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RESEARCH ARTICLE

High-metabolism Infrastructure and the Scrap Industry in Urban China

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Abstract

Rapid urbanization in 21st-century China has been fraught with contested demolition, overdevelopment and shoddy infrastructure with short lifespans. By viewing this infrastructure as having “high metabolism” and examining the urban scrap trade that is fuelled by its material outputs, this article challenges a common assumption that such a form of urbanization is merely wasteful and problematic. Crucially, such urbanization also puts rural migrants and scrap into motion in a way that helps to reproduce its form. This occurs by generating socio-material nodes of scrap trading wherein migrants make the most of temporarily stable situations with entrepreneurialism. The nodes are spaces of “suspension” shaped by challenges including cheap rental housing that is often targeted for demolition and frequent harassment from the authorities. However, the challenges do not prevent scrap traders from caring for kin, attending to human sentiments and sometimes achieving social mobility.

摘要

二十一世纪中国的快速城市化充满了有争议的拆迁，过度发展，和因粗制滥造而短寿的基础设施。本篇文章通过审视此具有“高代谢”的基础设施和检验此高代谢的物质产出所推动的城市废品交易，对认为此种城市化仅是浪费的和有问题的普遍看法提出异议。至关重要的是，此种城市化还把农村移民和废品调动起来以助于他（它）们的再生产。在生成废品交易的社会物质节点中，农村移民们通过他们的创业精神充分利用了暂时稳定的情况，从而实现再生产。这些节点是被存在的不同挑战塑造的“悬浮”空间，包括经常成为拆除目标的廉价出租房和当局的频繁骚扰。然而，这些挑战并不能阻止从事废品交易的农村移民们关爱家族成员、关注人情往来，有时甚至实现社会流动。

Keywords: China, infrastructure, scrap, waste, rural migrants, urbanization

关键词: 中国，基础设施，废品，废物，农村移民，城市化

Since the late 20th century, ageing buildings, neighbourhoods and villages across urban China have often been targeted for demolition. The process has relied on a rhetoric that emphasizes these structures' incongruence with visions of urban modernity and views them as obstacles to capital-intensive development projects. Many new structures built in the reform era construction boom have also been fraught with shoddiness, leading them to become new targets for demolition after relatively short lifespans. In 2010, *China Daily* published an article drawing attention to the short average lifespan of China's buildings – less than 30 years (compared to 74 years in the United

States and 132 years in Britain).¹ According to the oft-cited article,² these short lifespans are problematic for two main reasons. First, low-quality construction is tied to serious safety concerns, and a series of tragedies related to shoddy construction nationwide had led to widespread concern. Second, the rapid turnover of buildings is tremendously wasteful, with new but inefficient buildings consuming large amounts of energy and up to 40 per cent of the world's cement and steel, while leaving behind massive quantities of construction and demolition waste.

The short lifespans of buildings, characterized by both shoddy construction and waste, is a key characteristic of the broader phenomenon that Sorace and Hurst refer to as “phantom urbanization.” This concept names the process whereby “constructing the aesthetic form of the urban is even more important to local state actors than economic, demographic, and environmental repercussions.”³ Such urbanization is pursued by “urbanized” local state actors largely due to the ways that political performance is assessed in the short term.⁴ It is carried out through investment in expanding urban infrastructures, the expropriation of rural land and villages and the redrawing of administrative borders. Dwelling on ubiquitous empty housing, underutilized infrastructure and extreme cases of newly constructed “ghost cities,” the authors effectively disrupt the stubborn notion that China's unprecedented urbanization is driven by rural-to-urban migration.⁵ Yet, in this and similar analyses,⁶ there is a fundamental assumption that such urbanization is essentially wasteful, defective and problematic.

In this article I offer a different perspective by showing how the waste generated through China's contemporary rapid urbanization is not merely problematic nor a mere wasteful *endpoint* of the overdevelopment of infrastructure.⁷ What happens to the material remnants of so-called “phantom urbanization”? Despite the term's connotation of an immaterial illusion, these materials accumulate and flow in massive volumes. And, despite the aforementioned *China Daily* article's valid concerns, a portion of these materials are not just problematic waste but also function as valuable and crucial resources. To support and build on these two statements, I look closely at the marginalized scrap-trading industries that provide livelihoods for many migrant workers across China. Doing so not only shifts how China's infrastructure dilemmas are seen, but also reveals a nuanced story about the agency of and constraints on a key set of rural migrant workers. Building on Sorace and Hurst's main claim, the story does not revert to an image of migrants driving urbanization, but rather shows how migrants take advantage of the material remnants of rapidly constructed and demolished infrastructure and help reproduce its form. In the process, they eke out a living and have a chance to achieve social mobility, all while avoiding bosses, working flexible hours and caring for kin.

The article draws on 21 months of ethnographic fieldwork in Kunming, the capital of Yunnan province, carried out in four stints between 2013 and 2016. The data largely come from around 100 open-ended interviews with scrap traders and garbage pickers, guided by a set of predetermined questions. Interviews lasted anywhere from ten minutes to an hour and a half and

¹ “Short-lived buildings create huge waste,” *China Daily*, 6 April 2010, http://www.china.org.cn/china/2010-04/06/content_19749614.htm. Accessed 19 August 2021. See also “How will a slowing China cope with rapidly aging buildings?,” *China Economic Review*, 28 June 2013, <https://chinaeconomicreview.com/Unstable-Foundations-Part-2/>. Accessed 19 August 2021.

