 British analysis showed that putrescibles (food and garden waste) and paper were the biggest categories, each at about 25%. A comparative European study in 1995 showed putrescibles in Greece reaching nearly 50%, while paper was only half the British figure [Williams, 1998].

Adding to the variability is the fact that municipal waste originates as much from commerce and industry as from households. In addition, industrial production waste is frequently dumped with municipal waste. According to one estimate, the Sasolburg dump receives 50 tonnes a day of municipal waste plus 40 tonnes of industrial waste. Vanderbijlpark's Boitshepi dump started as an informal industrial dump before being turned into a municipal dump. It still receives industrial waste.

Municipal waste is classified according to its origins, doubtful as these are, and not according to whether it is hazardous or not. It contains appreciable quantities of toxins. Again, South African information is not available. In the US, lead tops the list of heavy metals in municipal waste, followed by cadmium and mercury. Batteries and e-waste are now the biggest sources of lead, after regulation forced leaded solder in steel cans and lead in paint out of production by the late 1980s. In the UK, lead concentrations in waste from affluent households reached a level of 247 parts per million in 1994. Other important toxic elements include volatile organic compounds (VOCs) and dioxins.

The creation of the consumption society by capital provoked resistance focused through the environmental movement but reflecting a more diffuse public unease. This unease is perhaps the more acute because people are aware of their complicity in the production of waste. The managers of capital and state had to find a response and, as noted in Chapter 4, the first move was to focus public anxiety precisely on post-consumer waste where this complicity was most visible while keeping production waste out of mind. What emerged from these beginnings was the discourse of 'ecological modernisation' which was consecrated by governmental negotiators at the 1992 Earth Summit in Rio. The discourse carries the purpose of representing capitalism – the whole system of materials extraction, commodity production, consumption and waste – as compatible with the continued functioning of ecosystems. This is then called 'sustainability'.

This discourse functions on several levels. First, it allows for state regulation to compensate for 'market failures' but at the same time gives increasing prominence to the use of market mechanisms which returns regulatory control to corporate

capital. Second, it promotes stakeholder participation to manage the relation between contending social interests but in a way that obscures unequal relations of power between the social actors representing those interests. Third, it has deployed an ever more detailed scientific language and practice for managing waste.

Box 19: Household hazardous waste

Household items containing hazardous substances that end up in municipal waste include:

- Batteries
- Chemical drain openers
- Oven cleaners
- Metal cleaners and polishers
- Used motor oil, automotive fuel additives, carburettor and fuel injection cleaners and starter fluids
- Grease and rust solvents
- Refrigerants in fridges and air-conditioners
- Paints, paint thinners, strippers and removers
- Adhesives
- Herbicides, pesticides, fungicides and wood preservatives
- Asbestos containing materials

Hazardous elements and compounds in these products include: metals such as lead, cadmium, mercury and nickel, and chemical compounds including acrylic acid, aniline, arsenic, benzene, chlordane, chlorinated phenols, chlorobenzene, methylene chloride, nitrobenzene, warfarin (rat poison) and xylene.

Source: Pichtel 2005: 75

Up to the 1970s, writes waste management professor John Pichtel, waste volumes were scarcely measured and "the chemical, physical and biological properties of the municipal solid waste stream were of little or no concern" to waste companies, municipalities or citizens. "The primary concerns regarding waste management were, at the time, aesthetic and economic, i.e., removing nuisance materials from the curb or the dumpster quickly and conveniently, and at the lowest possible cost" [2005: 3].

A series of scandals punctured this complaisance. Love Canal became a household name in the US in the late 1970s, as production waste buried in the 1940s and 1950s

was discovered to threaten the health of residents. In 1986, the Khian Sea wandered the seas for two years looking for a dumping spot for 15,000 tons of toxic municipal incinerator ash, which it eventually found on a beach in Haiti. In 1987, the Islip garbage barge roamed the Atlantic coastline for months looking for somewhere to dump its 3,100 tons of garbage. It all made excellent television material, remarks Szasz [1994].

In 1989, the US Environmental Protection Agency (EPA) formulated the approach of 'integrated waste management' which it said would ensure the 'proper' management of municipal waste – its storage, collection, segregation, transport, processing, treatment, disposal, recordkeeping and so on – while also embracing "waste reduction, reuse, resource recovery, biological processing, and incineration in addition to conventional land disposal" [Pichtel 2005: 4]. In short, it created a new language of waste management, giving a (false) reassurance that it is managed in such a way that waste does not become pollution. It thus gave substance to ecological modernisation in the domain of waste and replicated its basic intention: it saved consumption capital by managing environmental concerns.

Creating waste bodies

The modern sanitary landfills and incinerators are the emblems and endpoints of integrated waste management.

The sanitary landfill developed from older dumps which relied on the two principles of "attenuation and dispersion". Attenuation is the idea that mixed waste decomposes and becomes less dangerous over time. Dispersion is the idea that pollution, although freely released, is diluted as it spreads into the environment [Williams, 1998: 2006]. Both processes can work the other way round, however, with toxicity increasing over time and the potential for biological uptake increasing through the chemical transformations of pollutants in the environment. Older landfills were often started in quarry holes or simply exploited the shape of the landscape. Often 'filling the land' meant 'reclaiming' wetlands or other areas without market value, and therefore regarded as waste lands, for economic use.

Modern 'sanitary landfills' are huge, carefully sculpted waste bodies wrapped in plastic liners to isolate them from the environment and so prevent pollution of groundwater, soil, air, and neighbouring communities. Many are in fact not that well wrapped.

Writer Joseph Jenkins [2005] describes them as "giant diapers". Inside these municipal nappies, the liberally mixed waste goes through a cycle of chemical and physical change as organic wastes biodegrade. More than 60% of the waste is organic, including food and garden wastes, paper, cardboard and some woods and textiles, so the effects of decomposition are dramatic. Williams describes a five-stage process of what happens inside a regular landfill in Britain [1998: 197-201]:

Stage 1: Decomposition takes place in the presence of air. Micro-organisms use oxygen to break the fresh waste down into simpler hydrocarbons and the process produces carbon dioxide, water and heat. The CO_2 moves into the atmosphere or into the water leachate, making it slightly acidic. This stage does not last more than a few weeks as more waste is piled on top and oxygen is excluded by the daily coverage and compaction of waste.

Stage 2: Hydrolysis and fermentation become the main processes as the oxygen runs out and different micro-organisms start breaking down the waste. The carbohydrates, proteins and fats in organic matter are broken down to sugars and then to hydrogen, ammonia and organic acids. The leachate as a result contains high nitrogen in ammonia form. Temperatures drop and gas composed of 80% carbon dioxide and 20% hydrogen is produced.

Stage 3: The waste body now turns very acid and so increases the solubility of metals and flushes them into the leachate. Methane-generating micro-organisms play an increasing role and smelly hydrogen sulphide is produced as part of the gas.

Stage 4: This is the main landfill gas generation stage. Acid levels drop while the lack of oxygen maintains the anaerobic conditions required to produce gas composed of around 60% methane and 40% carbon dioxide. This process starts around 6 months after the fresh waste has been incorporated and gas formation will continue for between 15 and 30 years after the last waste is deposited. Some landfill gas will still be generated up to 100 years later.

Stage 5: The waste body slowly returns to aerobic (oxygen rich) conditions as the acids in the mix are used up in the production of methane and carbon dioxide. At this stage, residual methane is converted to carbon dioxide and water by a new lot of aerobic micro-organisms.

Knowledge of this process challenges the idea that landfills can really be isolated from the environment. The waste body produces water from chemical processes and is also infiltrated by rainwater. The water picks up various contaminants to turn into the 'landfill soup' known as leachate. It is supposed to be treated and then disposed to the municipal sewage works. In South Africa, most leachate is not treated.

Gases – some smelling foul and others odourless but dangerous – must also escape the waste body. Landfill gas was until recently simply seen as a threat, mainly because the methane is explosive. In 1986, a gas explosion at the Loscoe dump in the UK – in an old clay quarry that had been filled and then capped – blasted a house 70 meters away and injured the three occupants. Damage to local vegetation indicated high landfill gas concentrations and potential danger before the blast. Landfill gas management solutions are passive venting (which really means just letting the gases escape) or a gas removal system feeding gas either to a flare or for use as energy.

Materials used to contain the waste body – clay caps on top and liners at the bottom – are subject to stresses from the movement of the waste body as waste decomposes and compacts. Liners may also tear, be eaten by acidic or caustic agents, or be punctured by sharp objects or burrowing animals. The liners are designed to last 50 years. In South Africa, new landfills are planned for 20 to 30 years' operation with a 30 year aftercare period. At the end of this period, the liner is expected to fail. This does not mean, however, that the waste body will no longer be polluting.

Box 20: What's in landfill gas

Landfill gas (LFG) is between 40 and 60% methane, with most of the rest being carbon dioxide. It contains varying amounts of nitrogen, oxygen, water vapour, sulphur and hundreds of other contaminants, mostly (non-methane) volatile organic compounds (VOCs) but sometimes also metals such as mercury.

VOCs usually make up less than 1% of landfill gas. The US EPA has identified 94 in LFG although other tests have found many more. They include benzene, toluene, chloroform, vinyl chloride, carbon tetrachloride, and trichloroethane. At least 41 on the EPA's list are halogenated compounds – containing chlorides, fluorides and bromides – which give rise to dioxins and furans when LFG is burnt either in flares or for energy.

Source: Mike Ewall, Energy Justice Network.

The Minimum Requirements for Sanitary Landfills

The language and practice for managing and regulating the waste stream and waste bodies in South Africa was written into the DWAF's 'minimum requirements' which came in three parts: for disposal by landfill, for monitoring of landfills, and for hazardous waste.

The minimum requirements followed from the studies of the early 1990s [see Chapter 3]. They aim to improve waste management and bring it, eventually, to the standards of ecological modernisation. While focusing on disposal, they theoretically fit within the framework of the waste hierarchy which implies the overall reduction of both the volume and hazardousness of waste. They are periodically updated and some are now in a third edition. Actual control over landfills is by permits, issued by the DWAF, which should reflect the minimum requirements.

These regulations include requirements relating to:

- the siting and engineering design of landfills to prevent groundwater pollution;
- leachate management or at least leachate monitoring;
- gas management and monitoring;
- site security and access control, stipulating amongst other things the exclusion of waste-pickers;
- conditions for daily operating including record keeping, what wastes may be accepted and controls to prevent dumping of other wastes, and the daily covering of exposed waste with soil;
- plans for the final height and shape of the landfill;
- plans for final closure, rehabilitation and future land use.

The minimum requirements give the impression that waste will be managed without causing pollution but in fact build in a number of compromises. To take two examples: The requirements prescribe that landfills should be sited far from aquifers that could be contaminated but also take account of economic factors – like the origins of the waste streams and the distance that the waste must be transported – that may distort this fine siting principle. The choice of leachate system – i.e. for collecting or merely monitoring leachate – depends on the local climate but does not take account of extreme weather events that will become more common with climate change.

In practice, the minimum requirements are often not met. As a result of the history of gross neglect and the low priority and consequent under funding of waste management, the situation on the ground is far from the theory. Many municipal dumps are of such design that they cannot be permitted under the minimum requirements. Moreover, having a permit is no indication of being in compliance. According to DEAT [2007a], there are over 2,000 municipal waste facilities of which only 530 are permitted. This does not include the estimated 15,000 unrecorded communal sites in rural areas.

Waste managers generally refer to permitted dumps as 'landfills', while un-permitted ones are called 'dumps'. Things are not so clear cut, however. Many permitted sites are in fact dumps that have been 'permitted for closure'. This is a way of dealing with the legacy of neglect. It brings dumps which have no hope of meeting the minimum requirements within the legal regulatory system and sets the terms for closing them. Until closure, however, it legalises the operation and creates the conditions for negotiated non-compliance. Ecological modernisation is nothing if not flexible and it seems that 'closure' could be negotiated into a lengthy process.

The distance between theory and practice is clearly illustrated in the case studies below. Some of the common issues include:

- Dumps are not isolated from the environment by liners and have either rudimentary or no leachate collection, no leachate treatment and no gas gathering. Landfills are frequently built on top of old dumps. The landfill is lined but the old dump moulders beneath it. Leachate and gas gathering systems in the landfill part may or may not be well maintained.
- Managers do not know what is in the waste body they are responsible for as there are few historical records. Even after permitting, landfill records are not necessarily well-kept.
- Landfills and some dumps have weighbridges. Better managed dumps mostly rely on estimates of waste quantities by sight while others do not monitor incoming waste.
- Inspection of incoming waste is similarly uneven and generally uncertain. Sampling waste is notoriously difficult while smuggling hazardous waste under cover of general waste is easy. In addition, neighbours suspect landfill management of complicity in allowing illegal waste dumping while the 'de-listing' of hazardous waste blurs the lines between what is allowed or disallowed.

- Access is also variably controlled. Many dumps are not fenced while landfill fencing is not always secure. Access control is specified in the minimum requirements but is often accompanied by brutality aimed at waste pickers, and at the enclosure of recyclable resources from which they make a living.
- The DWAF's own monitoring and enforcement of permit conditions, even on 'proper' landfills, has neither bark nor bite. In so far as it is visible at all, it seems committed to negotiated non-compliance. This is generally attributed to the Constitutional requirement for co-operative governance. The interpretation of that requirement, however, seems to offer a convenient alibi for dysfunctional relations between government entities.

Chapter 6: Down at the dumps

Dumps share characteristics, but each dump is individual with an individual history. They also form part of the web of local government politics, in which arrangements are made and opportunities created. This section looks at waste and its management in four municipalities, two in KwaZulu-Natal and two in the Vaal Triangle, and focuses in on particular dumps in each of them. It starts with the eThekwini metropolitan municipality where Durban's Bisasar Road landfill is reputed to be the biggest municipal dump in Africa. It then moves up the road to the secondary city of Pietermaritzburg and its New England Road landfill. Pietermaritzburg is located in the Msunduzi local municipality which in turn is at the centre of the Mgungundlovu district municipality. The next two case studies are in the Vaal Triangle. The Emfuleni local municipality is part of the Sedibeng district in the south of Gauteng province. Vanderbijlpark's Boitshepi dump and the Palm Springs dump in Sebokeng are explored along with the legacy of illegal dump sites. Across the Vaal River in the northern Free State, Sasolburg is the polluted heart of the Metsimaholo local municipality and the focus is on the Sasolburg town dump.

