CHAPTER 7

AT THE CUTTING EDGE: PRECARIOUS WORK IN BRAZIL'S SUGAR AND ETHANOL INDUSTRY

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Dawnlight seeps slowly into São Paulo skies
as if reluctant to rediscover old betrayals
or disclose new ones

Dennis Brutus, 2010

INTRODUCTION

The late geographer Milton Santos interpreted the changing Brazilian landscape as a dynamic social product of *work*, both past and present. What happened at each specific site was affected by previous practices and by their link to the globalized systems into which these sites were incorporated. "Space", he wrote (1978, p. 138),

> is a witness to a moment in the mode of production in these concrete manifestations; it is where some processes adapt themselves to pre-existing forms, while others create new forms that are inserted.

His words resonate across the swaying stands of sugarcane, blood red soils and cloudless skies surrounding the biofuel refinery in Brazil's São Paulo State where we base our study of precarious work in the production of sugar-derived ethanol. They begin to explain how it is that company engineers are flown to Canada to perfect advanced biotechnologies as sugarcane cutters disembark from a dusty bus and angle their machetes into the fields for their last season of employment. They help us understand why new public/private highways linking once-remote rural areas to expanding port terminals will be driven by those willing to risk their life to make a living wage. And they help us comprehend how a cane cutter, who stands amidst the fields of Brazil's oldest industry now targeted for North American, European and Asian investment and reflects that 'they don't want to know if you live or if you die', symbolises not just a superexploitation of rural workers inherited from slave plantations and their historic invisibility to state policy but also their dispensability in the contemporary project of modernization rolled out by government and the recent mergers between Brazilian and international capital.

In this context, this chapter explores what Brazilian state and corporate determination to lead the international commodification of green energy in general – and sugar-derived ethanol in particular – mean for the growth of precarious work amongst those who cut and transport sugarcane in two areas of São Paulo State, a region with a relatively long history of industrial production and westward expansion into the interior. Three categories of workers are being subjected to this precarity. First, there are the locally sourced, waged cane cutters who are still paid based upon the weight of cane they cut and who face a crude, Darwinesque 'selection of the fittest' at the end of each season as they anxiously await the announcement of those who will be invited back the following year.[1] Second, there are the migrant cane cutters, who exist in a permanent condition of underemployment and who are contracted temporarily to the cane fields. For both of these groups the pressure to compensate for a very poor and seasonal wage by augmenting production through the forfeiting of breaks and the illegal lengthening of the working day – practices which have contributed to the alarming growth in worker deaths in the cane fields – is exacerbated by the annual cull of the workforce. Third, there are the drivers of the sugarcane trucks, workers who, in the context of the current trend towards the outsourcing of transport work for 'greater operational efficiencies', are subject not only to third-party subcontracting but, frequently, fourth-party subcontracting and who, because of their tenuous contracts, are stuck without statutory or trade union protections and so are routinely pushed to drive for ever longer periods of time, a development which has made the road transport of cargo Brazil's most dangerous profession.

These, then, are the categories of workers we analyse as we explore the persistence of precarity within Brazil's sugar-producing sector over four distinct periods: i) the post-revolutionary era of state planning (1930-64); ii) the period of import substitution under military rule; iii) the phase of neoliberal structural adjustment policies implemented between 1982 and 2002 under the aegis of the International Monetary Fund and World Bank; and iv) the era of the expansion of international capital in the sector following the Kyoto Protocol of 2002. After outlining these four periods in general terms, we then explore how they impacted the two regions of our study – Middle Paranapanema and Pontal of Paranapanema (see Figure 5.1). In so doing we pay particular attention to the hegemonic companies present in the region which have driven the modernization of Brazil's biofuel industry and which have transformed the landscape – economically and materially – through their aggressive competitive strategies. In the chapter's third section we draw upon the testimonies of salaried and contracted manual sugarcane cutters, together with those of the truck drivers who transport sugarcane in the outsourced sections of the commodity chain, to examine the implications of these industrial developments for the growth of insecure, underpaid, seasonal, poorly protected and hazardous work. Finally, we explore how these precarious conditions are variably accepted or resisted individually and collectively. In doing so we consider the current and future challenges faced by Brazil's trade unions.

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THE STATE, SUGAR AND SERVITUDE

Brazil's first refinery to process the sugarcane cut by slaves on huge northeastern plantations (*latifundia*) was built in 1532. The wealth generated by this white gold would be instrumental in shifting the locus of mercantilism away from the Mediterranean towards transAtlantic commerce and, later, in driving European industrialization. Although the 18th century saw growing challenges from French and British planters in Haiti, Barbados and Jamaica, sugar has remained one of Brazil's most important cash crops for nearly five hundred years. Initially reliant upon labour provided by slaves from Guinea, Congo and the Portuguese possessions of Angola and Mozambique, little changed in how the industry was organized after slavery's abolition in 1888. Given that Brazilian elites' profits have historically been tied to the sale and consumption of their products abroad, both during and after slavery they have shown little interest in how their workers have been able to socially reproduce themselves domestically. Instead, their primary concern has largely been to ensure the continued availability of an abundant reserve of cheap, interchangeable labour (Souza 1975; Santos 1978; Marini 2005). In the absence of the kinds of technical developments which increased the productivity of labour in the European industrial revolution, securing greater levels of surplus value from sugarcane workers has historically been done largely by increasing their work rate whilst reducing their wages. Consequently, physical degradation and the need for workers to supplement their meagre incomes through subsistence agriculture or through finding secondary jobs have been the enduring hallmarks of a super-exploitation of readily available labour that has been integral to Brazil's capitalist development (Marini 2005). What is most striking about this development model, though, is the persistence of this kind of work alongside recent technological and economic developments which have seen Brazil emerge as one of the planet's largest and most dynamic economies. To understand how this has come to be, in the remainder of this section we outline the complex articulations of state, capital and labour relations through four distinct economic periods in Brazil's recent history.

From colonialism to state planning

Brazil's loss of primacy in the sugar trade following the abolition of slavery and growing competition from the Caribbean, Antilles and Philippines was exacerbated by the 1929 economic crisis, which reduced demand for Brazilian sugar in European and US markets (Edel 1969). Amidst economic upheaval and discord among the landowning elites, discontented politicians and soldiers marched into Rio de Janeiro in 1930 and declared a new Republic. The new state actors, without historic ties to the powerful northeastern landowners, quickly recognized that ethanol, long considered a mere by-product of sugar, had the potential to substitute for imported oil (Szmrecsányi 1979). With the establishment of the Institute of Sugar and Alcohol (Instituto do Açucar e do Alcool – IAA) in 1933, they took an increasingly central role in the planning and development of the sugarcane industry.