² For example, Feng and Hubacek 2016.

³ Sorace and Hurst 2016, 305.

⁴ Hsing 2010.

⁵ Ong also emphasizes that China's urbanization is constrained by the household registration system. Ong 2014.

⁶ For example, Woodworth and Wallace 2017; Li 2017; Jiang, Mohabir, Ma and Zhu 2017.

⁷ O'Brien 2008, 5. The notion that waste is not an endpoint is a tenet of discard studies, see Liboiron 2018.

were conducted in Mandarin Chinese (in which the author is fluent) or regional dialects with the help of paid local research assistants. Interviews were primarily conducted on the streets and at old warehouses and storefronts used as places for conducting the scrap business, which opened opportunities for relationship building, repeat visits and participant observation. Further conversations occurred in restaurants, in vehicles while in transit, and elsewhere. Altogether, the interviews, combined with notes from observations and casual conversations, make up a corpus of ethnographic data from which I present and examine relevant parts.

The article unfolds in the following way. I start by putting China studies into conversation with a broader body of scholarship on infrastructure to make a case for viewing contemporary Chinese urbanization through the lens of what I call “high-metabolism infrastructure” (i.e. infrastructure with high material inputs and outputs over time). The next section details the evolution of the scrap trade in Kunming and describes how China’s high-metabolism infrastructure generates key socio-material nodes of scrap trading in “suspension” – where social life is temporally aligned with infrastructure-development projects elsewhere. I then present a set of ethnographically infused vignettes on different aspects of Kunming’s scrap trade that use these concepts as lenses to help make connections between diverse practices and relations that would otherwise largely appear disparate. The article concludes by reiterating the implications of high-metabolism infrastructure in terms of how it fuels scrap economies; and, how the key infrastructures that are necessary for the functioning of scrap economies are utilized with great difficulty and within the limited time spans in which they are functional. Although China’s recent overdevelopment and shoddy infrastructure are clearly problematic and wasteful, they are not merely so, and a focus on the nexus of infrastructure and scrap trading helps reveal what this form of urbanization makes possible and how it persists.

High-metabolism Infrastructure: Beyond Eventfulness

Infrastructure tends to receive attention when it is eventful, for instance, when large structures are completed and ceremonially opened for use, when infrastructure catastrophically fails or is spectacularly demolished or when social conflicts over infrastructure become newsworthy.⁸ In between these eventful moments, as Julie Chu notes, “infrastructure can slip into invisibility as the embedded technical backdrop of social flows and exchanges.”⁹ By paying more attention to the everyday workings and material make-up of infrastructure, scholars have highlighted its role in conditioning social and political sensibilities of life.¹⁰ This article builds on this work by drawing attention to how scrap economies are fuelled by the waste of demolition and short-lived and shoddy infrastructures, along with the cyclical but erratic temporalities that characterize movements of scrap and scrap traders.¹¹ Doing so helps step outside the limiting frameworks of “project time” and “developmental time” through which infrastructure is seen as being built in linear stages and serving as a “material metonym of modernity.”¹² Instead, as Hannah Appel emphasizes, “attention to infrastructure’s actual life courses confounds developmentalist narratives of linear progress.”¹³

The popular focus on eventfulness, and opportunities opened when attending to the in-between, can be illustrated by jumping to 2008, a pivotal year for China. First, this was the year

⁸ Chu 2014, Nguyen 2017.

⁹ Chu 2014, 353.

¹⁰ For example, Anand 2011.

¹¹ Kao 2013 takes a similar approach in following the afterlives of demolished buildings in Beijing.

¹² Carse and Kneas 2019; Appel 2018.

¹³ *Ibid.*, 46.

of the long-awaited Beijing Olympics, a massive display of state power, much of which manifested itself in infrastructure projects such as the iconic Beijing National Stadium (the “Bird’s Nest”), the completion of the world’s largest airport, and public infrastructure such as new subway lines and a network of free toilets blanketing the city.¹⁴ But earlier in 2008 the massive Wenchuan earthquake struck in Sichuan, leading to over 69,000 lives lost, with a disproportionately high number of casualties coming from schools that collapsed due to shoddy construction. Artist Ai Weiwei, designer of the Bird’s Nest, emerged in 2008 as a more confrontational critic of the state as he began a series of works that aggressively questioned the government’s role in shoddily built schools, corruption and the cover-ups after the earthquake. One of his powerful earthquake-related art pieces, *Straight*, made use of 150 tons of mangled iron rebar scavenged as scrap from the school buildings that collapsed in Sichuan, put together by paying his workers to meticulously straighten each piece by hand.¹⁵

Taking a cue from *Straight*, this article takes seriously the fundamental materialities of infrastructure along with non-linear temporalities that extend beyond event. Doing so shifts what is seen. First, infrastructural events become embedded in much longer techno-political narratives. These narratives can include corruption and cover-ups, but also include less spectacular forms of resistance that manifest in slowness and delays.¹⁶ Second, and more crucially here, events appear as only narrow temporal snapshots of flows of a multitude of materials that come from and will come to rest elsewhere. These flows are intertwined with movements of people, their livelihoods and expenditures of labour, accumulations of capital, and a bounded period of relative stability when infrastructure is serving its official intended use. Thus beyond the eventfulness of infrastructure – during the material processes of construction, demolition and removal, as well as during lifespans of usage marked with decay, breakdown and repair – is infrastructure’s more mundane consumption and excretion of materials. From this fundamentally materialist perspective, infrastructure is not just the technical backdrop that enables socio-material flows and relations. It is also itself a material form reliant on other flows and relations (i.e. other infrastructures) to come into existence, maintain form and function and sooner or later be broken apart, partially or fully removed, and entangled into new webs of relations.¹⁷ Scrap can provide a lens revealing how large infrastructures can feed and become smaller infrastructures that in turn enable other infrastructures to be maintained and built anew.