The case studies thus move across the uneven terrain of waste management from a relatively well resourced metro, to a secondary city in a 'B1' municipality and ends with two 'B2' municipalities centred on very significant industrial towns. Regrettably, it was not possible to go further down the municipal hierarchy. The studies consider the vital statistics of waste, in so far as they are known, and the pollution produced at the dumps. They also explore the local politics and economics of dumping and recycling.

Waste pickers, or reclaimers, are particularly vulnerable to exclusion from decisions that affect their lives. Taken together, the studies show that the process of formalising waste management is accompanied by the progressive exclusion of waste pickers from dumps and their marginalisation or subordination within the economy of recycling. This process is highly uneven and the case of Palm Springs in Emfuleni indicates that managers do have other options. The pickers themselves are anything but passive. They have vigorously resisted their marginalisation and, with uneven success, developed strategies responding to the formalisation process.

eThekwini

eThekwini's Department of Solid Waste (DSW) collects and disposes 1,266,220 tonnes of waste a year, according to its 2004 Integrated Waste Management Plan. Of this, 117,917 is hazardous (H:h) waste collected from industry and disposed at two private waste sites. 1,148,303 t/y is general waste, collected both from businesses and households.

DSW itself collects waste from most areas that were formerly designated as white, Indian or coloured, with permanent workers providing the labour. In 1996, it inherited responsibility for township collection from the provincial authorities. In these black African and mostly working class areas, including Umlazi and KwaMashu, it has appointed contractors to provide the service. The IWMP says this was done following community consultation and that it has "created an opportunity for emerging contractors from the communities" [5-14]. It says there is verge-side collection in all areas where there is road access to houses. Where there is not, contractors take refuse from people's houses to a collection tip. It claims that all households in eThekwini are serviced with the exception of some remote rural areas and it is planning to extend services to these areas as well. In the Kennedy Road shack settlement next to the City's central landfill, however, people say that their rubbish is not collected. This lack of service followed from the City's decision that people should be removed to the city peripheries. Conditions in Kennedy Road are described below.

Waste is taken by the collection trucks directly to DSW's general waste landfills. These are Bisasar Road in the city, Mariannhill to the west and a new landfill at Buffelsdraai to the north. La Mercy has recently been closed down while DSW plans to develop Lovu in the south.

DSW also operates a number of 'transfer stations', mostly taking garden waste which is then forwarded to the landfills. However, with the major city landfill due to close within the next decade, DSW is planning a major transfer station for general waste so that waste can be transferred from collection trucks to long haul vehicles.

Two 'low hazard' waste sites (H:h) operated by private corporations take industrial waste, with some municipal general waste added as absorbent. They are BulBul Drive operated by Wasteman and located in an Indian area close to the city, and Shongweni operated by EnviroServ and located between a farming community and a black rural village. There is no high hazard (H:H) site in KwaZulu-Natal and such waste is transported to sites in Gauteng and the Eastern Cape.

Bisasar Road

Bisasar Road is said to be the biggest landfill in Africa. It is constructed in a valley off the Mgeni River as a series of steep terraces backing up to the hill top at the head of the valley. At its foot is the Springfield estate holding big bulk retail stores. This is prime flat land turned over to development following the removal of the Indian shack settlement of Tin Town in 1964. On the fenceline of Bisasar is the Kennedy Road shack settlement. It houses some 6,000 people in tightly packed shacks made of wood, corrugated iron, tarpaulins and plastic sheeting. Higher up the road is the beginning of Clare Estate, a working class Indian neighbourhood with a fringe of wealthier families who found that the houses they had bought for a view of the sea were to be on the fenceline of the expanding dump.

The calculus of cost

Bisasar now takes up to 5,000 tonnes of rubbish delivered by around 1,000 vehicles every working day. The average is 3,800 t per working day or 2,300 t/d for the full week. Larger vehicles, including municipal waste compactor trucks, grind up the hill to deliver their load directly to the work face. Smaller vehicles off load on the recycling pad at the bottom of the waste terraces. Some of this waste is sorted for recycling, but the bulk is scooped up by giant front end loaders onto tipper trucks which circulate endlessly up and down between the pad and the working face. Water trucks also circulate in what appears a vain attempt to suppress the dust kicked up by the heavy traffic. At the face, the bulldozers and heavy steel-wheeled compactors work over the waste, pushing it in place and rolling it to save air-space. At the end of the working day, the cover material is taken to the work face. This is a combination of soil and garden waste which has been ground up by the 'wood hog', another large and noisy machine located on the recycling pad.

This is an energy intensive process. Fuel and vehicles account for some 70% of the landfill's operating costs. Transport takes a similar proportion of the budget of the entire waste system and costs are rising with the rising fuel price. On landfill manager Logan Moodley's estimate, it now costs around R9 to carry one tonne one kilometre, up from R6 a year ago.[88]

[88] Moodley was interviewed in May. The volatility of the oil price and the Rand may have altered this estimate, or more likely, made any estimation of cost highly uncertain.

Traffic, dust and noise aside, Bisasar generates 7,000 cubic metres of landfill gas (LFG) per hour. Historically, much of this simply vented off the surface of the landfill while gas wells drew some from areas of the dump that had been permanently closed. This gas was flared off. A more comprehensive system of wells has now been developed to provide a fuel feed for electric generators with a capacity of 4 MegaWatts – with 2 MW more to be installed next year and the possibility of a further 2 MW depending on the actual flow of gas. Surplus gas is flared. At present, the landfill is producing more gas than originally estimated, according to DSW managers. In contrast, Mariannhill has proved a relatively 'dry' landfill with less gas than expected.

eThekwini's gas-to-energy project document says the wells will capture 80% of the gas, implying that the remaining 1,400 m^3/hour is either vented or trapped inside the dump. 80% appears optimistic however. The US EPA assumes 75% collection but in practice, says Mike Ewall of Energy Justice Network [2008], average collection in the US is around 50% and this for only one third of a landfill's gas producing lifetime.

In the words of eThekwini's project document, this is "dirty, low calorific value gas" being composed of about 45% methane as compared with natural gas at 80-99% methane. To upgrade it, "landfill gas needs to be dried, and the CO_2, sulphur and halogenated components need to be removed". This would clearly be costly. Having found no other takers for the gas, the project therefore opted to power the generators driven by internal combustion engines, which are tolerant of the low quality gas, in preference to gas turbines which are more efficient but require a cleaner gas feed. DSW claims that the engines are environmentally efficient and overall air quality will be improved by the project. This may merely be testimony to the poor state of the air prior to the project. According to Mike Ewall, internal combustion engines are the dirtiest way of burning LFG, producing more carbon monoxide and nitrogen oxides even than flaring. Because the un-cleaned gas is halogenated[89], dioxins form in the generator exhausts as well as in the flare plume.

Bisasar Road is slated for closure in 2016 according to the 2004 IWMP. John Parkins, of eThekwini's Department of Solid Waste (DSW), says this has been brought forward to 2013. This is partly because there has been a small increase in the amount of waste

[89] Halogen elements include fluorine, chlorine and bromine. They are highly reactive and so form compounds, known as fluorides etc., with other elements. They are toxic in themselves and, because they are very corrosive, the presence of halogens in landfills is one of the ways in which toxics are mobilized through the waste body.

coming in but mainly because there has been a reduction in air-space as the permitted slope from the top has been reduced from 1-in-3 to 1-in-4. The neighbours, he says, do not believe this.

Waste will then be diverted to the landfill inland at Mariannhill, to the recently opened Buffelsdraai in Inanda to the north of the city and to Lovu in the south which is still to be developed. At present, Buffelsdraai takes 300 tonnes/day and Mariannhill takes 700 t/d, so the diversion of Bisasar's 3,800 t/d will massively increase the costs of waste transportation.

Escalating fuel costs are changing the economics of waste disposal according to Parkins. In 2004, the IWMP emphasised economies of scale in the operation of landfills, so creating a positive demand for waste. The objectives of waste reduction were therefore seen to create an anomaly: Successful waste reduction and recycling "could reduce the waste stream, staff needs, vehicles etc. whereas a major objective is to increase revenues" to maintain DSW's own "profit sustainability" [3-13]. This could be off-set by actively taking control of the recycling market. Parkins comments that the short term 'cost calculus' has now swung towards reduction. This makes it easier to persuade council – which generally focuses on income and costs over its five year term of office rather than taking long term benefits into account – of the benefits of reduction. Reduction, however, is largely reduced to recycling. DSW has no influence over what is produced and minimisation at source is not therefore in its control. "We have to take what comes at us," says Moodley.

Following closure, DSW plans to construct a transfer station at Bisasar Road and is considering major recycling facilities to reduce the load to be carried to the distant landfills. These include:

- a Materials Recycling Facility (MRF);
- a plant for crushing demolition rubble which might be sold for engineering fill material;
- a composting facility – or possibly 'in-vessel gasification' which is basically a biogas digester dealing with wet waste and producing methane gas as well as compost.

Recycling is preferable to dumping by a very long way. It nevertheless remains an 'end-of-pipe' solution. It does not reduce waste at source and may rather have the effect of creating a demand for waste to sustain itself. MRFs are themselves dirty places to

work particularly if there is limited or no separation of waste at source. Evidence from Denmark indicates that endotoxins form in mixed dry waste, penetrate worker's lungs and will eventually kill them. It is not clear if these endotoxins will form in different climates.[90]

A pilot recycling plant at Mariannhill now employs 50 people at the minimum wage sorting mixed (including wet) domestic waste. The operation is outsourced to Re-Ethical Engineering but DSW monitors legal compliance with labour laws and insists on employment from the local community, according to officials. However, Parkins says there is a tension between jobs and mechanisation as the latter would be cheaper. Outsourcing recycling is evidently one way to contain costs but also reflects the construction of a close association between the discourse of environment and that of privatisation by the waste industry in general and municipalities in particular. As noted, however, DSW is concerned to develop its own revenues and to use its strategic positioning to control the market. For Moodley, the primary purpose of recycling is to save 'air-space'. He estimates the costs of landfill at R130 per cubic meter. At present, Mariannhill takes a total of 700 tonnes a day of which 200 tonnes is diverted through the recycling facility. 28% of this waste is taken out for recycling, which works out at about 8% of the 700 tonne total. Moodley calculates that this saves R120,000 in air-space per month.

Construction and demolition waste makes up a substantial proportion of all waste,[91] reflecting the increasingly rapid turnover of buildings as well as the abandonment of whole districts and industries. This is a concrete manifestation of the so called 'creative destruction' of capital and is accelerated under conditions of financialisation. Recycling rubble for construction infill or road foundations would make substantial savings on landfill space and transport, as well as replacing virgin material used for such purposes. The plant, however, is likely to add considerably to dust and noise pollution.

Composting, by contrast, appears benign if well managed.[92] Whereas the metaphor of the cycle of nutrients in natural living systems is commonly used in relation to recycling,

[90] Thanks to Peter Lukey for this information. The endotoxins are essentially dead microbes.

[91] Construction and demolition wastes make up one third of the UK waste stream. No South African figures are available.

[92] Pichtel [2005] reports potential health threats from a fungus and from endotoxins and bioaerosols depending on the management regime, including the method and scale of composting and the working conditions.

composting restores a part of the cycle of life. As noted, Bisasar Road's management is using ground up garden waste as landfill cover and, in doing so, contributing to future LFG generation. Composting decomposes organic matter aerobically and so does not generate methane emissions or leachate. City scale composting, however, does not generally include kitchen wastes for public health reasons. A biogas digester can accommodate a mix of garden and wet wastes. It uses an anaerobic process which destroys pathogens and produces methane gas on the one hand and compost on the other. Assuming that the wet waste is not contaminated by other wastes – requiring that it is separated at source – the gas from a digester is fairly pure. Using it for energy generation therefore avoids most of the problems associated with LFG. Emissions are largely carbon dioxide but this is mostly off-set by the carbon absorbed during the plants' growth so it provides a genuine low carbon technology.

LFG wells have not been developed at Buffelsdraai yet because it is not yet producing enough to give an economic return. If the bulk of organic wastes are intercepted before landfill, it will be a largely dry landfill. The landfill will still be noisy, dusty and strewn with litter, but neighbours will not have to breathe toxic LFGs or the toxic emissions from burning LFGs.

The costs of LFG capture and power generation are covered by two revenue streams: the sale of the electricity and of 'certified emissions reductions' (CERs). CERs are part of the global trade in carbon brought into being by the Kyoto Protocol. Southern countries can access this trade through the Cleaner Development Mechanism (CDM). With the support of the World Bank, DSW persuaded eThekwini Council that CDM revenues would make the project profitable in the short term at a carbon price of $3.95/tonne. The returns now look better than ever. This year's 27.5% hike in electricity prices will be followed by similar rises in the next two years and CERs are now trading at close to E20 ($30) on European markets – although this is a highly volatile market. Moreover, DSW got in before the global price of energy projects went through the roof. Capital costs on equivalent projects are now considerably higher. For the council, which takes the profits, it looks like a sweet deal. DSW managers point out that they can still get carbon credits for composting or for a biogas digester. The prospect of a dry dump at Buffelsdraai is not therefore a problem, assuming that the carbon trading market is extended beyond 2012 through the current round of climate change negotiations. Besides, with the rising electricity price, CDM may become just the cherry on the top, according to Parkins.

CDM and local struggles

The CDM deal covered LFG energy projects at the Bisasar Road, La Mercy and Mariannhill landfills. It was proposed in 2002 and advertised at the World Summit on Sustainable Development (WSSD) as a demonstration of South Africa's commitment to sustainable development. This was the first CDM project in Africa, according to Erion et al [2008], and was promised $15 million start up capital by the World Bank's Prototype Carbon Fund.

The deal immediately linked local conflicts over Bisasar Road to global conflicts over carbon trading and the workings of CDM in particular. Locally, the residents of Clare Estates had been fighting for the closure of the dump since the day it was opened in 1980. The residents of the Kennedy Road shack settlement, however, saw the dump as a source of livelihoods and were led to believe that the CDM project itself would support community upliftment.