Over the next 40 years the area of sugar cultivation increased more than five-fold and production by a factor of six as companies in the Central and Southeastern ('Centro-Sud') region of Brazil took advantage of generous government subsidies toward those refineries that could switch between sugar and ethanol production. They found a healthy market in the increasing sugar and energy demands brought about by rapid industrialization in the state of São Paulo, such that by the 1950s the Central South region had replaced the Northeast as the country's major sugar supplier (Ribeiro and Tonella 2010). Having concentrated almost solely on sugar production, the Northeast, once the richest region in Brazil, quickly became the poorest, bleeding an army of rural labourers who migrated seasonally or permanently to São Paulo State's expanding cane fields.

Import substitution in the 1970s

Despite the efforts of the IAA to boost indigenous ethanol demand and supply, 80 per cent of the energy required to drive the military government's import-substitution policies of the 1960s and early 70s was met by imported oil. This dependency was starkly revealed when the cost of oil imports tripled during the 1973 OPEC crisis. Facing economic crisis, the Ministry of Industry and Trade launched the PROALCOOL programme in 1975 to achieve two principal goals: i) increase the national production and consumption of ethanol as a biofuel replacement of oil; and ii) grow the chemical processing industry to counter the national balance of payments deficit (Ribeiro and Tonella 2010).

The PROALCOOL programme was one of several agro-industrial policies during this time which relied heavily upon borrowed money, much of it sourced from abroad. However, the military's vicious repression of organizations representing labour, which saw its share of national income slashed, appeared to be counterproductive as it resulted in the population simply not having sufficient purchasing power to spur on national development (Marini 2005).[2] This problem was exacerbated in 1982, when Brazil underwent the largest (at that time) debt default in modern history and the government was forced to the table by the International Monetary Fund (IMF). The resultant structural adjustment programme deregulated the state-planned sector and ended the export regulations that had favoured northeastern landowners at the expense of the southern (São Paulo) distilleries (Leal 2008). It also ended controls on land pricing and led to a virtual end to credit support for the rural poor, who were no longer able to reproduce their familial agriculture. Overall, some three million jobs were lost in the countryside (Jakobsen and Barbosa 2008). This led, in turn, to increased migration to the urban centres, swelling the *favelas* and city peripheries as inequality reached a historic peak (Cassel and Patel 2003).

Market liberalization

Brazil deepened its integration into regional and global markets by joining the southern trading bloc MERCOSUR in 1991 and the World Trade Organization (WTO) in 1995. The withdrawal of targeted subsidies and subsequent intensification of competition closed the doors of many sugarcane mills in the north of Brazil, contributing to the exodus of about 1.5 million migrants between 1995 and 2000 from Pernambuco alone (Hirsch *et al.* 2002; Santos 2006). Many of these migrants found their way to São Paulo's cane fields and were amongst the 25 million rural workers surviving on temporary rural jobs as foreign debt servicing replaced national welfare spending, work informality peaked and wealth was further concentrated.[3] Unemployment more than doubled between 1994 and 2000 (from 6.1 per cent to 15 per cent) and, ironically, was higher amongst the better educated (with 4 to 7 years of schooling) than amongst those with less than one year of schooling. This was a stark indication of Brazil's reversion to primary production for export under IMF-inspired neoliberalism and, as agricultural exports increased to 41 per cent of total exports, a renewed reliance upon a particular and historic comparative advantage: poorly paid and unskilled labour.

Despite these developments, the government dispatched R$2.2 billion in public funds to reenergize distillery development as low ethanol demand and unstable sugar prices escalated debts within the industry at the close of the century.[4] Seventy per cent of this credit was used by São Paulo State companies, whose economies of scale allowed them to buffer the crisis that had disabled weaker firms and so to pave the way for a migration of the more successful companies with new organizational strategies and competencies to the 'regional frontiers of sugar cane' (Belik 1998, p. 159; Eid and Neve 1998; see also Santos 1996).

Renewable energy and international expansion

In the context of these changes, São Paulo State-based companies were well positioned to take advantage of the lifeline thrown to the industry by the 2002 ratification of the Kyoto Protocol, which increased global interest in renewable energy production. Furthermore, the newly elected government of President Lula da Silva boosted the market though the 2003 introduction of incentives for 'flexible fuel vehicles' (FFVs), which can run on either petroleum or ethanol-based fuel. Presently, 88 per cent of new light duty vehicles produced in Brazil are FFVs and, to date, these vehicles and endogenous industry have absorbed almost all of Brazil's annual ethanol production. With global biofuel prices doubling between 2000 and 2010, leading global brands in food (Bunge, Cargill), energy (BP, Shell), biotechnology (Monsanto, Iogen) and automobiles (Hyundai, Mitsubishi) moved in to take advantage of Brazil's natural endowments of land, sun and water, its large internal market, attractive interest rates and a remarkable R$28.2 billion in state credit.[5]

As a result of these developments, the area planted with sugarcane almost doubled between 2000 and 2011 (from 4.8 to 8.1 million hectares) and ethanol production increased from 11 billion to 28 billion litres over the same period. The companies most responsible for the second boom in ethanol production (between 2004 and 2009) have been those with access to sufficient international finance to redistribute escalating debts and nourish the required territorial and technological advances. This has been even more apparent following the 2008 financial crisis (Mendonça *et al.* 2013). With the subsequent squeeze on government-backed credit, multinational companies have grown at the expense of those with more limited scales of operation. Thus, fifty-one companies have ceased operations since 2007, with 30 of these folding in 2011 and 2012 alone. By 2012 these closures had extinguished an estimated 13 000 direct and 32 000 indirect jobs (*Folha de S. Paulo* 2012).

The period of the early 2000s, then, was one of significant capital centralization and concentration. Ninety-nine mergers and acquisitions took place in the ethanol industry between 2000 and 2009 (Pretto 2009; Scaramuzzo 2009). By 2011, the amount of foreign capital in the sector had tripled in just the previous three years and four of the top five companies are now more than 50 per cent owned by foreign interests (Borras *et al.* 2012). Of the 43 member companies of the Brazilian Sugarcane Industry Association (União da Indústria de Cana-de-Açúcar – UNICA) that produced 60 per cent of the country's ethanol in 2012, just two (Cosan and Copersucar) commanded 44 per cent of the country's production. These operational scales of the industrial leaders make for highly unequal power relations.