Conceiving of infrastructure as metabolic can help untangle the complexities highlighted above, without losing sight of both the techno-political and material components of infrastructure development. When infrastructure is being rapidly and shoddily constructed,¹⁸ such as in the context generated through contemporary China’s “urban speed machine,”¹⁹ infrastructure is characterized by high metabolism. This entails: (1) initial construction that is often rushed, inefficient and characterized by stoppages and restarts that contradict notions of linear progress; (2) infrastructures both new and old that frequently fall into disrepair and as such become rationales for new development schemes while conditioning new political sensibilities;²⁰ and most dramatically, (3) continued wholesale demolition of targeted areas sought to accommodate new

¹⁴ See Zhao, Ching, He and Chan on China’s “mega-event urbanization model.” Zhao, Ching, He and Chan 2017.

¹⁵ See Chin 2013.

¹⁶ Nguyen 2017.

¹⁷ This formulation builds on Larkin’s and Carse and Kneas’s approaches to infrastructure and Reno’s approach to waste and form. Larkin 2013; Carse and Kneas 2019; Reno 2016.

¹⁸ Appel 2018.

¹⁹ Chien and Woodworth 2018.

²⁰ Chu 2014.

construction. Such wholesale demolition, however, often plays out in unexpectedly piecemeal and contested ways. It can be met with a flurry of additions to buildings or even “fake divorces” by residents to qualify for more compensation or simply gain more rental income.²¹ Over time, these processes together equate to large quantities of material inputs/outputs as well as large expenditures of dispersed labour. Metabolism as an analytic thus helps account for both the materialities and temporalities of infrastructure and avoid the trappings of only looking at infrastructure through eventfulness.

As explained by Matthew Gandy, organic metaphors used to describe cities such as “metabolism” first gained popularity in relation to fast growing global cities in the 19th and 20th centuries.²² Yet, these metaphors were limited by how they treated cities as discrete physical entities, and tended to emphasize how the health of a city is derived from the adequacy of its flows of water, energy and other raw materials – which were to be managed by technical experts. Gandy points out that such organic metaphors ignore one especially crucial flow: capital. “It is capital that represents the most powerful circulatory dynamic in the production of modern cities, yet its presence remains obscured in most technical or libidinal accounts of the urban process.”²³ While there are good accounts that address flows of capital in explicating China’s rapid urbanization and corruption,²⁴ they tend to be focused more on the bigger picture (sheer sizes and scales of projects) and the bigger actors (coalitions of state and private actors and the individual land and housing rights holders who stand to win or lose from large development projects). In contrast, below I highlight the cruciality of access to capital among one set of infrastructure-development stakeholders who are too often ignored: the large populations of rural migrants who rent some of the cheapest urban housing to make a living trading scrap. This crucial flow must be embedded alongside an account of the flows of matter and people set in motion by high-metabolism infrastructure.

Scrap Trading Nodes in Suspension

Scrap is a reasonable translation for the Chinese *feipin* 废品 – a colloquial term for waste with market value that generally does not have the environmental connotations of the English notion of “recycling.”²⁵ Metals are the most iconic and lucrative type of material, but plastics, paper, glass, furniture, appliances and electronics can also all be categorized as *feipin*. For rural migrants across China, plying the urban scrap trade has become one of a few alternatives to menial wage labour opportunities commonly referred to as *dagong* 打工 – a term alluding to the reform era commodification of labour which Wanning Sun aptly translates as “working for the boss.”²⁶ The primary advantages of plying the scrap trade include being able to set one’s own hours (providing valuable flexibility) and potentially making more money. The disadvantages scrap traders mention are many, including the dirtiness involved in handling waste, the tolls that moving heavy loads take on bodies, vulnerability to stagnating or falling scrap prices (tied to global economic trends), feeling disdain and disrespect from “people with money” and frequent harassment from the authorities (more on this below).

²¹ Kao 2013; Ou 2021; Rodenbiker 2019.

²² Gandy 2014, 8.

²³ Ibid.

²⁴ Lin and Yi 2011; He, Zhou and Huang 2016; Song, Wang and Lei 2016.

²⁵ See Zimring 2009; MacBride 2012. See also Liebman for a richer explanation of the term *feipin*. Liebman 2019, 15–17.

²⁶ Sun 2010; see also Pun 2005; Yan 2008.