The smell from Clare Estate

Sajida Khan died of cancer in July 2007 at the age of 55. She lived in one of the big houses at the top end of Kennedy Road immediately next to the dump. Having monitored the dump and documented the incidence of cancers in the local community, she had no doubt that her own cancer was the consequence of breathing toxic fumes for 27 years, both from the dump itself and from a medical waste incinerator that operated on the site until 1997.

Khan came to be recognised as the face of Clare Estate's struggle to have the dump closed. It was not, however, just her fight. The original decision by Durban's apartheid local council to locate the dump in an Indian area was clearly racist and residents of Clare Estates protested vigorously. Acting within the political fortifications of apartheid, the council could and did ignore these protests and opened the dump in 1980.

The experience of living next to it was, if anything, worse than anticipated. The stench was unspeakable and the dust invasive. The campaign against the dump intensified and the city authorities were driven to promise that it would be closed in 1987. As they broke that promise, they responded to community protests with a new one: the dump would be closed in 1996 and rehabilitated as a recreational amenity. These promises were repeated by political parties ahead of the first democratic elections in 1994. However, consultations which Clare Estate residents thought were about

issuing a closure permit, turned out to be about extending the operating permit. "Public reaction was swift, as people blocked the site entrance of the dump, held demonstrations and marches, and circulated a petition to council that gained 6,000 signatures," reports Trusha Reddy [2005].

The authorities also broke promises to keep the dump below the level of Kennedy Road, says Arun Edwards, chair of the Clare Estates Residents Association. Those who once had a view across the Mgeni estuary to the sea now look out onto a mountain of waste. He also cites numerous contraventions of the permit conditions: the requirement of an 800 metre buffer zone has been ignored; industrial waste, animal carcasses and sewage sludge are illegally dumped on the site; and the daily soil cover is inadequate. The smell, he says, is now worse than ever particularly in the mornings after rain. Adding insult to injury, the City installed perfume rods to mask the smell. Reddy comments that the "landfill now exudes the stink of dump rot mixed with an artificial sickly-sweet smell" [2005].

City authorities argue that the CDM project has mitigated LFG impacts. According to Parkins, cold fronts cause temporary cracks in the top seal and resulted in LFG being vented before the wells were developed to provide an easier escape route for the gas. Edwards says Clare Estates was not against the gas wells which should have been developed anyway. Nor did they take a view on CDM as such. The issue was that the project might extend the life of the dump in order to secure the maximum return on investment. Erion et al [2008] note that, while DSW officials denied any link between closure and the CDM project, the original project documents assert that the landfill will stay open throughout the 'crediting' period which is a minimum of seven years but may be extended to a total of 21 years. Further, early closure would reduce methane production by over 12%.

Khan saw the project as giving the dump an environmental justification as well as extending its life. She vigorously challenged it through the EIA process and in the courts. She also linked with local and international climate justice campaigners opposed to CDM as part of the carbon trading regime brought into being by Kyoto. Finally, the grandees of the Prototype Carbon Fund, wary of bad publicity, approved funding for the projects at Mariannhill and La Mercy only, leaving out the much larger Bisasar Road. eThekwini Council, however, has gone ahead with the Bisasar Road project without the PFC and is awaiting the approval of the CDM Executive Board.

As noted, DSW says that Bisasar Road will be closed around 2013. Given the history of broken promises, it is unsurprising that residents of Clare Estate are sceptical. Either way, it is clear that the decision on closure remains impervious to their demand for immediate closure. The current CDM Project Design Document responds bluntly: "This is not a feasible option from a municipal waste management perspective."[93]

Kennedy Road

In the shack settlement down Kennedy Road from Khan's house, the project appeared to offer hope. Conditions there are dreadful. As Richard Pithouse reports:

> Many people have no viable livelihood and scrape out the most precarious and uncertain living. The tiny number of toilets[94] causes serious health risks, puts the safety of women and children at particular risk when seeking privacy at night and imposes easily avoidable cruelties on the everyday lives of people with AIDS who often suffer chronic diarrhoea. The lack of electricity means fires and last year there were nine conflagrations. Children have been found eating the worms that grow in the shit in the portable toilets. Everyone seems to have someone who is desperately sick and there are more than 50 households headed by children. [2006: 11]

The settlement started in the 1970s as a small number of shacks hidden in the bush to evade the enforcers of the Group Areas Act. Several of the early settlers were families removed without compensation from their farmlands a little way up the Mgeni valley to make way for the Inanda Dam which now supplies the bulk of Durban's water. The Kennedy Road site afforded them access to jobs and many worked as domestic labour for people in Clare Estate. The opening of the dump provided a new income stream from waste picking for many.

The settlement grew during the 1980s as apartheid started falling apart in the face of increasingly overt resistance and expanded rapidly in the early 90s, encouraged by the ANC slogan to 'occupy the cities'. In power, however, the ANC's position started shifting. While the Kennedy Road Development Committee (KRDC) participated in

[93] CDM PDD: Durban Landfill-gas-to-electricity project – Bisasar Road Landfill, Version 2007-03-28, p.39.

[94] 147 pit latrines were installed by the Urban Foundation in the late 1980s. The City stopped servicing them in 2001 and installed six portaloos for the population of 6,000.

official development processes on the optimistic expectation that the concerns of the people would be addressed, the City was increasingly working to a 'world class city' agenda which involved the eradication of slums – principally by relocating people to housing projects on the peripheries of the city. Abahlali baseMjondolo, the Durban shack dwellers movement, had its origin in the clash between the people of Kennedy Road and the City when the latter sold off an adjacent piece of land to property developers. This land was long promised to start the process of upgrading the housing in the settlement and the City did not even inform KRDC of their intention to sell it. Housing, and land for housing, remains at the centre of the Kennedy Road agenda. Above all, Abahlali demands that shack dwellers be recognised as active participants in deciding their own future, capable of thinking and speaking for themselves.

According to Pithouse, most of the people come from rural areas and are escaping "'traditional' authority, familial and racial domination (especially on white farms)" on the one hand and looking for livelihoods and access to schools and amenities on the other [2006: 10]. DSW officials see the dump itself as having been a primary attraction. Before the City formalised operations, according to the owners of commercial recycling firms, over 600 people were selling them recyclable material picked off the dump and could earn as much as R300 a day. Not all were from the settlement but a significant number of Kennedy Road families secured a livelihood, put their children through school and built their shacks from the pickings from the dump.

Following the permitting of Bisasar Road as a landfill, the City increasingly asserted control over access as well as employment but the now illegal dump pickers continued to break through the security fencing. This gave the community leverage in negotiations with officials, according to Abahlali president S'bu Zikode. Closing down illegal picking was not possible without their cooperation. But in return for that cooperation they wanted to secure the recycling and site cleaning jobs exclusively for people from Kennedy Road and take over the labour-broking contract with DSW for site cleaners. There are not, in fact, many of these jobs left at Bisasar Road. The commercial recyclers employ 15 people on piece rates at the recycling pad established by DSW, while there are 25 people employed as site cleaners.

"Our struggle was for recognition first. We had to be recognised as human beings with rights to work," says Zikode. The CDM project seemed to afford such recognition. Faced with the opposition of Clare Estate, the City and its World Bank allies cultivated the support of Kennedy Road. Khan saw this as a divide and rule tactic, saying, "I am

fighting for all of us, no one wants to live next to a smelly dump" [quoted in Erion et al 2008]. It didn't look like that in Kennedy Road where the approach mandated by the World Bank contrasted with that of the environmental activists. "We invite them to the presentation here in the hall so that we can be together. They didn't come. They have their meetings in places we can't go to. They don't invite us but they always represent us," said Zikode [quoted in Patel 2008]. Abahlali now insists that others "speak to us, not for us".

Lindsey Strachan, the DSW manager who drove the project, held an open meeting with the community. On his own account, he told them 45 jobs would be created and three bursaries offered for children from affected communities to study engineering. People in the community understood that there were to be 50 bursaries for young people and that 'affected communities' referred to Kennedy Road. This fitted very well with the manner in which Kennedy Road was responding to the formalising process on the landfill generally. They recognised, says Zikode, that they needed to acquire the skills, to "have what it takes", to insert people into strategic positions to ensure that the community would benefit from developments on the site. They were also promised cheap or free electricity and 5 to 10% of the profits were to be ploughed into community upliftment.

But the promises were broken. Strachan moved on and his successors at DSW told Zikode they knew nothing of them. After construction, the project created just six jobs – all highly skilled. Three bursaries have been awarded, but not to people from Kennedy Road who heard nothing of the awards until after the fact. And City Manager, Mike Sutcliffe, now says that the 'community' that will benefit from the profits is the Durban community, not just the Kennedy Road community. "We were used," says Zikode. "They even offered us free busses to protest in favour of this project … to damage those who oppose this project … Where was the whole Durban community when they made us fight for this dump?"

The open confrontation with City authorities, sparked by the broken promise on land for settlement, has had major consequences. Abahlali is now organised in shack settlements across Durban with the participation of some 30,000 people. With respect for all people as its core value, it has insisted on a practice of democracy that recognises each person as having an equal right to speak and be heard. The clash marked the end of participation as pretence, as a ritual of democratic inclusion, acted out as much by KDRC as by the politicians, while the City managed the real business of economic

exclusion. This, Raj Patel argues, "set off the street violence [the blockade of a highway], directed not against any particular piece of property, but against its flow" [2008]. In response, the City acted as if it had declared low intensity war on the settlement and on the rapidly spreading movement. Abahlali protests were met with police violence while Kennedy Road was put under surveillance. This added a new dimension to a siege initiated in 2001 with the withdrawal of already inadequate services. The siege is intended to persuade the residents to participate in the City's plans to remove them to the peripheries.

A new politics has thus been created precisely out of the community's violent exclusion from the state's project. Pithouse points to "the essential ambiguity" that attends the shack settlement: "… it can simultaneously be a site of political and cultural freedom because of its autonomy from the state and authoritarian modes of enforcing 'tradition' and, also, a site of suffering because the absence of the state means the absence of the services – sanitation, roads, health, water, refuse collection and so on – that are needed for a viable urban life" [2006: 5]. A similar ambiguity is evident in dump picking.

Participation as pretence is anchored on the promise-to-be-broken. Even as Kennedy Road's relationship with the City overall turned to open confrontation, the rituals have been maintained in the relationship with DSW and the landfill. KRDC remains a participant in the landfill monitoring committee and in the environmental impact assessment (EIA) for the proposed transfer station where it is anticipated that more jobs will be created.

It also successfully negotiated with DSW to take over the labour-broking contract for site cleaning for Bisasar Road, Mariannhill and Buffelsdraai from December 2006. This contract was previously held by Kelly Staffing who had employed Nonhlanhla Mzombe, one of the Kennedy Road leadership, as a community liaison officer. KRDC recognised that Kelly meant to use her as "an instrument" of social control, says Zikode, but it also saw the possibility that she would acquire the skills to manage the operation on behalf of the community and it formed the Kennedy Clare Estate Community Project for that purpose. Within nine months of the take over, however, the project collapsed. The KRDC felt that Mzombe had privatised the business and it no longer belonged to the community. The administration was also failing with workers not being paid on time and the requirements of labour legislation not being met. Zikode sees this as a collective failure. KRDC did not contest the decision when DSW withdrew the contract because "we knew it was within our weakness". The

leadership has nevertheless kept its side of the bargain in terms of policing dump picking which is seen as "an attack on the community". For its part, following a fire in the settlement, DSW allowed a limited number of people on site to collect materials to rebuild their shacks.

The contract, meanwhile, was handed back to Kelly. Conditions according to one of the site cleaners, who did not wish to be named, are wretched: "The dump is a filthy place. It has gas and dust. … There is a high number of people working at the dump who have died of Tb [although] we can't say for sure it is the dump. … We were 20 when I started in 2001. More than 10 have died."[95] Kelly is seen as indifferent to these deaths because it contributes nothing to the families for the funerals and did not respond to requests to set up a funeral scheme. Workers are also fearful of raising health issues or asking why so many people die: "You can't talk like that. You will lose your job. They tell you not to give out information when they hire you." Workers are entitled to limited sick leave but are clearly reluctant to expose themselves to the possibility of losing their jobs. Wages at Bisasar Road have been paltry at R9 an hour, but were due to be raised to R14 an hour, still low by comparison with permanent municipal employment.

Zikode acknowledges that people are also dying in the settlement. "In the middle class community they talk about cancer, and asthma and people dying." But this cannot be discussed in the settlement because there are too many more immediate threats to life than the long term effect of breathing poisoned air. People die by fire "and no-one cares". One child was killed by a rat, which may have come from the dump or bred in the refuse piled up in the settlement. The people saw it as the consequence of the municipality's refusal to collect refuse from the settlement. Meanwhile, the landfill is still seen as a source of livelihoods and resources.

The workers suffer the double hazard of conditions on the landfill and at home. It should be noted that DSW is clearly the real employer. It controls the work on the site and even who is recruited. What is outsourced is responsibility for legal compliance and disciplining workers along with low wages and non-unionised insecurity. The broker is thus a function of the employer's interest. In taking on this role as a community project, it is not clear that KRDC or Mzombe fully recognised the contradictions.

[95] Tb may be used here to mean any respiratory disease or it may be that conditions on the dump worsen actual Tb.

Where things go next is not yet clear. Given the failure of the project, Zikode thinks it may be best if the site cleaners are made permanent municipal employers and unionised. In time, however, this is likely to erode Kennedy Road's monopoly on those jobs. Now the community's hopes for more jobs – and for a monopoly of jobs – will clearly inform its participation in the EIA for the proposed transfer station. It seems possible that the tensions between organising in the work place and organising in the community will re-emerge in this context.

The transfer station is opposed by people in Clare Estate. Nevertheless, both Zikode and Edwards report an improved relationship which seems to be based on the two communities beginning to recognise the other. On the one hand, Edwards notes the importance that Kennedy Road people attach to livelihoods. On the other, Zikode remarks that "this environmental language is not our language" but, living next to the dump, people now understand about recycling and also recognise the concerns about cancers. But while Edwards sees acceptance that the dump will close as critical to a new harmony, Zikode remarks that "we had to have the stronger voice" to support the transfer station through the EIA. It remains to be seen whether promises are kept when the project is operational.