GLOBAL FORCES IMPACTING LOCAL PRODUCTION

Middle Paranapanema

In 1936 and 1947, respectively, two family-owned distilleries – Cosan and NovAmérica – were founded in São Paulo State. In the 1980s Cosan formed joint ventures with several French, British and US sugar conglomerates, thereby expanding its production and market capacity. In 2009 the company took over several NovAmérica distilleries. However, it chose not to acquire NovAmérica's agricultural operations, which today supply 8.5 million tonnes of sugarcane to Cosan plants in Tarumá, Maracaí, Paraguaçu and Caarapó, thus pushing responsibility for the supply of a high quality and quantity of sugar onto its contracted providers. It thus avoided direct responsibility for the labour involved in planting, harvesting and transporting raw sugarcane, although this does not mean that it is not deeply implicated in the unlawful, degrading and slave-like working conditions experienced by cane cutters in recent years (*Reporter Brasil* 2011a; Xavier *et al.* 2011). In 2010 Cosan merged with oil giant Royal Dutch Shell to form a new company: Raízen. Valued at US$20 billion, the venture quickly gained a 23 per cent share in the national sugar market and Raízen became the largest sugar and ethanol producer in the world, promising to double ethanol production and 'turn ethanol in to an international commodity' (Raízen 2012).

The centralization and concentration of sugar capital exemplified by the emergence of Raízen is having significant impacts. In particular, the intensified competition imposed by the large corporations has exacerbated problems for the few family-owned plants left in the Middle Paranapanema region of São Paulo State. One such plant is the Pau d'Alho facility in Ibirarema, whose closure in December 2012 had dramatic effects on the small town – of the municipality's 7200 inhabitants, 1800 workers lost their jobs. With the company owing US$26 million in wages to workers, local newspapers carried stories of businesses suffering a 40 per cent decrease in sales and 80 families were reported to have left town. When the laid-off workers were not provided their outstanding wages, social security and holiday entitlements, some 400 of them blocked local roads in protest in June 2013. The crisis led the town's mayor to declare a state of emergency (*Globo G1* 2013). Even so, as bad as is the situation in Middle Paranapanema, stories that point to the creative destructive processes spawned by the leading sugar-processing companies have been far more numerous in the spaces of westward expansion – that is to say, the Pontal of Paranapanema.

Pontal of Paranapanema

In planting the first sugarcane seedling in the humble town of Teodoro Sampaio on the western limit of São Paulo State in 1974, the Minister of Trade and Energy symbolically opened this new frontier for sugar and biofuel production on the eve of the PROALCOOL programme's unveiling. Local landowning elites converted their pastures to sugarcane, building six distilleries between 1974 and 1982. Lacking the experience and industrial networks enjoyed by established firms such as Cosan and NovAmérica, however, when the direct state support from PROALCOOL ended these distilleries increasingly encountered financial difficulties and by 2004 only two were still in business (Barreto 2012). Between 2000 and 2010, though, when a second wave of industrial expansion took place in Western Paranapanema, sugarcane production increased from 75 million to some 330 million hectares. Four of the five firms that took advantage of the flat, affordable land, low labour costs and municipal elites keen to attract private investment during this period were corporations boasting foreign investment, as opposed to the kinds of local enterprises that had first appeared in the 1970s.

In understanding the history of sugar production in the Pontal of Paranapanema, the story of the Alvorada do Oeste distillery is perhaps instructive. Founded in 1979, the business had 23 shareholders, all large landowners from the Santo Anastacio municipality. However, poor management and the end of government subsidies contributed to bankruptcy and the laying off of hundreds of workers in the late 1980s. After a short-lived, unsuccessful return to production in the 1990s, the company was bought by the Marques Group of Minas Gerais State in 2005 and remained at productive capacity until the 2008/2009 season. When the large firms entered the region, however, land rents rose dramatically. This made it difficult for smaller entities like Alvorada do Oeste to meet its rental payment for the 7000 hectares it required to supply adequate amounts of raw sugarcane whilst maintaining the technical investments needed to stay competitive. Consequently, in 2011/2012, when production fell to below half of capacity and with borrowing abilities limited after the credit crisis of 2008, the company was forced to turn to municipal authorities for financial support, in the form of a Judicial Recuperation Plan. This, though, was insufficient to save it and by the end of 2013 the plant had ceased activity, as had three other local companies, resulting in thousands of workers being laid off. When the dust settled Odebrecht Agroindustrial (the product of a merger between Japanese firm Sojitz and Brazilian multinational Odebrecht), a company that was seeking to control 100 000 hectares in the Pontal alone, moved in and took over the Alvorada do Oeste distillery and its associated land

and also secured control of the supply of raw sugar from the nearby Decasa plant that had folded in October 2013.

Across the region's small towns events like these have led to a palpable frustration on the part of laid-off workers. Workers have arrived to find factory gates closed, have received fake cheques, and have waited for wages, social entitlements and sick pay for many months. Given that the monthly wage paid to the unskilled and semi-skilled workers only just covers basic living expenses – leading multinationals continue to give monthly food packages to their poorest-paid staff – and given that the industry monopolizes localized employment opportunities, the prospect of destitution is very real. It is this situation that forms the backdrop to the individual stories of precarious work to which we now turn.

THE EXPERIENCE OF PRECARIOUS WORK IN THE CANE FIELDS

Full-time cane cutters in Middle Paranapanema

Lucas, now 65, lists the several sugar plantations furnishing NovAmérica and then Cosan in Tarumá, Paraguaçu and Maracaí that he has trodden since the age of 15, when he was paid in his father's name and was hidden in furrows along with other children when the authorities visited the mill. 'My goodness', he says, as his eyes – glassy from 25 years of no protection from the glaring sun – look down and then off into the distance, 'it was brutal work'. He could not count the number of times he had collapsed in the fields but continued because his employer would otherwise dock sick pay from his wages. He felt fortunate to have reached retirement, 'otherwise I would have been retired on ill health'.

Many other workers we interviewed, who are now living in poor, peripheral housing in Assis and Maracaí, recalled working in coffee, cotton and maize fields in the 1970s and 1980s when subsistence agriculture was the mainstay of thousands in the region and sugarcane cutting was one of several seasonal jobs. However, with the expansion of mono-cropping, and of sugarcane in particular, these opportunities disappeared. As local agricultural workers lost control over their traditional means of production and because the small, rural towns favoured by sugar plantations provided few other employment opportunities, the notoriously poorly paid, harsh work on the plantation was (and still is) one of the few opportunities for the rural workers who were proletarianized during these decades.