An estimated 24,000 people worked in Kunming's scrap industry when the industry was in its golden age (the mid-2000s), although other estimates put the number as high as 70,000.²⁷ The latter figure suggests that for every 1,000 Kunming residents, up to 16 made their living as part of the scrap trade, a proportion similar to that in China's largest metropolitan centres. Altogether, it is estimated that 3.3 million to 5.6 million people comprise the nation's scrap industries – millions more if one includes those who work in scrap processing.²⁸ A portion of the scrap traded in Kunming is processed and sold to factories within the region, while another portion is sold and shipped to China's more industrialized east coast and north-eastern regions, depending mostly on price differences and changes. Prices fluctuate in response to regional, national and global economic trends and the Global Financial Crisis of 2008 as well as China's domestic real estate contraction in the early 2010s are examples of events that have destabilized prices and at times led to dramatic price drops.

Although these instabilities affected scrap traders in Kunming, rapid demolition and construction continued through this period, keeping the trade afloat with a plenitude of materials. The pace of demolition in Kunming was bolstered by a 2008 policy to demolish all 336 of the city's "urban villages" (*chengzhongcun* 城中村),²⁹ i.e. villages that are administratively recognized as "rural" by the state but which have been engulfed by deepening and expanding urbanization.³⁰ Urban villages have played an especially important role in the scrap trade as they provide cheap rental spaces for rural migrants, a portion of whom transform first-floor storefronts into buying stations and courtyards into places for sorting, storing and otherwise processing scrap. These spaces thus not only provide cheap rents, but also provide crucial indoor and outdoor space and proximity to demolition and construction sites. The pace of demolition in Kunming finally slowed somewhat after 2015, the year when former Yunnan Provincial Party Secretary Qiu He was accused of corruption related to kickbacks from actors involved in construction.³¹ In particular, the aggressive plan he had previously put forward to demolish all urban villages was abandoned with 223 still standing.

The aspects of China's demolition and construction boon that relate to corruption and resistance are relatively well known.³² Here, through the lens of scrap, another set of stories comes into focus, representing a cross section of the massive flows of matter and people put in motion by the high-metabolism infrastructure of rapidly urbanizing Kunming. In low-income enclaves where the scrap trade thrives, this high metabolism in part was felt as a pervading threat of demolition that turned the enclaves into what Tzu-Chi Ou calls "spaces of suspension." In these spaces rural migrants can enter the urban economy at a low cost and build mutually beneficial social networks, but also experience a lack of stability and protections, are frequently displaced and are forced into

²⁷ The first estimate comes from a trade association focused on professional traders, while the larger estimate was relayed to me from an NGO worker involved with projects supporting "garbage pickers" and a broader swath of scrap traders who are less legible.

²⁸ Goldstein 2021, 3.

²⁹ "Qiu He xinzheng zai guan cha: zhizheng moshi yuqi qianglie gexing youguan" (Another look at Qiu He's new policies: a mode of governance related to strong personality), *Sina*, 24 June 2009, <http://news.sina.com.cn/c/sd/2009-06-24/110818084490.shtml>. Accessed 13 January 2022.

³⁰ For more on this term see Zhan 2018; Ou 2021.

³¹ Chan 2015.

³² For example, see the 2013 documentary film *Dianchi dong an* (The Eastern Shore of Dianchi Lake) directed by Zhu Xiaoyang and Li Weihua on the dramatic and partially successful efforts to save one urban village in Kunming. See also Zhu 2015.

a spatial hypermobility.³³ In this sense, “suspension” can be seen as a translation of the Chinese term *xuanfu* 悬浮. The term has become a popular way to index an entrepreneurial energy combined with political resignation – wherein people frantically make the most out of unstable conditions of life of which they largely disapprove.³⁴

Meanwhile, broader scholarship on infrastructure engages with suspension as the temporal windows of social life that are shaped by promised, unbuilt or unfinished infrastructures,³⁵ giving rise to key socio-material nodes. These nodes are “the by-product of economic development originating somewhere else that nevertheless affects localities and mobile subjects in significant ways.”³⁶ In considering China’s scrap trade in relation to infrastructure, these two connotations of suspension complement each other. When migrant tenants in urban villages and other old neighbourhoods are anticipating inevitable demolition and dislocation while taking advantage of these same processes underway nearby, these sites become just these kinds of key socio-material nodes. From the vantage of these sites, China’s infrastructure dilemmas look different.

Infrastructure, Scrap and Mobility

The subsections below touch on different aspects of scrap trading and demonstrate the utility of viewing contemporary China’s infrastructure as having a “high metabolism” with large material outputs instead of as merely being wasteful and problematic. This perspective on infrastructure also illustrates (1) how scrap traders come to the trade and embed themselves in the low-income urban social fabric; (2) how the scrap trade provides limited but definitive possibilities of social mobility and opportunities to better care for kin; (3) the underappreciated importance of infrastructural waste to the functioning of the scrap trade; and (4) how daily use of infrastructure is the most crucial, risky and contested aspect of plying the trade.

The social fabric

Of all the rural migrant scrap traders with whom I became acquainted, Li Jin (pseudonym) had been plying the trade the longest. She first came to Kunming from a rural part of Sichuan in 1993, along with her husband who worked in construction. As he went off to work every day, she went out to peddle cheap clothing and fruit to supplement their income, and formed the habit of gathering and saving discarded waste that could be sold as scrap. Through this practice she encountered someone she called a “person with a good heart” (*haoxinren* 好心人) from Guizhou, who, noticing that she was also a rural migrant struggling to make money, taught her how to ply the scrap trade. She quickly learned the basics about prices, materials and where to sell, and in 1996, with only 100 yuan to start, became a scrap trader. This meant she mostly stopped collecting waste herself and instead started purchasing loads of scrap from other collectors, sorted and processed them, and then sold the materials to larger-scale buyers for slightly higher prices.