Rival authority: uMgungundlovu and Msunduzi

uMgungundlovu District Council was brought into being in 2000 when South Africa demarcated new municipalities to cover the whole country for the first time. It sprawls across a large part of the KwaZulu-Natal midlands, includes seven local municipalities and centres on the city of Pietermaritzburg which is presided over by the Msunduzi Local Municipality. Msunduzi has recently announced its ambition to become a metropolitan municipality, a move which re-opens the question of the demarcation of boundaries and also deepens the shadow over an already clouded relation between the district and local municipality.

Waste statistics for the area are highly uncertain. The figures below are based on uMgungundlovu's IWMP produced in 2004. It calculates domestic waste from population data but the assumptions for per capita waste seem low: it attributes 0.61 kg per day to middle and high income groups, 0.3 kg to low income urban groups, and 0.03 kg to low income peri-urban and rural groups.

Msunduzi inherited a substantial waste infrastructure from the erstwhile City council, including a substantial fleet of collection vehicles and the New England Road landfill, the largest in the area. It collects from 63,000 households but excludes one urban and all rural areas within its boundaries. It is estimated to produce 74% of uMgungundlovu's domestic waste, amounting to 65,700 tonnes of a year.

The other six local municipalities within uMgungundlovu are centred on smaller towns and have minimal waste infrastructure. Waste collection services centre on previously white towns and have been extended to some, but not all, neighbouring townships. Waste is not collected from several large and dense settlements, from black rural areas or from commercial farms. The IWMP estimates that the six municipalities generate over 23,000 tonnes of domestic waste a year, but that 60% (14,000 tonnes) is not collected. District official Riaz Jogiat believes the real figure for the district (including Msunduzi) is more like 50,000 tonnes of uncollected waste. In consequence, the area is littered with informal dumps. To dispose of the waste that is collected, two of the smaller municipalities transport it over considerable distances to New England Road, three have upgraded dumps now designated as landfills and one has a newly developed lined landfill – but does not have the capacity or resources to run it.

Waste is generally a low priority for all the municipalities and budgets range from inadequate to paltry. Waste is also low on central government's priorities: only 5% of the municipal infrastructure grant may be spent on waste and central government funding does not cover waste operations. Jogiat notes that the new Waste Bill makes no provision for such funding.

The Waste Bill also does not distinguish between district and local municipalities. At present, the district is responsible for planning and has taken responsibility for landfill development. Operations is a local responsibility. This separation of functions, says Jogiat, is a recipe for failure as the information necessary for planning is not available. Indeed, information for almost every table in the IWMP is unavailable or incomplete. The smaller municipalities do not have the capacity and operational systems to produce it. Msunduzi, on the other hand, has withheld strategic information.

A bitter rivalry between Msunduzi and Mgungundlovu is symptomatic of the general malaise of governance. It is characterised by constant restructuring, which reflects inter-governmental power struggles as much as attempts to rationalise responsibilities, and dysfunctional administrations. Here, the power relations between district and

local are reversed. Msunduzi has a much larger budget than Mgungundlovu and, on Jogiat's account, sees the district as a threat to its control. Its bid for metro status has sharpened its determination to hold onto assets. Meanwhile, the landfill, which represents a major asset, is running out of time.

Given the long lead times, Mgungundlovu has begun the process of planning for its replacement and it intends to develop a regional landfill to service the entire district. This appears to be in line with DEAT's thinking. The project, however, is fraught with uncertainty. First, there is no obvious source of financing. Second, it may fall within the future boundaries of an Msunduzi metro and revert to its control with uncertain consequences for the rest of the district. Third, as a metro Msunduzi may decide on a rival project.

New England Road

The New England Road landfill has created a new hill in the Pietermaritzburg landscape. The original dump dates from the mid 20th Century. It was located in a valley next to the Msunduzi River directly across from Sobantu, Pietermaritzburg's oldest black township, on the opposite bank. In 1993, a lined landfill to comply with the minimum requirements was constructed on top of this old dump and received a permit from the DWAF. This landfill is now rapidly approaching the maximum height allowed by the permit. According to the manager, there is sufficient air-space for 8 to 10 years. Other sources give it a maximum of 6 years.

In 2006, the landfill received 62,750 tonnes a year of domestic waste, 20,175 t/y garden waste and 27,538 t/y industrial waste, according to the external audit. This appears not to include building waste, which the 2004 IWMP put at 71,000 t/y. The figures are based on weighbridge records but it is not at all clear that they are reliable. There is therefore no way of assessing trends in waste generation from the archive of landfill records.[96]

The permit notwithstanding, the landfill has had a sorry history. External audits commissioned by uMgungundlovu and carried out in 2004/5 and 2006 indicate a

[96] Generally, the figures given in the 2004 IWMP don't add up. Figures for waste received at New England Road were based on weighbridge records but, for example, only show 20,000 t/y of domestic waste received at the landfill. This may reflect misreporting or entirely unreliable record keeping as it is not credible that domestic waste has tripled since then.

deepening crisis.[97] Both audits produce long lists of transgressions of the DWAF's permit requirements, including:

- The system for collecting leachate had collapsed and the aquifer beneath the landfill was polluted. The build up of leachate created the risk of the landfill slipping. The stormwater system was also failing.
- The gas gathering and flaring system was dysfunctional, creating the potential for a catastrophic explosion;
- At the working face, dumping was mismanaged, the compactor was broken down and the bulldozer close to break down, and cover material was inadequate or not available. In consequence, garbage and waste food was exposed and a breeding ground for flies and rats;
- Fires were burning on site, dust suppression was not carried out, screens to catch litter blown in the wind were not in place and there was no site cleaning;
- The perimeter fence was broken down and dump pickers (not permitted on site in terms of the permit) had uncontrolled access;
- Monitoring of air, water and chemicals in the waste body was not carried out, or not carried out regularly.

In terms of process issues, internal audits had not been carried out and there were no minutes to show that the Landfill Monitoring Committee was meeting as required. Further, it seems evident from the reports that the DWAF had abandoned its responsibility for monitoring compliance, let alone enforcing it.

For the most part, it appears that the state of the dump was largely the result of under-funding by Msunduzi, leaving the landfill without adequate budgets for staffing, cover material, maintenance of plant and machinery or monitoring.

Waste pickers are also routinely blamed for vandalising equipment to take electric cable, ironically including the cable feeding the electrified security fence designed to keep them out. The pickers themselves, however, speak only of materials that have been dumped. For them, these are abandoned goods which then become the rightful property of whoever first claims them. They are not thieves. The pirating of working infrastructure for high value metals is scarcely limited to landfills and requires some knowledge of electricity. The possibility that regular waste pickers are not those who

[97] Mgungundlovu, External audit reports: November 2005 prepared by SRK; and January 2007 prepared by Geomeasure.

plunder equipment does not seem to have occurred to either officials or auditors. Instead, the term 'picker' is used indiscriminately.

This is not to say that the presence of many pickers on the site does not pose problems for good management. The pickers themselves are most at risk. They have no protective clothing and, at a number of sites, they told of people being killed in accidents. The site auditors also report seeing pickers lighting fires – a practice which is obviously dangerous particularly on a site where the management of LFG is less than exemplary.

Over the last year, a number of the most serious issues raised by the auditors have been remedied according to both Jogiat and landfill manager Cyril Naidoo. The leachate and gas systems have been restored, a new compactor bought and adequate cover material supplied. At the same time, management is caught in a fortress mentality. The fence remains full of holes but security staff numbers have been beefed up as the frontline against pickers. Jogiat comments that there has been no attempt to work with the pickers.

Security aside, it seems that the necessary investments were made at the instigation of Mgungundlovu who provided half the capital funding. It is less certain that Msunduzi itself recognised, or cared, that the landfill was in crisis. Participants in the Landfill Monitoring Committee say that it remains a low priority for council and this is reflected in the constant postponement of meetings.

Privatised projects seem to have attracted more attention. With unusual efficiency, tenders have been awarded to build and operate a CDM gas-to-energy project and a recycling centre at the landfill gate. Streamlined EIAs have been carried out with participation reduced to a single public meeting for each project. By all accounts, the meetings were publicised only in a neighbouring white suburb. There was no meeting in Sobantu, municipal workers are in the dark about the contracts and consulting the dump pickers was never on the agenda. These projects are, in Naidoo's view, proof that the City is "passionate about waste". It seems more likely that these projects are seen to hold opportunity. Naidoo hopes the recycling centre will employ some of the dump pickers but says he will have no influence on the decision of the company.

Sobantu

Sobantu looks onto the dump and the sewerage works across the river on the one side, and onto an industrial estate across the Byrnespruit on the other. Residents say they are surrounded by pollution. The river is polluted by leachate and the stream by industrial effluent. Those who used to fish stopped doing so when they found fungal infections on the fish. The township is also plagued with rats, flies and mosquitoes from the dump. In summer, the smell is unbearable, particularly when sunshine follows rain and contaminated water evaporates from the garbage, or when the smoke from periodic dump fires blows across the settlement. According to Naidoo, Sobantu is not in the path of the prevailing wind. Nevertheless, the 2005 audit report found the highest rates of dust deposition in those parts of Sobantu closest to the dump. Residents say there is a high incidence of respiratory ailments which are then associated with, and exacerbate the effects of, Tb.

Councillor Ngubane has lived over 50 years in Sobantu. He remembers when it had a clean environment. He also remembers when the people had jobs. In the last two decades, Pietermaritzburg's shoe industry has closed down as have several other factories. The impression of full employment, however, was an apartheid illusion. Sobantu was used as a labour dormitory and those who were surplus to requirements were kept out by influx control. Some industries are now returning but they are mostly high tech and do not employ people from Sobantu.

The dump has always provided a supplementary livelihood for some and cheap goods for others. Those who pick have contacts in the dump or in factories disposing rejects. They always seem to know when the high value goods such as chocolate and chicken feed will be arriving.

Unlike many later settlements in South Africa, Sobantu has always had its waste removed and its streets swept. The service was previously managed locally at municipal offices in Sobantu and the workers were part of the community. Now, however, the service is centralised. The street sweeping gangs are sent in periodically and are not responsive to residents.

Waste pickers

With the failure of the fence, security now relies on brutality. The waste pickers say that security staff regularly assault them with whips and confiscate the material they have collected. They believe that they are being excluded because the landfill staff – security, municipal workers and management – are muscling in on the recycling trade and see the pickers as competition. There seems some justification for this view as SAMWU shop stewards acknowledged that some workers do some recycling on the side although it is not permitted. The pickers observe workers focusing on high value items such as metals.

This new approach to security has taken a heavy toll on the earnings of the pickers. Previously, the top earners made as much as R1,750 a week while the lowest earners made R200. This was supplemented by items picked for their immediate use value. Some items, such as paper and metal were picked for the recycling market but much of it was sold through informal networks. This included chicken feed discarded from a local factory and expired supermarket foods that cannot be resold in the formal economy. They relied on smell to detect rotten or contaminated products. Building materials also found a ready informal market.

Now the pickers either sneak around security or enter the site over the workers' lunch break. Some make deals with security although others regard this as divisive. Time for picking is much reduced and earnings have been cut by half in the best cases and to virtually nothing in the worst. The pickers estimate that there were as many as 1,000 people working the site but say many have now given up.

People arrived at dump picking by many different routes. Caroline Dlamini had 15 years experience picking at a site in Johannesburg but returned to Pietermaritzburg to be with her family. Her speciality was white paper which gave the best returns. Ntoko Madondo and Thokozile Mbatha both begged for a living but could not support themselves. The dump had provided them with a liveable income. Dumisani Zondi had a job doing piece work but that was unreliable and he got a steadier income from the dump. Douglas Maphumelo lived in a shack settlement and ran his own informal tuck shop in a neighbouring suburb. He was an activist in the Homeless People's Federation and, when the authorities decided to remove the settlement, he was targeted because of his role in resisting the removal. His home was demolished twice and the police arrested him for trading and confiscated his stock. The policeman then gave the stock to his own brother who ran a shop. Maphumelo had first come to

the dump to get materials to rebuild his house. When his tuck shop was taken, he had nothing and so came to the dump where he made a reasonable living.

Conditions on the dump are harsh and many are sick. Nevertheless, it provided people who have been harassed and marginalised by the state and the market with a space of relative autonomy. It was a place where they could make a living which they thought they could rely on: "You can find piece work but it is not going to last. But with the dump it is ongoing." When they were denied access, some tried to approach the municipality but met with a brick wall. Now they see their livelihoods being handed over to a 'contractor' (the recycling company) without anyone thinking to consult them.

They are now beginning to organise with the support of groundWork. They want:

- The security staff to stop beating them;
- To have a say in decisions about their own future. In particular, they want to negotiate access to the dump. They do not want the contractor and, unless there is a proper participatory process, they want the project stopped;
- Access to health care and to ID books so that they can access social grants.

The Vaal Triangle

The greater part of the Vaal Triangle, a highly industrialised area based on coal and water resources, falls in the Sedibeng district municipality north of the Vaal. An important part, centred on the chemical complex of Sasolburg, falls in the Metsimaholo district in the Orange Free State south of the Vaal.

It is not clear how many people live in Sedibeng. Official estimates range from 843,000 to 1,362,000 according to Sedibeng's 2008 Integrated Development Plan (IDP).[98] The economy is dominated by manufacturing and services which each produce just short of half the local 'geographical value added'. Physically, the area is dominated by heavy industry, and industrial waste streams and pollution are overwhelmingly evident. Industrial wastes surround and intrude on residential areas and are routinely dumped at municipal dumps in contravention of the minimum requirements.

[98] At http://www.sedibeng.gov.za/IDP2008-09/Part%202.pdf.

The Gauteng State of the Environment Report [SOER 2004] says that Sedibeng disposes of just under 40,000 cubic metres of waste per year. Calculating from Census 2001 and 1996, it estimates that weekly municipal collection services are provided to just 48% of households. 30% dispose of their rubbish in "own dump" (it is not explained what this means, but it may well refer to informal rural dumping which means digging holes in the ground or burning rubbish), 10% in "communal dumps" (presumably bigger holes with burning), while 8% have no disposal services at all [93].[99] The SOER registers a decrease of 6% from 1996 to 2001 in households with services.