With this scenario being repeated throughout Brazil's sugar-growing regions, the expanding monoculture had attracted (and actively sought) migrant workers from Paraná State (the greatest exporter of people in the 1970s), Minas Gerias and the more distant, northeastern regions of Alagoas and Bahia. The insertion of these seasonal workers from Brazil's poorest regions into the sugarcane industry certainly boosted production (Moraes 2000; Thomaz Júnior 2003). However, this boost was based upon a high degree of exploitation, for the men and women who toiled in the fields were paid notoriously low wages. Luis, for instance, recalled 100 buses bringing workers to the NovAmérica plantations. These buses were commanded by the 'gatos' ('cats'), third-party contractors engaged by the sugar companies to find, recruit, transport and accommodate cane cutters who routinely made deductions from the workers' wages for these, often substandard, services. These agents targeted the thousands of workers and small farmers who had been driven from the fields by Brazil's 20th-century modernization strategies and clustered in the outskirts of urban areas (Silva 1999). Lacking education and access to secure employment in the cities, these workers, neither fully urban nor any longer solely rural, were pulled back to work on daily or seasonal trips to the sugar plantations by these intermediaries who blurred the relations between employer and employee. By the 1990s, 390 000 manual workers were being brought to the cane fields of São Paulo. Lucas reeled off several rural towns of Paraná State that had supplied most of the seasonal workers to the NovAmérica plantation and its largest suppliers. These 'cats' each commanded three or more buses, with around 48 cane cutters on each, and their own payment was often based upon the productivity of the workers they supplied. Junior, whom we met with two work colleagues after an early finish one Saturday afternoon, was one of them. He explained:

> I heard Tarumã was a paradise [and] that you could earn more.…At first I came for several seasons, by bus every day, getting home at 1am in the morning. Back in Paraná I worked on a farm with cattle and maize and got R$900 per month but here, if you work hard, you can earn twice the minimum wage. So we came here because of the children. I've worked for 22 years as a cane cutter but, to tell you the truth, after rent, food and water…there's nothing left at the end of the month.

Lucas's equating of hard work with an augmentation of income refers to the piece-rate system, condemned by Adam Smith and Karl Marx, amongst others, that is maintained to this day by the plantation owners. The system incentivizes the worker to push harder, to cut breaks and to work longer in the hope of making gains that s/he is never quite certain of receiving. Whilst a series of now-legendary strikes by more than 5000 cane cutters in Guariba, São Paulo State in the mid-1980s gained year-round salaries for locally sourced cutters and substituted payment by weight with payment per metre cut (see D'Incao and Botelho 1987; Xavier and Barone 2008), such that workers can at least roughly gauge the number of metres they have worked, the rudimentary conversions from metre to tonnage and then to wages are still made by the employer out of sight of the workers. These measurements are prone to discrepancies and/or deliberate undercounting by employers and have routinely been used as a method by which excess surplus value has been extracted from the cutters. Furthermore, despite gaining year-round salaries, rural workers have overall seen a drop in real wages following the application of neoliberal policies in the 1980s and 90s, with the price they are paid per ton cut (adjusted for inflation) having diminished from R$2.73 (US$1.16) in 1970 to about R$0.80 in the mid-2000s (Ramos 2007). Although the average basic wage cutters received increased in line with national minimum wage improvements after 2003, their real wages fell again following the 2008 financial crisis (*Repórter Brasil* 2008). This means that the workers must continually increase output to make-up for a basic real wage that is insufficient for a family's survival.[6]

Pedro, a worker on one of the large plantations contracted to supply the Maracaí distillery that Cosan acquired from NovAmérica, gave us an insight into the implications for their bodies of cutters continuously pushing themselves:

> They say I'm the fastest, first or second. Anyway, they say that. I don't know. But one morning back in 2009 I was feeling strong. I said 'hey, leave everything to me'. I was 'pah! pah! pah!' [he swings his arm, as if cutting cane]. I got to lunch time, the food wouldn't go down, got stuck here [pointing to his throat], so I went back to work. Then, it was almost time to go home, I couldn't see anything anymore. Next thing I knew, where did I wake up? In hospital, with a drip in my arm....[T]he doctor told me to rest, gave me 15 days....No one came to see me. They don't want to know if you live or if you die. No one cares for the rural worker. And when I got back to work they just looked at me, like, 'aw, he's no good anymore'.

His colleague, originally from Alagoas, who also had replaced seasonal with annual work by eventually relocating to Tarumã, nodded in knowing agreement. As he commented:

> The cramps, you know, they're common, and they can kill. They really kill. People swallow their tongue, suffer convulsions. But when the worker dies they don't publish it. They say it was some health reason.

Although several spontaneous strikes during the 1980s served to bring attention to systemic breaches of working-time regulations and pay, of health and safety measures, and to the failure to provide protective equipment, fresh water, shelter and accommodation, the response from the industry has been largely encapsulated in this candid statement from a logistics consultant, whose clients control 60 per cent of Brazil sugar and ethanol production:

> Now you have these laws, like breaks for sugarcane cutters. They have to stop for two hours if the temperature gets too high. An hour for lunch. You have to provide water,

shade. Costs go up, productivity goes down. One machine can do the work of one hundred men.

In light of such an admission, it is perhaps not surprising that cane cutters viewed mechanisation as an (ultimately successful) attempt to break the organizational capacity of their trade unions. The impact of the introduction of such machinery can be measured by the dramatic reduction in labour needs – whereas in 2003 2300 cane cutters travelled to NovAmérica's fields from Assis city alone, in 2013 only 230 made the daily journey. However, not only has the mechanization of field work reduced the number of cutters required but it has also intensified the labour of those who remain, lest low productivity be used as an excuse to replace them with technology and/or to cull them from the returning groups of migrant workers. Thus, according to at least one local trade unionist, Diogo, the new arrangement

> gives workers the sense that they must work harder to get chosen for the next season.…[Now] the owners can choose the best each year, the strongest, so, for sure, the workload has increased.

The employers' use of an annual selection process explains both the decreasing average age of workers and the intensification of the workload for the young males who are preferred. Moreover, this practice has had profound gender consequences. Beginning in the late 1980s, the women whom we interviewed and who recalled 'working as hard as the men to get kept on' (Paula, aged 58) and who had struck for equal pay had started being moved from cutting to planting. They were then further demoted to collecting cane that had fallen from trucks and then were finally almost completely phased out in São Paulo State. This spectre of unemployment that had initially affected the women, however, now also weighs heavily upon the remaining men in the region. Hence, as Pedro, a man in his fifties who is from Paraná but who settled in Tarumã, states:

> We've heard that we're going to be out of work [by 2017]. We heard there'll be no more. Last year there were 14 teams working in the plantation. This year just…ours and one other.

When asked if he would be selected for the following year, he and two colleagues shrugged.

> I don't know. It depends on the mill. Depends on the owner, doesn't it? But I hope so....If I'm not a cane cutter what will I be? They say there's work in the distilleries, but you need a minimum qualification and a driving license. I was at school but my father needed us to work on the farm, so my older brother and I quit school to help him. If you don't have these papers forget it.…They tell us that there are courses for us [training courses for the semi-skilled jobs] and that, in a few

> years, the cane cutting will finish. But it costs R$2-3000 for a course. We don't have this money. Maybe we'll get work for the council sweeping the streets, but we can't even do this because you still need to pass a public exam for that….Maybe if the council outsources the work, you might get a job with a company but it would only be temporary....This is why we need to be cane cutters.