Eventually, the couple amassed enough savings to start renting an old storefront, which doubled as their living quarters. Over the years, storefronts which they were renting had been demolished many times, but they had thus far been able to find other spaces to rent and had formed many good relationships with other low-income residents in the area, a valuable asset for the scrap business. In this way, the rapid pace of demolition and development in the city provided the couple with both construction and scrap trading work. Despite the instability of having to move their

³³ Ou 2021.

³⁴ Xiang 2021.

³⁵ Carse and Kneas 2019.

³⁶ Rippa 2021, 233.

home/business often, they had managed to embed themselves into the social fabric of low-income residents in one area on an increasingly urbanized fringe of the city.

Overall, Kunming's scrap industry is less rigidly gendered than are many wage labour opportunities such as construction and factory work, but loosely defined gender roles within the trade are still apparent. Some men ply the trade in the city alone, with wives and children staying behind in rural homes; some women ply the trade on their own (e.g. Li Jin), with husbands typically performing other types of work in the city; and some couples ply the trade together, with men more likely to load and transport goods and women more likely to do the more domestically oriented work of sorting and purchasing. When couples ply the trade together, their children are either left under the care of grandparents in the countryside or are with parents in the city (seen often completing homework on makeshift tables on the sidewalk, or if they are older, helping with the business). Providing their children a chance to have a more prosperous life is typically the biggest motivation for scrap traders, as is generally the case with rural migrant workers in other industries. Li Jin, for instance, had one son in college and another in the fifth grade when we spoke in 2014. Many scrap traders plan to leave the trade to return to rural homes or live with their children once they are independent and, for sons especially, have sufficient income to take over the leading financial role within families.

The majority of scrap traders in Kunming were introduced to the business not by good-hearted strangers but rather by kin (*qinqi* 亲戚) or non-kin from the same native place (*laoxiang* 老乡), as is typical for other kinds of work done by rural migrants in Chinese cities.³⁷ Over time, these relationships tend to remain important for mobilizing extra hands and resources when needed; and, as scrap moves down commodity chains, these relationships can influence who sells to whom, a factor considered alongside price, proximity and various risks involved with navigating city streets. However, to be successful in the low levels of the scrap trade it is helpful for rural migrants to form mutually beneficial relationships with a broader swath of low-income urban inhabitants. Money is earned in slim margins, and business depends on workers and residents being willing to sell their scrap to smaller buyers instead of inconveniently transporting goods further away for higher prices.

With more than one smaller-scale buyer typically set up for business in every city neighbourhood, cultivating good relations with residents can be crucial for ensuring good business. Some scrap trading stations even function as robust sites of a sociality that connects low-income urban inhabitants of many kinds (including both retired urban workers and rural migrants). At these sites, there is often a sharing of stories, complaints, information, gossip and camaraderie. The suspended conditions of life shaped by the unpredictable and inevitable demolition of older structures thus may constrain scrap traders, but it does not prevent them from embedding themselves in the social fabric of low-income urban communities and networks.

Social mobility

A few scrap traders have made a lot of money. Rapid infrastructure development combined with gaps in regulations and enforcement give form to a very free market that opens possibilities for upward mobility. Stories of those who have become rich trading scrap circulate through the trade and are commonly recited to new audiences; for example, the man who established a small scrap buying station near a construction site for the city's new subway system. As the story goes, this trader happened to become acquainted with one of the contractors, then began treating him to

³⁷ Smart 1999; Zhang 2001; Lai 2016.

meals and other entertainment. Consequently, the contractor went on to sell him many tons of scrap iron and steel, sometimes multiple truckloads per day. Later this trader bought an expensive urban home and new car – two standard markers of upward mobility – and shifted to other kinds of business. This is a situation that most traders less successful in the industry describe using the phrase *facai* 发财, “striking it rich.” Scrap traders explained such success as being due to individual’s existing networks and resources, personal abilities (especially to cultivate valuable connections) and good timing and luck.

Although opportunities for upward mobility through plying the scrap trade exist, they should not be conflated with autonomy from capitalist social relations. A more accurate description is that traders have “broad discretion over their rate of self-exploitation” – by deciding for themselves when to work, where to work and when and where to sell their goods.³⁸ Traders understand well that the largest profits in the industry are accrued by entities that assert control downstream, including some remnants of state-owned scrap companies that were first created during the 1950s Mao Zedong era but then mostly withdrew from the sector in the 1990s. In Kunming, as in other Chinese cities,³⁹ these companies utilized access to land to emerge as proprietors of the trade in the early 2000s, establishing formalized scrap-trading markets where they could profit through the collection of rents without needing to directly employ or oversee labourers. The local state’s shift away from directly instituting the labour involved in trading and processing scrap also corresponded with a time when increasing numbers of rural migrants were traveling to cities as regulations restricting such movement were loosening.⁴⁰ Thus, the scrap trade that can be found throughout urban China today is contingent on a rural to urban mobility that emerged within this historical context.