Emfuleni is the biggest local municipality in the Sedibeng district with 28% of the land but 84% of the people. Most of the population is urban. Indeed, the area is now the southern extension of the Gauteng conurbation stretching from Tshwane in the north. Vereeniging, Sharpville, Tshepiso, Boipatong, Vanderbijlpark and Bophelong cluster alongside the Vaal River in the south of Emfuleni while Sebokeng and Evaton to the north of Vanderbijlpark stretch up to the boundary with Johannesburg. A small proportion of the population lives on surrounding smallholdings.

According to the Emfuleni IDP review 2008/9,[100] 133,030 households have their waste collected once a week while 22,200 households in formal settlements and all households in informal settlements do not have their waste removed. Business waste is collected daily from 1,453 stands in Vanderbijlpark and Vereeniging. There are also street sweeping services in business centres in Vereeniging, Vanderbijlpark, other outlying business centres, the Sebokeng taxi rank "and all main roads".

None of the Emfuleni landfills are permitted. The old Zuurfontein dump, a silent monument to consumerism right next to the upmarket Vaal Mall, stopped receiving waste in 2005, was capped and equipped with a gas vent. DWAF issued a final closure permit in 2008. Boitshepi is Vanderbijlpark's main dump and handles 25,000 to 30,000 tonnes of waste a month. Its available air-space is not calculated but it is estimated to use up 270,000 m^3 a year. Palm Springs is a new dump taking waste from Sebokeng and Evaton and is growing rapidly. Its available air-space is stated to be 264,000 m^3. That this has been calculated seems to relate to plans to establish a

[99] The remaining 4% is categorised as "municipal other".

[100] http://www.emfuleni.gov.za/docs/idp/idp_0809.doc. See p. 38.

minimum requirements landfill there. At the moment, it is a dump on an old quarry run at minimal cost. It receives 13,200 m^3 per year. Emfuleni has declared a 'backlog' of between 73,000 and 100,000 m^3 of illegally dumped waste – although none of its waste disposal is exactly legal.

A new landfill site is being sought "west of ArcelorMittal Vanderbijlpark", according to Emfuleni Solid Waste manager Theunis Redelinghuys. This could mean Steel Valley, which would be consistent with locating landfills at already contaminated 'brown field' sites. Siting a landfill in Steel Valley would not only add insult to injury, but would also mask the original pollution from the steel mill.

The history of careless and profligate waste production combined with the gross neglect of waste management in South Africa flows into the present regime with its slow, inefficient and under resourced process of improving waste management. The results are clearly visible in Emfuleni. The first result is the continued and compromised operation of landfill sites. While on paper they may be illegal, in practice they are operated by the local authority and overseen by regulatory authorities. This semi-legal status is just one face of the greyness of waste and the shiftiness of definitions within the broader regime of negotiated non-compliance. The legacy costs incurred through decades of neglect are huge. The present waste management system is not only unable to deal with them but is adding to them.

Emfuleni's planning ignores reduction at source and the waste managers must deal with what comes at them. As elsewhere, waste is a low priority and under funded. This leads to substandard operations and leaves managers to 'make a plan'. The Palm Springs dump is a good example. Here the waste pickers far outnumber the municipal team and Emfuleni's landfill manager, Oupa Loate, responded by incorporating them into his management regime. In Sasolburg, the reclaimers are practically in charge of the dump although they have been stripped of control over marketing recyclables. In Emfuleni, Redelinghuys estimates that just 5% of the waste stream is recycled. The only formal example is the Evaton recycling centre where the IDP says nine permanent jobs have been created.

Illegal dumping in Sebokeng

Illegal dumping on open ground is still commonly practiced by businesses, big and small, hospitals and individuals. The municipality itself dumped illegally in the past and it is not quite clear that it does not do so now. The legacy of past illegal dumping still imposes on people's lives. Most of it was dumped in or next to black areas and Emfuleni's IDP review says the council has picked up 16,858 m^3 of waste mixed with earth but 57,192 m^3 is "still lying throughout the townships region" [2008/9: 79].

This is part of the history of apartheid's neglect of black townships. Many of the illegal dumping sites were created when township authorities did not provide services or infrastructure remotely comparable to what was provided in the white towns. According to the 2006/7 IDP, the former black local council – unseated in the Vaal Uprising – "used Kwaggastroom" in Zone 7 and a dump and burrow pits in Zone 20. Sharpeville was also a site of illegal dumping "since the early 1980s" [122]. VEJA members have observed ongoing illegal dumping in Kwaggastroom.

The Golden Highway runs alongside Sebokeng. Over a stretch of at least five kilometres, the land between the highway and the houses has been used as a dumping ground for hospital and industrial waste as well as general household waste. At the northern end of this stretch, wetland vegetation is discoloured and indicates severe leachate pollution in the groundwater. At the southern end, in Zone 20, is the old dump that now forms a hillock. The old burrow pits pock mark the ground over a wide area leading up to this dump. The entire area was evidently used for indiscriminate dumping over a long period and almost certainly started before the era of the black local council. A ditch cut behind one of Iscor's former hostels channels a stream through this area. Rubbish is exposed in its bank to the depth of about a metre.

Being illegal, none of this appears on maps and plans but everyone knows about it. Nevertheless, a part of this dumping ground was graded over and RDP houses built on top of the rubbish. Sello Ditheko is a long term resident of Zone 20 and has lived in one of these houses for the last 12 years. Sometime in the late 1980s, he recalls "a chemical syrup which left a strong smell" being dumped. In front of his house, the burrow pits are now being filled in. Ditheko had recently seen new waste brought in and says the municipality is flattening the waste into the pits and then covering it. It appears that this is a mixture of earth and waste removed from other illegal dumping sites by the municipality.

Redelinghuys confirms that the municipality's plan is to level these old burrow pits and cap them to stop infiltration of rain. A participatory process with local residents is to decide on an acceptable end use and then rehabilitate these stretches to that purpose. But the problem remains. "People see there is waste there, so they bring more. Sometimes they bring even dead dogs. When the wind turns, I get a smell," says Ditheko.

A few houses away, residents have made a community garden at the edge of the area previously filled in for the RDP housing development. They say a lot of rubbish came up when they dug the garden. They found medical waste including old syringes and blood bags at a depth of no more than two blades of the spade. Further on, a drain leads from Zone 20 directly towards the Golden Highway. As with the ditch behind the Iscor hostel, this one also excavates old rubbish and invites more informal dumping. Residents say it is infested with rats as well as choked with rubbish. Following hard rain, water dams up to form pools. They are particularly concerned that their children then swim in the contaminated water.

Boitshepi

The Boitshepi dump towers over the townships of Boipatong and Tshepiso – hence the name. To the north, there are a number of firms that produce steel drums, tins, nails and fencing. Their slag is used as daily cover. To the south, there is an open area through which the Leeuspruit flows. The stream flows from Mittal Steel's grounds and is already polluted from there. It runs in a wetland through Boipatong to Tshepiso and on to Sharpeville. The residents of these townships are not only exposed to industrial pollution, but also to the continued operation of the dodgy dump above them.

Boitshepi is thought to originate from the late 1960s. According to Redelinghuys, it started as a slagheap for Cape Gate. By the mid-1980s, it had become "an informal dumping site controlled by the municipality". Boitshepi's managers were slow to respond to the minimum requirements. When the second edition was published in 1998, the municipality privatised management of the dump and tasked the contractor to upgrade it to permittable legal status. By 2002, there was still no control over what industries and business dumped there. The contract was then given to Envirofill who still manages it. Envirofill has established entry controls, including a weighbridge, but the dump itself is scarcely upgraded. An EIA has now (2008) been initiated to obtain a 'permit for closure'. It seems that actual closure will probably be about the

time that the dump runs out of useable air-space. Thereafter, an engineered landfill is proposed for the same site adjacent to the present dump. There will, however, be a hiatus between closing the dump and opening the landfill, so the waste which presently goes to Boitshepi will have to be diverted. It seems doubtful that the other two dumps in the area – Palm Springs and Waldrift – have the capacity to handle it.

Boitshepi is now classified as a H:h site because, over its history, unknown types of hazardous wastes have been dumped in unknown quantities. At present there are two working faces, one for general waste and another for industrial waste and it is not clear if it still officially receives class 3 and 4 hazardous waste. According to Redelinghuys, only industrial waste that has been de-listed, and arrives with a de-listing certificate at Boitshepi, can be disposed of there. However, according to the 2008 landfill audit report, there is a two hour gap in the evening when there is access for dumping but no or very little control (only a security guard, but no spotter or weighbridge operator).[101]

Boitshepi is forced to accept industrial waste, says Redelinghuys. One reason is that an industrial waste exchange programme failed. This was a rare attempt to reduce waste by recycling from source on the principle that one industry's waste could be another industry's resource. The programme was initiated by Emfuleni with support from DEAT in 2006. It failed because industries refused to provide the necessary information on their products and waste streams. They also voiced fears around the legal implications of the chain of user responsibility and the definition of waste in NEMA. It is, of course, striking that dumping terminates all responsibility. The legal niceties seem aimed to keep it that way.

Boipatong residents have complained to parliament that industrial waste and animal carcases are dumped there along with general waste. One of the delegates, Moleleki Fantisi, is a member of the VEJA waste team. He told parliament that the landfill is too close to people's houses and that they suffer from the oppressive odours. A nightmare for parents is that the dump is accessible to children.

From the top of the dump it is clear that the Leeuspruit is taking a hammering. A stagnant water body just below the dump is choked with a sickly green growth. The dump has no liner, but a partial 'leachate system' has been installed. This does not – as is theoretically required – consist of perforated pipes strategically placed inside

[101] Boitshepi Landfill 2nd audit report, May 2008, prepared by Zitholele Consultants.

the waste body to collect leachate as it is formed. It simply catches leachate that leaks out at a lowest point. Even this minimal system is in a state of disrepair and does not function properly according to the audit report. What leachate the system does collect is not treated but connected straight up to the Vanderbijl sewage works. This works is itself dysfunctional. The combination is a recipe for serious pollution.

The cover material for the dump consists of slag from the metal industries across the road. There are some 300 pickers on site. Many of them, but particularly the young men, comb through the slag to find bits of steel to recycle as scrap. Otherwise people collect the usual range of recyclables – bottles, paper, plastics and supermarket food past its sell-by date. The pickers say they work individually and estimate that they earn around R400 per month. They have established a huge 'salvage yard' at the bottom of the dump with individual sites clearly marked. This is an indication of informal cooperation.

More formally, in 2002, the pickers elected a committee of 38 which is still in place.[102] This replaced another committee, which had folded, and it is possible that pickers have organised themselves in different ways over the twenty years that they had been on the dump. They have agreed rules to make the dump a safer place to work but members of the committee say it is difficult to enforce them on the many people who work there. This is confirmed by the audit report, which states that pickers jump onto moving trucks as they arrive and risk injury or death. Redelinghuys says he knows of at least 5 people killed in this way. Women on the committee say that men do it to block others from getting to the waste. They also allege that some men steal what others have collected and people have to stay overnight to guard their pickings. Many live on the site in plastic shelters. Getting decent housing off site is a top priority for the women on the committee. It does not appear, however that they have much faith that the municipality will deliver on this.

This reflects a general sense that they get little help from the municipality although they have a good relationship with Loate. They can get access to staff toilets and have received reflective t-shirts. They have not received any protective clothing such as boots, gloves or masks.

[102] Interview with some members of the pickers' committee: Pulane Ralephanyane, Mantwa Mokoena, Sylvia Chelwane and Mmateboho Sekhoto.

The current law makes pickers the responsibility of the waste manager – and legally saddles him or her with the risk should there be an accident. Despite the DEAT's reluctance to recognise salvagers in the Waste Bill, Redelinghuys says he has had indications, in discussions with provincial and national waste officials, that pickers will be accommodated in policy and legislation. He notes that there is a 47% unemployment rate in the area, so it is understandable that people are desperate and must make a living from whatever they can find, including waste. Moreover, pickers with community support can be quite powerful players on and around the dump. Redelinghuys recalls the reaction of the Boipatong community to an electricity blackout caused by an incident on the Boitshepi dump. They blocked the roads and shut down the dump. The more than 1,000 tonnes of waste that arrive each day could not be dumped and was simply left in the road.

Palm Springs

Palm Springs, opposite Sebokeng and on the border of Orange Farm, is an old quarry that developed into a dumpsite. "People just started dumping there more than 16 years ago," says Loate. The intention is to transform Palm Springs into a permitted landfill with 20 to 30 years' worth of air-space according to Emfuleni's IDP review. At the moment it is a minimal operation, despite the fact that it already receives all of the refuse from Sebokeng.

Loate is superintendent of Emfuleni's three dumps – Boitshepi, Palm Springs and Waldrift – and is directly responsible for the operations at Palm Springs. He manages the dump within scandalous constraints. The municipality has given him no budget for daily cover soil, so he uses soil which has been dumped as waste, and he operates Palm Springs on a meagre staff: a supervisor, a spotter, an entrance guard, two traffic controllers and nine casual workers. Loate has trained the staff himself and the supervisor, perched on a salvaged chair at the top of the dump, keeps a log of who dumps what. This is used to arrive at the monthly estimate of 1,100 m^3 waste received. The entrance guard is authorised to turn back anything other than general waste but there is no weighbridge, no fence and no security guards. On the dump itself the traffic controllers direct dumpers to the working face. The casual workers are employed as site cleaners, picking up wind blown or spilled litter. Loate's wish list reflects what is missing on the dump: running water, toilets, a dedicated compactor, a trench excavator and other machinery.

Box 21: Visiting Palm Springs

When the groundWork research team visited the dump, a column of thick, acrid black smoke rose up from the salvage yard where the pickers organise their collections. It is late afternoon and a bitterly cold winter wind is blowing. A group of young men have lit a tyre, probably for warmth, and it burns fiercely. From the top of the dump, Loate blows a whistle and shouts an instruction to put out the fire. The reclaimers do so without hesitation. He then sends a picker to summon everyone to meet the research team. From all corners the waste pickers ascend the dump and assemble in a circle.