Between 2009 and 2014, 180 000 cane cutters lost their jobs. Whilst the modern factories announce convincingly that they offer training and new positions to those facing unemployment (ILO and UNEP 2012), this is little comfort to those workers in their 50s who form a demographic of older and poorly educated citizens whose lack of formal schooling excludes them from these opportunities – most of Brazil's sugarcane cutters did not finish elementary school (currently nine years), 70 per cent have up to only four years of study and almost one-third are illiterate (Moraes 2007). Thus, although 40 000 sugarcane cutters in São Paulo State were made redundant between 2007 and 2011, the industry had provided new opportunities for only 10 per cent of these (Baccarin and Borges Jr. 2011). Although many had commenced courses, most were unable to complete them. Whilst there is some work in the construction sites, this is often short-term and 'drying up'. Some colleagues who had been dismissed from the cane fields were taken on for six months at a time but then let go. As Luis (64) later told us, he had taken his CV everywhere, but 'nobody wants an old worker'.

Now that sugar monoculture dominates agricultural activity in the region, the meagre options for the remaining workers elsewhere underscore the incentive to retain their waged job, even for another year or two. Yet this compounds the already-existing pressure to earn a living wage by enhancing production. Such compounding is reflected in an incredible intensification of manual harvesting across the sector that has seen the average daily workload rise from three tonnes per day in 1980 to between five and eight tonnes in 1990 and to 10 to 12 tonnes in 2006 (Alves 2006). In addition, it is now a widely understood, if unspoken, rule that for a cane cutter to maintain employment he must cut at least 10 tonnes per day. Today's cutters harvest a volume of sugarcane in 12 years that slaves managed in 15 years and their 'useful' working life has been reduced to 10 to 12 years, whereas it was as much as 20 on the 19th-century plantations (Silva and Ribeiro 2010). Presently, a brutal tally of 16 tonnes per day is not uncommon. This pressure on production is exacerbated for the seasonal workers who still augment the workforce. When a 27-year old working on one of the large plantations supplying sugarcane to Raízen's Maracaí plant stated casually that 'the workers from Minas [Gerais], they're young, in their twenties like me. Many come for the season and, if they are good enough, they are kept on', then the performance-based, tenuous nature of these migrant workers' employment was neatly and simply summarized.

Seasonal cane cutters in the Pontal of Paranapanema

Seasonal migrant work in the cane fields has long been synonymous with subcontracting, super exploitation and extremely precarious living and working arrangements (Silva 1999). Thus the geographical origin of the 14 workers who died from heart attacks, pulmonary seizures, respiratory failures and cerebral injury in just two São Paulo harvests (2004/2005 and 2005/2006) was just as noteworthy as was their relatively young age (24-50), for they all came from the distant towns of Minas Gerais, Bahia, Maranhão and Piauí (Alves 2006). Indeed, the impact of their deaths was such that the Minister of Work was moved to condemn the pay-per-production system at the heart of the migrant labour system, which he believed was contributing to deaths.[7] The wretched experience of such migrant workers, though, is not only measured in terms of these 14 deaths. Thus, half of the 5 244 workers freed from slave-like conditions in Brazil in 2008 alone were internal migrant workers working in the sugarcane industry (*Repórter Brasil* 2008).

Given this recent history it is not surprising that migrant seasonal work has been downplayed by industry representatives. Enquiries in the Pontal region about its existence typically result in producer, municipal authority and even trade union indifference or denial. Yet, in Martinópolis it did not take long walking through the streets to find migrant workers from the states of Minas Gerais and Bahia housed in the town's hostels. When we entered one of these facilities in the town centre we discovered boxes storing personal items and signs of lunch in an improvised kitchen. Ten adults and three children under the age of two occupied the hostel's five single rooms. As Ignes explained, it 'is very common in our city [Montezuma, Minas Gerais] for women to be abandoned by husbands who migrate to work in the sugar plantations in São Paulo. So we prefer to close up our home, pick up the children and follow our husbands'. For her part, Ana, who is 24 and a mother of two and who travelled 3000km from Bahia, explained how the family all sleep in the same bed and how wives try to earn some extra money by cooking or cleaning for other migrant workers or by seeking cleaning jobs in town because their husbands' earnings are barely sufficient. Where the children are school-aged, the situation is more complicated, for the migration period (May to October) disrupts the school calendar and school places are difficult to come by.

Another worker we interviewed – Ze – typically returns to the hostel exhausted after 6.30 pm. Also from Montezuma in Minas Gerais, his return home does not mean that his working day has ended. His clothes are drenched in sweat and black from the soot of the burnt sugarcane, which is ignited to strip away the fibres to make it easier to cut, even at the price of increasing nine-fold the carcinogens in the cutters' lungs. Hence, he must wash and dry his clothes and start preparing his dinner and some food for the following day. 'It's not worth it', he sighs. 'It's too much pain for too little' he declares, as he sets down his cap.

Like many others, Ze was recruited by a representative of the Atena Distillery of Martinópolis, the only company that acknowledged hiring migrant labour in the region, despite the large number of workers evident in various municipal hostels. The company's agricultural manager explained that 30-40 per cent of the plantation's harvest is still manual and local labour is generally unavailable to work all the various plantations. Furthermore, he stated, one worker from Minas Gerais did the work of three locals in a day. In his view, this greater productivity was because migrants were more committed to their work during the season as they needed to earn enough resources to sustain for the rest of the year their families, who remained in their city of origin. Hence, a representative is sent annually to carry out the selection of workers and return with an official document registering the workers with the Ministry of Work and Employment (Ministério do Trabalho e Emprego). However, the meagre amount that Ze earns per metre cut, R$0.14, demanded an increase in daily production and so he extended his workday from a 3.20pm finish to a 5.30pm one. For our interviewees, though, their poor wages hardly cover their living basics. Moreover, as the company provides transport back to their homes at the end of the season only for the migrant workers, not their families, the expense of the return journey is a further stress. In such a situation, the only option for many, ably abetted by the employer, is to breach the poorly policed labour regulations in order to increase productivity. Thus, ten-hour working days are commonly undertaken, which means that workers often cut an extraordinary 18-20 tonnes per day during the six months of their contract before facing seasonal unemployment at the end of October.

Outsourcing of transport

Given their bleak prospects, not all of the workers return to their towns of origin at the end of the season and they are often joined by others from neighbouring and distant states in seeking further employment within the sugar and ethanol production chain. As mechanization eliminates field labour – and with it the 'problem' of cutters' notorious work conditions – and as a new, skilled workforce demands secure jobs within the distilleries, global corporations have sought to drive cost savings further along the production chain. Although Brazilian labour regulations prohibit the outsourcing of a company's primary activities, this law is keenly contested and the outsourcing of the cutting, loading and transporting of sugarcane and its various products has proliferated in the industry (Scheidl and Simon 2012). As a spokesperson for Odebrecht Agroindustrial, the only company in the Pontal to outsource all activities beyond its distillery operations, stated to us:

> It's not in the interests for the large groups to tie resources to buying implements [harvesters] or vehicle fleets [cars, buses or trucks] if it is possible to outsource the service. In addition, the service provider takes responsibility for labour issues.