Over time, relationships between market proprietors downstream and independent traders upstream became obscured by middle buyers. Thus, rather than “wageless” work, by making money according to the amounts of goods each buyer brings to a larger-scale middle buyer, in effect a piecework wage system is in place which, from a broad perspective, can be more ruthless than time-based wage labour. This is because the system leads to a great variety in actual income between workers, exaggerated by their “different degrees of skill, strength, energy, staying-power”⁴¹ and luck. Such a system may provide riches for a select few traders, but most will have to enjoy any individualized experience of independence and self-control as a trade-off for being unpredictably subjected to fines, relocations, new competitors and price fluctuations. Price drops take a bit of time to ripple down from large scale traders to small scale traders, sometimes leaving the latter with no option but to sell loads for the same or less than the price they used to purchase, thereby squandering their labour.

One migrant scrap-trading couple who rented an old storefront in Kunming told me about how market conditions strained their relations with neighbours. Falling prices, combined with rising rent and other costs, were making it almost impossible to make ends meet. Yet, they had been plying the trade in their neighbourhood for about eight years, and had good relationships with many of the older low-income residents who lived nearby. They had always been willing to pick up scrap from neighbours’ homes, but the husband told me that it was no longer worth his time and energy to pick up heavy loads from homes: “Yesterday a neighbour living on the seventh floor across the street had me go move stuff. I moved over 40 kilograms of old books but in the end

³⁸ Goldstein 2006, 295–296.

³⁹ Goldstein 2021.

⁴⁰ Cheng and Selden 1994, Zhang 2001.

⁴¹ Marx 1990, 696.

made only one ‘feather’ [about two US cents] per kilogram. It’s so tiring, but it’s someone I know, and I would feel bad refusing.” The trader went on to complain that such a paltry economic gain did not outweigh the toll such work took on his ageing body, but that “human sentiments” (*renqing* 人情) compelled him to continue. Poor market conditions thus had the overall effect of shrinking the fuzzy lines between the realm of scrap loads that are worth residents’ and traders’ efforts and those that are not – leaving more waste for the city to manage as garbage. This ties into one of the main accusations that the state often makes against scrap traders: that they are too motivated by individualized economic values and not environmental values that benefit all. Human sentiments are a motivation that is not mentioned in state rhetoric.

The unstable incomes earned by smaller scale scrap traders and the accusations that they are unruly and too motivated by economics typify the broader “informal economy” that has grown rapidly across post-reform urban China. If one adopts a broad definition including “workers who have no security of employment, receive few or no benefits, and are often unprotected by labor laws,” by the late 2000s an astounding 60 per cent of China’s urban workers fit this designation.⁴² Scrap traders, like others who utilize public space to ply various trades, could be further delineated as being part of an “outdoors economy” – a category capturing how a growing number of non-contractually employed urban residents also lack adequate living space, and are thus “compelled to operate, subsist, or simply live,” partly along public streets and other accessible infrastructure.⁴³ Indeed, scrap traders and others engaged in outdoor work rely on streets and sidewalks not just for plying their trades. They also utilize such spaces to cook meals with moveable gas burners, to wash their bodies with cheap plastic basins, and much more.⁴⁴

Scrap trading as a “form of living” (contrasting with notions of *informal* work that connote a lack)⁴⁵ illuminates the broader significance of avoiding time-based wage labour and the disciplining effects of “working for the boss.” The flexibility with which most scrap traders ply the trade enables them to pick up children or grandchildren after school (if they have joined them in the city), or to go back to rural homes for days or weeks when kin are in need. Some scrap traders’ working hours were irregular due to the frequent presence of relatives and in-laws who come to Kunming to attain higher quality health care or other services that are lacking in the countryside. Accompanying these kin could be juggled with trading scrap, and some relatives lent helping hands with labour, or with buying groceries and cooking and caring for the family, if able. Thus, trading scrap not only offers possibilities of upward mobility, but also allows traders to better attend to the “everyday emergencies” of life that so often cascade through rural migrant networks.⁴⁶

These networks are also mobilized for borrowing money, i.e. for accessing the crucial capital needed to try to attain social mobility through the scrap trade. While skills, strength and luck all play roles in success, the way that success actually plays out is largely through small capital investments – e.g. who has access to the capital needed to buy bigger and/or gas-powered vehicles for transporting loads, to buy equipment needed to mechanize time-consuming sorting processes, and to rent out larger spaces for sorting and storing materials (most rents must be paid ahead of time and in full each year or half-year). While at the lowest levels of the trade there are people eking out a living without much hope of ascending through these stages of small-scale capital

⁴² Huang 2009.

⁴³ Bayat 2012, 113.

⁴⁴ See Farquhar and Zhang 2012, 55–56.

⁴⁵ Millar 2018; see also Inverardi-Ferri 2018.

⁴⁶ Millar 2018.

savings and investments, overall the scrap business is structured according to those who access and amass capital savings and make it productive by investing in livelihood instruments, space and infrastructure.