At the centre of the circle, Loate asks them to describe how things have changed since he took over the running of the dump. Martin Themba Khosa moves to the centre and expresses their gratitude. Life has become much easier. In particular, he appreciates the provision of transport to take the collected materials to the buyers. After his speech, as the wind-driven rain pelts us, Khosa shared his history with the research team. He was born in Johannesburg and stayed in Diepkloof until he was "kicked out". He then moved in with his sister in Orange Farm. She has since died. At home he has "two small sisters". He has contacted the welfare to help him look after the girls "but they didn't come". He comes to the dump every day. He collects tins, glass and PET plastics.

Loate addresses the meeting. "I am very proud of the reclaimers on this dump," he says, "and South Africa should be very proud of them too. Out of the 11,000 cubic metres of waste, they manage to recycle 4,000 cubic metres. They are saving air-space on the dump and they are protecting the environment." He pauses to let it sink in, and concludes with a view to the future: "At the moment, there are no industries that bring waste here. But as soon as Boitshepi is closed, we will be lucky here."

One of the pickers asks: "If we find gold, diamonds or guns on the dump, who should we give it to?" It is not an idle question. Anything could be found here. The pickers once found a fully functional pistol which was handed in to the police. They have also found dead babies. Alongside such testimony to people's desperation, unexplained riches can land on the dump. Gold and diamonds? Loate tells the story that, while he was working on the Simmer and Jack dump in Ekurhuleni, a truck dumped bags of money. Literally. The pickers got rich that day.

The rain stops and the sun appears. A truck arrives to off-load and the pickers run down the hill to sort through the contents. Between the cardboard they find neatly wrapped, clean stationary and bags. One of the bags is offered to Oupa, who declines. While Loate is convincing as a benign manager – with a solid grasp of realpolitik on the dumps – the pickers are now extremely dependent on the vision and goodwill of a single individual.

The main work force on the dump is in fact the 100 or so pickers on site. When Loate arrived at Palm Springs, the pickers were living in shacks around the site and their children picked with them. The shacks are now gone. Loate says he organised new accommodation in RDP houses for the people who lived there. He also instituted rules for waste picking. Nobody is allowed to climb onto the trucks. Children are not allowed on the dump and Loate says this is enforced by the pickers themselves. They also prevent new settlement in the area.

As recounted in Box 21, the pickers do not always follow the rules but Loate has demonstrated real sympathy with them and they appear to accept his authority without reservation. The changes that he has introduced have two purposes: to improve their working conditions and to regulate their activities. All the pickers are registered and given identity cards for display. They are organised into groups of women, young women, men and young men, who are allowed to pick waste from incoming vehicles at set times to ensure equal access to materials. The allocation of space in the salvage yard is now being organised on the same basis. Municipal trucks are provided to transport collected materials to buyers, resulting in major savings and improved incomes for the pickers. Loate was also concerned to reduce the number of people on site. He therefore negotiated with local mall managers and organised a group of pickers from Palm Springs to sort and recycle waste at the malls.

Muscling in on the pickings at Sasolburg

Across the Vaal River, the management of the Sasolburg dump is at once more remote and less benign. This case study, researched by Melanie Samson and presented in full in a report for groundWork focusing specifically on reclaimers [Samson 2008a], recounts the history of a struggle for control over the surplus of recycling from the dump. It shows both the pickers' initiative to organise themselves and how local elites, backed by Sasol itself, muscled in on the profits.

The Sasolburg dump is hemmed in and dwarfed by Sasol's industrial dumps – the mountainous ash heap, the geometrically engineered effluent dam and a series of three tar pits which are soon to be relocated. The dump was started in 1951, at the same time as Sasolburg itself. It is not permitted and has no lining. The Integrated Waste Management Plan produced for the municipality says that it receives 51 tonnes of waste a day [Metsimaholo 2008: 51]. Metsimaholo waste manager Johann Labuschagne estimates that, with industrial waste included, the figure is closer to 90 tonnes of

waste a day. However, as there is no weighbridge, it is impossible to calculate the exact amount of waste entering the landfill site.

Since at least 1980, but probably much longer, pickers have worked the dump to earn a livelihood, selling to a variety of middlemen. Up to 2004, various companies have intermittently held rights, given to them by the municipality, to the recyclables in the dump. Samson comments that up to this stage the municipal efforts to formalise recycling amounted to "nothing more than placing tremendous pressure on the reclaimers to sell to one particular middleman".

In 2004, the recycling company A-Z abandoned its operations at the dump. In the resulting gap, the pickers organised themselves into two groups: Ikageng composed of older men and women recycling a wide variety of materials; and Ditamating composed of younger men focusing on scrap metal. There was some friction between the two groups which is why they organised separately. Each group also established their own markets, selling directly to buyers of recyclable materials.

However, in 2006, the municipality awarded a 5 year contract to a black empowerment group, called Phutang and consisting of two black professionals from Zamdela, with an exclusive right to recycle materials from the dump. Phutang was established with a loan from Sasol granted through the Sasolburg Rejuvenation initiative. This process, Samson concludes, was not fair:

> First, Phutang had no relevant expertise in recycling or business more generally and prior to receiving support from Sasol/Rejuvenation had no access to capital required to run a business. Second, support from Sasol/Rejuvenation played a critical role in ensuring that Phutang received the contract. Third, the contract was awarded without being publicised or put out to tender. Fourth, the reclaimers were completely excluded from these processes and discussions.

The reclaimers find it ironic that they were excluded in favour of Phutang on the grounds of 'black economic empowerment'. While the reclaimers are also black, in the eyes of the municipality they did not appear fit for a deal worth millions of Rands when, as one official put it, they don't even own a motor vehicle. Neither were they seen as stakeholders in the decision despite the fact that they are in fact the only recyclers on the site, with experience in working there going back between eight and

fifteen years. Samson describes the scene at the dump to show how the reclaimers have made it their space:

> There is one permanent municipal employee at the entrance who keeps records of vehicles entering the site, and one other permanent municipal worker with a bulldozer who toils alone to cover the rubbish. Over the course of the fieldwork no supervisors or municipal officials were seen at the dump, and there is virtually no municipal presence at the site.
>
> The dump is clearly the domain of the fifty or so seSotho speaking reclaimers from surrounding areas who work there on a daily basis. Upon arrival at the top of the dump visitors are usually greeted by two or three young men lounging on a sofa at the top of the hill. The reclaimers have salvaged a range of furniture from the dump, and outdoor living rooms and rest areas dot the landscape. …. In early 2008 the municipality finally succeeded in removing the shacks where some of the reclaimers lived on the dump itself. However a few structures remain where some of the reclaimers store their clothes, personal items and even files containing documents relevant to their struggles. Although there is no water or toilet facilities at the top of the site the reclaimers haul water from the bottom so that they can wash and change before heading home at night.
>
> Walking around the dump one is immediately struck by the extent to which the reclaimers have organized the space and claimed it as their own … When trucks arrive reclaimers rush to retrieve materials, which they then carry back to their individual working spots. The section closest to the entrance is the preserve of the young men who collect scrap metal. They have several couches and sitting areas (a few covered by umbrellas) where they sort their materials and sit and smoke when there is nothing to be done. Although the men now work individually they labour in close proximity to one another and are usually found in groups. As you progress deeper into the dump you find the individual workspaces of the older women and men who collect paper, plastics and cardboard. Each of these salvagers has his or her own individual workplace, which is clearly demarcated by the large white sacks that he or she fills with recyclable materials. There is less furniture and collective spaces in this zone of the dump. Although the reclaimers from the two groups pass through each

> others' spaces and sometimes rest or labour near one another there is a clear spatial division between the two groups. … [T]his is a physical manifestation of the tensions and organizational divisions between the two groups that are based on gender, age, the type of labour that they perform, and their vision for reclaiming on the landfill.

Having secured sole right to the recyclables, the Phutang directors, who had no experience of recycling, remained in their full time jobs and tried to "run the business by cell phone and remote control". Phutang simply inserted itself in the selling chain between the reclaimers and the original buyers, paying the reclaimers less than they could get from the middlemen directly and substantially reducing their incomes. The business ran into cash flow problems, at one stage being unable to buy materials from the reclaimers. For several months Phutang disappeared from the site and reclaimers ran their own buying and selling again. By the beginning of 2008 Ikageng and Ditamating had each registered as closed corporations with the intention of bidding for the recycling contracts. Their plans include moving up the waste stream to connect with households separating recyclables at source. The two groups approached the municipality to take over Phutang's role. Alternatively, they proposed a sub-contracting relationship to Phutang. However, the municipality refused. In May 2008, Phutang merged with Remade, a large white-owned company operating across the Southern African region. Despite the fact that this would undermine the original intentions of black empowerment, local government officials anticipated smoother running and increased income from the new deal to supplement the income of the chronically under funded and under staffed waste management department. For its part, Sasol wanted to recover its loan to Phutang and bring order to the municipal dump which is adjacent to Sasol's own dumps.

Enclosing the dump with a fence – 60% paid for by Sasol – was a key strategy to force the reclaimers to sell only to Remade-Phutang, and to get police co-operation in controlling access. The reclaimers were also to be controlled through contracts in which they undertake to sell what they collect only to Remade-Phutang. At first they refused and withheld sales of recyclables from Remade-Phutang for several weeks. The company responded by beefing up security at the gate to prevent the reclaimers taking recyclables out to sell independently. Then council got tough on Remade-Phutang's behalf:

> On May 22 the reclaimers were summonsed by council to attend a meeting at 8 am on May 23, non-attendance of which, they were informed, would "leave the council with no option but to use its legal process to remove you out of the dumping site" (letter from L. Thile, Manager Health and Cleansing, 22/05/2008). The reclaimers attended the meeting and tried to raise their grievances. They once again refused to sign the contracts. The police were subsequently sent in with dogs and pepper gas to remove them … [T]his was not the first time that the police had been sent in. However, now that the dump was physically enclosed, once the reclaimers were evicted they were aware that it would be much more difficult to re-enter the site. In addition, they had not earned any income in the preceding few weeks due to the standoff with Remade-Phutang, and the police did not let them take their possessions with them. The combination of the police and the fence broke the reclaimers' ability to continue with their resistance. One reclaimer eloquently summarized the outcome of what she perceives as a hard-fought battle stating, "[w]e were chased away by the police on a Friday. We came back on Monday to surrender and sign the contract".

Remade-Phutang and the council officials believe that all the problems are now solved. The reclaimers, however, have a long list of problems. They are getting paid less than before. The promise of transport for their goods to the sorting and buying centre at the entrance to the dump is only kept intermittently. The company has also not provided the promised access to water and toilets – there are only two toilets and one tap with a trickle of water at the sorting centre. The reclaimers have lost their independence, and the individual contracts are also undermining the collective approach that they had developed.

> Although they meet less frequently now both Ditamating and Ikageng continue to meet and try to strategize their next moves. They are wounded and bitter. They had believed the ANC campaign slogan and expected a "better life for all" with the advent of democracy. However, they report that they have lost faith in council and are tired of knocking on endless doors and not being taken seriously by the Council … Members of Ditamating observed that the imposition of Remade-Phutang not only compromised their rights as citizens to participate in the policy process, but also undermined their ability to fulfil their obligations as citizens noting that,

> "we are citizens of this city. We are expected to pay for services. We used to pay for services, now it is difficult".

While the reclaimers have knowledge and experience of recycling materials, of collectively organising themselves, and of negotiating with buyers of materials, the council has consistently failed to recognise them as recyclers, or even just stakeholders, in recycling decisions. In a focus group one reclaimer offered the explanation that the council "just take[s] us for granted. Even if you have a serious problem they don't listen. They say you are just people from the dumpsite. You are just scrap."

Under neo-liberal orders

Municipal waste management has seen a variety of organisational forms emerge since 1994 – which in itself reflects the 'variable geometry' of networked neo-liberalism. While apartheid discriminated on racist grounds, the neo-liberal city aggressively asserts the order of the market. For Cape Town, McDonald and Smith [2004] show that, as an ideology, neo-liberalism is embraced by all political parties[103] and most city managers and planners and is, indeed, represented as the means of addressing apartheid inequalities. In part, they are responding to fiscal constraints imposed by central government which slashed financial transfers to local government by 85% between 1991 and 1997, and by a further 55% between 1997 and 2000. This financial squeeze was accompanied by the expansion of municipal mandates to deliver services to all citizens rather than just the white minority.

Private-public partnerships, punted by the World Bank and national government, then appeared as an efficient and cost effective means of serving 'unfunded mandates' while the notion of extending public service delivery was systematically downgraded. Local departments, still responsible for delivering services, are meanwhile corporatised – meaning that they are fenced off from the rest of local government so that they can be run like businesses. The variability of local opportunities and pressures for, as well as resistance to, corporatisation and public-private partnerships – a sort of upmarket variation on outsourcing – then accounts for something of the variety of local organisational forms.

[103] The real difference between the Democratic Alliance and the ANC in Cape Town is that the DA says it out loud while the ANC shrouds its neo-liberal affiliation in euphemisms.

Since 2004, the cuts in transfers to local government have been reversed. Central government is also investing some R24 billion nationally, up from R15 billion, through its Municipal Infrastructure Grant programme and this is supplemented by additional funding for the 2010 football World Cup. This is big money but it does not reverse the neo-liberal assumptions that now frame local institutional relations and planning. To the contrary, all the major cities have adopted the 'world class city' slogan, which sounds like a good thing but in fact expresses a commitment to keeping the city within the circuits of global capital. That means creating and servicing the high value locations and infrastructure to attract corporate investors and enable top managers to link with high value locations in other global cities.

For Samson, Johannesburg "provides the prototypical example" of the neo-liberal re-ordering of the state [2008b: 26]. It has opted for a corporatised business model. The waste utility, Pikitup, is owned by the local state and has its own Board with operational revenue theoretically funded from income. This has created pressure for boosting revenues and containing costs with the effect that rich areas get better services while costs are savagely cut both in poor areas and for functions such as street cleaning where it is not possible to secure an income. eThekwini's John Parkins does not see it as a model to follow because, he argues, real control in fact resides with the council and not the Board. One might conclude that the council has created a system of plausible denial, holding power while disavowing responsibility. If this is so, however, it reproduces the national strategy of devolving responsibility to local government while holding onto authority, whether through the centralisation of power in the ruling party, the transmission of neo-liberalism, or the concentration of market power supported by key departments.

eThekwini and Msunduzi are still funded through the rates with no independent billing for waste removal. Other revenues generated – from landfill charges and CDM etc. – are returned to the municipality. This is regarded as a disincentive to innovation. Councillors, according to Parkins, generally take a short term view defined by their five years in office. Waste management, in contrast, involves long lead times and a twenty year planning horizon at least. He argues that a 'business model' which gives DSW greater autonomy of decision making would allow it to plan for the long term. uMgungundlovu's Jogiat similarly complains that waste management in the district does not have its own 'cost centre' and says this is a reason why information on waste is not collected.