This outsourcing creates new opportunities for local 'entrepreneurs' and new precarious working arrangements for both local and migrant workers.

Widespread outsourcing of transport really began when large landowners, who either converted or leased their land to supply sugar to the distilleries, began to contract out the job of transporting the prime material. This paved the way for small, local entrepreneurs and larger transport companies to enter the local production chain. Myriad migrant workers from Minas Gerais, Mato Grosso do Sul and Paraná were enticed there, either directly by the small transport companies contracted by the landowners or through agents promising work, good wages, food and free accommodation to these young men. However, once there the best that many could do was to secure temporary contracts as drivers, a situation of little concern to local authorities. In place of the promises given by the well-spoken contractors, these workers now occupy dirty, unventilated and crowded accommodations whilst waiting to secure another exhausting shift in the region's cane fields. The grim, human face of these 'logistical partnerships', with their lean organizational processes designed to minimize overheads, reduce the time between harvest and processing, cut the cost and risk of labour engagement, and require an exceptional and ultimately dangerous daily and seasonal flexibility, can perhaps best be illustrated by the following three accounts from outsourced drivers whom we met.

One driver – João, aged 38 – stated that although his employer officially sets out his daily hours and targets on paper, it is the ethanol companies and the sugar suppliers who actually fix the number of daily trips and distances to be travelled between collection and delivery of the sugarcane and thus how much he must work in any given day. As the radius of source material is expanding to meet the crushing capacity of the new distilleries, and with distances of as much as 75km between plantation and distillery, João must leave the house at 5am if he is to complete his three trips across the region. He travels one-and-a-half hours to begin the shift but, in order to satisfy his boss and make the deliveries between plantations, he must skip lunch, breaking for a quick toilet stop or coffee only when maintenance problems halt his movements or when loading or unloading. He returns to his accommodation 15 hours later.

For their part, workers transporting sugarcane from plantation Paranapanema II to the city of Presidente Prudente were on a 12-hour rotation when we met them and, when required, they undertook a double shift. That meant a 24-hour working day, after which they were granted a rest time of 27 hours, even though legally a regulated journey time is six hours and a double shift of 12 hours should require a 36-hour break. Nevertheless, with a dearth of employment in the area, and in the distant hope of earning enough money to choose his own work by purchasing his own truck, Francis made the journeys to ensure the company he worked for would meet the almost-impossible targets set by the industry, win further contracts in a viciously competitive environment and that he, in turn, would be chosen again as a driver.

Finally, in order to fulfil their obligations to transport the plantations' raw material as swiftly as possible, the contracted trucking companies compliment their fleet at times of peak harvest by hiring in a further party, normally a smaller unit with one or two trucks. This is an additional fourth stage of subcontracting. In such situations the distillery contracts the plantation owner to provide sugarcane, the plantation contracts a trucking company to transport the prime material as it is harvested, the trucking company subcontracts a smaller company at times of high peak harvest, and this employer seeks out and temporarily contracts the ultimate actor in this particular network, Mal. Whilst Mal (aged 38) is locally born, he 'has no choice' but to follow the work to wherever it is called in, 'otherwise the boss does not hire us'. In order to secure work throughout the year and to remain in favour with the employer, he travels from job to job across the state of São Paulo and often spends two months in the neighbouring state of Mato Grosso do Sul. In doing so he adopts the precarious lifestyle of the other migrant workers from further afield, scraping out an existence in these outsourced sections of the sugar and ethanol industry and sleeping in the workers' dormitories littered across the two states with often 'just a mattress to sleep on, a jar of coffee and an old pot to cook rice and some sausage'.

Unsurprisingly, as the testimonies of workers in the region make visible, the dangerous cocktail of sleepiness, fatigue and high-speed journeys in a struggle to achieve difficult goals means that accidents plague the industry. In 2011 and 2012, five drivers from Pontal of Paranapanema municipalities lost their lives in traffic accidents. Nationally, in 2010 the road transport of cargo killed more workers than any other industry. State figures show that 40 per cent of all work-related accidents in the sector in São Paulo State between 1978 and 2008 were in transportation. Today, outsourced workers account for 80 per cent of all work accidents involving serious injury or death in Brazil. Although the state has attempted to better regulate the industry, according to a local transport union the outsourced contracts are normally struck between the agribusiness and an individual rather than with an organized company with a

Cadastro Nacional de Pessoas Jurídicas (CNPJ, a legal registration number issued by the Brazilian Ministry of Revenue). Moreover, they are usually struck in the absence of union agreements and this further hinders control and supervision by both organized labour and the Ministry of Work and Employment. The result is that irregularities permeate labour contracts, such that almost impossible targets are set, overtime is unpaid, and shifts that are more than twice the legal working hours are routinely accepted. The new wave of temporary contracts and seasonal work inherent in the new working patterns adds further complexity to an industry that, as we now explore, has been notoriously resistant to regulation.

CHALLENGING SERVITUDE: RESISTANCE, REGULATION AND PRECARIOUS WORK

Trade unions and the cane cutters

After finishing work on a Saturday, Pedro sits with two colleagues in Tarumã and recalls when 2300 cane cutters in the fields staged a successful strike at NovAmérica in 1986 that 'shut the place down for weeks'. This fight for the right to a 44-hour working week, equal pay for female cane cutters, eight-hour days and regularly paid, if still very low, wages was followed by strike actions by distillery workers in Tarumã and Maracaí in 1989 and came at the close of a decade of immense pressure for labour, land and democratic reform in Brazil. The Partido dos Trabalhadores (PT – the Workers' Party), the Central Única dos Trabalhadores (CUT – the national United Workers' Confederation), the Movimento dos Trabalhadores Sem Terra (MST – Landless Workers' Movement) and the Federação dos Empregados Rurais Assalariados do Estado de São Paulo (FERAESP – the São Paulo Federation of Rural State Employees) all emerged in this period as movements with the potential to mobilize. Now, however, more than two decades on, the sugarcane cutters bemoan the fact that 'with mechanization it [striking] is harder. They just say they don't need you'. Such a sense of powerlessness is widespread. Hence for Toni from Assis, reflecting on more recent strikes at the plant, 'It [striking] wasn't worth it. They just sacked everyone'. The origins of such feelings can be traced to the 1990s, when harvesting and planting machines began replacing workers. An annual reduction in workers (about 10 per cent per year) has created an acutely disempowering sense of insecurity amongst the cutters we interviewed. Their diminishing numbers, together with a fragmentation of the labour movement more generally, inversely correlated with the growing power and wealth of the industrial oligarchs identified earlier in this chapter.