Infrastructure as waste

In popular media in China, scrap trading is typically portrayed negatively. Although experts and government officials sometimes admit that scrap traders process a lot of waste and their work has some environmental and cost benefits, a more dominant narrative is that the industry epitomizes the kind of “dirty/messy/bad” (*zang luan cha* 脏乱差) activities that must be eliminated for urban China to become more orderly and modern. Tied to the indictment that it is unregulated and “informal” (*bu guifan* 不规范), the industry is said to be polluting, out of line with ideals of hygiene and modernity,⁴⁷ and existing in a legal grey area through which many stolen goods flow. Chatting with Li Jin eventually brought out stories of government harassment. In 2011 she had been accused by the police of operating illegally. She had valuable piles of scrap confiscated, had to close business for over ten days, argue with the police, pay a 3,000-yuan fee (more than one month’s earnings) and hand over another 200 yuan to recover a valuable machine that strips plastic coating from copper electrical wires. Then, two years later, when the couple returned to Kunming from an annual trip home to celebrate the lunar New Year, they found their rented storefront robbed. The police offered no help. After that she did not dare go back home, afraid to leave her valuable equipment and goods unguarded.

Since starting research on the industry and hearing stories such as this, I had been quite suspicious of the state’s framing of the trade as a haven for the flow of stolen goods, assuming this framing was primarily a manifestation of prejudice against rural migrants. However, one day I was riding in the van of scrap trader Xiao Ma (pseudonym), who had become a close interlocutor, on the way back from selling a load of mixed paper. This provided a chance to revisit this sensitive topic with him. “It’s interesting that the authorities and news reports always emphasize how many stolen goods are flowing through the industry,” I said. “It seems clear that they are exaggerating to justify their efforts to manage and monopolize the industry.” Expecting him to join in my critique, I was surprised by his reply: “They aren’t exaggerating. Without stolen goods, there isn’t that much money to be made from post-consumer scrap. Actually, I make most of my money from connections I have who work in construction, and a lot of the stuff they sell to me is a bit dirty [illicit] (*you dian zang* 有点脏).”

This was a revelation, leading me to eventually understand that the economics driving the scrap trade are *not* primarily based on bags of post-consumer plastic bottles and bundles of cardboard boxes from garbage pickers and retirees (although these certainly play an important role in expanding scrap traders’ social networks and maintaining appearances of legality). One official statistic from the 2000s suggested that 40 per cent of urban waste in China is demolition waste, which is one of the highest rates globally.⁴⁸ If calculated in terms of value instead of volume, this percentage would be even higher. Demolition waste can be considered part of an even broader category of legally ambiguous “infrastructural waste,” including materials such as electric cables (containing valuable copper), iron rebar, steel railroad components, manhole covers and even metal garbage bins – which together play a larger role than post-consumer waste in driving the economics of the trade. These are materials that can become legally unmoored from designated

⁴⁷ Rogaski 2004.

⁴⁸ Kao 2013, 6.

infrastructural uses through rapid demolition and construction, become detached via unsanctioned acts of theft, or most commonly, become unmoored and detached in a grey area between the two. Although some of these materials (such as electrical cables) can be legally sold as scrap via a system of official permits that are difficult to attain, overall a collective decision to forget the prior property histories and uses of materials that enter the scrap trade pervades.

In the van that day Xiao Ma went on to suggest that when construction workers take advantage of value potential in excess construction materials or demolition waste (scrap that construction companies might otherwise sell to larger, more formalized brokers), they are simply compensating for a bit of the exploitation they endure “working for the boss.” In this way, the piecework-waged scrap trade is linked to a particular expression of agency in time-waged construction work: a redirection of time and labour so that a bit more value is redistributed to workers and scrap traders through a redistribution of the matter of infrastructure itself.

Spatial mobility

How exposed and vulnerable scrap traders are to harassment from the authorities is largely tied to where they live, do business and store goods, along with how and when they transport goods. While some traders simply ply the trade out of rented storefronts in urban villages or other older neighbourhoods, others commute daily to set up buying stations on the sides of streets and rely on personal vehicles to store and transport goods. Using vehicles in this way allows scrap traders to conduct business in parts of the city where low-rent spaces are unavailable. Many different types of vehicles are used for this purpose, including pull carts, manual and electric bicycles, loaf-of-bread-shaped vans (“bread cars”), large trucks and, most commonly and emblematically, *sanlunche* 三轮车, which are bicycle-drawn carts (literally “three-wheeled vehicles”) also utilized by independent hawkers, knife sharpeners, tailors, food vendors and an assortment of other urban inhabitants plying unregulated trades of their own. The presence of non-motorized *sanlunche* in the city, propelled by the sweat and wiry muscles of rural migrants eking out precarious lives, provides a particularly striking contrast with the fast-moving and luxurious personal vehicles that increasingly dominate the streets – a contrast that is unwelcomed by municipal leaders who are concerned with maintaining appearances of urban modernity.⁴⁹

An especially crucial and challenging aspect of conducting the scrap trade is transporting goods to larger-scale buying stations or directly to factories that offer even higher prices. Regardless of its final destinations, scrap must be moved to have its value potential realized. Hauling scrap out of the city is made especially difficult by streets that are constantly under construction and the increased congestion that results. From 2007 to 2011, Yunnan Provincial Party Secretary Qiu He was notorious for building ten highways at the same time – all while mass demolition and construction of buildings was also occurring – thereby frequently paralyzing major traffic corridors.⁵⁰ In this context of frequently shifting and stalled traffic, scrap loads often tower and teeter high above drivers’ heads, blocking their peripheral vision (depending on what type of vehicle is being used). Traffic accidents are common, as are incidents when vehicles break down or when goods break free and spill onto the road. The vehicles used by scrap traders are thus often their most crucial livelihood instruments and represent significant investments. In this way, daily spatial mobility – the variable amounts of difficulty and ease with which scrap traders move different quantities of goods through and out of the city – is inseparable from their chances at

⁴⁹ Hanser 2016.