The low priority given to waste is common to most municipalities – with councillors and senior managers "wanting it just to disappear", according to Jogiat. So councillors who couldn't get anything better end up serving on waste committees. For some observers, this is linked to the fact that, in contrast to sectors such as housing, waste has not produced business opportunities for councillors. More general pressures from 'unfunded mandates' across the range of service delivery pushes waste down the order of priority. eThekwini perhaps is an exception to this trend. DSW has put considerable effort into persuading council of its importance and, according to Parkins, waste is about fifth on its list of priorities.

Privatising …

Irrespective of organisational form, the trend to privatisation is common. Even where waste services are not corporatised, functions are outsourced on the edges of the original core business of collecting and disposing waste from formerly white high income areas. So privatisation is frequently associated with the expansion of services into black areas, often on the rationale of creating 'entrepreneurial opportunities' for local business – which may mean contract labour employed directly by the municipality or indirectly through a labour broker, or it may mean that collection is outsourced. The effect is to reproduce racially defined differentiation of services.

In the end, however, either the municipality pays the contractor directly or people, redefined as consumers of waste services, pay. Municipalities may make savings in the short term but, in line with the overall experience of privatisation, they will likely pay more in the long term as they increasingly lock themselves into dependence on monopolistic service providers.

… labour

In the meantime, savings are less about the superior efficiency of private enterprise than the lower wages paid to workers and women workers in particular. Samson shows that male workers, permanently employed and with full union rights – equivalent to Webster and Van Holdt's 'core labour' – are predominant in the traditional core waste service areas. In Johannesburg, "Forty per cent of workers employed by Pikitup were women, 93 per cent of whom were employed in the feminized street cleaning section" [2008b: 28]. Most of these women were previously employed as 'permanent casuals'. Although they are now being made permanent by Pikitup, the number of workers employed in street cleaning has been progressively cut. This no doubt looks good as

an increase in 'productivity'. The streets, however, get dirtier and the women become increasingly vulnerable as they are more likely to work in isolation. To further increase savings Pikitup contracts out much of its street cleaning to small operators while tightening up on what it will pay. Most of the workers employed by these companies are women. They are not covered by bargaining council agreements on minimum wages, are very poorly paid and have tenuous access to labour rights. At the bottom of the hierarchy, labour is mobilised in the name of 'development', either on public works programmes exempted from key sections of the Basic Conditions of Employment Act or as entirely voluntary labour within one or another 'poverty alleviation' project in poor neighbourhoods. Many volunteers have been working for years in "the hope that volunteering would help them to secure employment", says Samson, but "by volunteering they undercut the need for Pikitup and the private companies to hire more workers" [32].

… skills

Privatisation is also driven by the paucity of skills in municipalities, says Jogiat. Even the larger municipalities are having trouble holding onto high level managerial and technical skills while in many smaller towns the skills were never really there. 'Lack of capacity' has indeed become a leitmotif of the justification for private-public partnerships. Political economist Ben Fine [2008b] observes that there has been adequate capacity to bid for and prepare to host the world cup; that South African corporations have demonstrated the capacity to globalise; that this capacity to globalise was supported by the state's capacity to facilitate those corporations listing in the global centres of accumulation – which was tantamount to managing capital flight from the country; that there is capacity to implement BEE; that considerable capacity has been put at the disposal of the PBMR project along with several other 'mega-projects' such as Coega. In short, the question is not so much one of capacity as of where capacity has been and is being built and the answer, since the late 1980s and more particularly since 1996, is 'not in the public sector'. But this fits within a broader pattern of neo-liberal de-skilling. There is now a global shortage of high level skills across a range of sectors as a result of corporate as well as state cost cutting through the 80s and 90s. Municipal engineers and managers are consequently now head hunted by corporations and by high paying global development institutions such as the World Bank.

… landfills

In consequence of the refusal to build the public sector skills base, the formalisation of disposal, following the introduction of the minimum standards, has played unevenly into the privatisation agenda, creating skills requirements to which only the larger municipal departments could respond. This is now likely to be taken further as the DEAT takes over the DWAF's responsibility for regulating landfills. DEAT's ambition is to close all the smaller un-permitted dumps in favour of large regional landfills. This is already anticipated in the planning of some district and metropolitan municipalities. eThekwini hopes to strike deals with neighbouring municipalities to take their waste to its new Buffelsdraai landfill. uMgungundlovu is currently looking for a site to build a new landfill to take waste from the entire district – although this plan may be scuppered by Msunduzi's metro ambitions. Unlike eThekwini, uMgungundlovu sees no prospect of running the landfill itself and plans to hawk it out to a private operator. Emfuleni is considering a major landfill to the "west of the Vanderbijlpark steel plant" – possibly in the already polluted Steel Valley. Operations at the Boitshepi dump are already privatised so the municipality has been paying for the development of the operator's skills base.

The peak of global oil production, anticipated in two or three years although likely to be delayed by economic depression, will play havoc with these plans for super-dumps. On the one hand, the rise in fuel prices will accelerate, making long distant waste transport unviable. On the other hand, the global depression now in prospect will likely force a reduction in waste, undermining the logic of economies of scale. Either way, a wholesale review of waste management will become necessary but the volatility of markets and prices will make traditional cost-benefit planning virtually meaningless.

… 'green'

Integrated waste management incorporates waste into the orders of ecological modernisation. The waste hierarchy here becomes a series of niche markets in which property rights are created in activities such as recycling to supplement the main business of disposal. Formalisation of landfills, notably the fencing in of sites, thus combines with the waste hierarchy – or rather, the commodities boom – to create the conditions for formalising recycling, elbowing out the waste pickers in favour of formal businesses.

eThekwini has pretty much completed that process. Msunduzi is just starting out with its brutal exclusion of waste pickers while tendering out the contract for the recycling facility. Further down the municipal hierarchy, Emfuleni and Sasolburg represent divergent responses. The initiatives at Palm Springs are possible precisely because the dump is informal and because the municipality ignores waste, leaving Loate to act on his own very considerable initiative. At Sasolburg, in contrast to Msunduzi, Metsimaholo has fenced the reclaimers in rather than out in order to facilitate the appropriation of their pickings.

'Green' initiatives such as recycling and CDM projects appear as prime candidates for privatisation. Ironically, this might be producing the kinds of business opportunities that will give waste a higher profile in council. Thus, there are rumours that Msunduzi councillors have business interests in the New England Road recycling facility while enforcing the Remade-Phutang contract on the reclaimers seems pretty much the beginning and end of Metsimaholo's interest. That it appears to have acted at Sasol's instigation is perhaps testimony to the local politics of patronage.

At the same time, the 'green' opportunities are drawing municipal managers into the wider circuits of ecological modernisation – particularly CDM, following the success of eThekwini – creating links to global institutions and giving waste a shade of glamour that it previously lacked. Thus, eThekwini mayor, Obed Mlaba was quoted by the World Bank's Prototype Carbon Fund:

> I think the example we are setting in Durban, working with the World Bank to deal with landfill, is a huge innovation. We are turning dirt and garbage into a raw material that we could grow wealth from. If you wanted to say to yourself, 'we want to be the cleanest city in the world' waste, in my view, is the best place to start. [quoted in Patel 2008]

Ecological modernisation is here associated with the broader project of neo-liberal globalisation, CDM being regarded in most southern countries as another channel for foreign direct investment with fierce competition for projects, accompanied by complaints that Africa is losing out on this as on other investment.

The priority given to capital similarly makes recycling a thing of the markets. Prior to the commodities boom, only the waste pickers did it, finding value at the point where the formal market – or capital – has terminated all value. The character of waste at

each dump is tied to the local economy – reject chicken feed and chocolate at New England Road or metal in the slag at Boitshepi. People have been recycling from many of them for decades. In Sobantu, they created their own networks of information – so that waste pickers always knew when reject chocolate or chicken feed was due at the dump – and informal markets.

The informal markets were always in the margins of the formal market but beneath notice so long as the value of recycling was marginal. The commodities boom created the conditions in which the formal market could recover value from waste with higher prices both for materials and energy. It is this, more than policy, that has attracted municipal interest. But the volatile pricing of recyclables makes this a fragile market niche and it is questionable that municipal interest will be sustained as the global depression collapses prices. Volatile prices are, of course, a function of the market. It is therefore curious that, within the waste management industry, the private sector is frequently given credit for thinking longer term than the local state, a perception that stems from the privileging of market relations. The long term in the market is in fact only a price swing away. The national state, meanwhile, has done nothing to support or stabilise prices by, for example, requiring a minimum of recycled content in final products.

Chapter 7: The question of the future

The system that makes waste of people and their environments is now making waste of itself. The competition between cities for investment in conspicuous consumption has excluded investment in waste and in the poor. Landfills and incinerators represent large investments but these are investments which destroy local property values. The presence of poor people is likewise destructive of value in the consumption city. The politics of this economy is therefore to expel both poor people and waste to the city margins – within reach but out of sight. The making of poverty and the making of waste are necessarily complimentary and those made poor must live in the environmental waste lands created by capital.

The system that created this is now coming to an end. Previous groundWork reports have warned of the impending economic crisis and noted the irony that global recession is now the best hope for a credible reduction in carbon emissions sufficient to avert catastrophic climate change – or for Northern countries simply to meet their Kyoto commitments. It presents also the best hope for a genuine reduction in waste. The point is not to celebrate recession, but to note that the economic order of capitalism is by definition unsustainable.

Commenting on the present crisis, sociologist Immanuel Wallerstein observes that 'recession' is too coy a word: "We are already at the beginning of a full-blown worldwide depression with extensive unemployment almost everywhere" [2008]. This is not a pretty prospect. Capitalism in chaotic decline is unlikely to be less vicious than capitalism booming. However, Wallerstein sees "a new order" emerging from the turbulence over the next 20 to 50 years.

> This will not be a capitalist system but it may be far worse (even more polarizing and hierarchical) or much better (relatively democratic and relatively egalitarian) than such a system. The choice of a new system is the major worldwide political struggle of our times.

As noted in Chapter 4, the origin of the crisis lies in over accumulation and the financialisation of capital. The values conjured from the air in the form of carbon trading – itself symptomatic of the financialisation of capital – will melt. Waste, and the economics of waste management, will be subject to more ambiguous change because waste, like real carbon as opposed to fictional carbon credits, represents real resources.

Assuming that 'the market' is left to decide, several trends in waste can be anticipated:

- The market definition of waste will be as volatile as the markets themselves. The price of recycled materials will be equally volatile. The informal market, however, will work to a different logic as more people look for survival in what 'the market' abandons.
- There will be less waste. Production waste will be reduced as production collapses. Post-consumer waste will reduce as households attempt to conserve resources. They will not have a free hand in this. As long as packaging is designed for dumping and goods are designed for obsolescence, the reduction will come more from reduced consumption than from saving and re-use.
- The collapse of commodity prices will collapse recycling markets but this process will be uneven. Depression will also deter investments in high cost raw materials extraction and so create shortages in some 'virgin' materials and a corresponding demand for recycled materials.
- Even in a depression, the price of oil will not stay down long. Peak oil may be delayed but only for a few years. While reduced demand will off-set the decline in existing production, reduced investment will mean that less new oil is available to replace depleted wells.[104] Any signs of economic recovery will be met with another round of price escalations.
- Planners are likely to be constantly wrong-footed. Thus, plans responding to high oil prices may now be shelved. eThekwini, for example, may be tempted to abandon plans to contain soaring fuel costs through recycling. A contraction

[104] The International Energy Agency has been complaining for some time now that energy investments are inadequate to future needs. This remained the case even as the price rose from $20 to $50 to $100 to $140. At the time of writing, it has retreated to below $60, the clearest indication that the markets expect recession. Many of the new oil projects now in prospect – extra deep sea, extra heavy oil or tar sand – require a price over $80 to be viable and their proponents are now having second thoughts. Aside from price, the volatility of the market will itself be a deterrent. Even when prices start going back up, investors will not be certain how long they will stay up.

> of municipal revenues will also put pressure on planning. Councils are likely to look for savage cuts in expenditure – even where those cuts result in higher future costs even in the short term. Those higher costs, however, may be avoided by simply neglecting services.

What the market abandons will not just be about materials reclaimed from waste. It will include mines from which owners will abscond. It will include factories such as those abandoned by owners – some of which were reclaimed by workers – when Argentina went broke in 2005. It will include whole areas of towns and cities. Capital will defend the shrinking enclaves of value while abandoning whole districts, nations and regions. In short, left to a declining market, what will appear will be a more extreme version of what has been produced by the expansion of financialised capital since the late 1970s.

Financialised capital has relied primarily on 'accumulation by dispossession' to manage a vast redistribution of wealth from poor to rich – globally and in most countries North and South. The groundWork Reports have identified three ways in which this works and environmental injustice is imposed on people:

- By polluting them, degrading their environments and coercing labour to work for less than it costs to live. This is called **externalisation** because corporations get a free ride by off-loading costs onto communities, workers, the public purse and the environment.
- By directly dispossessing them and by privatising common or public goods. This is called **enclosure** because it eliminates or subordinates non-capitalist systems of production, so ensuring that all escape routes are closed and people cannot survive without capitalism.
- By **excluding** them from the political and economic decisions that lead to their being polluted or dispossessed.

Geographer David Harvey [2005] argues that, during the 'golden age' of post war capitalism up to the 1970s the exploitation of labour was the primary means of accumulation and this created a working class politics for 'expanded reproduction' – for full employment and better paid jobs based on higher levels of growth sustained through increased demand. These gains, however, were largely confined to the First World and were not shared by Third World workers. Now inequality is growing in all countries and the promises of development ring hollow. Yet they retain great power because there is no evident escape from dependence on capital: if there are no jobs

on offer, then there is nothing but scavenging scraps from the world's overflowing rubbish dumps. Yet the numbers of those made destitute through the enclosures and externalities of accumulation by dispossession grows every day while the potential for expanded reproduction within industrial capitalism shrinks and is now collapsing.