Given that all rural unions in São Paulo State are experiencing falling membership and several are struggling just to keep their doors open, the continued indifference of most to the seasonally contracted workers who have in recent years tripled the harvest workforce is perhaps surprising, although it is indicative of the Brazilian labour movement's general reluctance to engage with the huge informal sector that still stands at around 20 million workers (almost half of the working population) (Zylberstajn 2006). Complaints by local workers in the Pontal that northern workers are taking local jobs or are assigned the more favourable stretches of sugarcane point to divisions on the plantations, divisions which have often been exploited by managers when solidarity has been shown. For example, following the 2008 strike to raise monthly basic income from R$470 to R$550 at the Cocal plant in Paraguaçu, 205 seasonal workers were singled out for dismissal and bussed 3000km back to Ceara.

The opening of a second plant by Cocal in the Pontal of Paranapanema the year following the strike had, in the eyes of one cutter, Marcio, increased the company's power and made it even more difficult to achieve further gains:

> We struck before, various times. Sometimes you would get something, other times nothing. But now they have built Cocal II, so you know [he shakes his head], they're powerful.

The geographical flexibility of employers and workers is asymmetrical, a factor which characterizes the emergent labour relations regime in the region. Hence, the current logic of accelerated territorial expansion and streamlined organizational capacity across state, regional, national and international boundaries that typifies the successful sugar and ethanol corporations contrasts starkly with the relatively fixed nature of the rural trade unions, whose geographical and occupational limits to organizing are enshrined in Brazilian labour law that dates to the 1940s. Elio Neves, the President of FERAESP, the federation for rural employees in the state of São Paulo, put it succinctly:

> In Brazil we have trade unions, but we do not have a trade union movement. Those are two different things. A movement means the collective good, recognizing the struggle of other workers. Here in São Paulo…you have workers from Paraguaçu, Maracaí, Tarumá, Florínea, Assis, small towns in the Pontal. You've maybe ten rural trade unions in that area representing those workers but you have one company, Raízen, with 24 distilleries, or two maybe – with Cocal – exploiting all of them!

Within a corporate trade union structure modelled on that of Mussolini's Italy (see Gomes and Prado 2011), a trade union must limit its activities to a defined geographical area and the specific occupation of worker that it represents, giving it a monopoly on representation for that category of worker in that area. A universal union fee (one day's wage) is paid annually by all workers registered in the sector. This means that a worker can avail themselves of the rights of collective agreements whilst the union receives his or her annual contribution, whether the worker is a member of the trade union or not. The result is that unions are spatially limited and that cane cutters, drivers and machine operators in factories refining sugar primarily for food and those refining it for ethanol distilleries may all belong to different unions who appear to be more content with co-existence than co-operation. Many of the rural unions prefer their autonomy to allying with either of the two federations in São Paulo State: the traditionally more conservative Federação dos Trabalhadores na Agricultura do Estado de São Paulo, linked to the Confederação Nacional dos Trabalhadores na Agricultura (CONTAG – National Confederation of Agricultural Workers); and FERAESP, born out of the cutters' militant actions in the 1980s..

For rural trade unionist Joelson in Tarumá, 'when maybe only 10 or 20 per cent of workers are associated with the union' this verticalized structure makes basic organizing difficult, whilst horizontal divisions compromised the broader impact of spontaneous strikes by some 10 000 cane cutters that took place in several isolated locations across the state in 2008 in response to suppressed wages (*Repórter Brasil* 2008). The illegal dismissal of strike leaders by both small and multinational companies during that period of financial crisis and the historical risk in confronting powerful agricultural interests may also partially explain the distinct acquiescence of many local unions. For instance, forty cane cutters were injured, three shot and one killed in the uprising of 1984 in Guariba. More recently, the January 2013 assassination of Cicero Guedes, a cane cutter and leading member of the landless people's movement in Rio de Janeiro, brought to 1650 the number of rural and indigenous workers killed in land-related conflicts since 1985, the year in which conflicts began to be systematically recorded by Brazil's Pastoral Land Commission (CPT). In 2010, one year after negotiating improved conditions for cutters with President Lula da Silva and UNICA, the FERAESP President, Elio Neves, narrowly survived an attempt on his life. Seated in his office with a mural stating that 'without agrarian reform there is no democracy', he points to the particular challenges to combatting precarious work amongst cane cutters and rural workers, one quarter of whom may still be unregistered in the industry:

> You have trade union offices with a paid official behind a desk with a pen, telling us that everything is ok. They are open 8-5pm. Worse still, you have offices where you'll find nobody in them! But when are rural workers really exploited? In the evenings, at night, at the weekends. A union movement needs to be there. If you don't have trade unions doing their work, then you don't know, can't know what is going on. Two years ago we met the government and asked how many salaried rural workers there were in the country. Nobody could tell us. And that's the formally employed workers!

As biofuel companies upscale their operations across state and national boundaries, the difficulty in motivating and organizing labour horizontally across occupational divisions has been complicated by very evident diverging political trajectories of the federations representing the diverse workforce at regional and national levels. For example, in contrast to Neves, the General Secretary of the São Paulo Federation of Workers in the Chemical and Pharmaceutical Industries (which represents workers in the ethanol-refining distilleries and laboratories), Edson Bicalho, shares the corporate drive to develop ethanol as an international commodity and is a proponent of mechanization. In this regard he has carried the federation's vision of 'decent work' to international forums in Latin America and Europe. As he put it:

> You have to understand that relations between capital and labour have changed. If a company cannot modernize, automate, it does not remain competitive. Yes, there may be fewer jobs but these are skilled, better quality jobs.

The geographical limitations of localized rural unions, the fault lines running through the trade union structure and diverging political trajectories at higher scales of labour organization and bargaining, then, all mean that principled actions in the interests of vulnerable workers are often overshadowed by, at best, a defensive compliance with employers or, at worst, a rather comfortable corporate management of unrest within the organizational logic of the industry.

State, corporations and organized labour

The increasing international visibility of the sector, however, is providing opportunities for workers to better challenge longstanding exploitative practices. For instance, in the region of Middle Paranapanema, tighter social regulations linked to the International Labour Organisation that were required for the export market have contributed to the phasing out of the despised, subcontracted cane cutting operations. As one local trade unionist (Sandro) pointed out:

> The unions have been involved in improving conditions for sure. But, to be honest, probably the biggest influence has been from the Ministry of Work [and Employment]. Nearby you have Raízen Maracaí, the first company to get the Better Sugar stamp for the European market. If you look I expect many more producers are sending their sugarcane to that mill. But this stamp requires regulation and checks of the sector and so the Ministry has played a large role[,] though you probably don't have to go too far to find things that are wrong.