⁵⁰ Chan 2015.

achieving social mobility, or at least maintaining enough income to support themselves and their children.

Xiao Ma drove a van to haul scrap. This type of vehicle has the advantage of being able to transport relatively large loads while also keeping goods well contained. However, driving the vehicle still entails risks. One day, as I rode along to transport and sell a load, I watched him grow nervous over the possibility that the traffic police had set up checkpoints that day. He drove in circles around a new peri-urban shopping mall just to make sure the way back to the more central part of the city was clear, lest he be fined 200 yuan – which could negate his day’s earnings. According to city regulations, it is not legal to use vans in the city for transporting goods, which is enforced by checking whether the vehicles have rows of passenger seats in place. For hauling larger loads, some scrap traders own or do business with owners of large trucks. However, these trucks are prohibited from being on city streets until after 8 p.m. Meanwhile, unlicensed *sanlunche* are officially prohibited inside the city’s second ring road, which encompasses the central city area. Although these regulations are primarily aimed at easing the city’s growing traffic problems and are not directed at scrap traders per se, they make conducting business significantly more difficult and riskier. Almost everyone using *sanlunche* in the central city area is periodically fined. Sometimes the authorities confiscate and impound the vehicles, charging a retrieval fee that is higher than the price of second-hand vehicles.

Many scrap traders have developed strategies for avoiding such troubles, including transporting their goods during times when certain authorities such as the traffic police and street management (*chengguan* 城管) tend to be off duty.⁵¹ The viability of this strategy depends on where buyers are located, what types of spaces they can access for sorting and processing goods, how frequently they need to move goods and their distance from selling points. Thus plying the scrap trade is closely shaped and constrained by the work rhythms of key government bureaus which serve to open and close spatial and temporal gaps of regulation enforcement (and shaped by less predictable campaigns to more fully clear out or otherwise crack down on rural migrant scrap traders in a certain area). Only in the evenings and weekends can traders transport goods without worrying as much about fines and harassment from the authorities.

Therefore, similar to the way Gidwani and Reddy describe the politics of waste and value in urban India, the streets and urban villages of Kunming serve as a “critical commons” that enable many rural migrants to find means of eking out a living in the city: “Far more than mere arteries of movement, [city roads] are means of production and reproduction. The latticework of life itself.”⁵² These spaces may be unstable, congested and at risk of being enclosed given sufficient political will, but together these qualities open suspended timeframes through which particular infrastructural configurations (some ossified, some in the process of being built or torn down) enable particular flows of waste and people. Thus suspension, far from being a passive state of waiting, here can capture the process of scrap traders putting entrepreneurial energies to use in socio-material configurations that will not last, but upon ending are likely to give rise to other opportunities elsewhere.

Continuing Uncertainty

This article has sought to disrupt the common assumption that China’s short-lived buildings, shoddy construction and “ghost cities” are symptoms of a merely defective or deficient process of urbanization. It has done so through a set of perspectives that allow for another interpretation. First,

⁵¹ This tactic is similarly deployed by street peddlers in Hanoi; see Turner and Schoenberger 2012, 1036.

⁵² Gidwani and Reddy 2011, 1648.

following the lead of much scholarly literature on infrastructure, I have taken the materialities of infrastructure seriously and focused on its temporalities beyond eventfulness and linear development narratives. Second, instead of viewing demolition and infrastructure development through the lens of the land rights holders who are resisting or negotiating compensation, I have focused on a common type of tenant in low-income enclaves who has migrated from more remote rural regions and is engaged in the making, maintaining and unmaking of infrastructure in a very different way: by sorting, processing and transporting it as material with value. Third, I have refused to stop at the statement that rapid urbanization is wasteful by showing how a portion of the material outputs from development projects are quite productive. The outputs help in the creation of other infrastructures and keep a large population of rural migrants suspended in states of temporary stability characterized by entrepreneurialism, attending to human sentiments and caring for kin. Lastly, I have approached urban infrastructure materially as a set of flows including capital, and done so in a way that highlights the importance of the relatively small stages of capital savings and investments that structure the scrap industry.

To reiterate, the approach I have taken to infrastructure is metabolic: structures require inputs of materials not just to be constructed, but also to be maintained and torn down, and they produce outputs of waste materials at different stages, a portion of which have scrap value potential. Describing a milieu in which infrastructure has a high metabolism offers a grounded conceptual means for capturing an aspect of China's rapid urbanization that is productive in a way that other studies do not quite capture. That is, this urbanization fuels scrap economies that keep large numbers of migrants suspended by uncertain futures while also politically unengaged in the enclosures of land, dispossessions, and dislocations through which rapid urbanization is being carried out. High-metabolism infrastructure thus keeps a swath of rural migrants aligned with shifts in flows of "infrastructural waste."

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