Excluding people from decisions is the pre-condition for externalising costs onto them or enclosing their resources. At Sasolburg, the waste pickers' labour itself was enclosed along with the recyclable materials from the dump and their exclusion from the decision making process was necessary for that end. Abahlali baseMjondolo insists that recognition is the first priority of their struggle. This is a refusal of exclusion and the necessary point of departure for the struggle for environmental justice. It is non-negotiable. Those who deny people's right to speak for themselves as equals with whomsoever claim power over them and this power finally rests on violence. With Abahlali's refusal of exclusion, that violence was made explicit.

The first world conference of waste pickers was held in Bogota, Columbia, in March 2008. Delegates came from 34 countries where waste pickers are getting organised – most from Latin America, where organisation is strongest, and Asia and with a small group of delegates from Africa where, for the most part, organising is barely started. Chris Bonner of WIEGO[105], who helped organise the conference, notes that the politics and agendas of the different waste picker organisations are very diverse. But the conference declaration highlights their common commitment to "the social and economic inclusion of waste pickers in solid waste management systems and to promote and strengthen their organisations" [quoted in Bonner 2008: 9]. Delegates noted that, in most Southern countries, recycling is the province of waste pickers but their contribution is generally not recognised and their livelihoods are everywhere under threat of enclosure as municipalities privatise waste services through contracts with large corporations.

[105] Women in Informal Employment: Globalising and Organising.

Greening and the city

There are a host of good ideas and technologies for the greening of waste. They include methods of recycling and approaches to design. They are elaborated in the principles of life cycle management and of 'natural' cycle production. Many of these ideas are essential for a long term project of creating economies which do not waste the earth. Thus far, however, cleaning up in the rich world – or the consumption city – amounts to displacing waste to the poor world. Waste involves risk and the distribution of risk is then a political question. It requires choices and, as philosopher Slavoj Zizek comments, "the powerful do the choosing, while others do the risking"[106] [2008]. This displacement of waste and risk does not address the environmental issue because it does not address the human issue – that is the relation of power between people. Waste remains a marker of class and power.

Prior to industrialisation, and particularly the development of chemicals, the most dangerous waste was human excrement. In principle, all waste materials could be reintegrated into the soil. Waste now presents a very different profile: many materials do not bio-degrade and, as waste, are contaminated by toxics; the volume of toxic waste, particularly from production, is simply staggering.

It is in this context that environmental justice organisations call for the elimination of waste. This implies: reduced consumption by the rich within a more equal world; and a transformation of technologies, for example, eliminating built-in obsolescence and toxic production; and the recycling of goods and materials that can no longer be mended.

Technologies are not neutral. They are both products and embodiments of power relations. The incinerator, the sanitary landfill, the waste compactor truck, all embody the power that the institutions of state and capital as well as richer consumers have in relation to waste. This includes the specific interest groups such as waste engineers who need to protect their markets as well as the more general interest that capital has in externalising costs. And these are investments that then demand more waste. Otherwise they end up as devalued stranded assets.

[106] Zizek originally made this comment in relation to Enron where the bosses who chose the risks could get their money out while employees lost their jobs as well as the money they had been persuaded to invest in the corporation. The same scenario is repeated with the financial melt-down as the managers who took the risks depart with golden handshakes while the costs of their choices are redistributed to others.

Waste compounds waste. Take human excrement. Shit is unpleasant and dangerous but is basically composed of nutrients in roughly the same proportions as those contained in artificial fertiliser: nitrogen, phosphorus and potassium. It is also a potential source of energy. It is naturally contaminated with pathogens from the human gut which can be treated fairly easily. It is unnaturally contaminated with heavy metals and chemical compounds because people themselves now carry a 'body burden' of pollutants. Metals can be sedimented out, but the sediments then need disposal. Many chemical compounds are more difficult to remove. Thus the toxic environment created by capital compromises the value of sewage as manure. Conventional plants are not built to make sewage available for energy or manure. Rather, they use high energy inputs and chemical disinfectants and, at the end, produce a toxic sludge. Similarly, a large portion of the municipal waste stream – invariably more than half and estimated at up to 70% in India – is composed of garden waste and food which, with little effort, could be separated, composted and returned as energy to the soil. In landfills, this resource turns toxic.

In Paul Connett's view, waste is a low-tech problem that has been compounded rather than addressed by high-tech solutions.[107] The experience of recycling would seem to confirm this view. North and South, the most successful recycling is relatively low tech. At the Bogota conference, delegates observed that Southern countries are adopting costly and environmentally destructive first world technologies such as compactor trucks and incinerators. They argued that informal systems are more efficient and agreed "to reject incineration and burial-based processing and defend systems that support the popular economy" [quoted in Bonner 2008: 9].

Box 22 shows that the better part of municipal waste disposal is unnecessary. The figures for reduction achieved through recycling are not strictly comparable as they were developed using different methodologies. Nevertheless, it is striking that the results from informal recycling in the South are at least as good as those from formalised recycling in the North.

Such high rates of diversion rely first on composting because of the high proportion of 'wet waste'. In these examples, composting is based on a variety of techniques using static piles, windrows, worm composting or vessels such as bio-digesters. People compost waste even in cramped conditions using small pots on the balconies of flats.

[107] Talk given at the launching of Target Zero Canada, Toronto, Canada, November 21, 2000.

Box 22: Reductions in municipal waste from recycling

Zabbaleen-served areas of Cairo, Egypt – 80 to 90%
Opotike District, New Zealand – 85%
Gazza, Padua, Italy – 81%
Halifax, Canada – 65%
Curitiba, Brazil – 65%
Sun Valley, the Philippines – 59%
Barangay Bagumbuhay, the Philippines – 52%

Source: Platt 2004: 31.

There is also great variety in who really manages waste, wet or dry, and in the distribution of benefits. Recyclers save 'air-space' in municipal landfills. The immediate beneficiary is the local government but it is ultimately the main producers of waste, richer households and businesses, who benefit. Researcher Brenda Platt [2004] reports that in some cases, such as Barangay Bagumbuhay in the Philippines, waste pickers are rewarded for this saving. In most places, they are not. Rather, it seems, waste pickers – and the waste itself – are disregarded and a substantial part of the value of their work is effectively appropriated. Ironically, it is because waste is disregarded that the resource is left open to the poor who toil long hours in dangerous conditions. Their returns are generally low and, in the formal market, they are at the mercy of volatile pricing and vulnerable to exploitative pricing by dealers.

In the North, waste activists and local groups have created a politics of zero waste, confronting the immediate problems of municipal waste created by consumerism and complimenting this with campaigns directed at retailers and producers to eliminate unnecessary packaging and toxic products. This is partly a response to the unease that people in Northern countries feel at their complicity in wasteful consumerism. Yet, in contrast to corporate zero waste spin, it also aims to enlarge the democratic space in relation to local and national government and it gestures towards the possibility of another world. Box 23 briefly summarises the zero waste campaign in north America.

In the South, waste picker organising is frequently articulated within the strategies of neighbourhood organisations or movements of the urban poor, sometimes supported by NGOs. In some cases, they have taken initiatives to move from the dump to intercept

Box 23: Citizens' agenda for zero waste

The 'Citizens' Agenda for Zero Waste' emerged from "decades of opposing landfills and incinerators and promoting recycling", say Paul Connett and Bill Sheehan. The zero waste movement presents a raft of alternatives to current waste management. At its centre is the conviction that "our current industrial system and throwaway society is based on the one-way flow of virgin resources to polluting dumps and incinerators … We need to reconfigure our one-way industrial system into a circular, closed-loop system, recycling discarded resources from communities back to industries, both new and old."

While in practice the citizens' zero waste agenda mostly focuses on reduction of the waste stream, recycling and reuse, it also argues that "[c]ommunities cannot solve the trash problem alone and should not be forced to clean up after irresponsible industries."

Zero waste activists have developed their own categories for analysing the waste stream: avoidables, reusables, compostables, recyclables, toxic materials, and re-designables. Each of these categories calls for different strategies: from dealing with the immediate waste stream in creative ways, to activism that forces retailers or producers to take back the unrecyclables and redesign or remove the re-designables they are responsible for. Tactics extend to take-back campaigns and shaming the producers of toxic waste and "silly" throw-away and fake convenience packaging.

In Halifax, Canada, citizen groups opposed a council plan to expand the dump as well as its alternative proposal for incineration. The council finally accepted the citizens' plan for intensive recycling and, with active people's participation, achieved a 50% reduction in municipal waste in just five years with more since. Other north American towns are also achieving major reductions and setting up recycling, fixing and re-use centres which have created permanent jobs and produced re-use goods including fridges, computers, bicycles and furniture.

Source: Paul Connett and Bill Sheehan 2001: A Citizens' Agenda for Zero Waste accessible at http://www.grrn.org/zerowaste/community/activist/citizens_agenda_4_zw.html.

waste at source to recover the high value items before they are contaminated by the mixing of waste and before the waste becomes a threat to health. In such initiatives, fees may be charged to households for waste collection or the reclaimers may pay for high value recyclables such as scrap metal.

In poor suburbs and settlements in India and the Philippines, pickers have provided collection and recycling services for their own neighbourhoods. They have built up understandings with both waste producers – shops, restaurants, tourist establishments – and middlemen who rely on them for a constant supply of recyclables [2004]. In Cairo, the zabbaleens (garbage collectors) collect from wealthy suburbs. They recycle 90% of the garbage, returning only 10% to the municipal dump. Their list of recyclables includes iron, nylon bags, copper, soft plastic, animal bones, aluminium, transparent plastics, cloth, broken and whole glass, paper, cardboard, tin and organics. The zabbaleen also make things to increase the value of recycled materials, for example working rags into stuffing for cushions and mattresses and pelletising plastic for resale.

In Curitiba, Brazil, the left-leaning municipality has supported the initiative of organisations of the urban poor to collect at source. Platt argues that this has been critical to the success of recycling in that city and enables the expertise and experience of pickers to create the basis for city-wide waste management. "These decentralized activities may need only an institutional structure and land for activities such as composting to be scaleable to city levels. Indeed, community projects can become mainstream solutions by being replicated in neighbourhood after neighbourhood" [2004: 30].

In some cases, NGOs have driven the process of organising pickers. A composting project run by the Young Women's Christian Association in Teoville in Paranaque City, the Philippines, kicked off with a six month period of engaging with householders to segregate their waste. The result was an expanded awareness of environmental issues, as well as projects for recycling paper, plastics and glass. The Exnora International[108], with its headquarters in Chennai, India, has supported the growth of a social movement with 300,000 members and over 1,700 Civic Exnoras, many of them with their own Zero Waste Centres.

[108] Standing for EXcellent, NOvel & RAdical.

National movements of waste pickers are well established in Brazil and Columbia and several affiliate groups have set up materials recycling facilities. In Brazil, they have support from President Lula da Silva. Nevertheless, Bonner notes that many face competition from corporate rivals bidding for municipal contracts. The establishment of formal recycling plants becomes a prerequisite for getting the contracts. The intention is to improve people's lives by creating work off the dump but, while most pickers value their autonomy, the plant requires the formalisation of labour with regular hours and supervision by technical and managerial staff. The contradictions are sharpening at a number of plants.

The people engaged in waste picking are generally driven by desperate circumstances. It is, in the first place, a 'survivalist' activity carried out by people impoverished by capitalist development. The zabbaleen of Cario are dispossessed farmers who moved into the city. Once there, they were again removed from more valued locations to the city periphery. Children often work with their parents for long hours and in unsafe conditions. And the zabbaleen face competition from large, commercial recycling firms as Cairo municipality follows the international trend of privatising services. Laila Kamel describes several initiatives – education, health, sanitation and water supply projects – that have improved their lives. However,

> … a number of serious, negative conditions prevail: garbage still arrives in the neighbourhood unsorted. What is not fit for recovery and trade is left on the streets to rot or burn. Women and adolescent girls still sort rotting filth manually. Hospital waste still arrives mixed in with kitchen waste. Health hazards from broken glass, infections from syringes and sharp metal still occur. Though animals are now often contained in pens, their presence in the neighbourhood still creates an unsanitary condition in the home and on the streets. Burst sewage pipes constantly threaten the health of the population. [Kamel 2000].

More broadly, pickers operate within the harsh constraints of capitalism. On the one hand they are challenged by privatisation and on the other rely on access to the markets of the consumption cities. The strategies of organised pickers, like that of other groups of informal workers, have largely aimed at moving up the value chain defined by capital. It is a way of surviving the neo-liberal context but, notes Bonner, one criticism of the Bogota conference was that there was no real political debate. The most immediate difficulty is that the markets for recyclables are notoriously fickle and

can collapse overnight. Beyond that, people are trying to improve their position, and are constrained to do so, within the system that makes ever more people waste.

The crisis of capital sharpens the question of politics. The articulation of the struggles of waste pickers within broader movements of the urban poor gestures towards a politics capable of responding to this moment. People's struggles around waste are a part of what Harvey calls the struggle for 'the right to the city'.

> To claim the right to the city in the sense I mean it here is to claim some kind of shaping power over the processes of urbanization, over the ways in which our cities are made and re-made and to do so in a fundamental and radical way. [Harvey 2008: 2]

In the neo-liberal period since the late 1970s, the making, unmaking and remaking of the city, and of the hinterland it makes of the country, has been driven by global finance capital. It has impoverished people in the country as much as in the city while creating globally connected enclaves of 'world class' affluence. The battle for the city cannot therefore be a parochial affair but it is also always the struggle in each country district, town and city. It is in this context that the question of waste – who makes it, who works in it, where it goes and why it is produced in the first place – carries a political charge that goes beyond access to markets as well as beyond narrowly technical 'green' solutions. It challenges trade unions and social movements to join forces in struggle and to respond to the question of the future. If capital is terminated in the struggles that intensify over the next decades, what will be the base, to succeed the corporation, for organising production and doing so democratically and without waste?

Finally, waste appears as capital's unadvertised testimony. It is part of the ecological debt owed by the twin powers of capitalism and imperialism to present and future generations of people.

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