Sandro's final words point of the limitations of these certification schemes that largely rely upon market incentives for labour regulation and stretch the capacity of government ministries to 'police' these. One such scheme has been Brazil's 'National Commitment for the Improvement of Labour Conditions in the Sugarcane Industry', a voluntary agreement of the type favoured by powerful biofuel lobbies across national borders (Franco *et al.* 2010). and signed in 2009 by the federal government, by the rural workers' federations FERAESP and CONTAG, and by the industry association UNICA. Following audited health checks of their operationsin 2012 President Dilma Rouseff was moved to personally present 169 companies with certificates in what her General Secretary, Gilberto Carvalho, called a 'historic moment in relations between capital and labour' (Secretary General 2012). Corporate websites across the industry presented the certification as further indication of the strides being taken on environmental and social responsibility.

By late 2012, however, 60 of these companies were being investigated through the courts for serious labour violations. In Goiás State, home to the greatest recent expansion of sugarcane, 39 workers freed from slave-like conditions had been found working in the *mechanized* cutting of cane. They had been subjected to 27-hour working periods without a break, whilst two workers involved in a serious accident had each been working in excess of 20 hours (*Repórter Brasil* 2011b). In São Paulo, 26 of the agreement's 85 signatories were involved in labour court actions for failing to provide their workers with protective equipment, toilet, eating or rest facilities and for continuing to use third-party contractors to hire workers. Amongst these was Raízen Energia S.A., the largest plant in the country, which faced 35 violations and had one conviction on appeal relating to inadequate provision of rest for workers, inadequate breaks in journeys made by workers and for the outsourcing of their primary activities; workers in the mechanized harvesting sector were dismissed on 10 July 2012 and rehired through an agency the following day at 63 per cent of their wages (*Jornal de Araraquara* 2012). The company is currently being investigated for neglect linked to the death of a worker in 2012. Although wind and not the employer was blamed for the burning to death of a young worker at the Cocal plant in Paraguaçau in 2012, the latter was fined only months later for subjecting cutters to hazardous work conditions in searing heat. The result of all of this was that by July 2013 the national agreement was in tatters, the seals deemed meaningless by the government and courts and a representative of CUT complained that the good faith of workers and their unions had simply 'been used' to make money from exports (Novacana 2013).

CONCLUSION

The territorial advances of export-orientated sugar and ethanol corporations are replacing the plantations and distilleries of the former land-owning elites. Their digitized plant operations and lean performance management systems, advanced biotechnologies and 'total quality' organization of work dovetail with historically low wages and super exploitation to restructure society and space, whilst renewing land and wealth concentration in Brazil. Although export-orientated strategies have formalized employment relations in specific sites of production, corporate claims of sustainable development and 'social responsibility' are countered by the experiences of those who cut and transport raw sugar. Their testimonies point to massive labour exclusion, rather than widespread reform, and the intensification of existing manual harvesting to stave off unemployment and secure a living wage, whilst new forms of work intensity, insecurity and precarity are produced through the outsourcing of transport. In this context it is appropriate to remember that Marx (1976) recognized that capitalism requires the movement between the destruction and creation of employment across space and time, that accumulation involves dispossession. In this regard, the gradual disintegration of rural livelihoods and the dissolution of exploitative work in some locations and its reproduction in the new frontiers of production and elsewhere along the commodity chain suggest that primitive accumulation is not the precursor to subsequent advanced forms of production but, instead, part of a continual process of dispossession across Brazilian soil (see Harvey 2003). In their encounter with capitalist production, those who cut and transport raw sugarcane articulate all four distinct stages by which Marx stated that workers are alienated. In the first of these the worker loses ownership over the means of production. In the second s/he is removed from controlling the output of her/his productivity as a waged labourer. In the third stage the estrangement is spiritual: the worker's degradation via the work experience means that s/he no longer recognizes her/himself. The result is that cane cutters and drivers internalize exploitation by pushing themselves to shorten breaks and lengthen working days so as to make enough each day to cover basic living expenses, to bring the family home after a season's work, and to retain the favour of the employer, all of which compromises collective action with fellow workers (Marx's fourth stage of alienation).

For sure, there have been spontaneous actions by cane cutters and some individual unions have been willing to confront their local industry whilst their federation, FERAESP, has been energetic on broader questions of rural workers' rights, supporting land occupations and in resisting occupational segregation. However, mass unemployment through factory closures and mechanization has compounded problems for a fragmented labour movement that has struggled to embrace informal, seasonal and precarious work. Ironically, then, the most salient displays of worker unity across the occupations have been in response to plant closures which have left thousands unemployed with little prospect of work. For those displaced, the result will be a future that involves reliance upon the government's family assistance packages accessed by seasonal workers upon their return to their home states.

The global corporations' confident marketing, though, belies a structural instability as subsidized oil prices and a suppressed international market for ethanol causes further problems for even leading brands. As logistics and science overcome spatial barriers and poor soils, territorial expansion may postpone financial crises for these enterprises that carry high debt burdens. Growth into the central savannas and pastures, however, requires ever more foreign capital at a time when large quantities have been returning to North America and Europe.[8] With predictions that a further 60 distilleries will close in the near future, that full mechanization of cane cutting and planting in São Paulo State will be in place by 2017, and that migrant workers seeking futures in these new frontiers will be even worse off as a result, it is becoming increasingly difficult for the corporate promoters of 'green' energy to render invisible the distinct social challenges that their monopolistic advances bring. It would also appear that a revival of the spirit that wrought such important changes to Brazil in the 1980s is needed if workers and their movements are to overcome divisions between the formally and informally employed, between occupations and between different regions so as to be able to rise to these challenges in the new spaces of Brazil's biofuel production.

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[1] Clearly, this phrase plays off the concept of the 'survival of the fittest'. Although usually associated with Darwin, the phrase was actually coined by Herbert Spencer. Darwin had initially used the term 'natural selection' before adopting Spencer's terminology.

[2] When adjusted for inflation, the minimum wage fell by 60 per cent between 1959 and 1975 and 52 per cent of workers earned less than that (Fausto 1999). Inequality rose from a Gini index of 0.5 to 0.6 (amongst the highest in the world) between 1960 and 1979, reaching 0.64 in 1989.

[3] By 1999, 1 per cent of the population owned 53 per cent of GNP. Only one-third of Brazilians had a registered job in 2002.

[4] US$1 = approximately R$2.5

[5] By way of comparison, the entire PROALCOOL programme had cost only R$7 billion.

[6] The current basic wage for cane cutters in Maracaí of R$900 contrasts with the R$2900 that the labour agency DIEESE estimates is the necessary living wage for Brazil (DIEESE, 2014).

[7] As the death of a locally born 53-year old at the above mentioned Alvorado d'Oeste plant in Pontal in 2008 showed, the cane field mortalities have not been restricted to migrants.

[8] Consultants predict that a further foreign investment of R$44 billion is required for its predicted expansion of 3.1 million hectares in sugarcane (*Estado do S. Paulo* 2011)